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Original Article

Awareness, Attitudes, And Practices Regarding HPV Vaccination Among Women in Lahore, Pakistan

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ABSTRACT

Background: Cervical cancer remains a major public health concern among women, particularly in low- and middle-income countries where preventive screening and vaccination services are underutilized. Persistent infection with high-risk human papillomavirus (HPV) is the principal cause of cervical cancer, and HPV vaccination is an effective preventive strategy. However, awareness, acceptance, and uptake of HPV vaccination remain limited in Pakistan. **Objective:** To assess awareness, attitudes, and practices regarding HPV vaccination among women in Lahore, Pakistan, and to identify key barriers influencing vaccine uptake. **Methods:** A descriptive cross-sectional study was conducted over four months among 500 women aged 18–65 years attending outpatient departments of selected hospitals and selected rural areas of Lahore. Data were collected using a pre-tested structured proforma covering socio-demographic characteristics, awareness of cervical cancer, HPV infection and HPV vaccination, attitudes toward vaccination, preventive practices, and perceived barriers. Data were analyzed using SPSS, and results were summarized as frequencies and percentages. **Results:** Awareness of cervical cancer was reported by 360 participants (72.0%), while 205 (41.0%) had heard about HPV infection and 180 (36.0%) had heard about the HPV vaccine. Only 150 women (30.0%) knew that HPV vaccination prevents cervical cancer. Although 290 participants (58.0%) were willing to receive the vaccine and 370 (74.0%) reported that physician recommendation would influence their decision, only 60 (12.0%) had received HPV vaccination and 90 (18.0%) had undergone cervical cancer screening. The main barriers were lack of awareness, high cost, fear of side effects, cultural hesitation, and absence of doctor recommendation. **Conclusion:** Women in Lahore showed favorable attitudes toward HPV vaccination but had limited HPV-specific knowledge and poor preventive practices. Community education, physician-led counseling, affordable vaccination, and accessible screening services are needed to improve cervical cancer prevention. **Keywords:** HPV vaccine, cervical cancer, awareness, attitudes, practices, Lahore, Pakistan.

INTRODUCTION

Persistent infection with high-risk human papillomavirus (HPV) remains the principal etiological factor in the development of cervical cancer, which continues to impose a substantial public health burden on women worldwide. Cervical cancer is among the leading malignancies affecting women, with a disproportionate burden in low- and middle-income countries where organized screening, early diagnosis, and preventive vaccination services remain limited (1,2). Although most HPV infections are transient and resolve spontaneously, persistent infection with oncogenic HPV genotypes, particularly HPV types 16 and 18, may lead to cervical intraepithelial neoplasia and eventually invasive cervical cancer over a prolonged preclinical period (3). This long latency provides an important opportunity for prevention through HPV vaccination and early detection through cervical screening methods such as Pap smear testing, visual inspection with acetic acid, and HPV DNA testing (4).

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The prevention of cervical cancer is strongly influenced by women's awareness of HPV infection, their attitudes toward vaccination and screening, and their actual engagement with preventive health services. HPV vaccination is most effective when administered before exposure to the virus and has demonstrated substantial efficacy in preventing high-grade cervical lesions associated with oncogenic HPV types (5,6). However, despite the availability and proven preventive value of HPV vaccines, their uptake remains low in many resource-limited settings, including Pakistan. Limited awareness of HPV as a sexually transmitted infection, inadequate understanding of its causal relationship with cervical cancer, concerns regarding vaccine safety, high vaccine cost, sociocultural hesitation, and insufficient provider counseling all contribute to poor acceptance and low vaccination coverage (7).

In Pakistan, cervical cancer is increasingly recognized as an important women's health concern, particularly because many cases are diagnosed at advanced stages as a result of poor screening practices, limited preventive healthcare access, and low public awareness (8). Previous studies from Pakistan have shown variable but generally inadequate awareness of HPV infection, HPV vaccination, and cervical cancer screening among women, students, and even healthcare-related populations. Although some women may have heard of cervical cancer, knowledge about HPV infection, the preventive role of HPV vaccination, the appropriate timing of vaccination, and the importance of routine screening often remains insufficient. This knowledge gap is clinically important because awareness alone may not translate into preventive behavior unless women receive accurate counseling, accessible services, and culturally acceptable health education (9,10).

Healthcare providers play a central role in shaping women's preventive decisions regarding HPV vaccination and cervical cancer screening. Physician recommendation has repeatedly been identified as a strong predictor of vaccine acceptance, particularly in settings where awareness is low and misconceptions are common. However, evidence from Pakistan suggests that counseling regarding HPV vaccination and cervical cancer screening is not consistently integrated into routine clinical practice. This creates a preventable gap between positive attitudes toward vaccination and actual vaccine uptake. In addition, barriers such as embarrassment, fear of screening procedures, lack of female healthcare providers, social stigma, limited affordability, and conservative sociocultural norms may further reduce women's participation in preventive services, especially among those with lower educational attainment or restricted access to healthcare (11,12).

Although several knowledge, attitude, and practice studies have explored HPV and cervical cancer prevention in Pakistan, many have focused on selected populations such as medical students, healthcare professionals, or hospital-based groups, limiting the availability of locally relevant data on adult women from mixed healthcare and community settings. Lahore is a large urban center with diverse educational, socioeconomic, and healthcare-access profiles, making it an important setting for evaluating women's awareness, attitudes, and preventive practices related to HPV vaccination. Understanding these factors is necessary for designing targeted health education, improving physician-led counseling, and informing public health strategies aimed at increasing HPV vaccine acceptance and cervical cancer screening uptake (13,14).

Therefore, the present study was conducted to assess awareness, attitudes, and practices regarding HPV vaccination among women in Lahore, Pakistan. Specifically, the study aimed to evaluate women's awareness of cervical cancer, HPV infection, and HPV vaccination; assess their attitudes toward vaccine benefit, safety, and willingness; determine self-reported HPV vaccination and cervical cancer screening practices; and identify perceived barriers influencing vaccine uptake. The study further sought to examine whether age and educational status were associated with HPV vaccine awareness and vaccination status, thereby providing evidence to support context-specific interventions for improving cervical cancer prevention among women in Lahore.

MATERIALS AND METHODS

This descriptive cross-sectional observational study was conducted over a four-month period among adult women in Lahore, Pakistan, to assess awareness, attitudes, and practices regarding human papillomavirus vaccination and cervical cancer prevention. Data were collected from women attending the outpatient departments of Bahria International Hospital, Chaudhary Muhammad Akram Teaching and Research Hospital, Jinnah Hospital, and Sheikh Zaid Hospital, along with women from selected rural areas of Lahore. The cross-sectional design was selected because it allowed assessment of HPV-related awareness, vaccine acceptance, preventive practices, and perceived barriers at a single point in time within a defined population.

The study population consisted of 500 female participants aged 18 to 65 years who were residents of Lahore and willing to participate. Women were considered eligible if they were able to provide informed consent and respond to the study proforma. Severely ill women, participants with communication difficulties, and individuals unwilling to participate were excluded (15). Eligible participants were approached during the data collection period, informed about the purpose of the study, and enrolled after consent was obtained. Participation was voluntary, and responses were collected using a structured proforma designed to capture socio-demographic characteristics, HPV-related awareness, attitudes toward HPV vaccination, preventive practices, and perceived barriers to vaccine uptake.

Data were collected through a pre-tested structured proforma. The socio-demographic section included age group, marital status, and educational status. Awareness-related variables included whether participants had heard about cervical cancer, HPV infection, HPV vaccination, the preventive role of HPV vaccination against cervical cancer, and the importance of cervical cancer screening.

Attitude-related variables assessed whether participants considered the HPV vaccine beneficial, whether they believed it was safe, whether they were willing to receive it, and whether physician recommendation would influence their decision. Practice-related variables included self-reported receipt of HPV vaccination, history of cervical cancer screening, discussion of HPV vaccination with a doctor, and whether the participant had actively sought information about the HPV vaccine. Perceived barriers to HPV vaccine uptake included lack of awareness, high vaccine cost, fear of side effects, cultural hesitation, and absence of doctor recommendation.

Age was categorized into 18–25 years, 26–35 years, 36–45 years, and 46 years and above. Educational status was categorized as primary, secondary, and graduation or above. HPV vaccine awareness was operationally defined as a participant reporting that she had heard about the HPV vaccine. HPV vaccination status was defined as self-reported receipt of at least one dose of HPV vaccine.

Cervical cancer screening practice was defined as self-reported previous screening for cervical cancer. Vaccine willingness was assessed according to whether the participant agreed, disagreed, or was unsure about receiving the HPV vaccine. Physician influence was assessed according to whether doctor recommendation would affect the participant's vaccination decision. To improve data quality, completed proformas were reviewed for completeness before coding and data entry. Responses were coded systematically and entered into Statistical Package for Social Sciences software for analysis. Descriptive statistics were used to summarize the data.

Frequencies and percentages were calculated for categorical variables, including socio-demographic characteristics, awareness indicators, attitude responses, preventive practices, and reported barriers. Cross-tabulations were performed to assess selected associations between educational status and HPV vaccine awareness, as well as between age group and HPV vaccination status. Results were presented as frequencies and percentages in tabular form to allow comparison across participant categories.

Potential sources of bias included self-reported responses, recall bias, and social desirability bias, particularly for vaccination and screening history. To reduce information error during data collection,

the same structured proforma was used for all participants, and questionnaires were checked for completeness before analysis. Confounding by socio-demographic factors was considered by examining selected participant characteristics, particularly age and education, in relation to HPV vaccine awareness and vaccination status. Informed consent was obtained from all participants before data collection, and participant responses were handled confidentially during coding, entry, and analysis.

RESULTS

A total of 500 women participated in the study. The majority were aged 26–35 years, representing 190 participants (38.0%), followed by 160 women (32.0%) aged 18–25 years, 100 (20.0%) aged 36–45 years, and 50 (10.0%) aged 46 years and above. Most participants were married, accounting for 310 women (62.0%), whereas 190 (38.0%) were unmarried. Regarding educational status, 200 participants (40.0%) had secondary-level education, 175 (35.0%) had graduation-level education or above, and 125 (25.0%) had primary-level education.

Table 1. Socio-Demographic Characteristics of Study Participants (n = 500)

Variable	Category	Frequency (n)	Percentage (%)
Age group	18–25 years	160	32.0
	26–35 years	190	38.0
	36–45 years	100	20.0
	46 years and above	50	10.0
Marital status	Married	310	62.0
	Unmarried	190	38.0
Education level	Primary	125	25.0
	Secondary	200	40.0
	Graduation and above	175	35.0

Awareness of cervical cancer was higher than awareness of HPV infection and HPV vaccination. Overall, 360 participants (72.0%) had heard about cervical cancer, while 205 (41.0%) had heard about HPV infection and 180 (36.0%) had heard about the HPV vaccine. Only 150 women (30.0%) knew that HPV vaccination helps prevent cervical cancer, and 240 (48.0%). knew that cervical cancer screening is important. Despite this limited knowledge, attitudes toward vaccination were generally favorable. A total of 340 participants (68.0%) agreed that the HPV vaccine is beneficial, 220 (44.0%) considered it safe, and 290 (58.0%) expressed willingness to receive the vaccine. Physician recommendation appeared to be an important influence, as 370 women (74.0%) reported that a doctor's recommendation would affect their vaccination decision.

Table 2. Awareness and Attitudes Regarding HPV Vaccination and Cervical Cancer Prevention (n = 500)

Variable	Yes / Agree n (%)	No / Disagree n (%)	Not Sure n (%)
Heard about cervical cancer	360 (72.0)	140 (28.0)	
Heard about HPV infection	205 (41.0)	295 (59.0)	
Heard about HPV vaccine	180 (36.0)	320 (64.0)	

Variable	Yes / Agree n (%)	No / Disagree n (%)	Not Sure n (%)
Knows HPV vaccine prevents cervical cancer	150 (30.0)	350 (70.0)	
Knows cervical cancer screening is important	240 (48.0)	260 (52.0)	
HPV vaccine is beneficial	340 (68.0)	60 (12.0)	100 (20.0)
HPV vaccine is safe	220 (44.0)	90 (18.0)	190 (38.0)
Willing to receive HPV vaccine	290 (58.0)	80 (16.0)	130 (26.0)
Doctor recommendation would influence decision	370 (74.0)	40 (8.0)	90 (18.0)

Preventive practices were substantially lower than awareness and willingness indicators. Only 60 participants (12.0%) had received the HPV vaccine, while 440 (88.0%) had not. Similarly, 90 women (18.0%) had undergone cervical cancer screening, whereas 410 (82.0%) had never been screened. Only 145 participants (29.0%) had discussed HPV vaccination with a doctor, and 170 (34.0%) had actively sought information about the HPV vaccine. The most frequently reported barrier was lack of awareness, reported by 175 participants (35.0%), followed by high vaccine cost in 120 (24.0%), fear of side effects in 90 (18.0%), cultural hesitation in 65 (13.0%), and absence of doctor recommendation in 50 (10.0%).

Table 3. Preventive Practices and Reported Barriers to HPV Vaccine Uptake (n = 500)

Category	Variable	Frequency (n)	Percentage (%)
Practice	Received HPV vaccine	60	12.0
	Not received HPV vaccine	440	88.0
	Undergone cervical cancer screening	90	18.0
	Not undergone cervical cancer screening	410	82.0
	Discussed HPV vaccine with doctor	145	29.0
	Did not discuss HPV vaccine with doctor	355	71.0
	Sought information about HPV vaccine	170	34.0
	Did not seek information about HPV vaccine	330	66.0
Barrier	Lack of awareness	175	35.0
	High cost	120	24.0
	Fear of side effects	90	18.0
	Cultural hesitation	65	13.0
	No doctor recommendation	50	10.0

Educational status showed a clear gradient with HPV vaccine awareness. Among women with primary education, 20 of 125 participants (16.0%) were aware of the HPV vaccine, compared with 65 of 200 women (32.5%) with secondary education and 95 of 175 women (54.3%) with graduation-level education or above. The association between education level and HPV vaccine awareness was statistically

significant, $\chi^2 = 48.16$, $p < 0.001$. Compared with women with primary education, those with secondary education had higher odds of HPV vaccine awareness (OR = 2.53, 95% CI: 1.44–4.44), while women with graduation-level education or above had markedly higher odds of awareness (OR = 6.23, 95% CI: 3.55 10.95).

Table 4. Association Between Educational Status and HPV Vaccine Awareness (n = 500)

Education Level	Aware n (%)	Not Aware n (%)	Total	Odds Ratio vs Primary (95% CI)	p-value
Primary	20 (16.0)	105 (84.0)	125	Reference	<0.001
Secondary	65 (32.5)	135 (67.5)	200	2.53 (1.44–4.44)	
Graduation and above	95 (54.3)	80 (45.7)	175	6.23 (3.55–10.95)	

HPV vaccine uptake also varied by age in the available age-group comparison. Among women aged 18–25 years, 30 of 160 participants (18.8%) had received the HPV vaccine, whereas none of the 50 participants aged 46 years and above reported vaccination. This age-group contrast showed a statistically significant difference in vaccination status using Fisher's exact test ($p < 0.001$). The observed pattern indicates higher vaccination uptake among younger women compared with the oldest age group.

Table 5. Selected Age-Group Comparison of HPV Vaccination Status

Age Group	Vaccinated n (%)	Not Vaccinated n (%)	Total	Statistical Test	p-value
18–25 years	30 (18.8)	130 (81.2)	160	Fisher's exact test	<0.001
46 years and above	0 (0.0)	50 (100.0)	50		

Overall, the results demonstrate a marked gap between general awareness of cervical cancer and specific preventive practices. Although 72.0% of participants had heard about cervical cancer and 58.0% were willing to receive HPV vaccination, only 36.0% had heard about the HPV vaccine, 30.0% knew its preventive role against cervical cancer, and only 12.0% had received it. Similarly, while nearly half of the participants recognized the importance of cervical cancer screening, only 18.0% had undergone screening. Higher education was strongly associated with HPV vaccine awareness, and younger age was associated with greater vaccine uptake in the selected age-group comparison.

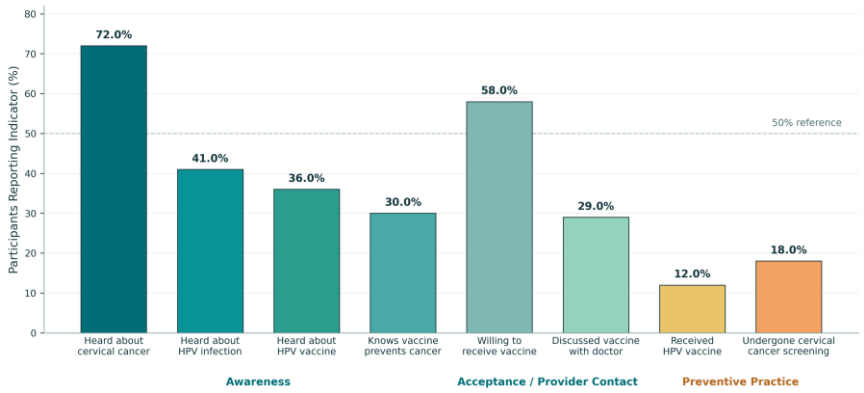

Figure 1. Knowledge-to-Practice Gradient in HPV Vaccination and Cervical Cancer Prevention

The figure demonstrates a substantial decline from general cervical cancer awareness to HPV-specific knowledge and preventive action. Although 72.0% of participants had heard about cervical cancer, only 41.0% had heard about HPV infection, 36.0% had heard about the HPV vaccine, and 30.0% knew that

HPV vaccination prevents cervical cancer. Willingness to receive vaccination was comparatively higher at 58.0%, but provider engagement and actual preventive behavior remained limited, with only 29.0% having discussed HPV vaccination with a doctor, 12.0% having received the HPV vaccine, and 18.0% having undergone cervical cancer screening. This gradient highlights a clinically important gap between awareness, acceptance, healthcare-provider interaction, and implementation of cervical cancer prevention practices.

DISCUSSION

The present study demonstrated a substantial gap between general awareness of cervical cancer and specific knowledge of HPV infection, HPV vaccination, and preventive practices among women in Lahore. Although nearly three-fourths of participants had heard about cervical cancer, less than half were aware of HPV infection, only about one-third had heard about the HPV vaccine, and an even smaller proportion knew that HPV vaccination helps prevent cervical cancer. This pattern suggests that cervical cancer may be recognized as a women's health problem, but its viral etiology and vaccine-preventable nature remain insufficiently understood. Such a knowledge gap is important because effective cervical cancer prevention depends not only on awareness of the disease but also on understanding the causal role of high-risk HPV infection, the timing and purpose of vaccination, and the need for screening. Evidence from modeling and prevention studies has consistently shown that HPV vaccination, particularly when combined with screening strategies, can substantially reduce cervical cancer burden in low- and lower-middle-income countries where late diagnosis and limited screening coverage remain major barriers to disease control (16,17).

Despite limited HPV-specific knowledge, attitudes toward vaccination were generally favorable. More than two-thirds of participants considered the HPV vaccine beneficial, and more than half expressed willingness to receive it. This finding indicates that low vaccine uptake in this population may not be explained primarily by outright refusal or negative perception of vaccination. Instead, the difference between willingness and actual vaccine receipt suggests the presence of modifiable barriers, including inadequate counseling, limited access, high cost, uncertainty about safety, and sociocultural hesitation. HPV vaccines have been shown to protect against oncogenic HPV types associated with cervical cancer, and their public-health value is greatest when vaccination is delivered before exposure to infection (18,19). Therefore, the relatively favorable attitude observed in the present study represents an important opportunity for health education and provider-led intervention.

The low level of actual preventive practice was one of the most important findings of this study. Only 12.0% of participants had received the HPV vaccine, and only 18.0% had undergone cervical cancer screening. These findings show that awareness and willingness are not translating into preventive behavior. The difference between 58.0% willingness and 12.0% vaccination uptake reflects a clear intention-practice gap, while the difference between 48.0% awareness of screening importance and 18.0% screening uptake suggests that women may recognize screening as useful but remain unable or unwilling to access it. Similar challenges have been reported in low-resource settings, where screening programs are often limited by lack of organized services, poor follow-up systems, low perceived susceptibility, embarrassment, fear of the procedure, and insufficient healthcare access (20,21).

Lack of awareness was the most frequently reported barrier to HPV vaccine uptake, followed by high vaccine cost, fear of side effects, cultural hesitation, and absence of doctor recommendation. These barriers reflect both individual-level and health-system-level limitations. Insufficient awareness may prevent women from recognizing the need for vaccination, while cost may restrict access even among women who are willing to receive the vaccine. Fear of side effects and cultural hesitation are particularly important in the context of HPV because the infection is sexually transmitted, and discussion of sexually transmitted infections may be socially sensitive in conservative communities. Misconceptions about vaccine safety and reproductive effects may further discourage acceptance if not addressed through

culturally appropriate counseling. Studies from different settings have shown that women's beliefs, perceived vulnerability, anxiety, and information need strongly influence cervical cancer prevention behaviors, highlighting the need for communication strategies that are medically accurate, respectful, and adapted to local sociocultural norms (22,23).

The strong influence of physician recommendation observed in this study is a key practical finding. Nearly three-fourths of participants reported that a doctor's recommendation would influence their decision regarding HPV vaccination, yet only 29.0% had discussed the vaccine with a doctor. This discrepancy indicates a missed opportunity within routine healthcare encounters. Women attending outpatient departments may already be in contact with the healthcare system, but HPV vaccination and cervical cancer screening are not being consistently discussed. Provider recommendation can help reduce uncertainty about vaccine safety, clarify eligibility, address misconceptions, and encourage women to seek screening. Strengthening provider training and integrating brief HPV counseling into outpatient, gynecological, maternal-health, and primary-care consultations may therefore improve vaccine acceptance and screening participation.

Educational status showed a strong relationship with HPV vaccine awareness. Awareness increased from 16.0% among women with primary education to 32.5% among women with secondary education and 54.3% among women with graduation-level education or above. This gradient suggests that education improves access to health information, comprehension of preventive health messages, and ability to engage with vaccination-related decision-making. Women with lower educational status may be more vulnerable to misinformation, may have fewer opportunities to receive accurate health education, and may depend more heavily on family or provider guidance for preventive decisions. Health-behavior models also suggest that preventive action is shaped by perceived susceptibility, perceived benefits, perceived barriers, cues to action, and self-efficacy; therefore, educational interventions should not merely provide information but should also address perceived risk, affordability, safety concerns, and practical access to services (24).

Age-related differences in vaccination status also emerged, with higher vaccine uptake among younger women and no reported vaccination among women aged 46 years and above in the selected age-group comparison. This pattern may reflect greater exposure of younger women to health information through educational institutions, social media, and healthcare campaigns, as well as greater relevance of vaccination messages to younger age groups. However, older women remain an important population for cervical cancer screening because vaccination does not replace screening, and women who were not vaccinated earlier may still benefit from awareness, risk assessment, and appropriate screening. The findings therefore support a dual strategy: promoting HPV vaccination among younger eligible females while strengthening screening awareness and access among adult and older women.

The findings have important implications for public health practice in Lahore and similar settings. First, awareness campaigns should clearly explain the link between HPV infection and cervical cancer, because general awareness of cervical cancer alone is insufficient. Second, HPV vaccination messages should emphasize vaccine purpose, safety, timing, and preventive benefit while addressing culturally sensitive concerns in a respectful manner. Third, physician recommendation should be used as a central intervention point, as healthcare providers are trusted sources of information and can directly influence acceptance. Fourth, affordability should be addressed through subsidized vaccination, school-based programs, public-sector availability, or integration into broader reproductive and adolescent health services. Finally, cervical cancer screening should be promoted alongside vaccination because screening remains essential for women who are unvaccinated, incompletely vaccinated, or beyond the routine vaccination age group.

This study also has limitations that should be considered when interpreting the findings. The cross-sectional design allows assessment of awareness, attitudes, practices, and associations at one point in time but does not establish causal relationships. Self-reported vaccination and screening practices may

be affected by recall bias or social desirability bias. The recruitment of participants from selected hospitals and rural areas of Lahore may limit generalizability to all women in Lahore or Pakistan, particularly women who do not access outpatient healthcare services. In addition, the study focused on selected socio-demographic associations, mainly education and age, while other potential determinants such as income, residence type, occupation, parity, family history of cervical cancer, media exposure, and access to female healthcare providers may also influence HPV vaccine awareness and uptake.

Overall, the study demonstrates that women in Lahore show favorable attitudes toward HPV vaccination but have limited HPV-specific knowledge and low engagement with vaccination and screening services. The observed knowledge-practice gap indicates that improving awareness alone may not be sufficient unless educational efforts are paired with physician counseling, affordable vaccine access, culturally appropriate communication, and stronger screening pathways. These findings support the need for integrated cervical cancer prevention strategies that combine community education, healthcare-provider engagement, and accessible preventive services to improve HPV vaccination uptake and cervical cancer screening among women in Lahore.

CONCLUSION

The present study concluded that although women in Lahore demonstrated relatively higher general awareness of cervical cancer and generally favorable attitudes toward HPV vaccination, their specific knowledge of HPV infection, the preventive role of HPV vaccination, and actual engagement in preventive practices remained limited. Only 36.0% of participants had heard about the HPV vaccine, 30.0% knew that it helps prevent cervical cancer, 12.0% had received the vaccine, and 18.0% had undergone cervical cancer screening, indicating a substantial gap between awareness, acceptance, and preventive behavior. Lack of awareness, high vaccine cost, fear of side effects, cultural hesitation, and absence of physician recommendation were the main reported barriers to vaccine uptake. Higher educational status was associated with greater HPV vaccine awareness, while younger women showed comparatively higher vaccination uptake. These findings highlight the need for integrated cervical cancer prevention strategies in Lahore, including community-based health education, culturally sensitive awareness campaigns, stronger physician-led counseling, improved vaccine affordability, and accessible screening services to translate positive attitudes into effective preventive practices.

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