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Determinants of Parents' Knowledge and Perceptions Regarding Human Papillomavirus Vaccination for Cervical Cancer Prevention

Mohamed Said NCIRI

nsiri.tv@gmail.com

Ons TOUAHRI
Omar ABDELHEDI
Fatma KHANFIR
Yesmin DAHECH
Alya BENGAYED
Kais CHABBENE
Bassem ABID

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Abstract

Introduction: Human papillomavirus (HPV) vaccination is a highly effective strategy for preventing cervical cancer and other HPV-related diseases. Parental knowledge and perceptions play a critical role in vaccine acceptance. This study aimed to assess parents' knowledge and perceptions regarding HPV vaccination and identify factors associated with poor knowledge among parents of girls aged 12–18 years in Tunisia.

Methods: A quantitative, descriptive, cross-sectional, and analytical study was conducted among parents of girls aged 12–18 years in Sfax, Tunisia. Data were collected using an anonymous self-administered questionnaire assessing sociodemographic characteristics, knowledge of HPV infection and vaccination, and perceptions toward HPV vaccination. Factors associated with poor knowledge were analyzed.

Results: Among 350 participants, the median age was 35 years, and 302 (86.3%) were mothers. Although 238 (68.0%) parents had heard of HPV and 262 (74.9%) had heard of HPV vaccination, knowledge remained limited, with a median score of 2 (IQR: 1–3); 139 (39.7%) participants had poor knowledge. Only 16 (4.6%) reported that their child had received HPV vaccination, whereas 167 (47.7%) refused it. The main barriers were concerns about vaccine side effects (46.0%) and insufficient information (31.1%). Lower education, low socioeconomic status, rural residence, unemployment, lack of previous HPV awareness, and absence of social media use were associated with poor knowledge**.**

Conclusion: Despite relatively high HPV awareness, parental knowledge and vaccine uptake remain insufficient in Tunisia. Targeted education by healthcare professionals, school-based awareness programs, and evidence-based communication strategies are needed to improve HPV vaccine acceptance.

1. Introduction

Cervical cancer is the first solid tumor whose pathogenic mechanism has been elucidated, enabling primary prevention through vaccination. It remains a major public health concern, particularly in low-resource countries where screening programs are insufficiently developed (1).

Globally, cervical cancer is the fourth most common cancer among women, with approximately 660,000 new cases and 350,000 deaths estimated in 2022 (2). In Tunisia, more than 300 new cases and around 185 deaths are reported annually, most diagnosed at an advanced stage (3).

Human papillomavirus (HPV) is one of the most common sexually transmitted viruses worldwide. Although most sexually active individuals acquire HPV at least once during their lifetime, persistent infection with high-risk HPV types is the necessary cause of cervical cancer (4).

To reduce this burden, the World Health Organization (WHO) launched the Global Strategy to Accelerate the Elimination of Cervical Cancer in 2020, aiming to vaccinate 90% of girls before the age of 15 years by

2030(5).

In line with this strategy, Tunisia introduced free HPV vaccination and, in April 2025, launched a single-dose HPV vaccination campaign for 12-year-old girls, integrated into the national immunization schedule. Since 2026, HPV vaccination has been administered concurrently with poliomyelitis, tetanus, and diphtheria vaccines (6).

Despite these efforts, HPV vaccine uptake remains below the WHO target, with global first-dose coverage increasing from 20% in 2022 to only 27% in 2023(7). Parental reluctance continues to be one of the main barriers to vaccination. Therefore, this study aimed to assess parents' knowledge and perceptions regarding HPV vaccination and to identify factors associated with poor parental knowledge.

2. Materials and Methods

Study Design

A descriptive, cross-sectional, and analytical study with a quantitative approach was conducted.

Study Population and Participants

This study was conducted in the Sfax region, Tunisia, among parents or legal guardians of girls aged 12–18 years eligible for human papillomavirus (HPV) vaccination.

Inclusion criteria

Parents or legal guardians of girls aged 12–18 years eligible for HPV vaccination, residing in the Sfax region (urban or rural), who provided informed consent to participate were included. Eligible participants were mentally competent, available during the study period, and able to complete the questionnaire.

Exclusion criteria

Individuals who were not parents or legal guardians of girls aged 12–18 years eligible for HPV vaccination, parents residing outside the Sfax region, those who refused to participate, or were unable to complete the questionnaire because of cognitive impairment or major communication barriers were excluded.

Participants who withdrew consent during the study, submitted incomplete or unusable questionnaires with substantial missing data, interrupted the survey before completion, or were subsequently found not to meet the eligibility criteria were also excluded.

Sample Size Determination and Sampling Technique

The sample size was calculated by the Power Analysis and Sample Size Software (PASS) 15.0, according to previous literature (3), resulting in a minimum sample size of **385 participants**.

A probabilistic random sampling method was applied to select participants.

Data Collection Instrument

Data were collected using a questionnaire adapted from the study by Smolarczyk et al. (2022) and modified to reflect the Tunisian context and the national HPV vaccination policy.(6)

The questionnaire consisted of 39 items organized into two sections. The first section collected sociodemographic information on the parents and their children. The second section assessed parents' knowledge and perceptions regarding HPV infection and HPV vaccination.

Before data collection, the questionnaire underwent content validation by a panel of five experts. A pilot study involving 20 parents, who were subsequently excluded from the main study, was conducted to assess the clarity, relevance, and completion time of the questionnaire. Internal consistency demonstrated good reliability, with a Cronbach's alpha of 0.872.

Scoring System

Parents' knowledge was assessed using a 12-item score. Correct responses were validated by a gynecology and obstetrics specialist. Knowledge levels were categorized as poor (0–4), moderate (5–7), and good (8–12).

Parents' perceptions were analyzed descriptively using frequencies and percentages without generating a composite score.

Data Collection Procedure

Data were collected between 14 February 2026 and 18 March 2026. The questionnaire was administered in both paper-based and online (Google Forms) formats. The average completion time was approximately 10 minutes. Participation was voluntary, and all questionnaires were completed anonymously.

Ethical Considerations

Authorization from the authors of the questionnaire was obtained for the use of certain items.

Several measures were taken to ensure respect for the rights and freedom of the participants. Before administering the questionnaire, information regarding the study, its objectives, and the modalities of participation was explained to the participants to ensure informed consent. In addition, measures were implemented to respect participants’ rights and autonomy. Likewise, confidentiality of the collected data and anonymity of the participants were maintained throughout the study.

Data Analysis

Data were entered and analyzed using SPSS version 20, Microsoft Excel 2016, and Google Forms.

Normality was assessed using the Kolmogorov–Smirnov test and visual inspection. Associations between categorical variables and KAP levels were examined using Chi-square or Fisher's exact test.

Statistical significance was set at $p < 0.05$. Results were presented in tables and figures.

3. RESULTS

Sociodemographic characteristics

A total of 350 parents participated in the study. The median age was 35 years (IQR: 30–42; range: 21–55 years). Most participants were mothers (n = 302, 86.3%), married (n = 337, 96.3%), and had at least a secondary level of education (n = 297, 84.8%). The median number of children per family was 2 (IQR: 2–3; range: 1–9). All participants had at least one daughter aged 12–18 years who was eligible for HPV vaccination. More than half were housewives (n = 197, 56.3%), while 85 (24.3%) were employed. Most families reported a middle socioeconomic status (n = 307, 87.7%), and 188 (53.7%) resided in urban areas. The majority of participants (n = 300, 85.7%) used social media, with 159 (53.0%) spending 1–3 hours per day on these platforms.

HPV-related characteristics

Overall, 238 (68.0%) parents had previously heard of HPV, and 262 (74.9%) were aware of the HPV vaccine. The Internet was the main source of information for both HPV (n = 128, 36.3%) and HPV vaccination (n = 175, 50.0%). Among mothers (n = 302), 46 (15.3%) had undergone cervical cytology screening, whereas only 18 (6.0%) had previously been screened for HPV infection.

Parents' Knowledge Regarding HPV Infection and HPV Vaccination

Overall, parents demonstrated limited knowledge regarding HPV infection and HPV vaccination. Although 65.4% (n = 229) correctly recognized HPV as the cause of cervical cancer, only 40.3% (n = 141) identified sexual intercourse as the main mode of HPV transmission, and 21.7% (n = 76) recognized that both women and men are at risk of HPV infection. Furthermore, 40.3% (n = 141) identified HPV vaccination before sexual debut as the main preventive measure against HPV infection, whereas 66.0% (n = 231) believed that HPV vaccination is intended only for females, highlighting persistent misconceptions regarding the target population for vaccination.

Table 1

Parents' knowledge regarding HPV infection and HPV vaccination (n = 350).

Variables	n (%)
Main mode of HPV transmission	
Kissing	18 (5.1)
Touching	51 (14.6)
Sexual intercourse	141 (40.3)
During vaginal delivery	15 (4.3)
Contact with infected blood	34 (9.7)
I don't know	158 (45.1)
Population at high risk of HPV infection	
Women only	155 (44.3)
Men only	2 (0.6)
Children	29 (8.3)
Both women and men	76 (21.7)
I don't know	88 (25.1)
HPV as a cause of cervical cancer	
Yes	229 (65.4)
No	26 (7.4)
I don't know	95 (27.2)
Main preventive measure against HPV infection?	
HPV vaccination before sexual debut	141 (40.3)
Condom use	58 (16.6)
Limiting the number of sexual partners	93 (26.6)
HPV infection cannot be prevented	10 (2.9)
I don't know	133 (38)
Target population for HPV vaccination	
Females only	231 (66)
Males only	1 (0.3)
Both females and males	57 (16.3)

Variables	n (%)
I don't know	61 (17.4)

The median knowledge score was 2 (IQR: 1–3), with scores ranging from 1 to 3. As shown in Fig. 1, 39.7% (n = 139) of participants had a poor level of knowledge.

Parents' Perceptions and Acceptance of HPV Vaccination

Table 2

Parents' Perceptions and Acceptance of HPV Vaccination (n = 350).

Variables	**n (%)**
Uptake of optional (self-paid) vaccines for children	
Yes	114 (32.6)
No	203 (58)
Do Not Remember	33 (9.4)
General attitude toward vaccination	
Positive	108 (30.9)
Positive, but not for all vaccines	137 (39.1)
Doubtful	77 (22)
Negative	28 (8)
HPV vaccination status of the daughter	
Vaccinated	16 (4.6)
Not vaccinated	334 (95.4)
Acceptance of HPV vaccination	
Accept	109 (31.1)
Refuse	167 (47.7)
Undecided	74 (21.1)
Main reason for refusing HPV vaccination	
Fear of side effects	161 (46)
Insufficient information about the vaccine	109 (31.1)
Uncertainty about vaccine effectiveness	91 (26)
Uncertainty about vaccine quality	73 (20.9)
Factors influencing parents' decision to vaccinate their daughters against HPV	
Positive opinions about the vaccine on the Internet	45 (12.9)
Perceived vaccine safety	39 (11.1)
Positive opinions from friends	45 (12.9)
Positive recommendation from a physician	14 (4)
Perceived high vaccine effectiveness	3 (0.9)

Variables	n (%)
Importance of educating adolescents about HPV	
Yes	285 (81.4)
No	65 (18.6)
Need for additional information about HPV	
Yes	307 (87.7)
No	43 (12.3)
Preferred source of HPV information	
Healthcare professional	246 (70.3)
School	115 (32.9)
Online videos by healthcare professionals	54 (15.4)
Posters/brochures	39 (11.1)
Social media influencers	27 (7.7)

Factors Associated with Poor Knowledge Regarding HPV Infection and HPV Vaccination

Table 3
Factors associated with poor knowledge regarding HPV infection and HPV vaccination among parents (n = 350).

Factors	n (%)	OR [95% CI]	p-value
Poor Knowledge			
Education level			
Primary	24 (57.1)	2.238 (1.164–4.300)	0.014*
Secondary	83 (48.3)	2.032 (1.315–3.140)	0.001*
Higher	26 (20.8)	0.260 (0.157–0.431)	< 0.001*
Employment status			
Employed	17 (20.0)	0.293 (0.163–0.525)	< 0.001*
Housewife	88 (44.7)	1.615 (1.042–2.502)	0.032*
Socioeconomic status			
Low	14 (60.9)	2.514 (1.057–5.980)	0.032
Place of residence			
Urban	65 (34.6)	0.628 (0.408–0.967)	0.034
Rural	74 (45.7)	1.591 (1.034–2.449)	
Social media use			
Yes	109 (36.3)	0.380 (0.206–0.702)	0.002
No	30 (60.0)	2.628 (1.424–4.851)	
Time spent on social media			
1–3 hours/day	48 (30.1)	0.475 (0.305–0.739)	0.001
Sex of children			
Female	134 (42.1)	3.933 (1.476–10.477)	0.003
Awareness of HPV			
Yes	58 (24.4)	0.123 (0.074–0.205)	< 0.001
No	75 (72.1)	7.355 (4.396–12.304)	< 0.001
Source of HPV information			
Social campaign	6 (17.6)	0.295 (0.119–0.732)	0.006

n: frequency; %: Percentage; OR: odds ratio; CI: confidence interval; p ≤ 0.05 considered statistically significant

Factors	n (%)	OR [95% CI]	p-value
Physician	4 (11.8)	0.179 (0.062–0.520)	< 0.001
Television/radio	25 (27.2)	0.471 (0.280–0.794)	0.004
Friends	13 (26.0)	0.485 (0.248–0.950)	0.032
Internet	30 (23.4)	0.317 (0.195–0.516)	< 0.001
Awareness of HPV vaccine			
Yes	79 (30.2)	0.201 (0.120–0.339)	< 0.001
No	60 (68.2)	4.964 (2.950–8.353)	< 0.001
Source of HPV vaccine information			
Healthcare professional	11 (17.2)	0.256 (0.129–0.511)	< 0.001
Internet	44 (25.1)	0.283 (0.180–0.445)	< 0.001
No source	49 (77.8)	7.661 (4.023–14.590)	< 0.001
HPV testing			
Yes	3 (15.8)	0.269 (0.077–0.941)	0.028
Cervical cancer screening			
Yes	9 (19.1)	0.315 (0.147–0.675)	0.002
No	112 (43.8)	1.930 (1.158–3.216)	0.011
Screening performed by a gynecologist			
Yes	4 (13.3)	0.211 (0.072–0.618)	0.002

n: frequency; %: Percentage; OR: odds ratio; CI: confidence interval; p ≤ 0.05 considered statistically significant

4. Discussion

Overall, knowledge about HPV and HPV vaccination remained limited despite relatively high awareness of HPV and the vaccine. Parents also expressed considerable willingness to receive additional information from healthcare professionals, highlighting important opportunities for educational interventions.

Most parents had heard about HPV (68.0%) and HPV vaccination (74.9%), with the Internet being the principal source of information for both. Awareness of HPV vaccination in our study was higher than that reported in Saudi Arabia, where nearly two-thirds of parents had never heard about the HPV vaccine (8), but remained lower than that observed in developed countries such as the United States and China,

where awareness exceeds 85% (9,10). These differences may reflect disparities in national vaccination policies, implementation of awareness campaigns, and accessibility of reliable health information. Since Tunisia has only recently introduced HPV vaccination into the national immunization program, public awareness remains limited compared with countries where vaccination has been recommended for many years.

Despite this relatively high awareness, parents demonstrated poor factual knowledge regarding HPV infection and its prevention. Approximately two-fifths of participants had poor knowledge, with a median knowledge score of only 2 out of 3. Similar findings have been reported in Poland (6) and Saudi Arabia (8), suggesting that awareness does not necessarily translate into accurate knowledge. In particular, misconceptions regarding HPV transmission, target populations, vaccine indications, and vaccine effectiveness remained common. Such knowledge gaps may reduce parents' perception of their children's susceptibility to HPV infection and consequently decrease vaccine acceptance.

Although almost two-thirds of parents correctly identified HPV as a cause of cervical cancer, knowledge of other HPV-related cancers remained substantially lower. Likewise, fewer than half correctly recognized HPV vaccination as the main preventive strategy. Similar observations have been reported in Côte d'Ivoire (7) and Saudi Arabia (8). These findings indicate that educational initiatives should emphasize not only cervical cancer prevention but also the broader burden of HPV-related diseases and the preventive benefits of vaccination.

Healthcare professionals appeared to play a pivotal role in parental decision-making. Parents considered physicians and other healthcare providers the most trusted sources of information and preferred face-to-face discussions over social media or mass media. Similar findings have been reported in Greece (11) and several international studies showing that healthcare provider recommendation is one of the strongest determinants of HPV vaccine acceptance. Strengthening provider-parent communication during routine consultations may therefore substantially improve vaccine confidence.

Actual HPV vaccine uptake was extremely low, with only 4.6% of parents reporting that their children had received the vaccine. Nearly half of parents expressed unwillingness to vaccinate their daughters, mainly because of concerns regarding vaccine safety, insufficient information, and uncertainty about vaccine effectiveness. Similar barriers have consistently been reported in Tunisia (3) and internationally. Safety concerns remain one of the principal drivers of vaccine hesitancy, emphasizing the importance of evidence-based communication strategies addressing misconceptions surrounding HPV vaccination.

Despite these barriers, parents demonstrated a strong interest in receiving additional information. More than four-fifths considered HPV education for adolescents important, and nearly 90% wished to improve their own knowledge. Most preferred educational sessions delivered by healthcare professionals, followed by school-based education. These findings support integrating HPV education into school health programs and routine primary healthcare services.

Several factors were significantly associated with poor knowledge. Lower educational attainment, low socioeconomic status, rural residence, unemployment, lack of social media use, absence of previous HPV or HPV vaccine awareness, and no history of cervical cancer screening were associated with poorer knowledge levels. Similar associations between educational level and HPV knowledge have been reported in previous studies (6,12).Individuals with higher education may have greater health literacy and easier access to reliable health information. Likewise, women who had undergone cervical cancer screening demonstrated better knowledge, suggesting that preventive healthcare encounters provide valuable opportunities for education about HPV and vaccination.

Interestingly, parents who had never heard about HPV or HPV vaccination were several times more likely to have poor knowledge than those previously exposed to these topics. This finding reinforces the importance of awareness campaigns as a first step toward improving knowledge and ultimately increasing vaccine acceptance. Since the Internet represented the primary information source in our population, developing reliable digital educational resources while reinforcing communication by healthcare professionals may be particularly effective.

Overall, our findings indicate that although awareness of HPV vaccination is relatively encouraging, substantial knowledge gaps and persistent vaccine hesitancy remain among Tunisian parents. Multifaceted interventions combining healthcare provider recommendations, school-based education, community awareness campaigns, and accessible evidence-based information are likely to improve parental knowledge and facilitate successful implementation of the national HPV vaccination program.

5. CONCLUSION

This study highlights that, despite relatively high awareness of HPV and HPV vaccination, Tunisian parents continue to have insufficient knowledge and persistent misconceptions regarding HPV infection, its transmission, and the benefits of vaccination. These knowledge gaps are reflected in the very low HPV vaccine uptake and high levels of vaccine hesitancy, mainly driven by concerns about vaccine safety and inadequate information. Lower educational level, socioeconomic disadvantage, rural residence, and limited prior exposure to HPV-related information were significantly associated with poor knowledge. These findings underscore the urgent need for comprehensive educational strategies integrating healthcare professionals, schools, and evidence-based digital communication to improve health literacy and strengthen parental confidence in HPV vaccination. Such interventions will be essential to support the successful implementation of Tunisia's national HPV vaccination program and contribute to achieving the World Health Organization's cervical cancer elimination targets.

Declarations

Declaration of conflicting interest:

The authors declare that there is no conflict of interest.

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Ethical approval and informed consent:
Ethical approval was obtained from the relevant institutional authorities, and written informed consent was obtained from all participants.

Data availability statement:
The data that support the findings of this study are available from the corresponding author upon reasonable request.

References

1. Boulanger JCh. Vaccination anti-HPV. Rev Sage-Femme. 1 déc 2007;6(4):188-91. doi:10.1016/S1637-4088(07)79642-6
2. Jiang Y, Gong L, Li B, Liu Y, Liu S, Liu H, et al. Information sources and message framing effect on parental willingness for adolescent HPV vaccination in China. Hum Vaccines Immunother. déc 2025;21(1):2588878. doi:10.1080/21645515.2025.2588878 PubMed PMID: 41292187; PubMed Central PMCID: PMC12667631.
3. Bannour I, Mastouri S, Bannour R, Saoudi R, Chahed S, Bannour B. HPV vaccination: analysis of acceptability among mothers – a study of 160 cases. Int J Adolesc Med Health. 1 déc 2025;37(6):389-96. doi:10.1515/ijamh-2025-0141
4. Saraiya M, Unger ER, Thompson TD, Lynch CF, Hernandez BY, Lyu CW, et al. US Assessment of HPV Types in Cancers: Implications for Current and 9-Valent HPV Vaccines. JNCI J Natl Cancer Inst. 1 juin 2015;107(6):djv086. doi:10.1093/jnci/djv086
5. Initiative pour elimination du cancer du col de uterus [Internet]. [cité 14 juill 2026]. Disponible sur: https://www.who.int/fr/initiatives/cervical-cancer-elimination-initiative
6. Smolarczyk K, Duszewska A, Drozd S, Majewski S. Parents' Knowledge and Attitude towards HPV and HPV Vaccination in Poland. Vaccines. 2 févr 2022;10(2):228. doi:10.3390/vaccines10020228 PubMed PMID: 35214686; PubMed Central PMCID: PMC8876926.
7. Kounangui MNAA, Kouadio DE, Assamala ME, Loukou GK, Bangaman CA, Kouassi C. Déterminants du refus de la vaccination contre le papillomavirus humain chez les parents des enfants de 9 à 14 ans au sein des ménages d'Aliodan en 2024, Côte d'Ivoire: étude transversale quantitative. PAMJ Clin Med. 3 juill 2025;51(62). doi:10.11604/pamj.2025.51.62.46844
8. Bakhashab AS, Aljilani SA, Alkinaidri NM, Felimban AA, Habbal MH, Bashah NA, et al. Knowledge, attitude, and perception of the parents toward HPV vaccine administration to their children in Saudi Arabia: a cross-sectional study. Front Public Health. 2025;13:1531517. doi:10.3389/fpubh.2025.1531517 PubMed PMID: 40740361; PubMed Central PMCID: PMC12307288.

9. Marlow LAV, Zimet GD, McCaffery KJ, Ostini R, Waller J. Knowledge of human papillomavirus (HPV) and HPV vaccination: an international comparison. Vaccine. 21 janv 2013;31(5):763-9. doi:10.1016/j.vaccine.2012.11.083 PubMed PMID: 23246310.
10. Zhou X, Wu M, Zhou Y, Su F, He Y, Ding J, et al. Knowledge, attitudes, behaviors, and information needs of women vaccinated with the HPV vaccine regarding cervical cancer prevention: a cross-sectional study. Front Public Health. 2025;13:1493589. doi:10.3389/fpubh.2025.1493589 PubMed PMID: 40017550; PubMed Central PMCID: PMC11865027.
11. Tsimpou E, Bothou A, Nanou CI, Kyrkou GA, Varela P, Diamanti A, et al. Knowledge and Perceptions of Parents and Adolescents Regarding HPV and Its Vaccine. Cureus. janv 2026;18(1):e102411. doi:10.7759/cureus.102411 PubMed PMID: 41769446; PubMed Central PMCID: PMC12942967.
12. John A, Abbah AP, Sandøy IF. Associations of socioeconomic factors with parents' awareness and acceptability of HPV vaccination in sub-Saharan Africa - a systematic review and meta-analysis. BMC Public Health. 17 oct 2025;25:3525. doi:10.1186/s12889-025-24550-x PubMed PMID: 41107838; PubMed Central PMCID: PMC12535123.

Figures

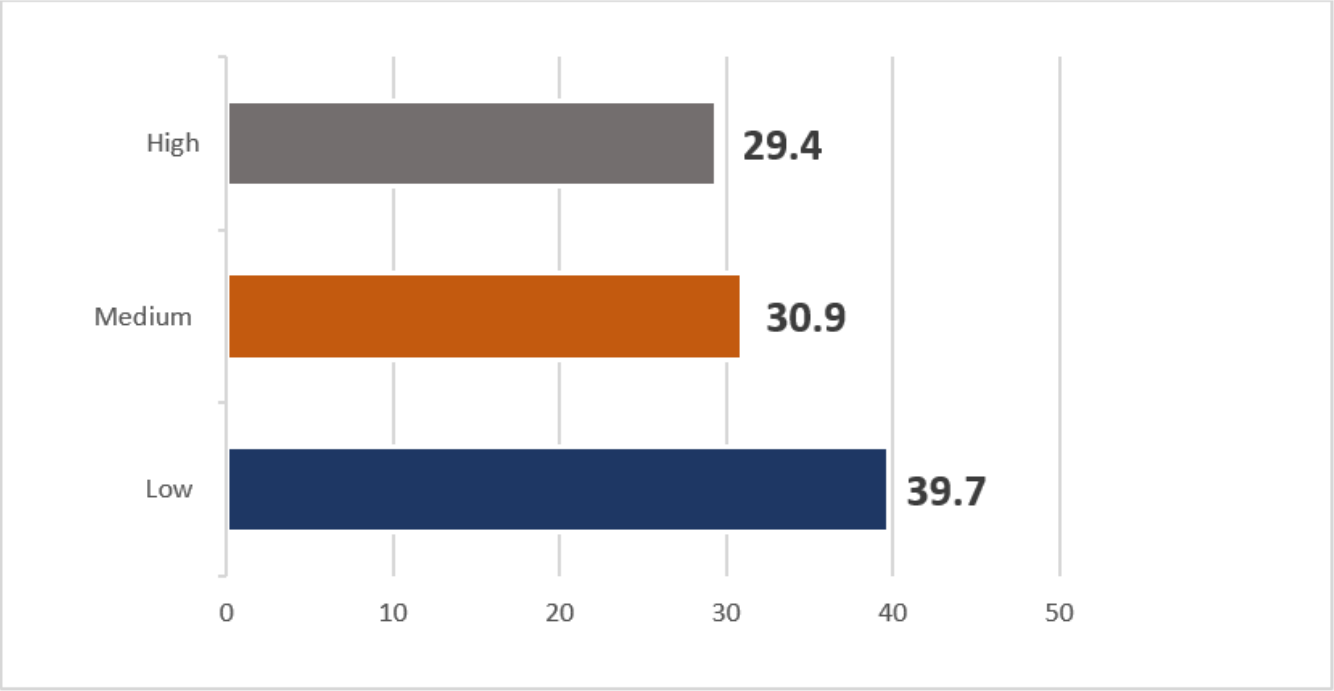


Figure 1

Overall knowledge level of parents regarding HPV and HPV vaccination.