

# The Saudi Population's Knowledge and Attitude Towards Human Papillomavirus (HPV) Infection and Its Vaccination

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## Abstract

**Background:** Human papillomavirus (HPV) infection is a major worldwide public health concern that can result in a range of clinical disorders, including cervical cancer. Saudi Arabia, similar to numerous other nations, has difficulties in facing HPV and its impact on society. The high incidence of cervical cancer in Saudi Arabia continues to be a cause for worry, highlighting the need for the adoption of efficient immunization programs. Nevertheless, public hesitation and inadequate knowledge can hinder the acceptance of vaccines. Evaluating public knowledge and attitudes concerning HPV and its vaccination is essential in order to create focused programs that enhance awareness and increase vaccine acceptance.

**Methods:** This study was cross-sectional in nature, using data from a sample of 516 Saudi participants 18 years and above. The participants completed online questionnaires that were distributed using Google Forms across social media platforms and ensured anonymity.

**Results:** A total of 516 participants made up the sample for this study, which had a predominance of females (83.5%, n=431); the majority aged 18-25 years (78.3%, n=404) and most of them (28.3%, n=146) were from the central region. The study results revealed that 43.7% (n=225) of the participants had a good knowledge level while 56.3% (n=291) of them had a poor level of knowledge about the HPV vaccine. A substantial proportion (35.9%, n=185) of the participants had good knowledge that HPV can be transmitted sexually from one person to another with only 30.2% (n=156) of them being aware that HPV is a common infection that causes cervical cancer (41.5%, n=214) and most of them (76.2%, n=393) knew that cervical cancer can be cured particularly when detected in early stages. The results established statistically significant associations between gender, education level, and occupation with p-values <0.005 (0.023, 0.003 and 0.001 respectively) and level of knowledge about the HPV vaccine.

**Conclusion:** The study emphasizes the necessity of implementing focused health education and vaccination initiatives in Saudi Arabia to enhance understanding and attitudes regarding HPV infection and its vaccine. The results can provide guidance to healthcare professionals, legislators, and public health authorities in creating programs that increase knowledge and acceptance of the HPV vaccine, ultimately decreasing the prevalence of HPV-related diseases in the nation.

**Categories:** Family/General Practice, Preventive Medicine, Dermatology

**Keywords:** health education programs, vaccine acceptance, cervical cancer, hpv vaccination, human papillomavirus (hpv)

## Introduction

Human papillomavirus (HPV) is a major global public health issue, as it is the most prevalent sexually transmitted infection (STI) that can lead to a range of clinical conditions, from harmless warts to cancerous tumors such as cervical, anal, and oropharyngeal malignancies [1,2]. The introduction of preventive vaccinations that specifically target high-risk strains of HPV has the potential to greatly decrease the occurrence of illnesses linked with HPV [3].

Saudi Arabia, amongst other developing countries, is dealing with difficulties in addressing HPV and its consequences. The prevalence of cervical cancer in Saudi Arabia continues to be a cause for worry, necessitating the implementation of efficient immunization programs [4]. The uptake of the HPV vaccine is significantly influenced by parental decisions, particularly for girls aged 11 to 12 years, who are the recommended target group. Catch-up vaccines are also available for older adolescents [5].

Although these preventive strategies are accessible, vaccine adoption can be impeded by public hesitation

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and gaps in understanding. The acceptability of HPV vaccination in Saudi Arabia is hindered by cultural sensitivities and a lack of information, which act as hurdles [6]. Therefore, it is essential to comprehend the public knowledge and attitudes regarding HPV and its vaccination in order to customize health education and vaccination campaigns that can effectively tackle these obstacles and encourage vaccine uptake [7]. The objective of this study is to examine the knowledge and attitudes of the population in Saudi Arabia regarding HPV infection and its vaccine. The study intends to evaluate the extent of awareness and identify any misconceptions or obstacles that may hinder the acceptance of the vaccine. The results will offer significant knowledge for healthcare practitioners, politicians, and public health authorities to create focused initiatives that can enhance awareness and adoption of the HPV vaccine, thereby lessening the impact of HPV-related illnesses in the kingdom [8].

## Materials And Methods

The study utilized a cross-sectional research design to explore the knowledge and attitudes of Saudi participants regarding HPV infection and associated vaccinations, with the goal of preventing cervical cancer in various regions of Saudi Arabia. The study was carried out between June 2023 and September 2023, with 516 Saudi volunteers who were over the age of 18. Participants were recruited via a random distribution of a closed-ended online questionnaire. The questionnaire, validated prior to distribution to ensure the reliability and consistency of the gathered information, was administered through Google Forms and shared on multiple social media platforms. The survey included a total of 16 questions, which were categorized into three sections: six questions regarding sociodemographic data, six questions assessing knowledge about HPV and its vaccination, and four questions regarding attitudes towards the vaccination. The data analysis was conducted using SPSS version 25 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to provide a summary of the sociodemographic characteristics and the responses to the knowledge and attitude items. Inferential statistics, including chi-square tests, were utilized to analyze the associations between sociodemographic variables such as age, gender, education level, and knowledge regarding HPV vaccination. The threshold for statistical significance was established at a p-value of less than 0.05. Ethical considerations encompassed voluntary participation, participant anonymity, and getting previous ethical approval from the University Ethics Committee at Majmaah University (MUREC-jun.19/COM-2023/23-10).

## Results

A total of 516 participants completed the questionnaire. Table 1 shows the socio-demographic information of the study subjects. The vast majority (83.5%, n=431) of participants were females with more than half (77.1%, n=398) being Saudi nationals and most of the participants (78.3%, n=404) were aged between 18-25 years. 28.3% (n=146) of the participants were from the central region. A substantial proportion (42.2%, n=285) of the participants had vocational school education while more than half of the participants (69.6%, n=359) were students.

| Socio-demographic information | Category                  | Frequency and Proportion n (%) |
|-------------------------------|---------------------------|--------------------------------|
| Gender                        | Male                      | 85 (16.5%)                     |
|                               | Female                    | 431 (83.5%)                    |
| Nationality                   | Saudi                     | 398 (77.1%)                    |
|                               | Non-Saudi                 | 118(22.9%)                     |
| Age                           | 18-25                     | 404 (78.3%)                    |
|                               | 25-30                     | 37 (7.2%)                      |
|                               | 30-40                     | 42 (8.1%)                      |
|                               | 40-50                     | 25 (4.8%)                      |
|                               | More than 50              | 8 (1.6%)                       |
| Place of residence            | Central                   | 146 (28.3%)                    |
|                               | Eastern                   | 97 (18.8%)                     |
|                               | Northern                  | 49 (9.5%)                      |
|                               | Southern                  | 97 (18.8%)                     |
|                               | Western                   | 127(24.6%)                     |
| Education Level               | Uneducated                | 2 (0.4%)                       |
|                               | Elementary School         | 3 (0.6%)                       |
|                               | Intermediate              | 11 (2.1%)                      |
|                               | High School               | 170 (32.9%)                    |
|                               | Vocational school         | 218 (42.2%)                    |
|                               | Diploma                   | 20 (3.9%)                      |
|                               | Bachelor's degree         | 80 (15.5%)                     |
|                               | Post-graduation education | 12 (2.4%)                      |
| Occupation                    | Healthcare professional   | 15 (2.9%)                      |
|                               | student                   | 359 (69.6%)                    |
|                               | Unemployed                | 87 (16.9%)                     |
|                               | Other                     | 55 (10.6%)                     |

TABLE 1: Socio-demographic information of the participants (N=516)

Socio-demographic information presented in frequencies (n) and proportion (%)

Table 2 depicts the knowledge about HPV, vaccination and cervical cancer of the participants. The findings demonstrate that 39.9% (n=206) of the participants had the knowledge that both genders can be infected with HPV. The vast majority of the participants (94.0%, n=485) had the knowledge that someone might be infected by HPV but not know. Only 35.9% (n=185) of the respondents were aware that HPV can be transmitted sexually from one person to another. Only 30.2% (n=156) of the participants were aware that HPV is a common infection while 41.5% (n=214) of them had knowledge that HPV infection causes cervical cancer. The majority of the participants (76.2%, n=393) were aware that cervical cancer can be cured particularly when detected in early stages.

| Questions   | Categories   | Frequency and Proportion n (%) |
|---|--------------|--------------------------------|
| Who can get infected with HPV   | Both         | 206 (39.9%)                    |
|   | Females      | 207 (40.1%)                    |
|   | Males        | 6 (1.2%)                       |
|   | I don't know | 97 (18.8%)                     |
| Do you know that someone might be infected by HPV, but he/she does not know                         | Yes          | 485 (94.0%)                    |
|   | No           | 31 (6.0%)                      |
| Do you know that HPV can be transmitted sexually from one person to another                         | Yes          | 185 (35.9%)                    |
|   | No           | 331 (64.1%)                    |
| Do you know that HPV infection is common  | Yes          | 156 (30.2%)                    |
|   | No           | 360 (69.8%)                    |
| Do you know that HPV infection can cause cervical cancer  | Yes          | 214 (41.5%)                    |
|   | No           | 302 (58.5%)                    |
| Do you know that cervical cancer can be cured, specifically when it is detected in the early stages | Yes          | 393 (76.2%)                    |
|   | No           | 123 (23.8%)                    |

TABLE 2: Knowledge about HPV, vaccination and cervical cancer

Knowledge about HPV, vaccination and cervical cancer presented in frequencies (n) and proportion (%)

Figure 1 illustrates the proportion of participants and their knowledge about the gender groupings that can get infected with HPV. According to the findings, a substantial proportion (206, 39.9%) of the participants correctly reported that both genders can be infected with HPV. A considerable majority (207, 40.1%) of the participants cited females; 97 (18.8%) were not sure while only six (1.2%) cited males.

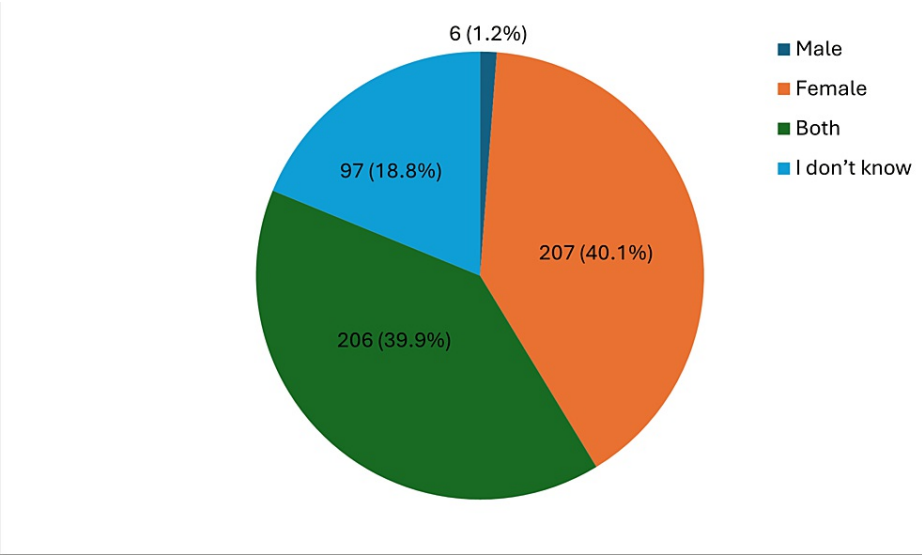


FIGURE 1: Proportion of participants and their knowledge about HPV infection across gender

Table 3 presents information on the general attitude towards vaccination. The vast majority (82.4%, n=425) of the participants agreed that vaccination is effective in preventing diseases. More than half (70.0%, n=361) were worried about the vaccine's side effects while 75.9% (n=392) of the participants understood that

vaccines are administered to prevent very severe diseases.

| Statement  | Strongly disagree | Disagree    | Agree       | Strongly agree |
|--|-------------------|-------------|-------------|----------------|
| Vaccination is effective to prevent disease                        | 34 (6.5%)         | 57 (11.1%)  | 321 (62.2%) | 104 (20.2%)    |
| I am worried about vaccine's side effects                          | 40 (7.8%)         | 115 (22.2%) | 284 (55.0%) | 77 (15.0%)     |
| Vaccines are administered to prevent very severe disease           | 40 (7.8%)         | 84 (16.3%)  | 278 (53.9%) | 114 (22.0%)    |
| Vaccines are administered to prevent sexually transmitted diseases | 59 (11.4%)        | 99 (19.2%)  | 257 (49.8%) | 101 (19.6%)    |

**TABLE 3: General attitude towards vaccination**

General attitude towards vaccination among participants presented in frequencies (n) and proportion (%)

Table 4 depicts the relationship between participants’ demographics such as gender, nationality, age, place of residence, educational level, occupation and level of acceptance of the HPV vaccine. The results established a statistically significant association between gender, education level, and occupation with p-values <0.005 (0.023, 0.003 and 0.001 respectively) and the level of knowledge about the HPV vaccine. There were no statistically significant associations between nationality, age, place of residence, and the level of knowledge about the HPV vaccine (p>0.005).

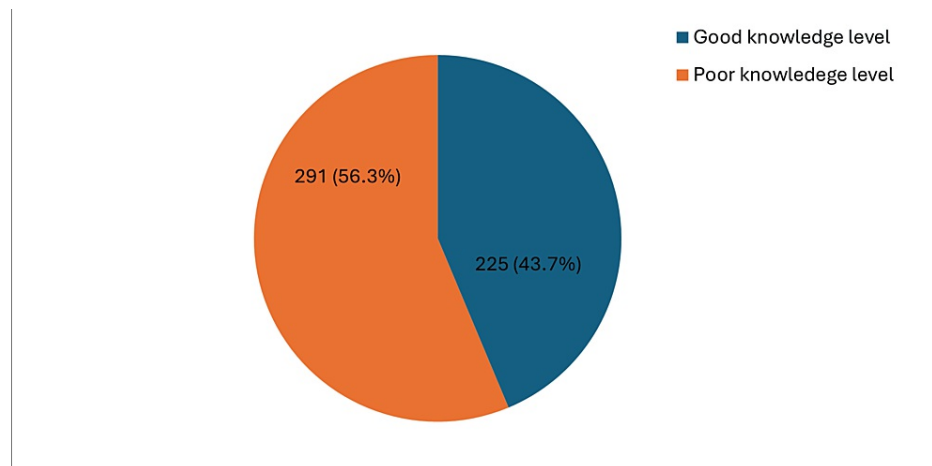
| Variables          | Category              | Poor        | Good        | p value |
|--------------------|-----------------------|-------------|-------------|---------|
| Gender             | Male                  | 50 (58.6%)  | 35 (41.4%)  | 0.023*  |
|                    | Female                | 216 (50.1%) | 215 (49.9%) |         |
| Nationality        | Saudi                 | 183 (45.9%) | 215 (54.1%) | 0.149   |
|                    | Non-Saudi             | 68 (57.7%)  | 50 (42.3%)  |         |
| Age                | 18-25                 | 219 (54.2%) | 185 (45.8%) | 0.306   |
|                    | 25-30                 | 21 (57.6%)  | 16 (42.4%)  |         |
|                    | 30-40                 | 26 (60.8%)  | 16 (39.2%)  |         |
|                    | 40-50                 | 15 (58.2%)  | 10 (41.8%)  |         |
|                    | More than 50          | 5 (56.9%)   | 3 (43.1%)   |         |
| Place of residence | Central               | 87 (57.2%)  | 62 (42.8%)  | 0.210   |
|                    | Eastern               | 58 (59.4%)  | 39 (40.6%)  |         |
|                    | Northern              | 29 (59.7%)  | 20 (40.3%)  |         |
|                    | Southern              | 57 (58.8%)  | 40 (41.2%)  |         |
|                    | Western               | 75 (59.1%)  | 52 (40.9%)  |         |
| Education level    | Uneducated            | 1 (69.1%)   | 1 (30.9%)   | 0.003*  |
|                    | Elementary school     | 2 (67.9%)   | 1 (32.1%)   |         |
|                    | Intermediate          | 7 (60.3%)   | 4 (39.7%)   |         |
|                    | High school           | 102 (59.8%) | 68 (40.2%)  |         |
|                    | Vocational school     | 124 (56.9%) | 94 (43.1%)  |         |
|                    | Diploma               | 11 (52.5%)  | 9 (47.5%)   |         |
|                    | Bachelor's degree     | 40 (50.1%)  | 40 (49.9%)  |         |
| Occupation         | Post-graduate         | 5 (48.7%)   | 7 (51.3%)   | 0.001*  |
|                    | Healthcare profession | 6 (42.8%)   | 9 (57.2%)   |         |
|                    | Students              | 177 (49.3%) | 182 (50.7%) |         |
|                    | Unemployed            | 46 (52.7%)  | 41 (47.3%)  |         |
|                    | Others                | 33 (59.6%)  | 22 (40.4%)  |         |

**TABLE 4: The association between socio-demographic information and level of knowledge of the HPV vaccine**

Association between participants' demographics and level of knowledge about the HPV vaccine

\* Significant at p<0.05 level.

Figure 2 illustrates the proportion of participants who had a good knowledge level and a poor knowledge level about HPV vaccines. The study results revealed that 43.7% (n=225) of the participants had a good knowledge level while 56.3% (n=291) of them had a poor level of knowledge about the HPV vaccine.



**FIGURE 2: Proportion of good knowledge level and poor knowledge level**

## Discussion

The study aims to assess the knowledge and attitude towards HPV infection and its vaccination among the Saudi Arabian population. The sample for the current study primarily consisted of participants aged 18-25 years, with a predominance of females; the majority of them were residents of the central region with a vocational education level.

The study results revealed that 43.7% (n=225) of the participants had a good knowledge level while 56.3% (n=291) of them had a poor level of knowledge about the HPV vaccine. The results found a higher proportion of females (215, 49.9%) with good knowledge about HPV vaccines than male participants (35, 41.4%) although it was not statistically significant. The study found a high proportion (185, 45.8%) of good knowledge among participants aged between 18-25 years. In terms of education level, the study revealed a statistically significant association between education and knowledge about HPV infection and its vaccines. Participants with post-graduate and bachelor's degrees had better knowledge about HPV infections and its vaccines than those with other education levels. Additionally, participants who were healthcare professionals demonstrated significantly higher knowledge of HPV infection and its vaccines than participants in other occupations. A substantial proportion (35.9%, n=185) of the participants were aware that HPV can be transmitted sexually from one person to another with only 30.2% (n=156) of them being aware that HPV is a common infection that causes cervical cancer (41.5%, n=214) and most of them (76.2%, n=393) knew that cervical cancer can be cured particularly when detected in early stages. The current study reveals a considerable knowledge gap with HPV which is congruent with the study done by Al-Shaikh, which revealed that Saudi women showed a high degree of awareness regarding HPV. However, their knowledge regarding the HPV vaccine and its efficacy in preventing cervical cancer was significantly lower [9]. Moreover, a cross-sectional study carried out in the eastern region of Saudi Arabia revealed a connection between sociodemographic variables, such as gender, age, education, employment, and number of children, and the level of awareness and willingness to accept the HPV vaccine. This implies that specifically addressing these factors could greatly enhance both knowledge and vaccination rates [10]. Furthermore, a comparable outcome was obtained in the southwestern region, indicating a lack of understanding among the participants. Although the participants in this study had limited knowledge, around half of the respondents expressed curiosity about the HPV vaccine and displayed a neutral stance towards its safety, effectiveness, and cost [11].

The same results have also been noticed around the world. Roy and Tang revealed low levels of understanding of HPV and vaccination in Kolkata, India [12]. Similarly, studies conducted in several countries have consistently indicated that participants have insufficient information about HPV and vaccination. The most influential factors contributing to this lack of understanding are the participants' level of education and age [12-15].

Meanwhile a cross-sectional study conducted in Indonesia showed high knowledge, with most statements (87.5%) that were used in the questionnaire being understood correctly by the majority of respondents. Regarding attitude, most respondents agreed about the importance of the protection effect of HPV vaccination for their children. Regarding decision-making related to vaccines, many respondents knew that the HPV vaccine is safe and effective, and there are no religious limitations to taking vaccines; however, the price of the vaccine and respondents' spouses were the only factors that affected their decision [16].

In addition to the previously mentioned studies, Alsubaie et al. conducted a cross-sectional study to assess

the knowledge and attitudes towards HPV infection and vaccination among Saudi females. The study revealed that there were gaps in knowledge among the participants, with some misconceptions about HPV transmission and prevention. However, the majority of the participants showed positive attitudes towards HPV vaccination, indicating a favorable disposition towards the vaccine [17].

Similar to this, Alrowais et al. studied Saudi women's attitudes and knowledge on HPV and the HPV vaccine. The findings indicated a lack of thorough understanding regarding HPV and its relationship with cervical cancer. The participants did, however, show favorable views toward the vaccine and acknowledged its potential to prevent HPV-related diseases such as cervical cancer [18].

In the current study, the poor level of knowledge regarding HPV and vaccination in the Kingdom of Saudi Arabia can be attributed to insufficient health education from the side of primary health care [19]. As such, there is a need for increased public awareness about HPV vaccines in order to increase the uptake of vaccines among the population.

A significant majority (82.4%, n=425) of the participants had a positive attitude towards vaccination due to their effectiveness in preventing diseases. While a substantial proportion (75.9%, n=392) of the participants understood that vaccines were administered to prevent very severe diseases, 70.0% (n=361) of them were worried about the vaccine's side effects. The study revealed statistically significant associations between gender, education level, and occupation with p-values <0.005 (0.023, 0.003 and 0.001 respectively) and the level of knowledge about the HPV vaccine.

The significant constraint and limitations in this investigation were the employment of a cross-sectional study design which can only establish the relations between factors but not causalities. As this involved the use of online questionnaires, the data collection may threaten the credibility of the gathered data. Also, considering that the data obtained was self-reported, there was a possibility of measurement bias given that self-reporting depends on participants' education level and memorizing capabilities.

## Conclusions

Overall, the study revealed a substantial level of knowledge with less than half of the participants having good knowledge about the HPV vaccines. The majority of the participants had a positive attitude towards HPV infection and its vaccines; however, a significant proportion of them were worried about its side effects. Female participants with bachelor's and post-graduate degrees as well as those working in healthcare demonstrated good knowledge about HPV infection and its vaccines. The study revealed a considerable knowledge gap about the HPV causes, transmission and possible complications of HPV vaccination. Therefore, we recommend concerted efforts be made by the medical community to increase the knowledge and acceptance of HPV vaccination among the population.

## Additional Information

### Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

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**Critical review of the manuscript for important intellectual content:** Hamad J. Aldhafiri, Razan S. Alsubhi, Mohammed Almakrami, Nour H. Aljamaan, Yazeed A. Almulhim, Salim A. Algaadi

**Supervision:** Salim A. Algaadi

### Disclosures

**Human subjects:** Consent was obtained or waived by all participants in this study. Majmaah University for Research Ethics Committee issued approval MUREC-jun.19/COM-2023/23-10. **Animal subjects:** All authors have confirmed that this study did not involve animal subjects or tissue. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an



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## References

- de Sanjosé S, Brotons M, Pavón MA: The natural history of human papillomavirus infection. *Best Pract Res Clin Obstet Gynaecol*. 2018, 47:2-13. [10.1016/j.bpobgyn.2017.08.015](#)
- Schiffman M, Doorbar J, Wentzensen N, et al.: Carcinogenic human papillomavirus infection. *Nat Rev Dis Primers*. 2016, 2:16086. [10.1038/nrdp.2016.86](#)
- Garland SM, Kjaer SK, Muñoz N, et al.: Impact and effectiveness of the quadrivalent human papillomavirus vaccine: a systematic review of 10 years of real-world experience. *Clin Infect Dis*. 2016, 63:519-27. [10.1093/cid/ciw354](#)
- Alhamlan FS, Khayat HH, Ramisetty-Mikler S, et al.: Sociodemographic characteristics and sexual behavior as risk factors for human papillomavirus infection in Saudi Arabia. *Int J Infect Dis*. 2016, 46:94-9. [10.1016/j.ijid.2016.04.004](#)
- HPV Vaccine Recommendations. (2021). <https://www.cdc.gov/vaccines/vpd/hpv/hcp/recommendations.html>.
- Tobaiqy MA, Mehdar SA, Altayeb TI, Saad TM, Alqutub ST: Parental knowledge, views, and perceptions of human papilloma virus infection and vaccination-cross-sectional descriptive study. *J Family Med Prim Care*. 2023, 12:556-60. [10.4103/jfmpe.jfmpe\\_1673\\_22](#)
- Heena H, Durrani S, AlFayyad I, Riaz M, Tabasim R, Parvez G, Abu-Shaheen A: Knowledge, attitudes, and practices towards cervical cancer and screening amongst female healthcare professionals: a cross-sectional study. *J Oncol*. 2019, 2019:5423130. [10.1155/2019/5423130](#)
- Jassim G, Obeid A, Al Nasheet HA: Knowledge, attitudes, and practices regarding cervical cancer and screening among women visiting primary health care Centres in Bahrain. *BMC Public Health*. 2018, 18:128. [10.1186/s12889-018-5023-7](#)
- Al-Shaikh GK, Almussaed EM, Fayed AA, Khan FH, Syed SB, Al-Tamimi TN, Elmorshedy HN: Knowledge of Saudi female university students regarding cervical cancer and acceptance of the human papilloma virus vaccine. *Saudi Med J*. 2014, 35:1223-30.
- Alnaeem L, Alanizi S, AlQarni G, Alwadani J, Bomouzah F, Ali Z: Acceptance, knowledge, and attitude of parents toward the human papillomavirus vaccine in the eastern region of Saudi Arabia: a cross-sectional study. *Cureus*. 2023, 15:e51293. [10.7759/cureus.51293](#)
- Darraj AI, Arishy AM, Alshamakh AH, et al.: Human papillomavirus knowledge and vaccine acceptability in Jazan Province, Saudi Arabia. *Vaccines (Basel)*. 2022, 10:10.3390/vaccines10081337
- Roy B, Tang TS: Cervical cancer screening in Kolkata, India: beliefs and predictors of cervical cancer screening among women attending a women's health clinic in Kolkata, India. *J Cancer Educ*. 2008, 23:253-9. [10.1080/08858190802189105](#)
- Das A, Madhwapathi V, Davies P, Brown G, Dearnley E, Spencer A, Williams H: Knowledge and acceptability of the HPV vaccine by school children and their parents in Birmingham. *Vaccine*. 2010, 28:1440-6. [10.1016/j.vaccine.2009.11.041](#)
- Abdelaliem SM, Kuaia AM, Hadadi AA, et al.: Knowledge and attitudes toward human papillomavirus and vaccination: a survey among nursing students in Saudi Arabia. *Healthcare (Basel)*. 2023, 11:1766. [10.3390/healthcare11121766](#)
- Cinar IO, Ozkan S, Aslan GK, Alatas E: Knowledge and behavior of university students toward human papillomavirus and vaccination. *Asia Pac J Oncol Nurs*. 2019, 6:300-7. [10.4103/apjon.apjon\\_10\\_19](#)
- Taebi M, Riazi H, Keshavarz Z, Afrakhteh M: Knowledge and attitude toward human papillomavirus and HPV vaccination in Iranian population: a systematic review. *Asian Pac J Cancer Prev*. 2019, 20:1945-9. [10.31557/APJCP.2019.20.7.1945](#)
- Frianto D, Setiawan D, Diantini A, Suwantika AA: Parental acceptance of human papillomavirus (HPV) vaccination in districts with high prevalence of cervical cancer in West Java, Indonesia. *Patient Prefer Adherence*. 2022, 16:2709-20. [10.2147/PPA.S365901](#)
- Alsubaie AS, Alshammari TM, Aldossary MY, Alqahtani FY, Almadi MA: Knowledge and attitudes towards human papillomavirus (HPV) infection and vaccination among Saudi females: a cross-sectional study. *Vaccines (Basel)*. 2020, 8:435.
- Alrowais NA, Alshammari TM, Almuammar MN, Alkubeyyer N: Knowledge and attitudes about human papillomavirus (HPV) and HPV vaccine among Saudi females. *Int J Environ Res Public Health*. 2019, 16:2463.