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Original Article

The influence of parents' knowledge on HPV vaccine uptake — evidence from Albania

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Abstract

Introduction: Despite the HPV vaccine's efficacy in cervical cancer prevention, cervical cancer ranks second in prevalence among women, following breast cancer. Various factors negatively impact HPV vaccination uptake, with parents' knowledge and attitudes being particularly crucial in this regard.

Methodology: A cross-sectional study was conducted between February and May 2023, targeting parents in northern Albania. The standardized Vaccination and HPV Knowledge (THinK) questionnaire was used, and a random sampling methodology was applied. Data were collected at primary healthcare centers, targeting parents who were seeking various healthcare services.

Results: A total of 102 participants completed the questionnaire, yielding a response rate of 74%. The majority of parents were married (79.4%), female (82.4%), over 30 years of age, and residents of urban areas (67.6%). A low mean score was reported for both the vaccination rate of girls (1.79 ± 0.40) and the willingness to vaccinate them (1.31 ± 0.46). Of the participants, 15 (14.7%) parents expressed strong knowledge of vaccines, while only 6 (5.9%) had knowledge about HPV, and 52 (51%) expressed interest in receiving information about HPV vaccination. Three factors emerged, explaining 71.02% of the variance: knowledge about HPV and vaccination, side effects of the vaccines, and the impact of vaccinating girls on HPV vaccination uptake.

Conclusions: The study found that the identified factors—knowledge, side effects of vaccines, and vaccination attitudes—significantly influence HPV vaccination uptake. Co-creation activities involving parents, girls, and healthcare professionals are the most effective strategies to build trust and improve awareness among the target population regarding the HPV vaccine.

Key words: HPV vaccine; uptake; parent's knowledge; Albania.

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Introduction

Cervical cancer, although one of the most easily preventable cancers, remains second only to breast cancer in incidence among women [1]. Persistent infection with human papillomavirus (HPV) causes cervical cancer worldwide, despite the fact that the body clears the infection in 90% of cases [2]. The causal relationship between HPV and cervical cancer has already been well-established, leading to screening and prevention initiatives targeting young girls and women of reproductive age [3]. Prophylactic HPV vaccination, along with screening and treatment of pre-cancerous lesions, are highly successful and cost-effective methods of preventing cervical cancer. However, low- and middle-income countries have the highest incidence and fatality rates from cervical cancer, reflecting significant disparities due to lack of access to national HPV vaccination, cervical screening, and treatment programs, as well as social and economic factors [4]. Studies conducted worldwide have shown that the widespread use of the HPV vaccine significantly reduces the number of women developing cervical cancer [5,6]. Despite the proven efficacy of the HPV vaccine in preventing cervical cancer and the implementation of national mass vaccination programs, several factors hinder the process, resulting in lower vaccination uptake. These factors include knowledge, attitudes, and beliefs [7,8-9], particularly parents' knowledge, especially regarding the vaccination of girls during puberty [10,11].

The national cervical cancer screening program in Albania was established under Decree No. 47 (30.1.2019) by the Council of Ministers, with support from the World Health Organization (WHO) [12]. The program uses high-risk HPV testing as the primary screening method for women in the 40–50 age group. According to data reported by the screening program, women from rural areas had higher participation rates—accounting for about 58% of all participants—as well as women who were less educated or unemployed. The overall prevalence of high-risk HPV among program participants was 6.1%, but it was higher

among women living in urban areas, those with higher education levels, employed women, and those who were unmarried. Women from lower-income groups and rural areas had lower HPV infection rates [13]. Studies conducted in Albania prior to the implementation of the cervical screening program indicated a relationship between perceived benefits, emotional and economic barriers, and participation in screening tests [14].

Cervical screening rates were found to be lower among healthcare practitioners compared to healthy women, as suggested by another study [15]. The HPV vaccination program for girls in Albania began in November 2023, marking the first time the vaccine has been introduced in the country. It is now included in the national vaccination schedule to protect girls from cervical cancer. Starting in January 2024, the vaccine will also be administered to girls aged 14–20 [16]. However, recent research suggests that several barriers to HPV vaccination have been identified, including a lack of knowledge and awareness, cultural norms, and religious beliefs [17]. In low- and middle-income countries, the primary issues related to HPV vaccination include a significant decrease in uptake in nations that previously had strong vaccination rates, challenges in maintaining uptake, financial sustainability concerns, and a lack of uniform monitoring and reporting procedures [18]. According to a systematic review of the literature on low- and middle-income settings, the obstacles were primarily related to cultural issues, perceptions of discrimination, and inadequate communication skills among healthcare providers [19]. A review involving 16 European countries found that parental understanding of limited information and concerns about vaccine safety influenced HPV vaccination acceptance [20].

Parental concerns play a decisive role in vaccination uptake, as research indicates that these concerns often lead to decisions to refuse or delay vaccination, as seen with childhood vaccines [21], COVID-19 safety [22], and the spread of vaccine misinformation, particularly on social media [23,24]. These decisions, in turn, significantly impact the spread of infections, influencing population health and overall well-being. To address this, engaging key stakeholders—such as parents, healthcare professionals, and young girls—in co-creating public health initiatives, like vaccination campaigns, can foster innovation and enhance their effectiveness. This collaborative approach allows diverse groups to work together, from identifying issues to completing projects, thereby maximizing the potential for success [25]. Innovative strategies, such as co-creation, have already proven effective in promoting HPV screening for mothers and vaccination for girls [26]. Additionally, engaging the community—particularly family members—has led to the co-development of culturally and locally tailored strategies that promote dialogue and shared decision-making in the vaccination process, as studies suggest [27,28]. To the best of our knowledge, this study is the first in Albania aimed at assessing parents' knowledge, information, risk perception, and attitudes toward HPV vaccination, with the goal of raising awareness and encouraging their active engagement as one of the most effective measures for the prevention and eradication of cervical cancer.

Methodology

A cross-sectional study was conducted between February and May 2023, targeting parents in northern Albania. The study used a self-administered, anonymous questionnaire based on a random selection methodology. Data were collected at primary healthcare centers, where parents received various healthcare services. The standardized Vaccination and HPV Knowledge (THinK) questionnaire [29] was used for data collection. The reliability and validity of the questionnaire in Albanian were pretested with a sample of 30 parents before finalizing the version to be administered. The results of the pretest survey were not included in the final data analysis. The questionnaire covered dimensions related to knowledge about HPV infection, knowledge of the HPV vaccine, and parents' attitudes toward HPV vaccination. The dimensions of HPV knowledge and attitudes were assessed using a 5-point Likert scale, ranging from low to high, as follows: 1 = Strongly Disagree; 2 = Disagree; 3 = Neither Agree nor Disagree; 4 = Agree; 5 = Strongly Agree. The questionnaire also included sociodemographic data such as age, marital status, education level, employment status, and other related information. Participants were assisted by nursing students who had been trained in the data collection process.

Data analysis

The total sample included 112 parents. Questionnaires were distributed to approximately 150 parents, resulting in a response rate of 74%. Ten questionnaires were excluded from the final analysis due to errors or incomplete responses. The data collected from the paper-based questionnaires were transferred to an Excel sheet, and after cleaning and coding, were analyzed using IBM SPSS Statistics, version 27. Descriptive statistics were applied to

analyze the sociodemographic data. A normality test was conducted for each variable, and the most appropriate statistical test was then applied. Nonparametric Kruskal-Wallis tests and Pearson's correlation coefficient were used to compare groups. A factor analysis was performed to reduce the number of variables by identifying the optimal number of latent factors that minimized information loss. The following criteria were used to determine the number of significant factors: (a) eigenvalues greater than 1, (b) the Cattell scree plot, (c) the percentage of total variance explained, and (d) factor loadings greater than 0.40. P-values ≤ 0.05 were considered statistically significant.

Ethical consideration

The study received approval from the Ethics Council of the University of Medicine in Tirana. All participants provided written consent after being informed about the purpose of the study and the use of the data collected. Participation was voluntary, and the study adhered to the principles of the World Medical Association's Declaration of Helsinki, as well as relevant legislation regarding confidentiality and the storage of personal data.

Limitations

The self-administered methodology used for collecting the quantitative data in this study, assisted by nursing students, may contribute to response bias due to potential interviewer error. Another limitation is related to the sample size. Due to time constraints imposed by the HPV vaccination schedule for young girls aged 14–20 starting in January 2024, as well as the introduction of the one-dose HPV vaccine for 13-year-old girls in November 2023, the sample size was limited. Despite these limitations, we believe the findings from the THinK questionnaire can serve as a starting point for guiding the HPV vaccination process, especially considering the limited literature on this topic in Albania, both in general and within local communities. The same methodology could be used to expand the scope and significance of the findings by examining them in different cities in Albania with varying socio-demographic characteristics.

Results

A total of 102 participants completed the questionnaire, resulting in a response rate of 74%. Table 1 shows their characteristics. The majority of participants were married (79.4%), female (82.4%), and over 30 years of age. Regarding educational background, 67 participants (65.7%) had a university degree, 24 (23.5%) had higher education, and 11 (10.8%) had only primary education. The majority of participants resided in urban areas (67.6%), and 42 (42.0%) had two children. Among those with children, 45 (45.0%) reported having two daughters. The majority of parents were teachers (36.0%). Table 2 presents parents' knowledge of HPV infection, vaccine

Table 1. Sociodemographic characteristics of study participants, n = 102.

Characteristics	n	%
Age (years)		
≥ 20	2	2.0
21-30	13	12.7
31-40	30	29.4
41-50	36	35.3
51-60	18	17.6
≥ 61	3	2.9
Gender		
Females	84	82.4
Males	18	17.6
Educational level		
Primary education	11	10.8
Higher education	24	23.5
University diploma	67	65.7
Marital status		
Married	81	79.4
Divorced	7	6.9
Single	13	12.7
Widow	1	1.0
Place of residence		
Urban	69	67.6
Rural	33	32.4
How many children do you have?		
1	28	28.0
2	42	42.0
3	26	26.0
4	4	4.0
Do you have daughters?		
Yes	82	80.4
No	20	19.6
If yes, how many daughters do you have?		
1	45	45.0
2	32	32.0
3	6	6.0
Have you lived abroad?		
Yes	24	23.5
No	78	76.5
If yes, where did you live abroad?		
Europe	49	49.0
America	6	6.0
Australia	1	1.0
Parents' profession		
Teacher	36	36.0
Journalist	10	10.0
Economist	8	8.0
Saleswoman	7	7.0
Nurse	7	7.0
Artisan	5	5.0
Tailor	6	6.0
Social worker	5	5.0
Household	5	5.0
Other*	11	11.0

* This includes different professions such as cooker, mechanic, farmer, etc., but since the frequency was only one for each profession, they were grouped in the variable other.

Table 2. Parent's knowledge about the domains of HPV infection, vaccine knowledge, and vaccination HPV attitude, n = 102.

Knowledge and attitudes Domains	**Frequency (n), Percent (%)**					**Mean ± Std.**
Scale 1-5	**1**	**2**	**3**	**4**	**5**	**Deviation**
How much do you know about vaccines?	3 (2.9)	22 (21.6)	25 (24.5)	37 (36.3)	15 (14.7)	3.38 ± 1.07
How much do you follow the children's vaccination schedule?	2 (2.1)	6 (6.3)	8 (8.3)	27 (28.1)	53 (55.2)	4.28 ± 1.00
How much do you know about the types of vaccines that are available in Albania?	6 (5.9)	21 (20.6)	24 (23.5)	40 (39.2)	11 (10.8)	3.28 ± 1.09
How much do you know about when and where you can get a vaccine?	3 (2.9)	8 (7.8)	21 (20.6)	40 (39.2)	30 (29.4)	3.84 ± 1.03
How many side effects do you think vaccines have?	11 (10.8)	37 (36.3)	40 (39.2)	11 (10.8)	3 (2.9)	**2.59** ± 0.92
How much do you believe you can be infected, even if you are vaccinated against it?	6 (5.9)	45 (44.1)	33 (32.4)	14 (13.7)	4 (3.9)	**2.66** ± 0.92
How effective do you think the vaccination is even if the person has been in contact with the infection?	8 (7.8)	36 (35.3)	33 (32.4)	22 (21.6)	5 (2.9)	**2.76** ± 0.97
How much knowledge do you have on HPV?	9 (8.8)	41 (40.2)	22 (21.6)	24 (23.5)	6 (5.9)	**2.77** ± 1.08
How accurate do you believe the information you have regarding HPV is?	1 (1.0)	28 (27.5)	54 (52.9)	9 (8.8)	10 (9.8)	**3.03** ± 1.00
How dangerous do you think HPV is?	5 (4.9)	23 (22.5)	26 (25.5)	35 (34.3)	13 (12.7)	3.27 ± 1.10
How well do you know that HPV is the main cause of cervical cancer?	17 (16.7)	30 (29.4)	19 (18.6)	28 (27.5)	8 (7.8)	**2.80** ± 1.23
How much do you know about HPV-associated lesions?	28 (27.5)	34 (33.3)	20 (19.6)	18 (17.6)	2 (2.0)	**2.33** ± 1.12
How much do you know about HPV vaccines and prevention?	10 (9.8)	41 (40.2)	24 (23.5)	22 (21.6)	5 (4.9)	**2.72** ± 1.06
How high do you think the risk of getting an HPV infection is?	7 (6.9)	35 (34.3)	36 (35.3)	20 (19.6)	4 (3.9)	**2.79** ± 0.96
How willing are you to vaccinate your child against HPV?	6 (5.9)	30 (29.4)	15 (14.7)	24 (23.5)	27 (26.5)	3.35 ± 1.31
Did you know that the recommended age to get the HPV vaccine is 12–13 years old?	16 (15.7)	25 (24.5)	23 (22.5)	23 (22.5)	15 (14.7)	**2.96** ± 1.30
How much do you think education about HPV vaccination should be done in schools?	12 (11.8)	11 (10.8)	19 (18.6)	24 (23.5)	36 (35.3)	3.60 ± 1.37
Did you know that HPV can cause genital warts and some types of cancer?	23 (22.8)	34 (33.7)	26 (25.7)	13 (12.9)	5 (5.0)	**2.44** ± 1.12
How much information do you want to get about HPV vaccination?	4 (3.9)	5 (4.9)	11 (10.8)	30 (29.4)	52 (51.0)	**4.19** ± 1.06
Has your daughter/daughters had the HPV vaccine?				*21 (20.8)	**80 (79.2)	
Will you give the HPV vaccine to your daughter?				*70 (69.3)	**31 (30.7)	

Correlations

		Parents' intention to vaccinate their daughters
Parent's knowledge about HPV infection and vaccine	Pearson Correlation	.216°
	Sig. (2-tailed)	**0.029**
	N	102

*Yes, **No. °. Correlation is significant at the 0.05 level (2-tailed).

knowledge, and vaccination attitudes, expressed in frequencies and percentages across the five-point Likert scale. It also includes the mean score and standard deviation for each variable. Parents in the study generally demonstrated low or average knowledge regarding HPV infection and vaccines across most domains. However, there was strong agreement on the importance of adhering to children's immunization schedules and the need for more information about the HPV vaccine. A low mean score (1.79 ± 0.40) was reported for vaccinated girls, as well as for the willingness to vaccinate them (1.31 ± 0.46). Additionally, Table 2 shows that only 15 (14.7%) parents had strong knowledge of vaccines, while only 6 (5.9%) had knowledge of HPV, and 52 (51%) expressed a desire to receive information about HPV vaccination. Furthermore, 70 (69.3%) parents indicated an intention to give the HPV vaccine to their daughters.

To evaluate the internal variability, we used Principal Component Analysis (PCA). Table 3 shows the total variance explained and the results obtained from PCA for the first three factors, which were extracted because they accounted for the highest variance. The three factors were correlated with each other, confirming the validity of the questionnaire, with a Cronbach's alpha of 0.801. All questions contributed to the reliability and construct validity of the questionnaire. In the PCA (Rotation Method: KMO and Bartlett's Test), the three underlying components and their respective questions showed correlations greater than 0.753. The rotation sums of squared loadings were greater than 60%, indicating that the variables can be used to measure parents' intention to vaccinate their daughters against HPV. As a result of the analysis, three factors were identified, explaining 71.02% of the variance, with eigenvalues greater than 1. The third-factor line is almost flat, suggesting that successive factors account for progressively smaller amounts of

Table 3. The internal variability of the Principle Component Analysis method among factors and the correlation matrix.

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	**3.15**	**39.41**	**39.41**	3.15	39.41	39.41	3.14	39.36	39.36
2	**1.52**	**19.01**	**58.43**	1.52	19.01	58.43	1.50	18.81	58.17
3	**1.00**	**12.59**	**71.02**	1.00	12.59	71.02	1.02	12.85	71.02
4	0.68	8.52	79.55						
5	0.54	6.76	86.32						
6	0.48	6.11	92.43						
7	0.38	4.79	97.22						
8	0.22	2.77	100.00						

The correlation matrix of three items			
Component	**1**	**2**	**3**
1	1	0.15	0.62
2	0.15	1	0.68
3	0.62	0.68	1

1-Knowledge about HPV and vaccination; 2-Side effects of the vaccines; 3-Vaccination of girls; 4-Knowledge about HPV; 5- Knowledge about HPV-associated lesions; 6- Knowledge about HPV vaccines and prevention; 7- Knowledge that HPV can cause genital warts and some types of cancer; 8- The daughter/daughters had the HPV vaccine.

the total variance. The three factors that emerged are: knowledge of HPV and vaccination, side effects of the vaccines, and vaccination of girls.

Discussion

A cross-sectional study was conducted targeting parents in northern Albania using the Vaccination and HPV Knowledge (THinK) questionnaire, employing a random selection methodology. A total of 102 parents, both male and female, participated. To the best of our knowledge, this is the first study in Albania assessing parents' HPV knowledge and attitudes before and after the introduction of the HPV vaccine in primary care as part of a national vaccination program for 14-year-old girls, as well as within the local population. Several studies have examined the role of parents in the decision-making process regarding the vaccination of their daughters against HPV, particularly in low- and middle-income countries where HPV vaccination has recently been incorporated into national immunization schedules [30,31-32]. As shown in Table 1, the sample included parents of both genders, with the majority being female. Studies have indicated that parental gender, particularly that of mothers, significantly impacts the willingness to vaccinate daughters against HPV, emphasizing the need to provide easily understandable information to mothers [33]. A systematic review of the literature found that sociodemographic factors, such as place of residence (urban versus rural areas) and parental gender (mothers versus fathers), with mothers often being the decision-makers regarding whether to vaccinate their children against HPV, were positively associated with parents' uptake of the HPV vaccine for their children [34]. In our study, no association was found between place of residence, parental gender, and the intention to vaccinate daughters against HPV (Table 1).

As shown in Table 2, a positive attitude toward adhering to the national immunization schedule for children was observed, which is consistent with findings from other studies conducted in Albania [35]. However, a low mean score for general vaccine knowledge was reported, particularly regarding the HPV vaccine and its associated side effects. These findings align with previous studies, which found that parents' perceived knowledge and perceived risk significantly influenced their decision to vaccinate their daughters against HPV. Parents who are confident in the safety of the HPV vaccine, particularly regarding side effects, are more willing to vaccinate their children [36,37]. The results of our study are consistent with findings from other studies, where exposure to higher levels of fear (as opposed to lower levels) resulted in increased vaccine hesitancy, which was closely linked to beliefs in anti-vaccine conspiracies [38]. A low level of knowledge was also reported regarding HPV as the main cause of cervical cancer and HPV-associated lesions, while there was a higher intention to vaccinate their daughters (69.3%). These findings align with other studies in which parents with limited knowledge about HPV-related diseases and infections expressed positive attitudes toward their daughters' HPV vaccination [39]. According to the findings in Table 2, parents in the study had a low perception of risk regarding HPV infection and related lesions, as well as the benefits of HPV prevention. A low mean score (2.96 ± 1.30) was also reported regarding the recommended age for receiving the HPV vaccine. Lack of knowledge about the HPV vaccine, its necessity, and the recommended age for vaccination has also been identified as factors

contributing to parents' reluctance to vaccinate their children against HPV [40]. According to Table 2, parents in the study agreed that education about the HPV vaccine should also be provided in schools. They expressed a positive attitude toward receiving more information and staying up-to-date about the HPV vaccine, with a mean score of 4.19 ± 1.06. These results are similar to those of another study in which parents who were informed about the HPV vaccine were more likely to vaccinate their children against HPV [41]. Table 2 shows that parents' knowledge about HPV infection and the vaccine is statistically correlated with their intention to vaccinate their daughters ($p = 0.029$). The study results are consistent with previous research, where a strong relationship was found between parents' HPV knowledge and their intention to vaccinate their daughters, emphasizing the role that knowledge plays in cues to action [42].

As stated in Table 3, three factors explain 71.02% of the variance, with eigenvalues greater than 1. These factors are: knowledge about HPV and vaccination, side effects of the vaccines, and vaccination of girls. A strong correlation was found between the vaccine and the fear of side effects. Additionally, there is a significant correlation between parents' knowledge and their perception of the effects of the vaccine. The findings are consistent with a systematic review study that identified fear and vaccine side effects as obstacles to the HPV vaccine, with these concerns being more linked to misinformation than to facts [43]. A study also found that trust in the HPV vaccine is declining across many European countries, supporting our findings of decreasing vaccination rates. To address vaccine hesitancy, strategies should not only highlight the vaccine's safety and effectiveness but also focus on rebuilding trust in healthcare workers and public health authorities to prevent future confidence crises [8]. Another study found similar results, noting that key factors influencing parents' decisions to vaccinate, such as HPV knowledge and positive attitudes, are modifiable. These findings, similar to our study, emphasize the need for targeted programs and innovative strategies to improve parents' knowledge, risk perception, and trust in HPV vaccination, as supported by other studies [44].

Conclusions

The study revealed that parents had limited knowledge about HPV infection, lesions, and the HPV vaccine, yet they expressed a strong desire for more information, both for themselves and their children. To address this, a participatory approach, such as co-creation, should be adopted to design educational programs that involve all stakeholders, including parents, children, and healthcare professionals. It is particularly important for parents, especially mothers, to stay informed about the introduction of the HPV vaccine as part of the national vaccination program and to understand the benefits it offers for their children. Additionally, involving parents in educational campaigns will help address their concerns about vaccine side effects, particularly those related to the HPV vaccine. Enhancing parents' willingness to vaccinate their daughters against HPV is crucial for the eradication of cervical cancer, especially in low-resource settings.

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Conflict of interests

No conflict of interests is declared.

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