International Journal of Health Services Research and Policy
www.dergipark.org.tr/ijhsrp

IJHSRP

e-ISSN: 2602-3482

Research Article

DETERMINATION OF UNIVERSITY STUDENTS' HPV KNOWLEDGE LEVELS AND THE AFFECTING FACTORS: A SAMPLE OF NORTHERN CYPRUS

***Derya Gülin PEKDEMİR*[1]** ***Rojjin MAMUK*[2*]**

[1]Nursing Department, Dr. Burhan Nalbantoğlu State Hospital, TRNC
[2]Nursing Department, Faculty of Health Sciences, Eastern Mediterranean University, TRNC
[*] *Corresponding author: rojinmamuk@gmail.com*

Abstract: *Human Papilloma Virus (HPV), infecting millions of men and women every year, is one of the most common STDs causing high mortality and morbidity rates. This study aims to determine university students' Human Papilloma Virus knowledge levels and the affecting factors. The descriptive and cross-sectional study was conducted with a sample of 369 students who were enrolled in the Turkish undergraduate and associate degree programs at a university in Northern Cyprus and met the research criteria. Data were collected through the Personal Information Form and the Human Papilloma Virus Knowledge Measure (HPV-KM). Of all the students 47.7% were aged 18-21 years, 50.1% were women, and only 1.1% had been vaccinated against HPV. The total mean score obtained from the HPV-KM was found to be 19.11±42. Factors affecting the HPV-KM scores were found as age (p<0.001), income level (p<0.001), place of living (p<0.001), family structure (p<0.001), program enrolled (p<0.001), parents' education level (p<0.001), parents' working (p<0.001), smoking (p<0.001), using alcohol (p<0.001), being sexually active(p<0.001), and knowing about sexually transmitted diseases (p<0.001). Students have an above-average HPV knowledge level, and several socio-demographic factors affect the HPV knowledge level. HPV vaccination rates are quite low.*

Keywords: *Human Papilloma Virus, sexually transmitted diseases, university students, knowledge level,*

Received: May 31, 2023 *Accepted: August 14, 2023*

1. Introduction

Human Papilloma Virus (HPV) is a double-stranded and nonenveloped deoxyribonucleic acid (DNA) virus that infects soft tissues such as skin or mucosal cells. At least 13 of 200 genotypes of HPV, one of the most common sexually transmitted diseases (STD), cause cervical cancer. Particularly two types of the virus (HPV type 16 and 18) account for 70% of cervical cancers [1].

There are 2.869.0 million women worldwide who are over 15 and at risk of cervical cancer. In the year 2020, 604.000 new cases were diagnosed and 342.000 women lost their lives due to cervical cancer. Hence, cervical cancers are ranked fourth among the most common female cancer types worldwide [2]. Studies conducted in recent years have revealed the relationship of the virus with other urogenital (anus, vulva, vagina, penis) cancers as well as head and neck cancers [3]. According to global statistics, HPV-related oral cavity cancer, laryngeal cancer, and oropharyngeal cancer burden is higher in men than women. For this reason, the life-threatening nature of HPV for both men and women has been understood better [4].

Owing to the reasons explained above, HPV was accepted as a serious public health concern in the WHO assembly in 2020, and the incidence rate of women with cervical cancer was aimed to be

decreased below four per 100 000 women [2,5]. The prerequisites for achieving the determined targets by the year 2030 were reported as vaccinating 90% of girls aged 15 years, having HPV screenings for 70% of women by the age of 35, and treating 90% of patients with cervical cancer [5]. However, global statistics indicate that we are far behind the targets determined for the elimination of cervical cancer. For instance, the rates of vaccination against HPV are only 15% worldwide [6]. As to HPV screening tests, although a decrease was reported in new cases and mortality rates within the past 50 years, the number of women who are late for screening is also increasing every day [7]. Failure to reach the expected targets inevitably causes a higher number of new cases and mortality rates [8]. Social awareness, particularly awareness of young people aged 15-25 years, is highly important because the prevalence of the disease is very high in this age group [9-11]. Besides, this age group is more inclined to follow contemporary news and changes and is more involved in formal education systems as well as informal learning processes. With these characteristics, young individuals aged 15-24 years have a key role in reducing HPV. In this regard, the literature reports different HPV awareness and knowledge levels. For instance, only a small number of university students enrolled in the field of health sciences were reported to have a good HPV knowledge level [12, 13]. Studies conducted with university students from different disciplines also reported low HPV knowledge levels in the majority of students [14-17]. Even the studies conducted with students who accessed HPV vaccines also reported low HPV knowledge levels.

Northern Cyprus is a small island country with low income, obtains the majority of its income from tourism and education, and thus hosts 108.204 young people every year [18]. The country provides women aged 30-65 years with a free pap-smear test for cervical cancer screening. Besides, those who want can pay for HPV-DNA tests in private health institutions. Efforts were made to include the HPV vaccine in the National Vaccination Schedule within the scope of health services, and then the Ministry of Health announced that vaccine services were started for girls aged 12 years [19]. However, no statistical evidence was found regarding the access of young individuals aged 12 years to the HPV vaccine in Northern Cyprus. In addition, no studies in the country seem to have investigated HPV awareness and knowledge levels. On the other hand, cervical cancer is ranked ninth among the top 10 female cancer types in the country, which indicates the inadequate fight against HPV [20]. In this regard, the purpose of this study is to determine HPV knowledge levels and affecting factors among university students in Northern Cyprus.

Research Questions

1. What is university students' Human Papilloma Virus knowledge level?
2. What factors affect university students' Human Papilloma Virus knowledge level?

2. Material and Method

2.1. Research design, target population, and the sample

This descriptive and cross-sectional study was conducted at a university located in Northern Cyprus between February and June 2021. The target population of the study was 8823 students who were enrolled in the Turkish programs during the spring semester of the 2020-2021 academic year. A stratified random sampling method was utilized to access students to represent the target population (Table 1). Hence, with a 95% confidence interval and 5% sampling error, the number of participants to be accessed was determined as 369 out of 8823 individuals. The inclusion criteria were being enrolled in Turkish undergraduate or associate degree programs and agreeing to participate in the study.

Table 1. Distribution of the sample by strata

Department	N	Ni/N	n
Faculty of Business and Economics	311	0.04	13
Faculty of Engineering	785	0-09	33
School of Computing and Technology	501	0.06	21
Faculty of Arts and Sciences	1181	0.13	49
School of Tourism	499	0.06	21
Faculty of Law	961	0.11	40
Faculty of Architecture	605	0.07	25
Faculty of Communication	389	0.04	16
Faculty of Medicine	167	0.02	7
Faculty of Education	1290	0.15	54
School of Business and Finance	159	0.02	7
Faculty of Health Sciences	1107	0.13	46
School of Justice	43	0.00	2
Faculty of Pharmacy	239	0.03	10
School of Health Services	546	0.06	23
Faculty of Dentistry	40	0.00	3
Total	8823	1.0	369

Ni /N: The ratio of the total number of students in each faculty to the study population

2.2. Data collection process and tools

Data were collected online through the ‘‘Personal Information Form’’ and the ‘‘Human Papilloma Virus Knowledge Measure (HPV-KM)’’ during the Covid-19 pandemic period by sending the data collection tool to students’ emails. The forms prepared in Google Forms continued to be sent to students’ emails until the calculated sample size was reached. Online questionnaires were set in a way to be filled in only once, and answering all the questions was compulsory. In this way, filling in more than one form was not possible. Besides, potential data loss was prevented as each question had to be responded.

2.2.1 The Personal Information Form:

This form was developed by the researcher in line with the literature (12-17) to determine some socio-demographic characteristics that can affect participants’ HPV knowledge level. The form included 17 questions that aimed to collect data about gender, age, income level, place of living, family type, parents’ education, parents’ working or not, use of cigarettes and alcohol, being sexually active, etc.

2.2.2 Human Papilloma Virus Knowledge Measure (HPV-KM)

The scale developed by Waller et al. in 2013 aims to measure individuals’ HPV knowledge level. Turkish reliability and validity of the scale were performed by Demir and Özdemir in 2019. The scale has 29 items and 4 sub-scales one of which is independent. Each item of the HPV-KM is responded as "Yes", "No" or "I don’t know". While correct answers are scored 1, wrong answers and "I don’t know" are scored 0. Scores to be obtained from the scale range between 0 and 33, with higher scores indicating higher levels of knowledge about HPV. Cronbach’s alpha value of the Turkish version of the scale was 0.96 [21]. This study found Cronbach’s alpha value as 0.71.

2.3. Statistical analyses

Data obtained from the study were analyzed using Statistical Package for Social Sciences (SPSS) 25.0 program. The distribution of the participants' descriptive characteristics was demonstrated using frequency analyses. The participants' HPV Knowledge Measure scores were also demonstrated through descriptive statistics such as means, standard deviations, and minimum and maximum values. The Kolmogorov-Smirnov test was utilized to find out the normality of the data distribution. Non-parametric

hypothesis tests were used as the data were found to be distributed non-normally. Hence, the Mann-Whitney U test was utilized when the independent variable was composed of two groups and the Kruskal-Wallis H test was utilized when it was composed of three and more groups. Further analysis included Bonferroni corrected Mann-Whitney U test.

Ethical statement: Before the study was conducted, ethics approval was obtained from the Eastern Mediterranean University Ethics Committee (ETK00–2020-0239, dated November 17, 2020), and a research permit was obtained from the University Rectorate. Participants were asked to submit their consent via an online consent form prepared in accordance with the Declaration of Helsinki.

3. Results

This study was conducted with 369 students. Of all the participants 58.3% (n=215) were sexually active, 87.5% (n=353) had information about STDs, 56.1% (n=207) smoked, and 71.5 % (n=264) used alcohol. Only 1.1% (n=4) of the participating students had been vaccinated against HPV. Other descriptive characteristics of the participants are demonstrated in Table 2.

Table 2. Distribution of the descriptive characteristics (n=369)

	Number (n)	**Percentage (%)**
Gender		
Female	185	50.1
Male	184	49.9
Age Group		
18-21 years	176	47.7
22-25 years	159	43.1
26 years and over	34	9.2
Income		
Income less than expenses	66	17.9
Income equal to expenses	181	49.0
Income more than expenses	122	33.1
Family Structure		
Nuclear Family	228	61.8
Extended Family	93	25.2
Fragmented Family	48	13.0
Place of Living		
With family	214	58.0
Dormitory	44	11.9
House-with friends	54	14.6
House-alone	57	15.5
Mother's education level		
Did not finish a school	41	11.1
Primary school	46	12.5
Secondary school	29	7.8
High school	124	33.6
University	129	35.0
Father's education level		
Did not finish a school	34	9.2
Primary school	35	9.5
Secondary school	29	7.9
High school	95	25.7
University	176	47.7

Table 2 Continued.

	Number (n)	Percentage (%)
Mother's working or not		
Working	197	53.4
Not working	172	46.6
Father's working or not		
Working	303	82.1
Not working	66	17.9
Marital Status		
Single	339	91.9
Married	30	8.1
Having children		
No	348	94.3
Yes	21	5.7
Program enrolled		
Health Sciences	89	24.1
Other Sciences	280	75.9
Class year		
First	116	31.4
Second	100	27.1
Third	77	20.9
Fourth	76	20.6

Students' total HPV-KM mean score was 19.41±4.76 (min=9 max=32), and the distribution of the scores obtained from the sub-scales is demonstrated in Table 3.

Table 3. Students' HPV-KM mean scores (N=369)

	n	$\bar{x}$	s	Item($\bar{x}$)	Min	Max
General HPV Knowledge Sub-scale	369	9.82	2.86	0.61	3	15
HPV Testing Knowledge Sub-scale	369	3.80	1.15	0.63	0	6
HPV Vaccination Knowledge Sub-scale	369	3.59	1.57	0.51	0	7
Knowledge about the current HPV Vaccination Program Sub-scale	369	2.21	0.79	0.55	0	4
Total HPV-KM Score	369	19.41	4.76	0.59	9	32

HPV-KM: Human Papilloma Virus Knowledge Measure

A comparison of students' HPV-KM scores according to some of their descriptive characteristics is given in Table 4. Comparisons showed that gender, marital status, and having children had no effects on the HPV-KM scores ($p>0.05$). On the other hand, HPV-KM scores were found to be lower in those who were aged 26 years and over, who had income less than expenses, who lived with their family or in a dormitory, and who received education in departments other than health sciences ($p<0.05$). In addition, the HPV knowledge level of first-year students was found to be lower compared to students in higher class levels ($p<0.05$).

Table 4. Comparison of HPV-KM scores according to descriptive characteristics (N=369)

Descriptive Characteristics		General HPV Knowledge Sub-scale	HPV Testing Knowledge Sub-scale	General HPV Vaccination Knowledge Sub-scale	Knowledge about HPV Vaccination Program Sub-scale	Scale Total Score
Gender	Female	9.96±2.75	3.69±1.15	3.68±1.60	2.20±0.79	19.52±4.53
	Male	9.69±2.97	3.90±1.14	3.49±1.54	2.21±0.79	19.30±4.49
	P	0.219	0.142	0.247	0.914	0.241
Age	18-21 years	9.94±2.78	3.82±1.17	3.46±1.56	2.17±0.77	19.39±4.71
	22-25 years	10.09±2.91	3.75±1.19	3.91±1.58	2.31±0.80	20.06±4.82
	26 and over	7.97±2.42	3.88±0.88	2.74±1.14	1.91±0.71	16.50±3.63
	P / Difference	**0.000 1-3 2-3**	0.509	**0.000 1-3 2-3**	**0.005 1-3 2-3**	**0.000 1-3 2-3**
Income level	Income less than expenses	8.52±2.30	3.83±0.92	2.97±1.39	2.03±0.61	17.35±3.64
	Income equal to expenses	9.76±2.83	3.81±1.04	3.38±1.40	2.15±0.78	19.09±4.51
	Income more than expenses	10.63±2.92	3.75±1.39	4.23±1.69	2.39±0.86	21.00±5.15
	P / Difference	**0.000 1-3**	0.903	**0.000 1-3**	**0.015 1-3**	**0.000 1-3**
Place of living	With family	9.51±2.51	3.65±1.09	3.36±1.53	2.13±0.73	18.65±4.05
	In dormitory	8.55±2.95	3.75±0.89	3.30±1.49	1.95±0.48	17.55±4.46
	At home with friends	11.67±2.97	4.22±1.31	4.43±1.64	2.74±0.94	23.06±5.42
	At home alone	10.23±3.12	3.96±1.28	3.88±1.39	2.18±0.85	20.25±5.01
	P / Difference	**0.000 1-3 1-4 2-3 2-4**	**0.004 1-3 1-4 2-3 2-4**	**0.000 1-3 1-4 2-3 2-4**	**0.000 2-3 2-4**	**0.000 1-3 1-4 2-3 2-4**
Marital Status	Single	9.87 ±2.82	3.81±1.15	3.58±1.56	2.21±0.78	19.47±4.67
	Married	9.33 ±3.29	3.67±1.18	3.60±1.65	2.20±0.89	18.80±5.70
	P / Difference	0.309	0.608	0.917	0.627	0.251
Having children	No	9.83±2.83	3.80±1.13	3.56±1.57	2.20±0.78	19.39±4.68
	Yes	9.71±3.47	3.67±1.43	3.95±1.56	2.38±0.97	19.71±6.03
	P / Difference	0.750	0.772	0.318	0.565	0.707
Program enrolled	Health Sciences	11.25±2.80	3.90±1.41	4.03 ±1.78	2.40±0.79	21.57±5.22
	Other sciences	9.50±2.78	3.77±1.08	3.49±1.50	2.16±0.78	18.92±4.52
	P / Difference	**0.000**	0.237	**0.020**	**0.033**	**0.000**
Class year	First-year	9.72±2.51	3.76±0.99	3.19±1.46	2.13±0.64	18.80±3.93
	Second year	10.26±3.41	3.91±1.36	3.87±1.65	2.39±0.94	20.43±5.72
	Third year	9.53±3.84	3.70±1.11	3.74±1.63	2.12±0.83	19.09±4.92
	Fourth-year	9.70±2.57	3.80±1.12	3.66±1.47	2.17±0.70	19.33±4.20
	P / Difference	0.608	0.339	**0.008* 1-2 1-3 1-4**	0.101	0.396

*HPV-KM: Human Papilloma Virus Knowledge Measure, the Mann-Whitney U test was utilized when the independent variable was composed of two groups and the Kruskal-Wallis H test was utilized when it was composed of three and more groups. Further analysis included Bonferroni corrected Mann-Whitney U test, *p<0,05,*

Table 5 demonstrates students' HPV-KM scores according to some family characteristics and habits. HPV-KM scores were found to be higher in those who grew up with a single parent, whose parents' education level was high, and whose parents had wage-earning employment ($p<0.05$). On the

other hand, HPV-KM scores were lower in those who were not sexually active, and who did not use alcohol and cigarette ($p<0.05$).

Table 5. Comparison of students' HPV-KM scores according to some family characteristics and habits (N=369)

Descriptive Characteristics		General HPV Knowledge	HPV Testing Knowledge	General HPV Vaccination Knowledge	Knowledge about the current HPV Vaccination Program	Scale Total Score
Family type	Nuclear	9.59±2.56	3.65±1.11	3.55±1.55	2.09±0.69	18.89±4.13
	Extended	9.68±3.12	3.83±1.20	3.40±1.55	2.30±0.86	19.20±5.17
	Single parent	11.23±3.33	4.42±1.05	4.10±1.61	2.56±0.94	22.31±5.73
	P / Difference	**0.005 1-3 2-3**	**0.000 1-3 2-3**	**0.037 2-3**	**0.002 1-3**	**0.001 1-3 2-3**
Mother's education level	Did not finish a school	7.49±2.04	3.63±0.99	3.00±1.40	2.00±0.39	16.12±2.71
	Primary school	9.07±2.52	4.02±0.80	3.02±1.31	1.96±0.76	18.07±4.02
	Secondary school	8.86±2.43	3.79±0.94	3.03±1.27	2.03±0.57	17.72±3.18
	High school	9.93±2.61	3.76±1.13	3.40±1.56	2.27±0.7+	19.35±4.54
	University	10.95±2.95	3.81±1.35	4.27±1.54	2.34±0.92	21.37±5.14
		0.000* 1-2. 1-3. 1-4. 1-5. 2-4. 2-5. 3-4. 3-5	0.625	**0.000 1-5 2-5 3-5**	**0.018 2-5**	**0.000 1-2 1-3 1-4 1-5 2-5 3-5**
	P					
Father's education level	Did not finish a school	7.65±2.19	3.47±1.05	2.85±1.46	2.06±0.34	16.03±2.81
	Primary school	8.80±2.00	3.80±0.99	3.29±1.27	2.06±0.84	17.94±3.33
	Secondary school	8.97±2.50	4.00±0.80	2.90±1.37	2.17±0.47	18.03±3.90
	High school	9.54±2.70	3.71±1.04	3.31±1.43	2.16±0.75	18.71±4.04
	University	10.74±2.91	3.88±1.29	4.05±1.61	2.30±0.89	20.97±5.21
		0.000* 1-2. 1-3 1-4. 1-5. 2-5. 3-5	0.390	**0.000* 1-5 3-5**	0.497	**0.000* 1-2. 1-3 1-4. 1-5. 2-5.3-5**
	P					
Mother's working	Working	10.36±3.01	3.80±1.26	3.92±1.57	2.30±0.81	20.38±5.04
	Not working	9.22±2.56	3.80±1.01	3.20±1.48	2.09±0.74	18.31±4.16
	P	**0.000***	0.702	**0.000***	**0.006**	**0.000***
Father's working	Working	10.12±2.85	3.81±1.20	3.72±1.57	2.25±0.82	19.90±4.82
	Not working	8.48±2.52	3.76±0.90	2.95±1.41	1.98±0.54	17.18±3.75
	P	**0.000***	0.772	**0.000***	**0.022**	**0.000***
Being sexually active	Yes	10.26±2.86	3.83±1.25	3.95±1.60	2.29±0.83	20.33±5.00
	No	9.21±2.76	3.75±0.99	3.08±1.38	2.08±0.70	18.13±4.09
	P	**0.001**	0.762	**0.000***	**0.025**	**0.000***
Using alcohol	Yes	10.16±2.88	3.77±1.25	3.83±1.61	2.30±0.83	20.06±4.95
	No	8.97±2.65	3.87±0.83	2.97±1.27	1.98±0.62	17.79±3.80
	P	**0.001**	0.571	**0.000***	**0.001**	**0.000***
Smoking	Yes	10.20±3.11	3.79±1.26	3.75±1.57	2.33±0.85	20.07±5.21
	No	9.34±2.43	3.80±0.99	3.38±1.55	2.05±0.68	18.57±3.98
	P	0.010	0.799	**0.024**	**0.003**	**0.019**

*HPV-KM: Human Papilloma Virus Knowledge Measure, the Mann-Whitney U test was utilized when the independent variable was composed of two groups and the Kruskal-Wallis H test was utilized when it was composed of three and more groups. Further analysis included Bonferroni corrected Mann-Whitney U test, *p<0,05,*

4. Discussion

HPV, infecting millions of men and women every year, is one of the most common STDs causing high mortality and morbidity rates [1]. Therefore, there is a need for comprehensive approaches to prevent HPV and bring it under control. These approaches to providing lifelong interventions in a multidisciplinary manner should include scientific studies, social awareness activities, public education, vaccinations, and treatment and palliative care [2].

There is a strong relationship between the development level and health indicators of countries. For instance, the risk of cervical cancer is much higher for women in underdeveloped countries [8]. Hence, several studies reported that university students in these countries had a low or medium level of knowledge about general HPV, HPV testing, and HPV vaccines [17, 22-24]. For this reason, high HPV awareness and HPV vaccination rates of students in developed countries are somewhat expected [25, 26]. On the other hand, despite high economic development levels, some countries have low HPV awareness. For instance, two studies conducted in Saudi Arabia reported a serious lack of knowledge among university students about cervical cancer, general HPV, and HPV vaccines [14, 15]. Having been vaccinated against HPV is naturally considered to be associated with high HPV awareness and knowledge. On the other hand, two studies conducted in Malaysia included a group of students who all had been vaccinated against HPV and only a small number of students who were vaccinated respectively; both studies determined students' HPV knowledge level as medium [16, 27]. Two separate studies conducted in Bangladesh and Indonesia respectively found that university students' HPV awareness was high, but their level of knowledge about details such as HPV vaccines was low [28, 29]. Owing to the professional education they receive, students enrolled in the field of health sciences can be expected to know better about general HPV as well as the relationship between HPV vaccines and HPV and cancer. However, the majority of the studies on the issue reported low and medium levels of HPV awareness and knowledge among university students enrolled in the field of health sciences [24, 30-32]. Fewer studies reported high levels of HPV awareness of students [12, 33]. This study conducted in Northern Cyprus, like the majority of the studies listed above, includes students from families with medium income levels. Besides, participants also include students from the field of health sciences. Despite this, similar to the studies reported above, students' knowledge level about general HPV, HPV testing, and HPV vaccines was found to be medium.

The global HPV vaccination rate is expected to be 70% by the WHO [5]. As a novel finding for Northern Cyprus, this study found that the HPV vaccination rate was quite low, even close to none (%1,08). Turkey, a neighboring country to Northern Cyprus, does not have an HPV vaccination program, and just like the findings in this study, vaccination rates are reported to be very low (between 1,4% and 1,7%) [23, 24, 34]. As for the other two neighboring countries, vaccination rates in 2012 were reported as 4,1 and 5,2 per 100.000 women in the Republic of Cyprus and Greece, respectively [35]. The findings of this study are similar to those in the Turkish samples and indicate the need for active HPV vaccination programs.

Just like the biological and physiological characteristics of men and women, the roles and responsibilities imposed on them by society and culture also affect their health, health beliefs, and behaviors [36]. Studies that investigated the effect of gender on HPV knowledge report conflicting results. The literature includes studies reporting female students' higher HPV knowledge than males [22, 23, 28, 30, 37]. as well as those reporting high knowledge levels of men [31]. On the other hand, just like the findings of this study, some other studies reported no effects of gender on HPV knowledge [11, 29, 38]. No differences between genders in this study indicate that in recent years, HPV has been acknowledged as a severe risk factor for men too, and thus the difference between genders regarding HPV awareness has gotten smaller [26].

The age range in which HPV prevalence is the highest is reported to be 15-25 years [9-11]. Therefore, the risk perceptions of this age group that is considered at risk should be assessed well [30]. The study conducted in Saudi Arabia reported higher HPV knowledge levels among university students aged 18-25 years compared to those aged over 25 years. Wanderley (2021) also reported that although students aged below 25 years were more willing to be vaccinated against HPV, no relationships were detected between age and HPV knowledge [38]. On the contrary, Çınar et al. (2018) reported that students' HPV awareness and knowledge levels increased with an increase in age [23]. However, the literature also includes some studies that demonstrated no effects of age on HPV knowledge [29, 39]. This study found that the HPV knowledge levels of students aged 26 years and over were lower in comparison to the students aged 25 years and below. This finding is considered to be associated with the increasing number of recent studies on young individuals aged 15-25 years, who are accepted to be at risk in terms of HPV.

Although HPV screening tests are free in many countries, the rates of applying for testing is lower in poor women compared to women with better economic condition [40]. Besides, due to high costs, the interest in the HPV vaccine is higher among groups with high income [6, 41]. In a similar vein, although cervical cancer is one of the most frequently encountered female cancers worldwide, life expectancy after diagnosis is shorter and the mortality rate is much higher in less developed countries [42]. In light of this information, income level has the potential to affect HPV screening, vaccination, and treatment rates as well as HPV knowledge level. A review of the literature based on this finding revealed two studies that reported higher HPV knowledge levels in students with high income [38, 43]. On the other hand, some other studies reported no effects of income level on students' HPV knowledge level [15, 39]. However, when it is considered that income level affects HPV screening programs as well as vaccination and mortality rates, it is believed that the positive effect of income level on HPV knowledge level in this study is not coincident.

Individuals who have developed healthy life behaviors are also known to have high HPV knowledge levels [24]. When the literature was reviewed in terms of this aspect, two studies were found to report high HPV knowledge levels of sexually active students, which is similar to the findings in this study [32, 38]. Smoking is another habit that poses a risk in terms of HPV. However, unlike the findings of the present study, Tunaman et al., (2022) indicated that smoking had no effects on students' HPV knowledge level. Although the literature includes no examples, this study found that HPV knowledge levels were higher in those who used alcohol compared to those who did not [44]. These findings indicate that students who had a secular lifestyle had higher HPV knowledge levels.

Place of living potentially affects an individual's health behaviors and knowledge. However, the literature includes conflicting results on the effects of place of living on HPV knowledge levels. For instance, while Tunaman et al.(2022) reported that students' place of living did not affect their HPV knowledge, Özdemir et al. (2021), similar to the findings in this study, reported higher HPV knowledge levels in individuals who lived at home alone or with their friends [43, 44]. Sexuality is rarely mentioned in the family in traditional societies and traditional families usually prefer dormitories for their children receiving education in other cities, which are considered to be factors associated with lower HPV knowledge levels of students in dormitories. This finding also indicates that HPV trainings to be provided to parents and students in dormitories can be successful in terms of accessing target groups.

Owing to the curriculum they implement, programs providing education in health sciences are expected to provide their students with detailed information about HPV. Hence, students from these departments naturally have higher knowledge levels compared to students from other departments [14, 17, 27, 29]. Although the HPV knowledge level of students from the health sciences is not at the desired level, it is higher in comparison to other students. This finding is in line with the literature.

For many students, the first years of education is a process in which they move away from their families, begin to have increased freedom, and live their first experiences. In this regard, first-year students are critical in terms of first contact with STDs. Besides, students from lower class levels are reported to have less HPV knowledge levels, and their knowledge levels increase with the increase in the class year [12, 15, 30]. HPV vaccination knowledge levels of first-year students were found to be lower compared to students from higher class levels in this study. In this respect, providing HPV education in the first year and repeating the education in the following years are considered to be more effective.

Parents are the first educators of children regarding sexuality issues and play an important role in the development of knowledge, attitudes, and value judgments about sexuality. Therefore, family structure and parent characteristics are predicted to affect adolescents' knowledge levels and awareness about STDs [45]. Unlike this widely accepted view, some studies in the literature reported no effects of family structure on HPV knowledge [44]. This study detected higher HPV knowledge levels in students who grew up with a single parent compared to those who grew up in other family types. Özdemir et al. (2021) also reported that HPV knowledge level was higher in students who had nuclear families compared to students who grew up in an extended family [43]. Higher HPV knowledge levels of students who grew up with single parents can be associated with the less traditional nature of these families, indicating that they discuss sexual issues more or they are more independent in terms of obtaining information.

Not only family structure but also parents' education level has an important role in growing up healthy individuals in the changing and developing world. A review of the literature indicates that parent education level, particularly that of mothers, affects HPV knowledge level [39, 41]. There are some other studies indicating the opposite as well [23, 44]. The findings of this study show that students with high parent education levels also have higher HPV knowledge levels, indicating that HPV education to be provided to parents can help to protect both their own health and the health of future generations.

5. Conclusion

This study detected an above-average level of HPV knowledge in students and indicated several factors affecting the HPV knowledge level. The HPV vaccination rate was found to be quite low, almost close to none. Factors that had positive effects on students' HPV knowledge levels included being aged below 25 years, having income more than expenses, growing up in a single-parent family, having parents who graduated from university, having working parents, receiving education in the field of health sciences, being enrolled in higher class levels, living at home alone or with friends, using cigarette and alcohol, being sexually active, and knowing about STDs. In light of the study findings, it can be recommended to organize HPV trainings at universities for all groups at risk, particularly first-year students. Besides, there is a need for conducting programs and awareness studies to increase HPV vaccination rates. Researchers interested in this issue are recommended to investigate the reasons for low HPV vaccination rates as well as the effects of structured training on university students' HPV knowledge levels and vaccination rates.

Ethical statement

Before the study was conducted, ethics approval was obtained from the Eastern Mediterranean University Ethics Committee (ETK00–2020-0239, dated November 17, 2020), and a research permit was obtained from the University Rectorate. Participants were asked to submit their consent via an online consent form prepared in accordance with the Declaration of Helsinki.

Acknowledgments

This study was generated from the postgraduate thesis of the first author which was completed in Eastern Mediterranean University. Also the study was presented at the 1st International Rumelia Food and Health Congress, August 28-29, 2023, Online.

Conflicts of interest

The authors declare no conflicts of interest.

Authors' contributions

D.G.P: Conceptualization, Methodology, Acquisition of data for the study, Formal analysis, Writing - Original draft preparation

R.M: Conceptualization, Methodology, Formal analysis, Writing - Original draft preparation

All authors read and approved the final manuscript.

References

[1] World Health Organization (2006). Human papillomavirus (HPV). [Online]. Available From: https://www.who.int/teams/health-product-policy-and-standards/standards-and-specifications/vaccine-standardization/human-papillomavirus

[2] World Health Organization (2022). Cervical cancer. [Online]. Available from: https://www.who.int/news-room/fact-sheets/detail/cervical-cancer

[3] Khan, I., Harshithkumar, R., More, A., Mukherjee, A., "Human papilloma virus: An unraveled enigma of universal burden of malignancies", *Pathogens*, 12(4), 2-24, 2023. https://doi.org/10.3390/pathogens12040564.

[4] HPV Information Center (2023). Human papillomavirus and related diseases report. [Online]. Available from: https://hpvcentre.net/statistics/reports/XWX.pdf

[5] International Federation of Gynecology and Obstetrics (2021). HPV vaccination and cervical cancer: A global picture. [Online]. Available from: https://www.figo.org/news/hpv-vaccination-and-cervical-cancer-global-picture

[6] Bruni, L., Saura-Lázaro, A., Montoliu, A., Brotons, M., Alemany, L., Diallo, M.S.,…&Bloem, P., "HPV vaccination introduction worldwide and WHO and UNICEF estimates of national HPV immunization coverage 2010-2019" *Prev Med.*, 144, 106399, 2021. https://doi.org/10.1016/j.ypmed.2020.106399.

[7] National Cancer Institute (2022). Why are many women overdue for cervical cancer screening? [Online]. Available from: https://www.cancer.gov/news-events/cancer-currents-blog/2022/overdue-cervical-cancer-screening-increasing

[8] Arby, M., Weiderpass, E., Bruni, L., de Sanjosé, S., Saraiya, M., Ferlay, J., Bray F., "Estimates of incidence and mortality of cervical cancer in 2018: A worldwide analysis", *Lancet Glob Health*, 8(2), 191-203, 2020. https://doi.org/10.1016/S2214-109X(19)30482-6.

[9] Burchell, A.N., Winer, R.L., de Sanjosé, S., Franco, E.L., "Chapter 6: Epidemiology and transmission dynamics of genital HPV infection", *Vaccine*, 24(3), 52-61, 2006. https://doi.org/10.1016/j.vaccine.2006.05.031.

[10] Dunne, E.F., Unger, E.R., Sternberg, M., McQuillan, G., Swan, D.C., Patel, S.S., Markowitz, L.E., "Prevalence of HPV infection among females in the United States", *JAMA*, 297(8), 813-19, 2007. https://doi.org/10.1001/jama.297.8.813.

[11] Manhart, L.E., Holmes, K.K., Koutsky, L.A., Wood, T.R., Kenney, D.L., Feng, Q., Kiviat, N.B., "Human papillomavirus infection among sexually active young women in the United States: Implications for developing a vaccination strategy", *Sex Transm Dis*., 33(8), 502-8, 2006. https://doi.org/10.1097/01.olq.0000204545.89516.0a.

[12] Aga, S.S., Yasmeen, N., Khan, M.A., Hakami, A.Y., Awadh, A., Malli, I.A., "Knowledge, attitudes, and perception toward human papillomavirus among health profession students: A cross-sectional study in King Saud Bin Abdulaziz University for Health Sciences", *J Educ Health Promot.*, 11(141), 1-14, 2022. https://doi.org/10.4103/jehp.jehp_640_21.

[13] Aksoy, H., Dağcıoğlu, K., Durmuş, M., Uyan, D.D., Sari, E., Fidancı, İ., Başer, D.A., Cankurtaran, M., "The knowledge level of medical students about cervical cancer and their attitudes towards Human Papilloma Virus vaccine", *The Journal of Turkish Family Physician*, 12(2), 66-75, 2021. https://doi.org/10.15511/tjtfp.21.00266.

[14] Alshammari, F., Khan, K.U., "Knowledge, attitudes and perceptions regarding human papillomavirus among university students in Hail, Saudi Arabia", *PeerJ*., 10:e13140, 2022. https://doi.org/10.7717/peerj.13140.

[15] Altamimi, T., "Human papillomavirus and its vaccination: Knowledge and attitudes among female university students in Saudi Arabia", *J Family Med Prim Care*, 9, 1849-55, 2020. https://doi.org/0.4103/jfmpc.jfmpc_1205_19.

[16] Chew, K.T., Kampan, N., Shafiee, M.N., "Perception and knowledge of human papillomavirus (HPV) vaccine for cervical cancer prevention among fully vaccinated female university students in the era of HPV vaccination: A cross-sectional study", *BMJ Open*, 11, e047479, 2021. https://doi.org/10.1136/bmjopen-2020-047479

[17] Khan, T.M., Buksh, M.A., Rehman, I.U., Saleem, A., "Knowledge, attitudes, and perception towards human papillomavirus among university students in Pakistan", *Papillomavirus Res*., 2, 122-127, 2016. https://doi.org/10.1016/j.pvr.2016.06.001.

[18] Turkish Republic of Northern Cyprus (2020). Statistical Yearbook 2020. [Online]. Available from: https://stat.gov.ct.tr/Portals/39/IST-YILLIK-2020.pdf

[19] Turkish Republic of Northern Cyprus Ministry of Health (2019). Adult vaccination guide. [Online]. Available from: http://saglik.gov.ct.tr/ONLINE-HİZMETLER/ERİŞKİN-AŞILAMA-REHBERİ

[20] Turkish Republic of Northern Cyprus Ministry of Health (2016). Cancer Registry Project in the Turkish Republic of Northern Cyprus. [Online]. Available from: http://saglik.gov.ct.tr/ONLINE-HİZMETLER/İSTATİSTİKİ-BİLGİLER/KANSER-İSTATİSTİKLERİ

[21] Demir F. Validity and reliability of the Turkish version of Human Papilloma Virus Knowledge Scale. Master's Thesis. Gulhane Institute of Health Sciences, Ankara, 2019.

[22] Chen, G., Wu, B., Dai, X., Zhang, M., Liu, Y., Huang, H.,…& Wu, Z., "Gender differences in knowledge and attitude towards HPV and HPV vaccine among college students in Wenzhou, China", *Vaccines (Basel)*, 10(1), 2-12, 2021. https://doi.org/10.3390/vaccines10010010.

[23] Cinar, İ.O., Ozkan, S., Aslan, G.K., Alatas, E. "Knowledge and behavior of university students toward Human Papillomavirus and vaccination", *Asia Pac J Oncol Nurs*., 6(3), 300-307, 2019. https://doi.org/10.4103/apjon.apjon_10_19.

[24] Tosun, H., Gül, A., Yazıcı, S., "Survey on the knowledge level and attitudes of university students about human papilloma virus infection and vaccination and assessing healthy living behaviors", *J Public Health*, 30, 273–280, 2022. https://doi.org/10.1007/s10389-020-01420-x

[25] Barnard, M., George, P., Perryman, M.L., Wolff, L.A., "Human papillomavirus (HPV) vaccine knowledge, attitudes, and uptake in college students: Implications from the Precaution Adoption Process Model", *PLoS ONE*, 12(8), 1-9, 2017. https://doi.org/10.1371/journal. pone.0182266

[26] Preston, S.M., Darrow, W.W., "Are men being left behind (Or Catching Up)? Differences in HPV awareness, knowledge, and attitudes between diverse college men and women", *American Journal of Men's Health,* 13(6), 1-12, 2019. https://doi.org/10.1177/1557988319883776.

[27] Widjaja, V.N., "Awareness, knowledge and attitudes of Human Papillomavirus (HPV) among private university students- Malaysia perspective", *Asian Pac J Cancer Prev.*, 20(7), 2045-2050, 2019. https://doi.org/10.31557/APJCP.2019.20.7.2045.

[28] Rahman, M. E., Moonajilin, M. S., Bishwas, M. S., Banik. R., Pinky, G.N., Alin, S.I., "Awareness, knowledge about Human papillomavirus and attitude towards its vaccine among university students: A Bangladeshi pilot study", *Asian J. Health Sci.*, 5(2), 1-10, 2019.

[29] Khatiwada, M., Kartasasmita, C., Mediani, H.S., Delprat, C., Van Hal, G., Dochez, C., "Knowledge, attitude and acceptability of the Human Papilloma Virus Vaccine and Vaccination Among University Students in Indonesia", *Front. Public Health*, 9, 616456, 2021. https://doi.org/10.3389/fpubh.2021.616456.

[30] Ali, D.M.D., Hassan, Y., Ahmad, A., Ghosn, S.A., Ahmad, W., Al-Abduljabbar, E.,…& Al-Shatti, B., "Knowledge, attitudes and practices toward human papillomavirus infection among undergraduate pharmacy students in Saudi Arabia", *Pharmacy Education*, 22(1), 629–636, 2022. https://doi.org/10.46542/pe.2022.221.629636.

[31] Srinivas, V., Fehrenbacher, A.E., Shashikala, N., Perduru, S., Krupp, K., Khan, M., "Knowledge, attitudes, beliefs and willingness to recommend human papillomavirus (HPV) vaccination among medical students in Mysore, India", *Int J Preven Curat Comm Med*., 6(4), 9-18, 2020. https://doi.org/10.24321/2454.325X.202015.

[32] Chowdhury, S., Ara, R., Roy, S., Tanvir, S.M.S., Eva, F.N., Neela, T.M.,….& Hawlader, M.D.H., "Knowledge, attitude, and practices regarding human papillomavirus and its' vaccination among the young medical professionals and students of Bangladesh", *Clin Exp Vaccine Res*., 11(1), 63-71, 2022. https://doi.org/10.7774/cevr.2022.11.1.63.

[33] Gollu, A.N., Gore, C.A., "Knowledge, awareness and attitude of medical students regarding HPV infection and HPV vaccination", *Asian Pac J Cancer Care*, 6 (1), 41-46, 2021. https://doi.org/10.31557/APJCC.2021.6.1.41.

[34] Güneysu Tunaman, S., Eryılmaz, N., Kösretaş, B., "The Knowledge Levels and Health Beliefs of Vocational School of Health Services Students about Human Papilloma Virus (HPV) and Vaccine", *Journal of Inonu University Health Services Vocational School*, 10(1), 180-198, 2022. https://doi.org/10.33715/inonusaglik.1053013

[35] Altobelli, E., Rapacchietta, L., Profeta, V.F., Fagnano, R., "HPV-vaccination and cancer cervical screening in 53 WHO European Countries: An update on prevention programs according to income level", *Cancer Med.*, 8, 2524-2534, 2019. https://doi.org/10.1002/cam4.2048

[36] Sezgin, D., "Health and medicalization in gender perspective", *Journal of Sociological Research,* 18(1), 153-186, 2015.

[37] Monteiro, D.L.M., Brollo, L.C.S., Souza, T.P., Santos, J.R.P.D., Santos, G.R., Correa, T.,…&Trajano, A.J.P., "Knowledge on the HPV vaccine among university students", *Rev Inst Med Trop Sao Paulo,* 60, 1-8, 2018. https://doi.org/10.1590/s1678-9946201860046.

[38] Wanderley, M.S., Sobral, D.T., Resende, C.N., Levino, L.A., Marques, L.A., Feijo, M.S., Aragao, N.R.C., "Medical students' knowledge of the human papillomavirus (HPV), cervical cancer, and HPV vaccination", *Rev. bras. educ. med.*, 45(3), 1-7, 2021, https://doi.org/10.1590/1981-5271v45.3-20210071.ING

[39] Biyazin, T., Yilma, A., Yetwale, A., Fenta, B., Dagnaw, Y., "Knowledge and attitude about human papillomavirus vaccine among female high school students at Jimma town, Ethiopia", *Human Vaccines & Immunotherapeutics*, 18, 1, 2036522, 2022. https://doi.org/10.1080/21645515.2022.2036522.

[40] Iflazoğlu, F., Aydoğdu, N.G., "Status of low income and non-low income women for taking pap smear in accordance with health promotion model and examination of affecting factors", *Journal Of Public Health Nursing,* 1(3), 132-146, 2019.

[41] Winarto, H., Habiburrahman, M., Dorothea, M., Wijaya, A., Nuryanto, K.H., Kusuma, F.,…&Anngraeni, T.D., "Knowledge, attitudes, and practices among Indonesian urban communities regarding HPV infection, cervical cancer, and HPV vaccination", *PLoS ONE,* 17(5), 1-29, 2022. https://doi.org/10.1371/journal.pone.0266139.

[42] OECD iLibrary (2018). Screening, survival and mortality for cervical cancer. [Online]. Available from: https://www.oecd-ilibrary.org/sites/health_glance_eur-2018-41-en/index.html?itemId=/content/component/health_glance_eur-2018-41-en

[43] Özdemir, K., Şahin, S., Ünsal, A., "Investigation of the university female students' knowledge on the HPV (Sakarya, Turkey)", *Androl Bul.*, 23, 97−104, 2021. https://doi.org/10.24898/tandro.2021.24540.

[44] Tunaman, G.S., Eryılmaz, N., Kösretaş, B., "The knowledge levels and health beliefs of vocational school of health services students about human papilloma virus (HPV) and vaccine", *Journal of Inonu University Health Services Vocational School,* 10(1), 180-198. 2022. https://doi.org/10.33715/inonusaglik.1053013

[45] Gölbaşı, Z., "A step for healthy youth and society: Sexual health education", *Aile ve Toplum*, 2(6), 1-8, 2003.