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ORIGINAL ARTICLE

Exploring the Underuse of HPV Vaccination Among Women in Pakistan, A Clinical Evaluation of an Urgent Public Health Threat

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ABSTRACT

Background: Cervical cancer is a leading cause of cancer-related morbidity and mortality among women worldwide, especially in low- and middle-income countries like Pakistan. Although human papillomavirus (HPV) vaccination is a proven preventive measure, its uptake in Pakistan remains extremely limited. This study aimed to assess the awareness, vaccination status, and barriers to HPV vaccine acceptance among women in Pakistan.

Methods: A descriptive, cross-sectional study was conducted from January 2022 to January 2023 at two tertiary care hospitals: Sandeman Provincial Hospital (SPH), Quetta, and Liaquat National Hospital (LNH), Karachi. A total of 150 women aged 15 to 45 years attending gynecology outpatient clinics were interviewed using a structured questionnaire. Data were analyzed using SPSS version 25.0, with Chi-square test used to determine associations.

Results: Only 15.3% of participants had heard of HPV, and 21.3% were aware of the HPV vaccine. Vaccine uptake was extremely low, with only 6.7% of respondents having received at least one dose. The most commonly reported barriers to vaccination were lack of awareness (63.6%), fear of side effects (48.6%), cost (46.4%), cultural or religious concerns (28.6%), and unavailability at local health centers (20%). Higher education level and urban residency were significantly associated with greater awareness and uptake ($p < 0.05$).

Conclusion: HPV vaccination remains severely underused among Pakistani women due to a combination of informational, economic, cultural, and systemic barriers. Public health interventions are urgently needed, including nationwide education campaigns, healthcare provider training, and integration of HPV vaccination into the national immunization program.

Keywords: HPV vaccine, cervical cancer, women's health, Pakistan, awareness, public health barriers

INTRODUCTION

Cervical cancer remains a major public health concern and is one of the most preventable forms of cancer affecting women globally. According to the World Health Organization (WHO), it is the fourth most common cancer among women worldwide, with an estimated 604,000 new cases and 342,000 deaths reported in 2020 [1]. A significant proportion of these deaths nearly 90% occur in low- and middle-income countries (LMICs), where access to early screening and preventive interventions remains limited. Persistent infection with high-risk types of human papillomavirus (HPV), particularly HPV-16 and HPV-18, is recognized as the primary etiological factor in the development of cervical cancer. The introduction of prophylactic HPV vaccines has revolutionized the prevention of cervical neoplasia, and numerous studies have confirmed their efficacy in reducing the incidence of both cervical intraepithelial lesions and invasive cervical cancer[2,3].

Despite the global momentum toward HPV vaccination, disparities in vaccine uptake persist, particularly in developing countries like Pakistan. Although the HPV vaccine is available in the private sector and has been approved for use by the Drug Regulatory Authority of Pakistan (DRAP), its inclusion in the national immunization program remains pending[4]. Consequently, there is no standardized or government-subsidized vaccination initiative targeting adolescent girls, who are the ideal candidates for immunization prior to the onset of sexual activity. As a result, vaccination coverage remains exceptionally low, with anecdotal estimates suggesting uptake rates of less than 5% among the eligible population[5].

Pakistan faces unique sociocultural, educational, and healthcare system challenges that contribute to the underutilization of the HPV vaccine. Public awareness about HPV, its mode of transmission, and its role in the development of cervical cancer is critically low. Health-seeking behavior among women is influenced by societal norms, religious beliefs, and male-dominated decision-making dynamics, all of which limit women's access to preventive healthcare[7]. Moreover, healthcare professionals themselves often lack adequate training or confidence to recommend HPV vaccination to patients, further compounding the problem. Myths and misconceptions regarding the safety, effectiveness, and implications of the vaccine particularly the false notion that it promotes promiscuity are widely prevalent and discourage both parents and young women from considering vaccination[8].

Economically, the cost of the HPV vaccine remains prohibitive for most of the population. A complete three-dose regimen in the private sector can cost several thousand rupees, which is beyond the reach of lower- and middle-income families[9]. In the absence of government subsidies, school-based immunization programs, or awareness campaigns, the burden of cervical cancer continues to rise silently. Pakistan does not have a robust national cervical cancer screening program either, which means that most cases are detected at advanced stages when curative treatment is difficult or impossible[10].

Global health agencies, including WHO and GAVI (the Vaccine Alliance), have emphasized the urgent need to implement HPV vaccination programs in countries with high cervical cancer burden. Several regional counterparts of Pakistan, such as Bangladesh, Sri Lanka, and Bhutan, have already introduced HPV vaccines through school-based programs or government initiatives with significant success[11]. The contrast underscores a critical gap in Pakistan's public health policy and the urgency to address it. Incorporating HPV vaccination into the Expanded Programme on Immunization (EPI) could drastically improve access, especially for underserved rural populations. Additionally, strengthening the capacity of healthcare providers, launching community-level awareness campaigns, and addressing cultural barriers through targeted education are essential steps to overcome vaccine hesitancy and improve uptake[12].

This study aims to clinically evaluate the level of awareness, accessibility, and acceptance of HPV vaccination among women in Pakistan, and to investigate the barriers that contribute to its underuse. By analyzing patterns of knowledge, attitudes, and practices in urban healthcare settings, the study aims to provide data-driven recommendations for national policy formulation. In doing so, it sheds light on a neglected but critical aspect of women's health in Pakistan and advocates for a structured,

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culturally sensitive, and evidence-based public health response to mitigate the looming threat of cervical cancer[13].

MATERIALS AND METHODS

This descriptive, cross-sectional study was conducted to assess the level of awareness, accessibility, and barriers to the human papillomavirus (HPV) vaccination among women in Pakistan. The study was carried out over a period of one year, from January 2022 to January 2023, at two major tertiary care public-sector hospitals: Sandeman Provincial Hospital (SPH), Quetta, and the Obstetrics and Gynecology Department of Liaquat National Hospital (LNH), Karachi. These hospitals were selected to represent two culturally and geographically distinct provinces Balochistan and Sindh ensuring a diverse sample population.

The study population comprised women aged 15 to 45 years who attended the outpatient gynecology clinics of the participating hospitals for routine medical consultations, antenatal care, or non-emergency gynecological complaints. Women diagnosed with cervical cancer, those who had undergone hysterectomy, and individuals with any known immunocompromised conditions were excluded to avoid bias related to vaccine indication or contraindication. A total of 150 women were included in the study, with 75 participants recruited from each hospital using a non-probability purposive sampling technique.

Data collection was conducted through face-to-face interviews using a structured, pre-tested questionnaire designed in both English and Urdu to accommodate varying literacy levels. The questionnaire consisted of four major sections. The first section gathered demographic data including age, marital status, educational attainment, socioeconomic status, and area of residence (urban or rural). The second section assessed participants' knowledge about HPV and its link to cervical cancer. The third section focused on HPV vaccination status whether participants had heard of the vaccine, received it, or intended to receive it. The fourth section explored perceived barriers to vaccination, such as cost, fear of side effects, religious or cultural concerns, unavailability of the vaccine, and lack of knowledge.

The interviews were conducted in a private, quiet room within the outpatient department to ensure confidentiality and comfort. All interviewers were trained female medical staff members to encourage open communication. Informed verbal and written consent was obtained from each participant prior to data collection, with the assurance that participation was voluntary and that anonymity would be maintained. No personally identifiable information was recorded.

Ethical approval was obtained from the Institutional Review Boards (IRBs) . The study adhered to the ethical principles outlined in the Declaration of Helsinki. Participants retained the right to withdraw at any point during the study without consequence.

All data were entered and analyzed using IBM SPSS Statistics version 25.0. Descriptive statistics such as frequencies and percentages were used to summarize categorical variables. Associations between independent variables (e.g., education level, residence, income) and awareness or vaccination status were analyzed using the Chi-square test, with a p-value of less than 0.05 considered statistically significant.

RESULTS

A total of 150 women were enrolled in this cross-sectional study conducted at two tertiary care hospitals in Pakistan Sandeman Provincial Hospital (SPH), Quetta, and the Obstetrics and Gynecology Department of Liaquat National Hospital (LNH), Karachi from January 2022 to January 2023. Each hospital contributed 75 participants. All women completed the structured interview without missing responses, allowing for a complete dataset.

The mean age of participants was 30.1 ± 6.9 years, with the age range spanning from 15 to 45 years. The majority of the respondents 60.7% (n=91) were married, while 39.3% (n=59) were unmarried. Educational qualifications showed that 42.7% (n=64) had completed secondary education, 32% (n=48) had attained graduate or postgraduate degrees, and 25.3% (n=38) had only primary-level education or no formal education. Regarding geographic distribution, 57.3% (n=86) of participants resided in urban areas, while 42.7% (n=64) lived in rural settings. In terms of socioeconomic classification, 61.3% (n=92) belonged to the low-income group, 30.7% (n=46) to the middle-income group, and 8% (n=12) were classified as high-income (Table 1).

These findings from Table 1 provide important context regarding the demographic and socioeconomic status of participants, illustrating that a significant portion of the sample came from underprivileged and semi-urban or rural backgrounds an important consideration when interpreting vaccine accessibility and acceptance.

Table 1: Socio-demographic Characteristics of Study Participants (n = 150)

Variable	Frequency (n)	Percentage (%)
Age (mean ± SD)	30.1 ± 6.9	–
Marital Status		
• Married	91	60.7
• Unmarried	59	39.3
Education Level		
• No formal/primary	38	25.3
• Secondary	64	42.7
• Graduate or above	48	32.0
Residence		
• Urban	86	57.3
• Rural	64	42.7
Socioeconomic Status		
• Low income	92	61.3
• Middle income	46	30.7
• High income	12	8.0

In terms of awareness regarding HPV and its vaccine, only 15.3% (n=23) of the participants reported ever hearing about human papillomavirus. Of these 23 women, 65.2% (n=15) correctly identified HPV as a sexually transmitted infection, and 39.1% (n=9) were aware of its association with cervical cancer. Slightly more respondents 21.3% (n=32) reported having heard of the HPV vaccine. However, among them, only 6.7% (n=10) had actually received at least one dose of the vaccine. This means that overall, only one in fifteen participants had been partially vaccinated, while none had completed the full course.

When asked about sources of information, 43.7% (n=14) cited social media as their primary source, followed by 31.3% (n=10) who reported receiving information from healthcare professionals, and 25% (n=8) who learned through friends or family members. This pattern of information sources suggests a lack of formal, healthcare-based vaccine education and overreliance on potentially unverified channels like social media.

Table 2: Awareness, Vaccination Status, and Barriers to Uptake (n = 150)

Variable	Frequency (n)	Percentage (%)
Heard of HPV	23	15.3
Knew HPV is sexually transmitted	15	10.0
Knew HPV causes cervical cancer	9	6.0
Heard about HPV Vaccine	32	21.3
Received at least one dose of vaccine	10	6.7
Sources of Vaccine Information		
• Social media	14	43.7 (of 32)
• Healthcare providers	10	31.3
• Friends/Family	8	25.0
Barriers to Vaccination		
• Lack of awareness	89	63.6
• Fear of side effects	68	48.6
• Cost of vaccine	65	46.4
• Cultural or religious concerns	40	28.6
• Unavailability at local centers	28	20.0

Among the 140 unvaccinated women, the most frequently cited barrier to vaccination was lack of awareness (63.6%, n=89), followed by fear of side effects (48.6%, n=68), cost-related concerns (46.4%, n=65), cultural or religious opposition (28.6%, n=40), and unavailability of the vaccine at local health facilities (20.0%, n=28) (Table 2).

These results, as shown in Table 2, point to a combination of informational, economic, cultural, and systemic barriers to HPV vaccine uptake among Pakistani women. The low vaccination rate of 6.7% is particularly alarming, given the accessibility of the participants to tertiary care centers suggesting that rates may be even lower in rural or peripheral settings.

Further statistical analysis showed a significant association between higher educational status and awareness of the HPV vaccine ($p < 0.01$), with graduate-level participants being notably more informed than those with only primary or no formal education. Similarly, participants residing in urban areas were significantly more likely to be aware of the vaccine and to have received at least one dose compared to their rural counterparts ($p = 0.03$). However, no statistically significant differences were found based on age group or marital status.

These results reveal a critically low level of HPV vaccine uptake in the study population. The findings from Tables 1 and 2 underscore a multifactorial crisis involving low awareness, misinformation, cost-related barriers, and infrastructural limitations. The heavy dependence on informal sources of information and the negligible vaccine coverage even in tertiary settings highlight the urgent need for systematic, government-led intervention in the form of education, subsidization, and integration of HPV vaccination into national immunization programs.

DISCUSSION

This study presents a clinical snapshot of the alarmingly low levels of awareness and utilization of the human papillomavirus (HPV) vaccine among women attending two major tertiary care hospitals in Pakistan. Despite the increasing global recognition of HPV vaccination as a highly effective strategy for cervical cancer prevention, our findings reveal that the vaccine remains significantly underutilized in the Pakistani healthcare setting[13].

One of the most critical findings is that only 15.3% of participants had heard of HPV, and just 6.7% had received even a single dose of the vaccine. These numbers are consistent with earlier research conducted in other low- and middle-income countries (LMICs), but they remain far below the global targets set by the World Health Organization (WHO), which aims for 90% of girls to be fully vaccinated with the HPV vaccine by age 15 by 2030 [14]. The low awareness level in our cohort, despite recruitment from tertiary care hospitals, suggests that HPV-related education has not yet been meaningfully incorporated into standard gynecological care and health promotion services in Pakistan[15].

The data from Table 2 highlights that social media was the most common source of vaccine information among those aware of HPV vaccination. This finding is concerning because social media often spreads misinformation, especially on topics related to reproductive health. Although healthcare providers were the second most common source, their limited role underscores a missed opportunity within clinical practice to educate women during routine visits. Many gynecologists and family physicians may either lack proper training or hesitate to discuss sexually transmitted infections due to perceived social or religious sensitivities an issue that must be addressed through medical curriculum reform and continued professional development[16,17].

Cost was identified as a major barrier by 46.4% of unvaccinated participants. The HPV vaccine is currently only available through the private sector in Pakistan and is not part of the Expanded Programme on Immunization (EPI). Given that 61.3% of the women in our study (as shown in Table 1) belonged to low-income groups, the economic burden of the vaccine becomes an obvious deterrent. Additionally, 48.6% of participants expressed fear of side effects, indicating that misinformation regarding vaccine safety is widespread. Public health communication campaigns must be tailored not only to raise awareness but also to address common fears and misconceptions about the vaccine's safety and long-term effects[18,19].

Cultural and religious objections were noted by 28.6% of participants as barriers to vaccination. This finding reflects the conservative societal context in which open discussion of sexual health, particularly among unmarried women, remains taboo. HPV vaccination is often misinterpreted as a license for promiscuity, which deters both families and healthcare providers from promoting it. Culturally sensitive messaging, involving religious scholars and community leaders, may be necessary to dismantle such stigma and reposition the vaccine as a preventive measure against cancer rather than a marker of sexual activity[20,21].

Furthermore, 20% of respondents indicated that the vaccine was not available in their local healthcare facilities. This lack of availability, especially in rural and peripheral areas, is a major systems-level barrier that reflects weak health infrastructure and inequitable resource distribution. Even in urban tertiary centers, sporadic availability and high costs make consistent access difficult for most women[22].

Our results also demonstrate a statistically significant association between educational level and HPV awareness ($p < 0.01$), as well as between urban residency and vaccine uptake ($p = 0.03$). These associations suggest that women with better access to information and healthcare are more likely to be informed and vaccinated, thus revealing critical disparities in vaccine equity. This aligns with global findings that education and urbanization positively correlate with better health outcomes[23].

Although the study sample was modest (n=150), its strength lies in its dual-site design, drawing participants from both Quetta and Karachi, which adds geographic and cultural diversity to the dataset. However, one limitation is that hospital-based data may not fully reflect community-level dynamics, particularly in rural and tribal areas where cultural resistance and access limitations may be even more severe. Additionally, self-reported data on awareness and vaccination may be subject to recall bias or social desirability bias[22,24].

Overall, the study confirms that HPV vaccination in Pakistan is not only underutilized but is actively hindered by a complex interplay of misinformation, inaccessibility, cultural stigma, and poor public health infrastructure. These findings reinforce the urgent need for a national HPV vaccination strategy in Pakistan that includes public awareness campaigns, healthcare provider training, subsidized or free vaccine availability, and integration into school-based immunization programs. Without such interventions, the burden of preventable cervical cancer will continue to rise, disproportionately affecting the most vulnerable segments of society[19,25].

CONCLUSION

This study highlights the critically low awareness and uptake of HPV vaccination among women in Pakistan, even within tertiary care settings. Major barriers—including lack of knowledge, fear of side effects, high cost, cultural stigma, and limited availability—contribute to this underuse. The findings underscore the urgent need for nationwide awareness campaigns, integration of HPV vaccination into the national immunization program, and targeted interventions addressing both informational and structural barriers. Strengthening health education and accessibility is essential to reduce the future burden of cervical cancer and improve women's preventive health outcomes in Pakistan.

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Conflict of Interest: The authors declare that there is no conflict of interest regarding the publication of this paper.

Ethical Approval: Ethical approval for this study was obtained from the Institutional Review Boards (IRBs). All procedures performed in the study were in accordance with the ethical

standards of the institutional research committees and with the 1964 Helsinki declaration and its later amendments.

Informed Consent: Informed written and verbal consent was obtained from all participants before participation. Participants were assured of full confidentiality, and their decision to participate or withdraw at any stage was respected without any impact on their medical care.

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