

RESEARCH ARTICLE

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Public Knowledge, Attitude, and Perception of Human Papilloma Virus in Northern Border Province, Saudi Arabia: A Cross-Sectional Study

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Abstract

This cross-sectional study intended to measure human papillomavirus (HPV) and HPV vaccine awareness among the society residing in the Northern Border Province of Saudi Arabia and its adjacent regions. A 26-item questionnaire was used to attain the objectives of this study. Cronbach's alpha of 0.878 was used to assess the tool's reliability. SPSS version 20® was used for statistical analysis. Both descriptive and inferential statistics were employed and p-value <0.05 was deemed statistically significant. Overall, 1041 people participated in this study. Most respondents were 18-45 years old. HPV awareness is found to be higher in women than men. Education was not the primary factor affecting HPV knowledge among respondents. Most respondents were conscious that HPV can instigate cervical cancer; however, women were more knowledgeable than men. Most men and women were unaware of HPV vaccine availability in their region, and most advocated for pre-marital immunization. This survey found that most northern border respondents knew little about HPV, its prevention, and its vaccine schedule. Public health education is needed to address respondent knowledge gaps in these regions and increase vaccination success by sharing evidence-based information about HPV vaccine safety, clinical efficacy, and complications.

Keywords: Human Papillomavirus, KAP, Northern Border Region, Al-Jouf, Saudi Arabia, Vaccine

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INTRODUCTION

Cervical cancer ranks as the second most common malignancy among women aged 15 to 44 globally. In 2018, there were 570,000 additional cases and 311,000 mortalities attributed to cervical cancer of whom, over 85%, happened in developing nations.¹ Human papillomavirus (HPV) is found to be one of the main triggers of cervical cancer and a significant worldwide public health concern since it is the extremely common sexually transmitted infection (STI) that may initiate many clinical diseases, including benign warts and malignant tumors such as cervical, anal, and oropharyngeal malignancies.^{2,3} The implementation of prophylactic immunizations that particularly focus on high-risk strains of HPV can significantly reduce the incidence of diseases associated with HPV.⁴

In Saudi Arabia (KSA), cervical cancer is the ninth most common cancer in women aged 15-44.⁵ The WHO reported 316 Saudi women diagnosed with cervical cancer in 2018 and 158 deaths.⁶ Cervical cancer is sixth in cancer fatalities in women this age.^{6,7} If cervical cancer rates in the KSA continue steadily, there will be a 100% increase in cases among women under 65 years and a 120% increase among women over 65 years by 2025.⁸ The lack of coordinated national screening programs, societal and behavioral factors, and HPV incidence may increase cervical cancer in KSA.⁸ KSA and other nations struggle to tackle HPV and its effects. KSA needs efficient vaccination efforts due to its high cervical cancer rate.⁹ Parental decisions affect HPV vaccine uptake, especially for girls aged 11-12, the recommended population. Older teenagers are often vaccinated to catch up on missed vaccinations.¹⁰

As soon as it was available, the HPV vaccination was incorporated into children immunization programs in numerous nations. Similar approaches were adopted by the Saudi Government; however, there is still a shortage of complete-dose coverage in many places, and national HPV programs only manage to reach around 30% of the prospective population.¹¹ The HPV vaccine is now routinely administered to youngsters in Saudi Arabia as part of their childhood immunization program. According

to Saudi Arabia's Ministry of Health, the HPV vaccine protocol is exclusively administered to females. It is recommended that women between the ages of 15 and 26 receive the initial dosage and booster shots.¹² In addition, as part of Saudi Arabia's protection program, every three years, women between the ages of 21 and 29 will receive a cervical test in addition to Pap tests based on cytology. Every five years, women who are thirty-five years old or older should get a pap test that includes an HPV test.

While these preventive measures are readily available, the acceptance of vaccines can be hindered by public reluctance and deficiencies in comprehension. Cultural sensitivity and a lack of information provide obstacles to the acceptance of HPV vaccination in KSA.¹³ Hence, it is critical to understand the general awareness and opinions of the public on HPV and its immunization to tailor health education and vaccination initiatives that may successfully address these challenges and promote vaccine acceptance.^{13,14} Keeping in view the disease burden of HPV in KSA,⁶ this study aimed to measure HPV and HPV vaccine awareness among the public residing in the Northern Border Province of KSA and its adjacent regions.

MATERIALS AND METHODS

A cross-sectional study was undertaken on public knowledge, attitude, and perception regarding HPV in the Northern Boarder Province of KSA and its adjacent region. The study commenced on 15th July 2024 and concluded on 31st August 2024. The study utilized a convenience sampling strategy and employed an online questionnaire consisting of twenty-six items.¹⁵ A convenient sample method was adapted to attain the desired responses for this online survey. Over time the use of online surveys has increased, which is due to its benefits, *i.e.* respondent anonymity, ease in inviting the respondents and robust response. Furthermore, it's a very cost-effective method and in a short time larger sample can be calculated.

Study location

The Northern Borders Province of KSA, the least populated province, is situated in the northern region of the nation, adjacent to Iraq and

Jordan. The 2022 census recorded a population of approximately 373,577. The area is separated into four governorates: Arar, Turayf, Rafha and Al-Uwayqilah. The capital is Arar, whereas the main adjacent region is AL-Jouf.

Study tool

A 26-item questionnaire was translated into Arabic language using standard guidelines outlined by ISPOR for linguistic validation.¹⁶ Upon completion of this task, a pilot test was performed among 30 individuals to warrant it met the criteria for face validity.¹⁷ The reliability scale¹⁵ was administered to these 30 participants, and the alpha coefficient was ascertained to be 0.878, implying that the tool is appropriate for achieving the objectives of this research. In addition, the appropriateness of the tool's content was assessed by doing the Bartlett test of sphericity to address any concerns.¹⁸

Contents of study tool

The questionnaire comprised five segments. Section one consisted of six inquiries designed to collect the demographic information of the respondents. The focal purpose of section two was to assess the overall understanding of HPV. A nominal scale, consisting of a yes/no option, was offered to the respondents to facilitate their disclosure of responses. Section three consisted of three primary components, intending to investigate participants' understanding of symptoms, prevention, and transmission of HPV. Section four consisted of five items designed to assess respondents' knowledge and understanding of HPV vaccines using a nominal scale [yes/no]. The final segment of the study tool comprised three primary components designed to assess participants' views on the HPV vaccine using a five-item Likert scale. Rest all the scoring parameters were followed as recommended by the primary authors of the study tool utilized.¹⁵

Sample size

The minimum sample size estimated for the population of the northern border province was $n = 377$. RaoSoft® sampling size calculator was used to estimate this number using the confidence interval of 95% and response distribution of 50%.¹⁹

$$n = (Z^2 \times \hat{p}(1 - \hat{p})) / \epsilon^2$$

Where;

z is the z score

ϵ is the margin of error

n is the population size

\hat{p} is the population proportion

Analysis of data

The data analysis was accomplished using Statistical Package for Social Sciences (SPSS) version 20. The use of binary and linear regression was employed to inspect the correlation between demographic features and binary/ordinal responses.²⁰ A significant level of 0.05 was used to analyze the responses of the participants.²⁰

RESULTS

A total of 1041 respondents contributed to this investigation. The majority of respondents (460, 44.2%) were from the Northern Border Region (Arar, Turayf, Rafha, and Al-Uwayqilah), followed by the Al-Jouf Region (360, 34.6%). The results indicate that most responders (833, 80.0%) were aged between 18 and 45 years. The remaining (208, 20%) were those above the age of 45 years. Regarding gender, over half of the respondents were female (591, 56.8%), while others were male (450, 43.2%). It was observed that 40.1% of participants were unmarried, whereas 59.9% were married. Most of the respondents (779, 74.8%) possessed a graduate degree, 164 (15.8%) responders owned a postgraduate or higher degree, whereas 98 (9.4%) responders had a secondary or lower education. The predominant participants were students and healthcare professionals (440, 42.3%) followed by other sectors (295, 28.4%), and the administrative field (157, 15.1%). During the exploration, it was disclosed that 34.6% of respondents undergo a medical checkup annually; however, 44.2% reported no medical examinations in the preceding two years. The demographic details are revealed in Table 1.

The next section of the study questionnaire aimed to explore respondents' general knowledge about HPV. When respondents were asked if they heard of HPV? Only 395 (37.9%) replied yes and

Table 1. Demographics of the respondents

| Variables | Groups | N (%) |
|---|--|------------|
| Region | Northern Borders Region | 460 (44.2) |
| | Al-Jouf Region | 360 (34.6) |
| | Other | 221 (21.2) |
| Age (years) | 18-25 | 329 (31.6) |
| | 26-35 | 175 (16.8) |
| | 36-45 | 329 (31.6) |
| | 46 to 55 | 164 (15.8) |
| | More than 55 | 44 (4.2) |
| Sex | Male | 450 (43.2) |
| | Female | 591 (56.8) |
| Marital status | I am single | 417 (40.1) |
| | Married | 624 (59.9) |
| Level of education | Secondary or Lower | 98 (9.4) |
| | Undergraduate | 779 (74.8) |
| | Postgraduate | 164 (15.8) |
| Employment sector | Health Sector | 220 (21.1) |
| | Engineering field | 51 (4.9) |
| | Technical field | 27 (2.6) |
| | Administrative field | 157 (15.1) |
| | Private work | 31 (3.0) |
| | Student | 220 (21.1) |
| | Retired | 40 (3.8) |
| | Other | 295 (28.4) |
| How often do you have medical checkups? | Once a month | 22 (2.1) |
| | Once every three months | 24 (2.3) |
| | Twice a year | 175 (16.8) |
| | Once a year | 360 (34.6) |
| | No Medical checkup in the last two years | 460 (44.2) |

the remaining 646 (62.1%) were unaware of the HPV. It was observed that women are more likely to be conscious of HPV in comparison to men OR 2.644 (1.622-4.312). In addition, education was not found to be the main factor associated with the awareness among respondents about HPV OR 0.134 (0.025-0.244), $p < 0.05$. Almost similar level of understanding was observed among the respondents regarding the probability of HPV infection among men and women. Moreover, the majority 78.0% were found unaware of the mode of transmission of HPV. Similarly, the majority 74.6% did not recognize HPV can steer to cervical cancer; however, the level of understanding for this specific item was observed to be higher among women than that of men OR 2.615 (1.357-5.041), $p < 0.01$. Overall, a limited understanding was

observed among the respondents regarding HPV, its transmission, and infection rates in KSA. The details regarding general knowledge of HPV are presented in Table 2.

The next section evaluated respondents' knowledge of HPV-related consequences, preventative strategies, and comprehension of HPV transmission. Only 8.6% of respondents recognized genital cancer as a possible complication of HPV, followed by genital warts (8.1%) and 3.5% indicated that it may result in a heightened incidence of HIV/AIDS. Furthermore, an examination of the understanding surrounding HPV prevention indicated that 13.8% of respondents erroneously believed that antibiotics might prevent HPV, while 25.4% identified vaccination as a preventive measure against HPV. A majority of 53.9% did not answer this question, while 2.9% were uninformed about HPV prevention methods. A nearly equivalent level of comprehension was noted about the respondents' understanding of HPV transmission methods. The information about respondents' awareness of HPV's spread, prevention, and related issues is presented in Table 3.

The next part presents data on respondents' comprehension and impressions of the HPV vaccine, including its effectiveness in precluding cervical cancer, availability, timing of administration, and the requirement for cervical cancer screening in vaccinated individuals. Both male and female respondents acknowledged that the HPV vaccine can reduce the likelihood of cervical cancer, with a statistically significant difference in responses (p -value < 0.001), indicating that females were more inclined to trust in the vaccine's efficacy. Most men and women were uninformed of the accessibility of the HPV vaccine in their region, with the majority advocating for pre-marital vaccination, suggesting that the vaccine should be administered before marriage (p -value < 0.001). The respondents exhibited a limited comprehension of the HPV vaccination schedule, with the majority perceiving the appropriate age for immunization to be between 14 and 20 years old. The significance of ongoing HPV screening was revealed to be markedly greater (p -value < 0.001) among female respondents compared to male respondents. The information about respondents'

Table 2. General knowledge of HPV

| General knowledge of HPV | Yes N (%) | No N (%) | Gender OR (CI) | Educational Status OR (CI) |
|--|--------------|-------------|---------------------------|-------------------------------|
| Have you ever heard of HPV? | 395 (37.9%) | 646 (62.1%) | 2.644 (1.622-4.312)*** | 0.134 (0.025-0.244)* |
| Do you think HPV affects both males and females? | 391 (37.6%) | 650 (62.4%) | 1.341 (0.859-2.095)** | -0.020 (-0.121-0.080)** |
| Do you have any idea how HPV is transmitted between individuals? | 229 (22.0%) | 812 (78.0%) | 1.426 (0.771-2.637)** | -0.001 (-0.131-0.129)** |
| Does HPV cause cervical cancer? | 264 (25.4%) | 777 (74.6%) | 2.615 (1.357-5.041)** | 0.126 (-0.014-0.266)** |
| The highest incidence of HPV infection among women in their 20s and 30s? | 197 (18.9%) | 844 (81.1%) | 1.766 (0.957-3.260)** | -0.147 (-0.278-0.016)* |
| Can a person be infected with HPV without showing symptoms? | 260 (25.0%) | 781 (75.0%) | 0.330 (0.197-0.553)*** | 0.006 (-0.106-0.118)** |
| Are HPV infections rare in Saudi Arabia? | 153 (14.7%) | 888 (85.3%) | 0.843 (0.461-1.543)** | -0.027 (-0.156-0.103)** |
| Can HPV cause any type of cancer? | 339 (32.6%) | 702 (67.4%) | 0.477 (0.248-0.917)* | -0.170 (-0.242-0.028)** |

Binary logistic regression was applied. *** $p < 0.001$, ** $p < 0.010$, * $p < 0.05$

understanding of HPV vaccine availability, benefits, and ideal vaccination timing is presented in Table 4.

The last section of the results aimed to explore factors influencing HPV vaccination. Overall, there were significant differences among men and women in their preference for vaccination. Most of the female respondents were in favor of HPV vaccination for both men and women ($p < 0.001$) and most of the respondents were in favor of getting tested before vaccination ($p < 0.001^*$). Some of the leading factors that were disclosed by the respondent hindering the HPV vaccine are limited information about the HPV vaccine, followed by concerns about safety and complications, and limited awareness of the availability of the vaccine. The factors that influence HPV vaccination are outlined in Table 5.

DISCUSSION

The current study is perhaps the very first study that has explored the knowledge, attitude, and perception concerning HPV among the KSA population residing in the Northern Borders Province (44.2%) and its adjacent regions (Al-Jouf,

34.6%). Those who participated in the current study were mostly comprised of individuals who were between the ages of 18-25 years and 36-45 years. In terms of gender, the current study sample was dominated by females comprising 56.8% of the study respondents. Prior research concerning awareness and perceptions of the HPV vaccine in Saudi Arabia has uncovered several inadequacies and gaps, particularly concerning understanding HPV infection and its association with cancer, alongside the accessibility of the HPV vaccine.²¹⁻²⁶ It was reported that 17.7 percent of participants were aware of the HPV vaccine, with only 2.0 percent having received it.²³ Whilst other studies conducted in the other regions of Saudi Arabia have also reported lack of adequate understanding regarding HPV infection.^{24,25}

Consequently, prior research consistently indicates a deficiency in awareness and understanding regarding HPV infection and HPV vaccines across various regions of Saudi Arabia. However, the results of the current study are a bit more promising and better in comparison with the previous studies. While focusing on the objective of this study the majority 62.1% were found unaware of HPV. Similarly, nearly the equivalent

number of respondents also disclosed that HPV is going to affect females, not men. Further investigation discovered that the education of the respondents was not the main factor meaningfully affecting their level of information about HPV. In

the current sample it was seen education tends to affect the understanding of HPV up to 13% (OR 0.134, 0.025-0.244, $p < 0.05$). The majority, 78.0% were unaware of the mode of transmission and only 25.4% disclosed their understanding of the

Table 3. Respondents' knowledge about the spread, prevention, and problems associated with HPV

| Variables | | N | % |
|-------------------------------------|--|-----|------|
| Health problems associated with HPV | Genital cancer | 90 | 8.6 |
| | Genital warts | 84 | 8.1 |
| | HIV/AIDS | 36 | 3.5 |
| | I don't know | 360 | 34.6 |
| Prevention of HPV | Non-responders | 471 | 45.2 |
| | By taking antibiotics | 144 | 13.8 |
| | By vaccination | 264 | 25.4 |
| | Practicing abstinence (avoiding sex) | 42 | 4.0 |
| | Don't Know | 30 | 2.9 |
| Spread/transmission of HPV | Non-responders | 561 | 53.9 |
| | Contact with body fluids (blood/saliva/etc.) | 60 | 5.8 |
| | Cough or sneeze | 18 | 1.7 |
| | Genital touching | 126 | 12.1 |
| | I don't know | 366 | 35.2 |
| | Non-responders | 471 | 45.2 |

Table 4. Respondent's understanding of HPV vaccine availability, its benefits, and ideal vaccination time

| | | Male | Female | χ^2 | p-value |
|--|--------------------|------|--------|----------|---------|
| HPV vaccine can prevent the chances of cervical cancer. | Yes | 340 | 438 | 14.585 | <0.001* |
| | No | 22 | 22 | | |
| | May be | 88 | 131 | | |
| Are you aware of the availability of the HPV vaccine in your area? | Yes | 55 | 164 | 0.990 | <0.001* |
| | No | 55 | 22 | | |
| | May be | 340 | 405 | | |
| HPV vaccine should be given before marriage. | Yes | 285 | 274 | 30.794 | <0.001* |
| | No | 142 | 285 | | |
| | May be | 22 | 33 | | |
| Vaccinated, women no longer must be screened for cervical cancer. | Yes | 88 | 152 | 16.962 | <0.001* |
| | No | 33 | 55 | | |
| | May be | 329 | 384 | | |
| What is the ideal time to get vaccinated for HPV? | <5 Year | 11 | 11 | 20.908 | <0.001* |
| | 5-9 years | 0 | 11 | | |
| | 9-14 years | 11 | 33 | | |
| | 14-20 years | 55 | 77 | | |
| | 20-30 years | 55 | 44 | | |
| | 30 years and above | 0 | 22 | | |
| | I don't know | 317 | 394 | | |

A Chi-square Montecarlo simulation was performed, p -value less than 0.05 was considered statistically significant

Table 5. Factors influencing HPV vaccination

| Variables | | Male | Female | χ^2 | p-value |
|--|--|------|--------|----------|---------|
| Who do you think should get the HPV vaccine? | Both (male and female) | 109 | 242 | 20.431 | <0.001* |
| | Female only | 77 | 109 | | |
| | Male only | 11 | 11 | | |
| | I don't Know | 252 | 230 | | |
| In your opinion, should individuals be tested before being given the necessary HPV vaccines? | Yes | 230 | 285 | 7.050 | <0.001* |
| | No | 22 | 66 | | |
| | May be | 197 | 241 | | |
| What do you think would prevent you from getting the HPV vaccine? | I am too old for HPV vaccination | 33 | 66 | 47.60 | <0.001* |
| | Concern about safety | 44 | 66 | | |
| | Concerns about complications | 88 | 164 | | |
| | Cost can be an issue | 11 | 10 | | |
| | I don't know | 22 | 33 | | |
| | I have limited information about HPV and its vaccination | 164 | 197 | | |
| | Lack of time | 0 | 11 | | |
| | Vaccine availability | 88 | 44 | | |

fact that HPV can lead to cervical cancer, moreover further analysis has shown that female respondent was found to be twice knowledgeable in this regard in comparison to male respondents [2.615 (1.357-5.041), $p < 0.010$]. The findings of the current study indicate that there is a noteworthy knowledge gap concerning HPV. These results are coherent with the earlier reports that Saudi women exhibited a prominent level of familiarity with HPV.²⁷ This study also highlights the fact that diversity in the sociodemographic factors, such as gender, age, education, employment, and employment sector can be some of the main factors which shall influence the knowledge about HPV and latter on willing to vaccinate as well.²⁸ In addition, to the impact of demographic diversity another factor that might influence the vaccination process can be the respondent's self-perceived assessment of the risk of HPV infections in KSA, most (85.3%) of the respondents believe that HPV infections are not rare in KSA.

In addition, to the general understanding of HPV another important aspect that was explored in this study was the respondents' understanding of the health-related difficulties linked with HPV, its prevention, and how HPV is transmitted. Surprisingly, 80.4% of the respondents either skipped replying or disclosed "I don't know" to the items exploring their sense of the challenges

linked with HPV and the route of transmission. For the item exploring the respondent's understanding of the prevention of HPV, about 55.0% skipped replying or disclosed "I don't know" followed by 25.4% disclosing vaccination as an effective way of preventing HPV, by taking antibiotics 13.8% and practicing abstinence 4.0%. The lack of adequate health education provided by primary health care providers in the KSA can be ascribed to the low level of knowledge regarding HPV and vaccination. For this reason, there is a requirement for improved public knowledge of HPV which will increase receptivity towards vaccines among the population.²⁶ From the current study, it was seen that about 71.56% were uninformed of the accessibility of HPV vaccine in their area most having significantly ($p < 0.001$) poor understanding about the correct age of vaccination, and most 53.7% stated to get HPV vaccine before getting married ($p < 0.001$). Even though respondents have a cursory understanding of HPV vaccine availability and vaccination time, about 74.73% of respondents found optimism that HPV vaccine may avert the chances of cervical cancer. Similar variability in responses was also reported by an Indonesian study²⁹ where respondents with a poor understanding of the basic knowledge about HPV, have shown optimistic responses for the few other items that perhaps reflect their

perceptions towards the subject under discussion. Various global studies presenting curiosity and understanding among respondents about HPV have disclosed the impact of socio-demographic variables on the understanding of HPV.³⁰⁻³² When it came to making decisions regarding vaccines, a significant number of respondents showed concerns for safety and efficacy and most highlighted that they had limited knowledge about the HPV vaccine which is preventing them from getting a shot. Overall, this study has displayed that the participants had various misconceptions regarding the transmission and prevention of HPV, as well as gaps in their knowledge.

Important steps toward lifelong management and prevention of HPV include raising public awareness and providing easier access to relevant information and services. As per the World Health Organization (WHO) along with the health promotion and education in the HPV prevalent regions HPV-related malignancies and infections can be successfully managed by ensuring vaccination among young girls ages 9 and 14.^{33,34} This is a policy matter and Saudi healthcare stakeholders shall consider ensuring the implementation of WHO directives to prevent the upcoming generations from HPV-related complications. Moreover, as per the directive of WHO screening among individuals aged 30 years or above (25 years and above with HIV) must be done for the timely diagnosis and treatment of HPV and cervical cancer.^{33,34}

Keeping in view these recommendations, our research emphasized the critical necessity to enhance HPV awareness and understanding among Saudi women. To do this, HPV education initiatives must be launched to enhance awareness and understanding of HPV and associated diseases.³⁵ Longitudinal qualitative study is necessary to obtain a comprehensive understanding of Saudi women's knowledge, attitudes, and beliefs concerning HPV infection and vaccination via in-depth interviews or focus group discussions. This approach would reveal further cultural, social, and psychological factors influencing perceptions of the HPV vaccine within this population, enabling public health workers to develop targeted campaigns with specific educational messages to

enhance awareness of cervical cancer prevention and other HPV-related diseases, thereby improving vaccine uptake among Saudi women.

CONCLUSION

The outcomes of this analysis have exposed that most of the respondents from the northern border province and its adjacent region had cursory knowledge of HPV, its prevention, and its vaccination schedule. Public health education is the need of the hour so that respondent knowledge deficit from these regions can be timely uplifted and the success rate for vaccination can be enhanced by sharing evidence-based information regarding the HPV vaccine, its safety, and clinical efficacy in the prevention of HPV and its associated complications. It is critical to conduct educational programs that raise knowledge and comprehension of HPV infection among the public in Saudi Arabia due to the country's largely young population. Specifically, young adults at high schools must be targeted so that the rising incidence of HPV can be controlled promptly.

Limitation and generalizability

Since this involves the utilization of online surveys, data gathering may pose a threat to the trustworthiness of the data that was acquired. Additionally, taking into consideration that the data that was collected was self-reported, there was a chance of measurement bias. This is because self-reporting is dependent on the participant's level of knowledge and their ability to memorize and recall. So far, the generalizability of this survey is concerned, the findings of this study can be applied to the metropolitan population of Saudi Arabia with caution, because the sociodemographics of the regions included in this study are different from the metropolitan population of Saudi Arabia. Therefore, chances of variability are possible; however, these results will be beneficial for policy-making regarding the management and awareness of HPV at the regional level.

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DATA AVAILABILITY

All datasets generated or analyzed during this study are included in the manuscript.

ETHICS STATEMENT

Not applicable.

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