ODOVTOS
International Journal of Dental Sciences

UNIVERSIDAD DE COSTA RICA
FOd Facultad de Odontología

https://revistas.ucr.ac.cr/index.php/Odontos

CLINICAL RESEARCH:

Knowledge of HPV-Associated Head and Neck and Oral Cancers Among Health Care Students in Mexico

Conocimiento de los cánceres orales y de cabeza y cuello asociados a VPH entre estudiantes del área de la salud en México

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Received: 9-V-2025 Accepted: 7-X-2025

ABSTRACT: To assess the knowledge of students in health care-related programs at a public university in Mexico regarding human papillomavirus (HPV) and its association with head and neck and oral cancers. An institution-based descriptive cross-sectional study was conducted using bivariate and multivariate analyses. A representative sample of 323 students completed a questionnaire on sociodemographic characteristics, sexual history, and knowledge of HPV, HPV-related cancers, and the HPV vaccine. Participants were aged 18-36 years; 210 (65.0%) were female and 113 (35.0%) male. Regarding sexual activity, 37.8% had become sexually active at or before age 18, 33.7% thereafter, and 28.5% remained sexually inactive. Over 90% of students were aware that HPV causes cervical cancer, while 63.5% recognized its role in head and neck cancer and 79.5% its association with oral cancer. Overall, 57.6% had been vaccinated against HPV, and 90.4% were willing to receive the vaccine. Awareness that HPV causes cervical cancer increased recognition of its association with head and neck (OR=6.86, p<0.01; adjOR=5.12, p=0.02) and oral (OR=12.36, p<0.01; adjOR=15.15, p<0.01) cancers. However, willingness to receive the HPV vaccine did not translate into knowledge of HPV's role in head and neck (OR=0.16, p<0.01; adjOR=0.15, p=0.04) or oral (OR=0.11, p=0.01; adjOR=0.05, p=0.03) cancer. Raising knowledge of HPV's role in head and neck and oral cancers offers an opportunity to boost vaccination uptake and prevent HPV- related disease.

KEYWORDS: Human papillomavirus viruses; Knowledge; Students, medical; Students, health occupations.

RESUMEN: Evaluar el conocimiento de estudiantes en programas relacionados con el cuidado de la salud en una universidad pública en México, sobre el virus del papiloma humano (VPH) y su asociación con cánceres orales y de cabeza y cuello. Se realizó un estudio transversal, descriptivo, basado en una institución. Una muestra representativa de 323 estudiantes completó un cuestionario sobre características sociodemográficas, antecedentes sexuales, conocimiento del VPH, cánceres relacionados con el VPH y la vacuna contra el VPH. Se aplicó análisis bivariado y multivariado. Los participantes tenían entre 18 y 36 años; 210 (65.0%) mujeres y 113 (35.0%) hombres. Con respecto a la actividad sexual, el 37.8% se había vuelto sexualmente activo a los 18 años o antes, el 33.7% después, y el 28.5% permanecía sexualmente inactivo. Más del 90% de los estudiantes sabían que el VPH causa cáncer de cuello uterino, mientras que el 63.5% reconocía su papel en el cáncer de cabeza y cuello y el 79.5% su asociación con el cáncer oral. En general, el 57.6% había sido vacunado contra el VPH y el 90.4% estaba dispuesto a recibir la vacuna. La conciencia de que el VPH causa cáncer de cuello uterino aumentó el reconocimiento de su asociación con los cánceres de cabeza y cuello (OR=6.86, p<0.01; adjOR=5.12, p=0.02) y oral (OR=12.36, p<0.01; adjOR=15.15, p<0.01). Sin embargo, la disposición a recibir la vacuna contra el VPH no se tradujo en el conocimiento del papel del VPH en el cáncer de cabeza y cuello (OR=0.16, p<0.01; adjOR=0.15, p=0.04) u oral (OR=0.11, p=0.01; adjOR=0.05, p=0.03). Aumentar el conocimiento sobre el papel del VPH en los cánceres orales y de cabeza y cuello ofrece una oportunidad para mejorar las tasas de vacunación y prevenir enfermedades relacionadas con el VPH.

PALABRAS CLAVE: Virus del papiloma humano; Conocimiento; Estudiantes de medicina; Estudiantes de profesiones sanitarias.

INTRODUCTION

Human papillomavirus (HPV), the most common sexually transmitted infection (STI), has been widely recognized as a key factor in cervical cancer and is also linked to cancer of the vulva, vagina, penis, anus, as well as the oropharyngeal and oral regions (1). Rising globally, oropharyngeal cancer (OPC) has become the most prevalent form of cancer associated with HPV infection and is a significant cause of cancer-related mortality. In addition, HPV-associated oral cancer has surged as a result of a parallel surge in oral HPV infections. Oral health professionals play a crucial role in addressing this issue by educating patients and promoting higher levels of HPV vaccination (2,3).

Although HPV-positive cancers are preventable and treatable at early stages, health disparities in outcomes persist among Latin American populations (4). In Mexico, for example, 60-70% of patients with head and neck cancer are diagnosed at advanced stages, where five-year survival rates rarely exceed 50% despite the availability of therapeutic options (5).

University-aged individuals fall within the high-risk age group and are just beginning to

make independent decisions about their own health, underscoring the urgency of prioritizing this population for intervention (6).

Although these students are generally aware that HPV causes cervical cancer (7), only 20-40% recognize its association with non-cervical cancers (8,9). Furthermore, low HPV vaccination rates among medical students worldwide have been reported (10) as well as a limited willingness to be vaccinated (11).

Efforts should therefore focus on improving HPV vaccination rates to curb rising OPC incidence (7). Research should also prioritize knowledge of HPV-associated non-cervical cancers, as awareness is the key determinant of vaccine acceptance (12,13). Accordingly, this study aimed to assess the knowledge of students pursuing health care degrees at a Mexican public university regarding HPV and its relationship with head and neck and oral cancers.

METHODS

We conducted institution-based descriptive cross-sectional research in May and July 2024. Our study was granted exempt status by the local institutional review board (FO-UAS-2024-01). The study population included 12,670 undergraduate students enrolled in eight health care-related programs at a public university in Mexico: physical education and sports, biology, dentistry, nursing, medicine, nutritional sciences and gastronomy, research and teaching in health sciences, and pharmaceutical biochemistry.

We calculated a sample size adjusted for losses, yielding 273 students. Participants were selected through stratified probabilistic sampling with proportional allocation and randomly recruited within each degree program. Epidat, Version 4.2 (Consellería de Sanidade, Xunta de Galicia, España; Organización Panamericana de la Salud; Universidad CES, Colombia) was used to calculate the sample size.

Students were invited to participate through a letter posted in official academic WhatsApp accounts. Inclusion criteria were (a) formal enrollment in a health care-related academic program, and (b) provision of informed consent. The survey was anonymous and voluntary.

The survey questionnaire, previously adapted and tested by Vieira *et al*. (14), included 31 items regarding sex, age, marital status, sexual activity, family history of cancer, HPV vaccination, and knowledge about HPV and its relationship with cancer. Knowledge about HPV-associated cancers and vaccination was assessed through 20 yes/no questions.

Before taking the survey, selected students were informed in writing: “Completing and submitting this survey indicates your consent to participate in the present study.” With this understanding, those who consented were then asked to complete the questionnaire via Google Forms. No identifying information was collected, and confidentiality was ensured throughout the study. A panel of three faculty members and two university students pilot-tested the questionnaire and provided feedback, which served to make minor revisions to the instrument.

Data were collected using Google Forms survey software and automatically entered into a Microsoft Excel spreadsheet. The information was then exported to Version 26.0 of the Statistical Package for Social Science (SPSS Inc., Chicago, IL, USA) for cleaning, coding, and analysis.

We calculated frequencies and percentages for each category of the qualitative variables, and based on these, performed a bivariate analysis using the chi-squared test to assess the statistical significance of differences between categories.

We fitted a multivariate binary logistic regression model to estimate the strength of the association between knowledge of head and neck and oral cancers and the independent variables. Results are presented as odds ratios with 95% confidence intervals (95% CI), and p values<0.05 were considered statistically significant. Variables with a statistical significance of p<0.20 in the bivariate analysis were used in the construction of the final model. The overall model fit was determined through the Hosmer-Lemeshow goodness-of-fit test.

RESULTS

A total of 323 university students from eight health care-related disciplines participated in the survey with a response rate of 100%. The selected programs included physical education and sports (n=34), biology (n=14), dentistry (n=39), nursing (n=61), medicine (n=118), nutritional sciences and gastronomy (n=33), research and teaching in health sciences (n=2), and pharmaceutical biochemistry (n=22).

Table 1 shows the proportions of the study variables. Participants ranged from 18 to 36 years of age; 210 were female (65.0%) and 113 male (35.0%); 304 (94.1%) were single, and the majority (n=306, 94.7%) had no children; 141 (43.6%) had a family history of cancer; 303 (93.8%) had been exposed to information from at least one campaign concerning STIs; and most of them (n=299, 92.6%) regarded their own health as good/very good.

Sexual activity had begun at or before age 18 for 37.8% of students (n=122), at a later age for 33.7% (n=109), while 28.5% (n=92) reported being sexually inactive. Regarding frequency, 41.5% of students (n=134) indicated having sexual intercourse fewer than two times per week. Condom use as a preventive measure was noted by 56% (n=181) of respondents.

The majority of students (over 90%) had heard of HPV and were aware that it is a virus that can result in an STI. They understood that it may remain asymptomatic or cause conditions such as genital warts and cervical cancer. They also knew that HPV is distinct from HIV. Most believed they had not contracted the virus.

Between 70% and 80% of students understood that HPV can affect Pap smear results, is linked to the onset of sexual activity, and is associated with the number of sexual partners; they were also aware that condom use can offer protection against HPV.

A total of 48.3% (n=156) of students reported having discussed HPV. Additionally, 63.5% (n=205) believed that it can cause head and neck cancer, while 79.5% (n=257) recognized its connection to oral cancer.

Approximately 90% of students were aware that HPV vaccines are available and expressed a willingness to receive them; they did not believe that vaccination encourages the onset of sexual activity; 61% (n=197) recognized that the vaccine is not useful only for women; and 57.6% (n=186) had already been vaccinated against HPV.

Awareness that HPV is responsible for cervical cancer (98.1%; p<0.01), knowledge that it can affect Pap smear results (90.8%; p<0.01), and

willingness to receive the vaccine (86.4%; p<0.01) were all significantly associated with recognizing HPV as a cause of head and neck cancer. These same three factors were also associated with awareness of HPV's role in oral cancer (98.1%, p<0.01; 87.2%, p=0.04; and 88.3%, p=0.01, respectively) (Table 1).

Similarly, bivariate analysis revealed that awareness of HPV as a cause of cervical cancer and its potential to affect Pap smear results was significantly associated with an increased likelihood of recognizing HPV as a cause of head and neck (OR=6.86, p<0.01; OR=3.24, p<0.01, respectively) and oral (OR=12.36, p<0.01; OR=1.99, p=0.04, respectively) cancers. However, students who expressed willingness to receive the vaccine were less likely to identify HPV as a cause of head and neck (OR=0.16, p<0.01) or oral cancer (OR=0.11, p=0.01) (Table 2).

Finally, logistic regression analysis (Table 3) also showed that individuals aware of HPV's link to cervical cancer were more likely to recognize it as a cause of head and neck (adjOR=5.12, p=0.02) and oral (adjOR=15.15, p<0.01) cancers. Conversely, those willing to receive the vaccine were less likely to recognize HPV as a cause of head and neck (adjOR=0.15, p=0.04) or oral (adjOR=0.05, p=0.03) cancer.

Table 1. Analysis of knowledge about HPV as a cause of head and neck and oral cancers.

Variables	Can HPV cause head and neck cancer?			Can HPV cause oral cancer?		
	No (n =117)	Yes (n =206)	P value*	No (n = 66)	Yes (n = 257)	P value*
Sex						
Male	28 (23.9%)	85 (41.3%)		19 (28.8%)	94 (36.6%)	0.23
Female	89 (76.1%)	121 (58.7%)	<0.01	47 (71.2%)	163 (63.4%)	
Age group						
≤ 23 years	107 (91.5%)	192 (93.2%)		60 (90.9%)	239 (93.0%)	0.56
≥ 24 years	10 (8.5%)	14 (6.8%)	0.56	6 (9.1%)	18 (7.0%)	
Marital status						
Single	109 (93.2%)	195 (94.7%)		59 (89.4%)	245 (95.3%)	0.06
Other	8 (6.8%)	11 (5.3%)	0.58	7 (10.6%)	12 (4.7%)	
Had children						
No	112 (95.7%)	194 (94.2%)		62 (93.9%)	244 (94.9%)	0.74
Yes	5 (4.3%)	12 (5.8%)	0.54	4 (6.1%)	13 (5.1%)	
Onset of sexual activity						
≤ 18 years old	32 (27.4%)	90 (43.7%)		23 (34.8%)	99 (38.5%)	
> 18 years old	46 (39.3%)	63 (30.6%)		27 (40.9%)	82 (31.9%)	
Not started	39 (33.3%)	53 (25.7%)	0.01	16 (24.2%)	76 (29.6%)	0.17
Frequency of sexual intercourse						
≥2 times a week	13 (11.1%)	51 (24.8%)		14 (21.2%)	50 (19.5%)	
< 2 times a week	50 (42.7%)	85 (41.3%)		26 (39.4%)	109 (42.4%)	
Not applicable	54 (46.2%)	70 (34.0%)	0.01	26 (39.4%)	98 (38.1%)	0.66
Prevention measures						
Condom	58 (49.6%)	123 (59.7%)		33 (50.0%)	148 (57.6%)	
No condom	7 (6.0%)	15 (7.3%)		6 (9.1%)	16 (6.2%)	
Not applicable	52 (44.4%)	68 (33.0%)	0.98	27 (40.9%)	93 (36.2%)	0.47
Self-rated health						
Good/very good	107 (91.5%)	192 (93.2%)		57 (86.4%)	242 (94.2%)	
Bad/not very good	10 (8.5%)	14 (6.8%)	0.56	9 (13.6%)	15 (5.8%)	0.03
History of cancer in the family						
No	58 (49.6%)	124 (60.2%)		38 (57.6%)	144 (56.0%)	
Yes	59 (50.4%)	82 (39.8%)	0.06	28 (42.4%)	113 (44.0%)	0.81

Variables	Can HPV cause head and neck cancer?			Can HPV cause oral cancer?		
	No (n =117)	Yes (n =206)	P value*	No (n = 66)	Yes (n = 257)	P value*
Have you heard of any STI campaigns?						
No	6 (5.1%)	14 (6.8%)		6 (9.1%)	14 (5.4%)	
Yes	111 (94.9%)	192 (93.2%)	0.55	60 (90.9%)	243 (94.6%)	0.27
Have you heard of HPV?						
No	1 (0.9%)	2 (1.0%)		2 (3.0%)	1 (0.4%)	
Yes	116 (99.1%)	204 (99.0%)	0.91	64 (97.0%)	256 (99.6%)	0.04
Is HPV a virus?						
No	4 (3.4%)	5 (2.4%)		4 (6.1%)	5 (1.9%)	
Yes	113 (96.6%)	201 (97.6%)	0.60	62 (93.9%)	252 (98.1%)	0.07
Does HPV cause a STI?						
No	3 (2.6%)	3 (1.5%)		2 (3.0%)	4 (1.6%)	
Yes	114 (97.4%)	203 (98.5%)	0.47	64 (97.0%)	253 (98.4%)	0.42
Can HPV be asymptomatic?						
No	15 (12.8%)	17 (8.3%)		13 (19.7%)	19 (7.4%)	
Yes	102 (87.2%)	189 (91.7%)	0.18	53 (80.3%)	238 (92.6%)	<0.01
Does HPV cause genital warts?						
No	9 (7.7%)	6 (2.9%)		7 (10.6%)	8 (3.1%)	
Yes	108 (92.3%)	200 (97.1%)	0.05	59 (89.4%)	249 (96.9%)	0.01
Does HPV cause cervical cancer?						
No	14 (12.0%)	4 (1.9%)		13 (19.7%)	5 (1.9%)	
Yes	103 (88.0%)	202 (98.1%)	<0.01	53 (80.3%)	252 (98.1%)	<0.01
Can HPV affect pap smear results?						
No	29 (24.8%)	19 (9.2%)		15 (22.7%)	33 (12.8%)	
Yes	88 (75.2%)	187 (90.8%)	<0.01	51 (77.3%)	224 (87.2%)	0.04
Are HPV and HIV different?						
No	3 (2.6%)	11 (5.3%)		1 (1.5%)	13 (5.1%)	
Yes	114 (97.4%)	195 (94.7%)	0.23	65 (98.5%)	244 (94.9%)	0.20
Is there a relationship between HPV and the onset of sexual activity?						
No	37 (31.6%)	57 (27.7%)		20 (30.3%)	74 (28.8%)	
Yes	80 (68.4%)	149 (72.3%)	0.45	46 (69.7%)	183 (71.2%)	0.81

Variables	Can HPV cause head and neck cancer?			Can HPV cause oral cancer?		
	No (n =117)	Yes (n =206)	P value*	No (n = 66)	Yes (n = 257)	P value*
Is there a relationship between HPV and the number of partners?						
No	23 (19.7%)	61 (29.6%)		13 (19.7%)	71 (27.6%)	
Yes	94 (80.3%)	145 (70.4%)	0.05	53 (80.3%)	186 (72.4%)	0.19
Do you think you have already contracted HPV?						
No	114 (97.4%)	197 (95.6%)		64 (97.0%)	247 (96.1%)	
Yes	3 (2.6%)	9 (4.4%)	0.41	2 (3.0%)	10 (3.9%)	0.74
Can condom use protect you against HPV?						
No	14 (12.0%)	43 (20.9%)		10 (15.2%)	47 (18.3%)	
Yes	103 (88.0%)	163 (79.1%)	0.04	56 (84.8%)	210 (81.7%)	0.55
Are there any vaccines against HPV?						
No	7 (6.0%)	11 (5.3%)		5 (7.6%)	13 (5.1%)	
Yes	110 (94.0%)	195 (94.7%)	0.80	61 (92.4%)	244 (94.9%)	0.42
Can only women receive the vaccine?						
No	88 (75.2%)	109 (52.9%)		44 (66.7%)	153 (59.5%)	
Yes	29 (24.8%)	97 (47.1%)	<0.01	22 (33.3%)	104 (40.5%)	0.28
Are you vaccinated against HPV?						
No	42 (35.9%)	95 (46.1%)		29 (43.9%)	108 (42.0%)	
Yes	75 (64.1%)	111 (53.9%)	0.07	37 (56.1%)	149 (58.0%)	0.77
Are you willing to receive the vaccine?						
No	3 (2.6%)	28 (13.6%)		1 (1.5%)	30 (11.7%)	
Yes	114 (97.4%)	178 (86.4%)	<0.01	65 (98.5%)	227 (88.3%)	0.01
Does the HPV vaccine encourage the onset of sexual activity?						
No	111 (94.9%)	189 (91.7%)		61 (92.4%)	239 (93.0%)	
Yes	6 (5.1%)	17 (8.3%)	0.29	5 (7.6%)	18 (7.0%)	0.87
Do you discuss HPV?						
No	67 (57.3%)	100 (48.5%)		33 (50.0%)	134 (52.1%)	
Yes	50 (42.7%)	106 (51.5%)	0.13	33 (50.0%)	123 (47.9%)	0.75

STI: sexually transmitted infection; HPV: human papilloma virus; HIV: human immunodeficiency virus; *Pearson's Chi-squared test.

Table 2. Bivariate analysis of knowledge about HPV as a cause of head and neck and oral cancers.

Variables	Can HPV cause head and neck cancer?		P value
	OR	95% CI	
Sex			
Male	1 (Ref.)		<0.01
Female	0.44	(0.27-0.74)	
Does HPV cause cervical cancer?			
No	1 (Ref.)		<0.01
Yes	6.86	(2.20-21.38)	
Can HPV affect pap smear results?			
No	1 (Ref.)		<0.01
Yes	3.24	(1.72-6.09)	
Can condom use protect you against HPV?			
No	1 (Ref.)		0.04
Yes	0.51	(0.26-0.98)	
Can only women receive the vaccine?			
No	1 (Ref.)		<0.01
Yes	2.70	(1.63-4.45)	
Are you willing to receive the vaccine?			
No	1 (Ref.)		<0.01
Yes	0.16	(0.05-0.56)	
Onset of sexual activity			
≤ 18 years old			
> 18 years old	1 (Ref.)		0.01
Not started	0.48	(0.28-0.84)	
Frequency of sexual intercourse			
≥ 2 times a week			
< 2 times a week	1 (Ref.)		0.01
Not applicable	0.43	(0.21-0.87)	

Variables	Can HPV cause oral cancer?		
	OR	95% CI	P value
Self-rated health			
Good/very good	1 (Ref.)		
Bad/not very good	0.39	(0.16-0.94)	0.03
Does HPV cause cervical cancer?			
No	1 (Ref.)		
Yes	12.36	(4.22-36.15)	<0.01
Have you heard of HPV?			
No	1 (Ref.)		
Yes	8.00	(0.71-89.61)	0.04
Can HPV be asymptomatic?			
No	1 (Ref.)		
Yes	3.07	(1.42-6.60)	<0.01
Does HPV cause genital warts?			
No	1 (Ref.)		
Yes	3.69	(1.28-10.58)	0.01
Can HPV affect pap smear results?			
No	1 (Ref.)		
Yes	1.99	(1.01-3.94)	0.04
Are you willing to receive the vaccine?			
No	1 (Ref.)		
Yes	0.11	(0.01-0.87)	0.01

(Ref.): reference category; OR: odds ratio; 95% CI: 95% confidence interval.

Table 3. Logistic regression results regarding knowledge of HPV as a cause of head and neck and oral cancers.

	Can HPV cause head and neck cancer?		
Variables	**adjOR**	**95% CI**	**P value**
Does HPV cause cervical cancer?			
No	1 (Ref.)		
Yes	5.12	(1.20-21.79)	0.02
Can HPV affect pap smear results?			
No	1 (Ref.)		
Yes	2.97	(1.16-7.62)	0.02
Can condom use protect you against HPV?			
No	1 (Ref.)		
Yes	0.34	(0.12-0.96)	0.04
Are you willing to receive the vaccine?			
No	1 (Ref.)		
Yes	0.15	(0.02-0.94)	0.04
Do you discuss HPV?			
No	1 (Ref.)		
Yes	2.10	(1.10-4.00)	0.02
Are you willing to receive the vaccine?			
No	1 (Ref.)		<0.01
Yes	0.16	(0.05-0.56)	
Onset of sexual activity			
≤ 18 years old			
> 18 years old	1 (Ref.)		0.01
Not started	0.48	(0.28-0.84)	
Frequency of sexual intercourse			
≥ 2 times a week			
< 2 times a week	1 (Ref.)		0.01
Not applicable	0.43	(0.21-0.87)	
	Can HPV cause oral cancer?		
Variables	**adjOR**	**95% CI**	**P value**
Can HPV be asymptomatic?			
No	1 (Ref.)		
Yes	3.11	(1.11-8.74)	0.03
Does HPV cause cervical cancer?			
No	1 (Ref.)		
Yes	15.15	(3.21-71.44)	<0.01
Are you willing to receive the vaccine?			
No	1 (Ref.)		
Yes	0.05	(0.00-0.78)	0.03

DISCUSSION

Despite years of emphasis on the role of HPV infection in the etiopathogenesis of oropharyngeal and oral cancers, it continues to receive insufficient attention-even in medical education (9). Gaps in knowledge about HPV, its link to cancer, and the HPV vaccine have been identified among dental hygiene students in the Netherlands (15), health students in Japan and Vietnam (12), students at a Faculty of Health Sciences in Turkey (16), and medical and other professional students in the United States (13).

Most medical students recognize HPV's oncogenic potential but tend to associate it exclusively with cervical cancer (9). Awareness of its link to head and neck cancer varies globally. According to the literature, approximately 30% of Brazilian students were aware of HPV-associated head and neck cancers (14); 40% of American students (7), and 21% of Jordanian medical students (1) recognize the association between HPV and oropharyngeal cancer, while 33% of university students in Italy identify HPV as a risk factor for oral cancer (17). Notably, students in Brazil (35%) (14) and Poland (47%) (9) were found to be unaware of this association.

While most Mexican university students have heard of HPV, their knowledge about the virus and its prevention strategies remains limited (18). However, students who have received the HPV vaccine are more likely to be aware of its link to oral cancer. In contrast, those unaware of the vaccine's target population have demonstrated lower awareness of this connection (14). Studies have reported that undergraduate students generally hold positive attitudes toward the HPV vaccine (13).

Although most students in our study were aware that HPV causes cervical, head and neck, and oral cancers, and expressed willingness to receive the vaccine, a high proportion (42%) remained unvaccinated. By sex, 77.1% of women (n=162) and only 21.2% of men (n=24) had been vaccinated, a statistically significant difference ($p<0.001$), likely reflecting the fact that the vaccine was initially aimed at women. Similarly, approximately 30% of university students in Italy (17) and up to 93% of health sciences students in Turkey (16) have reported not being vaccinated against HPV.

Finally, among the health care students at the Mexican public university selected for our study, awareness that HPV causes cervical cancer was associated with greater knowledge of its role in head and neck and oral cancers. In contrast, willingness to receive the HPV vaccine-likely indicating an incomplete vaccination schedule-was not associated with awareness of HPV's involvement in these non-cervical cancers.

This study had several limitations. First, self-reporting bias may have affected the accuracy of responses. Second, the cross-sectional design precluded establishing causal relationships between the independent variables and the outcomes. Finally, because the sample included students from only one Mexican university, the findings cannot be generalized. Nonetheless, the results carry important implications for health communication

research and can serve to inform more effective public health strategies, particularly campaigns to prevent HPV-associated cancers.

CONCLUSION

Raising knowledge of HPV's role in head and neck and oral cancers offers an opportunity to boost vaccination uptake and prevent HPV-related disease.

AUTHOR CONTRIBUTION STATEMENT: Conception and design: C.M.U.B., J.G.R.M., D.A.C.P. and J.J.V.R.; Analysis and interpretation of the data: C.M.U.B., J.J.V.R., A.M.P.H. and A.R.A.; Drafting the article: C.M.U.B., D.A.C.P., A.M.P.H. and J.J.V.R.; Revising it critically for important intellectual content: J.G.R.M. and A.R.A. Final approval of the version to be published: C.M.U.B., J.G.R.M., D.A.C.P., J.J.V.R. and A.R.A.

ETHICAL CONSIDERATIONS: The current study was granted exempt status by the local institutional review board (FO-UAS-2024-01).

CONSENT TO PARTICIPATE: Participants were told, in writing that "Completing and submitting this survey indicates your consent to participate."

CONFLICT OF INTEREST: None.

DATA AVAILABILITY: Data available upon request to the corresponding author.

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