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Original Research Article

Determination of Turkish mothers' hesitations, awareness and knowledge levels regarding human papillomavirus vaccination for their sons

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ABSTRACT

Background: This is the first study aimed at determining the level of knowledge, awareness and hesitations among Turkish mothers about the administration of the human papillomavirus (HPV) vaccine to their sons.
Methods: This cross-sectional descriptive study was conducted at Eskişehir Yunusemre Hospital in Turkey from 13 April 2022, to 13 July 2022. The study involved a sample of 513 mothers with sons. Data analysis was performed using the SPSS 26, which included mean values, standard deviations, and percentage distributions, along with statistical tests such as ANOVA, post-Hoc, and Chi-square tests.
Results: Among the participants, only 38% had previously heard of the HPV infection. Only 1.9% of the participants had vaccinated their sons against HPV. Notably, 36% of those who were either hesitant or unwilling to vaccinate their sons expressed a lack of sufficient knowledge about the HPV vaccine as their primary reason. In our study, the participants' overall average HPV knowledge score was 22.6, while their awareness score was 77 out of 100.
Conclusions: Increasing knowledge about HPV is likely to play a crucial role in reducing vaccine hesitancy and enhancing vaccine acceptability. Consequently, healthcare professionals organizing educational initiatives and awareness campaigns to inform mothers about HPV infections and vaccines are seen as an effective approach.

Keywords: HPV, Vaccine Hesitation, Mothers, Sons

INTRODUCTION

Human papillomavirus (HPV) infection is the most widely recognized cause of cervical cancer, and there is evidence that it also causes anogenital cancers (including anus, vulva, vagina, and penis) as well as head and neck cancers.[1] Cervical cancer, caused by HPV, which continues to be a significant public health issue, ranks fourth among female cancers worldwide.[2] According to the Human Papillomavirus and Related Diseases report, approximately 569,847 women are diagnosed with new cases of cervical cancer annually, while 311,365 women die from cervical cancer globally.[1] In Turkey, cervical cancer ranks eighth among diagnosed cancer cases. Approximately 1500 new cases are detected each year, with approximately 600 resulting in fatalities within the first year of diagnosis.[3]

The Pap smear test is the simplest, most cost-effective, and highly accurate method for detecting cervical cancer, with an accuracy rate of up to 90-95% even before clinical symptoms manifest.[4] Today, in addition to the Pap smear test used for early diagnosis of cervical cancer, HPV vaccines can reduce the risk of cancer or provide protection against various types of HPV that can lead to cancer.[5] The HPV vaccine is effective when administered before exposure to HPV infection.[6]

According to the Advisory Committee on Immunization Practices (ACIP) recommendations, the HPV vaccine is most strongly recommended for both boys and girls to

commence at the age of 11 or 12. The starting age for the vaccine is 9, and two doses should be administered up to the age of 14. Between the ages of 15 and 26, however, it is recommended to receive three doses.[7] Vaccination coverage is inadequate among men in many countries due to a common misconception that the virus poses a risk solely to women.[8] Men are one of the high-risk and crucial groups in the battle against HPV and play a significant role in transmitting the virus to women.[9] Studies show the low immunization rates in women and the importance of expanding vaccination among men to obtain the greatest possible protection from cervical cancer.[10]

National HPV vaccination programs are implemented in at least 107 countries worldwide. About one-third of these countries have included their boys in the national immunization program.[1] In Turkey, despite the high prevalence of HPV, the vaccine designed to prevent diseases caused by HPV has not yet been incorporated into the routine immunization program, in contrast to many other countries.[11]

Vaccine hesitancy is a growing problem in society and was listed as one of the top global public health threats by WHO in 2019.[8] In the literature on the application of HPV vaccination to the target age groups; It has been reported that the main factors affecting the belief of the families about the HPV vaccine, the accuracy of the information they know about the vaccine and their perception of HPV vaccine implemention according to the gender.[12]

In Turkey, a significant portion of the population cannot afford the HPV vaccine because it is sold at high prices and is not covered by public funding.[13] However, a study conducted in the UK calculated the health outcomes and costs of the HPV vaccination program. According to the results of the study, although it is thought that the inclusion of boys in the HPV vaccination program will increase the cost, it has been stated that it will become cost-effective considering the long-time scales associated with HPV infection and the resulting disease.[14]

In Turkish families, mothers dedicate more time to child health, self-care, and nutrition compared to fathers. Consequently, mothers may find it easier to discuss sensitive topics such as reproductive or sexual health with their children.[15] When the literature was reviewed, no study was found in Turkey regarding applying the HPV vaccine to boys and measuring the knowledge and awareness of mothers with boys. In this study, the aim was to determine the hesitations of mothers who have boys regarding HPV vaccination, their level of knowledge about HPV, their awareness, their intention to have their sons vaccinated against HPV.

The research questions for this study are as what is the level of knowledge about HPV vaccination and infection among mothers with male children? what is the level of awareness about HPV vaccination among mothers? what are the hesitations of mothers with male children regarding vaccinating their sons against HPV?

METHODS

Study setting

The research was conducted between 13 April 2022, and 13 July 2022, in Eskişehir, Turkey. This cross-sectional descriptive study included mothers with boys aged 0-18.

Ethical considerations

The study received ethical approval from the Non-Interventional Ethics Committee of Eskişehir Osmangazi University in accordance with the Declaration of Helsinki (Approval Date: 18 January 2022; Decision No: 16).

Study participants

The study sample consists of mothers of patients who sought treatment at the Pediatrics Service of Eskişehir Yunusemre State Hospital in Turkey and were voluntarily accepted to participate in the study. In this study, no specific sample selection process was employed. While there is no age limit for participants who are mothers of boys, the inclusion criteria for this study required that participants do not have an intellectual disability, accept the survey's conditions, and willingly participate in the research. As of May 2022, 674 mothers were invited to participate in the study. As a result, 513 participants gave informed consent and participated in our survey. No incentives were provided for participation. Before the application, all participants explained the purpose of the research and how to fill in the questionnaires. After the participants accepted the informed consent letter, they answered the questionnaire questions.

Questionnaire and measures

The items of the survey questions in the present study were developed based on the literature.[15-18] The veri collection form consists of four sections, totaling 42 questions in the survey. These questions encompass 13 socio-demographic items, 8 questions aimed at determining whether participants have heard of HPV and the HPV vaccine, as well as whether they have received the HPV vaccine, 10 multiple-choice questions intended to identify their concerns regarding HPV vaccination, 13 knowledge-based questions designed to measure their level of knowledge about HPV and the HPV vaccine, and 7 questions focused on measuring their awareness of these topics. For one participant, completing the questionnaire required approximately 15-20 minutes. The questionnaire sections that measure knowledge and awareness are explained and scored as follows.

The participants' knowledge about HPV infection and HPV vaccine was assessed using a HPV knowledge test consisting of prepared key term questions. Eight experts

were consulted regarding the HPV knowledge test, and they were asked to provide their opinions on the items. The scope validity index (SVI) was calculated as 0.890. Furthermore, the reliability of this test was found to be high, with KR20=0.893, KR21=0.886, and Cronbach's Alpha=0.893. It was coded as '1' for correct answers to these questions, '0' for those who selected the incorrect answers, and 'I do not know' for participants who chose that option.

The participants' beliefs regarding HPV vaccination, the perceived importance of the vaccine, their perceptions about the likelihood of acquiring an HPV infection, and anticipated regret situations were assessed using awareness questions. Eight experts were consulted regarding the awareness section, and they were asked to provide their opinions on the items. The content validity ratio (CVR) of this test ranges from 0.7 to 1, with a content validity index (CVI) of 0.912. Reliability analysis was conducted for the HPV vaccine awareness scale, and the Alpha coefficient was found to be 0.908. The awareness questions were coded as follows: 1=not at all important, 2=not important, 3=undecided, 4=important, 5=very important. It was hypothesized that a higher score on these items indicated greater importance for the participant.

The prepared survey questions were tested on 15 participants, and a pilot application was conducted. The results obtained during the pilot implementation were not included in the study analysis.

RESULTS

The demographic characteristics of the participants are detailed in Table 1, which is associated with the study on the relationship between sociodemographic characteristics and HPV knowledge, HPV vaccine willingness, and the vaccination status of sons. The mean age of the participating mothers (n=513) was 36.5±6.5, with 89.8% of them being married, and nearly half (49.3%) having a university education or higher. According to the participants' statements, 69.3% of them were at the middle-income level, and 80.5% had health insurance. The majority of the participants' children were in the 7-11 age group, accounting for 34.98%. Participants' rate of having a family history of cervical cancer was 7%. Among the participants, only 38% had heard of HPV infection and vaccine before. Regarding the respondents, 37% mentioned that they had learned about HPV infection through social media, while the percentage of those obtaining information about the HPV vaccine from their family doctor or healthcare provider was 13.8%. Participants who did not receive information about the HPV vaccine from health professionals expressed a desire to receive information, accounting for 67.8% of the sample. The rate of participants who had their boys/children vaccinated against HPV was only 1.9%, while the rate of those who did not want to When the sociodemographic characteristics of the participants were compared with their HPV and HPV vaccine hearing rates, statistically significant differences were observed among employment status, economic status, educational background, and having health insurance ($p<0.001$). A statistically significant difference was found between the participants' desire to vaccinate their son against HPV, marital status, health insurance, and economic status ($p<0.001$).

The hesitations of participants who express unwillingness or indecision regarding the HPV vaccine are discussed. The majority of participants (36%) who did not want to get the HPV vaccine and were undecided stated that they did not want to accept the vaccine due to insufficient information.

The information presented in Table 3 delineates the knowledge of participants regarding HPV and the HPV vaccine, accompanied by the respective percentage values indicating their responses to the survey questions. According to the participants' responses to the questions assessing their knowledge levels about HPV and the HPV vaccine, more than half of them indicated that they selected the ‘I do not know’ option, indicating their lack of knowledge on these subjects. The participants gave the correct answer to the question 'HPV is a sexually transmitted disease' by 45.61%, to the question of 'family history of cervical cancer is a risk factor' by 41.91%, and to the question of 'HPV vaccine prevents cervical cancer in women' with a rate of 33.13%.

The survey results depicted in Table 4 reveal a constrained level of knowledge among participants regarding HPV and the HPV vaccine, while also highlighting the association between sociodemographic characteristics and mean total scores of awareness and knowledge levels. The participants achieved a total knowledge score of 22.6%. Post Hoc analysis revealed significant differences when comparing working participants to non-working participants ($p<0.001$), participants with health insurance to those without ($p<0.001$), participants with a university or higher education level to those with primary, secondary, or high school education ($p<0.001$), and participants with high-income levels to those with low-income levels ($p<0.001$). In all cases, the former group demonstrated higher average knowledge scores.

According to awareness questions, the participants responded as follows: 41.91% 'important' to the 1st question, 43.66% 'moderate' to the 2nd question, 49.51% 'very high' to the 3rd question, 45.61% 'undecided' to the 4th question, 42.8% 'important' to the 5th question, and 45.41% 'very important' to the 6th question. Regarding the question of including the HPV vaccine in the routine vaccination list, a significant majority of the participants, especially 63.73%, expressed a positive opinion by selecting the 'Yes' option.

Table 1: Association between sociodemographic characteristics and HPV knowledge, HPV vaccine willingness, status of son's having vaccinated (n=513).

Demographic features	N	%	Status of Having heard of HPVV vaccine before			The status of willingness to have the HPVV vaccination of the boy				The status of having a boy vaccinated against HPV		
			Yes N (%)	No N (%)	P value	Yes N (%)	No N (%)	I don't know N (%)	P value	Yes N (%)	No N (%)	P value
Age (years)												
18-25	19	3.7	6 (1.1)	13 (2.5)	0.005	3 (0.6)	2 (0.4)	14 (2.8)	0.09	0 (0)	19 (3.7)	
26-40	351	68.4	120 (23.3)	231 (45.1)		44 (8.8)	42 (8.4)	252 (50.5)		6 (1.1)	345 (67.2)	
>40	143	27.8	71 (13.8)	72 (14.0)		23 (4.6	23 (4.6)	96 (19.2)		4 (0.7)	139 (27.0)	
Marital status												
Married	461	89.8	174 (33.9)	287 (55.9)	0.36	58 (11.6)	64 (12.8)	325 (65.1)	0.006	8 (1.5)	453 (88.3)	0.05
Divorce	52	10.1	23 (4.4)	29 (5.6)		12 (2.4)	3 (0.6)	37 (7.4)		2 (0.3)	50 (9.7)	
Working status												
Yes	266	51.8	143 (27.8)	123 (23.9)	<0.001 *	50 (10)	29 (5.8)	179 (35.8)	0.1	7 (1.3)	259 (50.4)	0.05
No	247	48.1	54 (10.5)	193 (37.6)		20 (4)	38 (7.6)	183 (36.6)		3 (0.5)	244 (47.5)	
Educational status												
Primary school	34	6.6	4 (0.7)	30 (5.8)	<0.001 *	4 (0.8)	9 (1.8)	20 (4)	0.1	0	34 (6.6)	
Primary school	35	6.8	5 (0.9)	30 (5.8)		1 (0.2)	6 (1.2)	27 (5.4)		0	35 (6.8)	
High school	191	37.2	35 (6.8)	156 (30.4)		14 (2.8)	26 (5.2)	148 (29.6)		1 (0.1)	190 (37.0)	
Undergraduate or postgraduate	253	9.3	153 (29.8)	100 (19.4)		51 (10.2)	26 (5.2)	167 (33.4)		9 (1.7)	244 (47.5)	
Monthly income status												
Low	120	23.3	17 (13.3)	103 (20.0)	<0.001 *	11 (2.2)	21 (4.2)	87 (17.4)	0.9	2 (0.3)	118 (23.0)	<.001*
Middle	356	69.3	156 (30.4)	200 (38.9)		48 (9.6)	45 (9)	252 (50.5)		4 (0.7)	352 (68.6)	
High	37	7.2	24 (4.6)	13 (2.5)		11 (2.2)	1 (0.2)	23 (4.6)		4 (0.7)	33 (6.4)	

*p<0.001.

Table 2: Hesitations of participants who do not want to have the HPV vaccine or undecided hesitations (n=513).

Hesitations	N	(%)
I do not trust the effect of the vaccine	50	9.74
The HPV vaccine could be dangerous for my son	81	15.78
It's too soon for my child to be vaccinated against a sexually transmitted disease	175	34.11
I believe the HPV vaccine will have side effects	101	19.68
My son has decided he doesn't want to be vaccinated	17	3.31
I do not have health insurance or money to pay for the vaccine	23	4.48
My doctor or healthcare professional did not recommend the HPV vaccine	156	30.4
I do not want to decide without seeing the long-term results of the HPV vaccine	89	17.34
I do not think my son will be infected with HPV	66	12.86
I do not have enough information	185	36.06
Other (My son should decide for himself when he reaches a certain age)	1	0.19
Missing	70	13.64

Table 3: Knowledge of participants on hpv and hpv vaccine (n=513).

Information statements	True		False		I don't know		Correct answer
	N	%	N	%	N	%	
For children aged 9-14, the HPV vaccine is recommended to be administered in 2 doses	64	12.47	8	1.55	441	85.96	T
HPV vaccine prevents cervical cancer among women	170	33.13	2	0.39	341	66.47	T
The government provides the HPV vaccine free of charge	31	6.04	106	20.66	376	73.29	F
HPV is a sexually transmitted disease	234	45.61	16	3.11	263	51.26	T
A family history of cervical cancer is a risk factor oh HPV related diseases	215	41.91	5	0.97	293	57.11	T
Not every person infected with HPV has a complaint	78	15.2	39	7.6	396	77.19	T
Antibiotics are effective in the treatment of HPV infection	29	5.65	67	13.06	417	81.28	F
The HPV vaccine is given only to girls	21	4.09	115	22.41	337	73.48	F
HPV infection causes anal cancer	67	13.06	21	4.09	425	82.84	T
HPV infection causes penile cancer	73	14.23	13	2.53	427	83.23	T
HPV infection causes oral cancer	55	10.72	20	3.89	438	85.38	T
It is crucial for men to have the HPV vaccine to protect women against cervical cancer	128	24.95	6	1.17	379	73.87	T
The HPV vaccine is effective in preventing genital warts	144	28.07	7	1.36	362	70.56	T

Table 4: Association between sociodemographic characteristics and mean total scores of awereness and knowledge levels (n=513).

Demographic features		N	%	Awareness questions total score		Knowledge level questions total score	
				Mean±SD	P*	Mean±SD	P*
Age	26-40	19	3.7	22.31±4.46	0.5	3.68±3.49	0.3
	>40	351	68.42	23.16±3.33		2.80±3.55	
	0-25	143	27.87	23.07±3.55		3.23±3.51	
Marital status	Married	461	89.864	23.02±3.47	0.1	2.83±3.42	0.05*
	Divorce	52	10.137	23.80±2.98		4.05±4.37	
Working status	Yes	266	51.852	23.74±3.25	0.2	4.28±3.87	<0.001***
	No	247	48.148	22.47±3.49		1.52±2.46	
Health insurance	Yes	413	80.507	23.23±3.47	<0.001***	3.25±3.61	<0.001***
	No	100	19.493	22.60±3.23		1.71±2.93	
Educational status	Primary school	34	6.627	21.79±4.1	<0.001***	1.00±1.96	<0.001***
	Secondary school	35	6.822	22.02±3.15		1.28±2.49	
	High school	191	37.231	22.72±3.41		1.37±2.49	
	Undergraduate or Postgraduate	253	49.317	23.72±3.28		4.64±3.71	
Monthly income status	Low	120	23.392	22.73±3.5	0.03	1.63±2.90	<0.001***
	Middle	356	69.396	23.10±3.45		3.14±3.53	
	High	37	7.212	24.37±2.72		5.45±3.92	

Continued.

Demographic features		N	%	Awareness questions total score		Knowledge level questions total score	
				Mean±SD	P*	Mean±SD	P*
Family history of cervical cancer	Yes	36	7.018	23.52±3.50	0.4	3.27±3.04	0.5
	No	477	92.98	23.07±3.43		2.93±3.58	
Total knowledge score		Min-Max		Mean±SD		Success rate (%)	
		0-13		2.95±3.54		22.6	
Total awareness Score		Min-Max		Mean±SD		Success rate (%)	
		0-30		23.10±3.43		77	

**P<0.001; *P<0.05

DISCUSSION

The primary causative factor for female deaths due to cervical cancer is HPV infection, which can also be reduced through protection from HPV infection.[19] Vaccination is a safe and effective method of preventing HPV infection.[20] One of the most important reasons for vaccinating boys as well as girls is to prevent transmission of the virüs.[20] This study is the first to determine the knowledge and hesitations among Turkish mothers about administering the HPV vaccine to their boys. In this section, the findings regarding the knowledge levels and awareness of mothers regarding the HPV vaccine are presented and compared with the literature.

According to our study, factors such as low income, lack of health insurance, unemployment, and a low level of education were found to be associated with low hearing rates regarding HPV infection and vaccines (p<0.001). Our study revealed that mothers had never heard of HPV infection before. According to the literature, in Turkey, parents/women/mothers in Atlı's study (2022) had a prior hearing rate of the HPV vaccine at 26.7%, in Özyer et al's study (2013) at 27.9%, and in Akca's study (2022) at 33.9%.[21-23] These findings are in parallel with our study. In the USA, studies conducted by Davlin et al (2015) among mothers with low incomes reported an HPV hearing rate of 73%.[24] Similarly, Ruffin et al (2012) found that 95% of 18-year-old women had heard of HPV.[25] In another study involving young Latino women, Wu et al (2010) reported an HPV hearing rate of 71%.[26] Based on these findings, it can be concluded that the HPV hearing rate in Turkey is lower than that reported in the aforementioned studies conducted in the USA.

In our study, among the participants who had prior knowledge of HPV, social media was the most common source of information, accounting for 37%. Similarly, according to a study carried out in Hong Kong, a significant proportion of individuals who possessed knowledge regarding the HPV vaccine acquired it through social media channels.[27] However, vaccine hesitancy can be increased by health information obtained from various sources such as social media platforms, which may provide inaccurate information and may not be reliable.[28] For this reason, it is thought that it would be beneficial for people to rely on evidence-based information shared by institutions such as the Ministry of Health on social media, which serves as a source of information for the public. By increasing the activity of such institutions as the Ministry of Health on social media platforms like Twitter, Instagram, or Facebook, it is believed that the dissemination of false information can be prevented, thereby enhancing public awareness and increasing awareness of HPV.

Our study revealed that the HPV vaccination rate for boys in our sample was only 1.9%. In contrast, previous research in developed countries has reported a significantly higher HPV vaccination rate among boys, reaching as high as 40.6%.[12] Furthermore, in a study conducted by Taylor et al in the USA, it was reported that 21.4% of boys had been vaccinated against HPV.[29] Based on the data available in the developed countries, it can be concluded that the HPV vaccination rate among the sons in our study was low. In addition, according to the data from our study, it was revealed that the income level of individuals who had their sons vaccinated against HPV prior to our study was higher than that of those who did not (p<0.001) It is thought that the inclusion of the HPV vaccine in the national vaccination calendar in developed countries and the fact that these countries provide the vaccine at no charge have a positive effect on the rate of those who have been vaccinated. This may be the reason why families with low and middle-income levels do not have their children vaccinated against HPV since this vaccine is not included in the national calendar in Turkey and is provided for a fee.

In our study, among the participants who did not want to have their sons vaccinated against HPV or were undecided, 36% of them stated that they lacked sufficient knowledge, 34.1% believed that it was too early to vaccinate their children against a sexually transmitted disease, and 30.4% had not received a recommendation from a doctor or any healthcare professional regarding the HPV vaccine. According to the reasons for the low HPV vaccination rates in the literature, this is generally attributed to participants' need for more information about HPV, the absence of vaccination recommendations from physicians, and the perception that it is unnecessary because children in this age group are not sexually active.[30] In parallel with the

literature, our study is ranked among the top three, although the order of these reasons that cause mothers' hesitations may vary.

In our study, the participants' general average level of knowledge and awareness about the HPV vaccine and infection was 22.6 and 77 out of 100, respectively. According to our study, a significant and positive relationship was observed between participants' HPV awareness and their knowledge levels, indicating that as HPV awareness increased, knowledge levels also increased.

In our study, an increase in information provided by healthcare professionals was associated with higher levels of HPV awareness and knowledge among mothers. According to the literature, positive recommendations from healthcare providers regarding vaccines have been shown to positively influence the attitudes of parents or patients towards vaccination and contribute to an increase in vaccination rates. These findings underscore the importance of enhancing awareness among healthcare professionals, particularly regarding the HPV vaccine.

In our study, it was observed that the mean levels of knowledge and awareness increased as the level of education increased ($p<0.001$). According to a study by Lee and Ark (2017) conducted with mothers in Korea, it was emphasized that mothers with higher levels of education had greater awareness of HPV.[31] Marlow et al (2013) compared HPV awareness and knowledge levels of citizens in the USA, UK and Australia, and low education level was associated with lower HPV awareness in all three countries.[32] In addition, it was concluded that awareness of HPV is higher in the USA than in Australia and England. The possible explanation for this is attributed to advertising by various pharmaceutical companies and the extensive promotion of HPV vaccines by the pharmaceutical industry. In addition, according to a study conducted in the USA, employing messages about protecting sons' future female partners through male vaccination is considered an important step, and it is believed that using such messages may increase HPV vaccination rates in males and prevent HPV disease.[33] In Turkey, due to insufficient knowledge and education about the HPV vaccine, such campaigns are seen as inadequate. As a result of these findings, in underdeveloped and developing countries, including Turkey, it underscores the necessity for increased educational and awareness initiatives aimed at enhancing knowledge and awareness and for the expansion of vaccination campaigns.

Limitations

The results can only be generalized to this sample, as the study included volunteer participants who met the inclusion criteria, without using the probability sampling method.

CONCLUSION

The results of this study have shown that mothers have low rates of awareness and knowledge about the HPV vaccine and infection, although their awareness levels are high. Furthermore, it has been revealed that social media plays a significant role in HPV vaccine and infection awareness. Additionally, our findings indicate that mothers' hesitations regarding the HPV vaccine negatively affect its acceptability. This study highlights the potential of the HPV vaccine to protect every individual, regardless of gender, and underscores the significant issue of knowledge deficiency among mothers concerning the HPV vaccine. These results emphasize that increasing knowledge and awareness about the HPV vaccine is a crucial step in raising vaccination rates and reducing HPV-related health issues. Healthcare professionals have a significant responsibility in enlightening mothers about HPV infection and its vaccine. They should plan and implement health education programs to correct misinformation and provide the missing information about the vaccine. Furthermore, the inclusion of the HPV vaccine in national immunization programs and the expansion of vaccination campaigns are believed to be effective measures in preventing HPV-related cancers.

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