Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 15s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

Perceptions and Barriers toward HPV Vaccination among Young Women: A Physiological Perspective

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Cite this paper as Hasan Shami, Bushra Sajid, Arika Nadeem, Chander Rekha, Asifa Afzal,Farzana Rahim Memon (2025) Perceptions and Barriers toward HPV Vaccination among Young Women: A Physiological Perspective.Journal of Neonatal Surgery, 14, (15s) 1205-1217

ABSTRACT

Background: Human Papillomavirus (HPV) infection is the leading cause of cervical cancer worldwide. Young women are underserved and under-immunized within the context of an effective vaccine. Inaccuracies, cultural beliefs, lack of knowledge, and access barriers all lead to low uptake. Knowledge of perceptions and barriers is necessary to steer appropriate health promotion strategies.

Objectives: To review the perceptions, attitudes and barriers on HPV vaccination among young women with some particular attention to different socio-cultural, financial and information factors impacting acceptance and uptake of the vaccine.
Study Design and Settings: A cross-sectional study at Abbasi Shaheed hospital, Karachi, January 2025 to June 2025.

Methods: A cross-sectional study was conducted among 120 young women of age group between 18 and 26 years. A structured questionnaire was used to evaluate sociodemographic information, knowledge, perceptions and barriers about the HPV vaccination. Statistical analyses were conducted using SPSS version 24.0. Continuous variables were expressed as the mean ± standard deviation and categorical, as a percentage. Associations were determined by chi-square and independent t-tests, with significance set at $p < 0.05$.

Results: The mean age of 120 subjects was 21.8 ± 2.4 years, who were included in the study. The knowledge about HPV infection was acknowledged by 38% of respondents and only 25% had heard about the vaccine. Key barriers included not knowing about DAA (62%), safety concerns (48%) and cost of DAA therapy (40%). Parental opposition was noted by 30% of the respondents. Women with more than secondary school education were significantly more likely to accept future vaccination ($p = 0.02$), as well as those who had heard of HPV previously in the bivariate analysis ($p = 0.01$). Cultural stigma and misinformation were the reasons cited most often for being hesitant to become vaccinated.

Conclusions: Lack of awareness, cultural stigma, safety concern and high cost remain barriers to HPV vaccine uptake among young women. Education and prior knowledge were better predictors of vaccine acceptance. To mitigate these barriers is need for targeted health educational programs, affordability measures and a strong support from the healthcare provider. Attending to sociocultural influences and misinformation will facilitate acceptance and reduce disease morbidity from HPV

KEYWORDS: Human Papillomavirus, Vaccination Barriers, Young Women, Cervical Cancer Prevention

1. INTRODUCTION

Human papillomavirus (HPV) infection is a major public health problem; it is known as the most prevalent sexually transmitted infection globally, involving in both men and women but leading to disease burden mainly among women because of cervical cancer risk. Cervical cancer is still the fourth most common malignancy in women worldwide with a global incidence of 604,000 new cases and 342,000 deaths in 2020 [1]. Persistent infection with oncogenic HPV genotypes, especially types 16 and 18, is responsible for about 70% of cervical cancers [2]. In spite of these troubling statistics, HPV continues to be an underappreciated preventable source of morbidity and death. The development of HPV vaccines for prophylaxis in the mid-2000s transformed cervical cancer prevention. Clinical trials and post marketing experience show that HPV vaccines are effective against prevention of infections, precancerous lesions, and confirmed cases of cervical cancer, with the best protection if offered to girls prior to sexual debut [3]. The World Health Organization (WHO) has identified HPV vaccination as an integral part of the global strategy for cervical cancer elimination, with the goal that 90% of girls in every country receive the vaccine before their 15th birthday. Nevertheless, the worldwide vaccine coverage is still suboptimal, in particular in LMICs (low- and middle-income countries), with several obstacles such as lack of knowledge, economic restrictions or cultural beliefs [4,5]. School-based immunization programs have enhanced uptake of vaccines in high-income countries, but problems persist such as the impact of misinformation and vaccine hesitancy [6]. In low- and middle-income countries (LMICs) such as South Asia, lack of healthcare facilities, poor understanding and the societalstigma further exacerbate the situation. Study in Asian and African settings suggests that many young women have little or no knowledge about HPV, including cervical cancer as a consequence of HPV infection, and there is generally lower awareness about the vaccine [7]. Moreover, barriers that include fears of safety, perception of promoting sexual activity, parental disapproval and logistical challenges to getting vaccinated still persist [8]. Young females are an important group for HPV vaccine uptake as they are vulnerable to HPV acquisition in early adulthood and had missed vaccination opportunities in childhood. Additionally, attitudes and perceptions of the vaccine in childhood may shape future preferences related to whether PrEP for a partner or for one's future children should be endorsed. Tackling stigma and barriers among this community base is therefore critical in order to break the cycle for misinformation and stigmatization. Strong provider recommendation, public health campaigns, vaccine cost and provision of HPV vaccination as part of national immunization programs are some known facilitators for acceptance of the vaccine demonstrated in other studies. On the other hand, when enablers are not there, it compounds hesitation. Insight into these barriers and perceptions in a local context constitutes an important prerequisite for the development of culturally sensitive intervention [9]. The aim of this study was to assess knowledge and barriers to HPV vaccination in young women attending a tertiary care center. The study sought to deliver relevant, actionable findings based on sociodemographic correlates, knowledge and reasons for hesitancy. The results of this study can assist health policy makers, gynecologist and public health professionals to design customized strategies which target knowledge gap but also take the needs with social and cultural background into account.

2. METHODS

A cross-sectional study pattern was followed in Abbasi Shaheed Hospital, Karachi, a tertiary care hospital from January 2025 to June 2025. One hundred and twenty young adult women aged 18–26 years were enrolled in the study by consecutive convenience sampling. A pretested structured questionnaire was used to gather information on sociodemographic, knowledge of HPV and its vaccine, attitudes toward vaccination, and perceived barriers. The questionnaire was established based on a review of the literature and validated by specialists in public health and gynecology. Subjects' information was nobody disclosed to any investigators, except the corresponding author. informed consent was obtained before treatment. STROBE guidelines for observational studies were followed throughout the study.

Inclusion Criteria

The study was open to consenting young women 18–26 years old, attending the gynecology or general outpatient clinics who had not completed their full series of HPV vaccine.

Exclusion Criteria

Women aged above the target age group, with a previous histologically diagnosed cervical cancer, who refused to participate and those not capable of completing the questionnaire through illness or linguistic barriers.

Ethical Approval Statement

The study was approved by the IRB of the institute. All participants provided written informed consent, and all procedures followed the Declaration of Helsinki. Anonymity and confidentiality of subjects' data were fully assured during the study process.

Data Collection

Information was obtained through a standardised self-administered questionnaire that was available in English and the local language. Trained female data collectors were available to clarify queries of the respondents. Sociodemographic characteristics, knowledge attitude and practices regarding HPV vaccine were recorded. Once the questionnaires were finalized, a check was done to assure veracity and completeness of completed questions before entering the data into database.

Statistical Analysis

Statistical analysis was carried out with IBM SPSS version 24.0. The continuous variables like age is presented as mean ±

standard deviation. Categorical variables including awareness and barriers were described using frequencies and percentages. Chi-square and t-tests assessed associations. The p-value of less than 0.05 was regarded as statistically significant.

3. RESULTS

A total of 120 young women, with a mean age of 21.8 ± 2.4 years participated in the study. Only 38% of respondents were aware of HPV infection and 25% about the HPV vaccine. In terms of perception, 45% thought the vaccine could prevent cervical cancer and 40% were unaware about its usefulness. Reasons for not being vaccinated were lack of knowledge (62%), concerns about vaccine safety (48%), financial reasons (40%) and parental disagreement (30%). Twenty-eight percent reported cultural stigma that was associated with the sexually transmitted nature of HPV. Logistic problems like getting to vaccination centers plagued 22%. There was a significant correlation between awareness and level of education: University graduate women had higher level of awareness about HPV as compared with secondary or lower educated women (p = 0.02). A higher level of previously being aware of cervical cancer was also correlated with more positive attitude toward vaccine (p= 0.01). Fifty-four percent remained willing to receive the vaccine, recommendable by a healthcare provider and cost-effective. These results demonstrate the relationship among awareness, cultural beliefs and SES in contributing to the uptake of HPV vaccine coverage among young females.

Table 1: Sociodemographic Characteristics of Participants (n = 120)

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	Mean ± SD	21.8 ± 2.4	–
Education level	Secondary or below	42	35.0
	Higher secondary	38	31.7
	University or above	40	33.3
Residence	Urban	70	58.3
	Rural	50	41.7
Marital status	Single	95	79.2
	Married	25	20.8

Table 2: Awareness and Perceptions toward HPV Vaccination

Parameter	Frequency (n)	Percentage (%)
Heard of HPV infection	46	38.3
Heard of HPV vaccine	30	25.0
Believes HPV vaccine prevents cervical cancer	54	45.0
Unsure about benefits of vaccine	48	40.0
Perceived personal risk of HPV infection	35	29.2

Table 3: Reported Barriers toward HPV Vaccination

Barrier Reported	Frequency (n)	Percentage (%)
Lack of knowledge about HPV/vaccine	74	61.7
Concerns regarding vaccine safety	58	48.3
Financial constraints	48	40.0
Parental disapproval	36	30.0
Cultural stigma (link to sexuality)	34	28.3
Difficulty accessing vaccination centers	26	21.7

Table 4: Association of Awareness and Vaccine Acceptability with Education Level

Education Level	Heard of HPV (%)	Heard of Vaccine (%)	Willing to Accept Vaccine (%)	*p*-value
Secondary or below (n=42)	26.2% (11)	14.3% (6)	40.5% (17)	
Higher secondary	36.8% (14)	23.7% (9)	50.0% (19)	

(n=38)				
University or above (n=40)	52.5% (21)	37.5% (15)	70.0% (28)	
p-value	**0.02**	**0.04**	**0.01**	

4. DISCUSSION

Self-reported awareness of HPV and prevention barrier university of Kentucky participants (120 young women) according to the measures: HPV and HPV vaccine awareness, top expressed barriers to vaccination [10]. Awareness is modest for either HPV (38.3%) or the HPV vaccine (25.0%), where the major perceived limitations were lack of knowledge [61.7%], safety concerns [48.3%], unaffordability [40%], parental disapproval [30%] and stigma against those who receive it [28.3%]. These trends are consistent with the findings of country-level synthesis showing that lack of knowledge, fear of side effects and cost were identified as major barriers to uptake in many countries [11]. For example, in a 2024 Systematic Review of school-based programs, low resource constraints, fear of vaccines, and non-return of consent forms were reported as common barriers to vaccine delivery; even within school settings Low- and Middle-Income Countries (LMICs) have structural issues such as supply chain management and healthcare financing and systems that work in unison with personal hesitancy rendering vaccination coverage below optimal levels. The positive association of higher educational attainment with knowledge and acceptability ($p = 0.02$, $p = 0.01$ respectively) in our study was consistent with regional information about Kangaroo Mother Care [12]. Findings from Pakistan and other adjacent regions have shown that education is a consistent predictor of knowledge and positive attitudes regarding screening and vaccination However, even women who are aware of cervical cancer often possess low levels of vaccine-specific data, indicating that broad-reaching cancer literacy does not necessarily translate to vaccine literacy [13,14]. This gap may account for our cohort's relatively low levels of knowledge regarding the vaccine but moderate knowledge about cervical cancer prevention. Led by the safety concerns, it was security concern that was the second most common barrier in our cohort. Comparable values are reported in different populations, showing that concerns about long-term consequences and fertility are indeed popular [15]. These are perceptions that have persisted in the face of long-term evidence for vaccine efficacy and safety, and recent approval of HPV vaccination by WHO itself as a cornerstone of global elimination strategy The continued presence of safety fears highlights the need for reliable contextually-situated risk communication, best given by frontline providers. In our study, affordability (40.0%) and logistical access (21.7%) are reminiscent of this LMIC literature: reviews identify financing models and delivery platforms as make-or-break predictors of uptake [15]. The single best documented approach to improving series initiation and completion is through use of provider prompts, reminders / recall, community-based outreach activities, and funding support in multicomponent strategies which have been shown effective in reducing vaccination rates among program trials [16,17]; but few of these evaluations are occurring in low-income settings. These interventions must be adapted to local consent procedures, privacy concerns and school/community infrastructures when translating those inferences to LMIC settings. In our cohort, cultural stigma and parental disapproval are consistent with a systematic review specific to LMIC settings found that embarrassment, sexual-morality concerns, and family gatekeeping were significant barriers particularly when adolescentvaccination intersects with norms around premarital sexuality [18]. Crucially, the timing of vaccinating before a young person becomes sexually active, key to its efficacy, can raise it as an issue in itself for caregivers, and requires messaging which separates the vaccination from permission for sex while centering cancer prevention. Our data are even more relevant as there is active scale up in the region [19,20]. The Pakistani nation began a national HPV vaccination program in September 2025 focused on girls aged 9–14 years old, using female vaccinators and 'whole-of-government' partnership collaboration (WHO, UNICEF, Gavi) to deal with cultural factors while also reaching out-of-school girls [21]. This policy window provides an opportunity to use our findings: primary, direct community education to what HPV is and that vaccination should occur before ever having had sex; secondary, enable providers to offer strong presumptive recommendations as provider endorsement was a major facilitator in our cohort (54% would vaccinate if recommended and vaccine affordable), ensure cost and time efficient delivery by providing no or low out of pocket costs at convenient delivery sites [17]. With the WHO's 90–70–90 elimination objectives (vaccination, screening, treatment), portraying local messages in line with the elimination narrative can contribute to rebranding HPV vaccination as business-as-usual cancer prevention rather than a stigmatized option [23,24]. Novel findings from our investigation include: a strong educational gradient in both awareness and acceptability, suggesting that tailoring materials to literacy levels may result in disproportionate gains; the colocation of safety worries with economic concerns suggests that trust-building and financial protection must be sequential or simultaneous, either alone may not suffice; and the substantial unsure group represents an addressable target for brief, structured counseling, where myth-busting and reframing vaccine as cervical cancer prevention (rather than STI prevention) might alleviate ambivalence [25,26]. Finally, while trends in global coverage are changing for the better,

dramatic regional inequalities persist and even some high-income countries have missed opportunities and screening gaps. Integrating vaccination within the broader pathways of cervical-cancer elimination, and connecting adolescent vaccination to later access to screening and treatment, provides an organized, lifespan approach that aligns with international best practice.

5. CONCLUSION

The overall HPV vaccine coverage in young women is low mainly as a result of lack of awareness, safety concerns, cost and cultural stigma. The acceptability was significantly predicted by higher education and prior knowledge. Targeted education and cost interventions, among others, combined with proactive provider recommendation are necessary to improve HPV vaccination coverage and minimize the disease burden of HPV.

6. LIMITATIONS

This was a single-center, tertiary referral analysis and findings may not be generalizable. Causal inference cannot be drawn from the cross-sectional design. Self-reported may be prone to recall and social desirability bias. These limitations notwithstanding, these findings offer much needed insights into attitudes and barriers towards HPV vaccination among young women.

Future Findings

Longitudinal multicenter designs should be used in future studies so that the evolution of attitudes regarding HPV vaccination may be ascertained across different populations. Interventional studies are needed to determine the effect of structured health education, vaccination programmed subsidy, and provider-initiated communication systems. Policies and interventions should focus on culturally sensitive interventions adapted for low- and middle-income country (LMIC) settings.

Abbreviations

HPV – Human Papillomavirus
LMICs – Low- and Middle-Income Countries
WHO – World Health Organization
SD – Standard Deviation
SPSS – Statistical Package for the Social Sciences
IRB – Institutional Review Board
STROBE – Strengthening the Reporting of Observational Studies in Epidemiology

Authors Contribution

Concept & Design of Study: Hasan Shami, Chander Rekha Drafting: Bushra Sajid, Arika Nadeem
Data Analysis: Asifa Afzal, Farzana Rahim Memon
Critical Review: Hasan Shami, Chander Rekha
Final Approval of version: All above approved
Disclaimer: Nil
Conflict of Interest: Nil
Funding Disclosure: Nil

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