A Survey on the Acceptability of Human Papillomavirus Vaccine Among Educated Bangladeshi Women

By

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A thesis submitted to the School of Pharmacy in partial fulfillment of the requirements for the degree of Bachelor of Pharmacy

School of Pharmacy
Brac University
October 2024

Declaration

It is hereby declared that

1. The thesis submitted is my own original work while completing degree at Brac University.
2. The thesis does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate referencing.
3. The thesis does not contain material which has been accepted, or submitted, for any other degree or diploma at a university or other institution.
4. I have acknowledged all main sources of help.

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Approval

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Ethics Statement

This project does not involve any kind of animal and human trial.

Abstract

This study aims to evaluate the acceptability of the Human Papillomavirus (HPV) vaccine among educated Bangladeshi women, highlighting key barriers and opportunities for increasing vaccination rates. Given the rising cervical cancer burden in Bangladesh, this research addresses the gaps in awareness and vaccine uptake. A questioner was distributed *via* online platforms to collect the data from 196 respondents on vaccine awareness, willingness, and influencing factors. The results revealed that 79.6% of the participants were aware of the HPV vaccine and only 5.6% received the vaccine. High costs and limited healthcare recommendations identified as major barriers for getting vaccinated. However, 78.1% expressed willingness to be vaccinated if the vaccine was more accessible, and 84.2% showed willingness to vaccinate their children. Based on this study, it can be concluded that targeted public health interventions, including digital campaigns and government-backed initiatives, can play crucial role in increasing HPV vaccination rates and reducing cervical cancer incidence in Bangladesh.

Keywords: Cervical cancer, HPV vaccine, vaccination program, educated women, Bangladesh

Dedication

This thesis is dedicated to my family and to all the people who have always been there for me, offering constant support and encouragement throughout my journey.

Acknowledgement

All praise to Almighty Allah for enabling me to complete this thesis smoothly.

I sincerely thank my supervisor, Dr. Nishat Zareen Khair, for her invaluable support and guidance throughout this journey.

I am deeply thankful to my friends and family for their unwavering support and prayers, which have been my strength.

A special thanks goes to all the participants who took the time to complete the survey. Their valuable input has made this research possible, and I am deeply grateful for their contribution.

To everyone who has been part of this, thank you.

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List of Acronyms

HPV	Human Papillomavirus
CC	Cervical Cancer
WHO	World Health Organization
GAVI	Global Alliance for Vaccines and Immunization
EPI	Expanded Programme on Immunization
VIA	Visual Inspection with Acetic Acid
MOHFP	Ministry of Health and Family Planning
MOH&FW	Ministry of Health and Family Welfare
BSMMU	Bangabandhu Sheikh Mujib Medical University
CIN	Cervical Intraepithelial Neoplasia
STD	Sexually Transmitted Disease
VLP	Virus Like Particle
ACOG	American College of Obstetricians and Gynecologists
IARC	International Agency for Research on Cancer
ICO	International Collaboration on Cancer
CDC	Center for Disease Control and Prevention

BDT	Bangladeshi Taka
NGO	Non-Governmental Organization

Chapter 1

Introduction

1.1 Cervical Cancer

Cervical cancer ranks as a significant contributor to cancer causing mortality among women worldwide, notably in low- and middle-income nations, where the access to healthcare and preventive strategies mostly considered falls short. It is primarily caused by a persistent infection with high-risk strains of the Human Papillomavirus (HPV), which causes the disease to proliferate the cells atypically that lining the cervix to begin with. Cervical cancer frequently presents without symptoms in its initial stages, complicating detection efforts in further. Symptoms may manifest as abnormal vaginal bleeding, unusual discharge, pelvic pain, or pain during intercourse. As cancer advances, symptoms may include painful bowel movements, hematuria, back pain, leg oedema, and fatigue (Okunade, 2019). According to American College of Obstetricians and Gynecologists (ACOG), early detection *via* screenings such as Pap smears, HPV tests, or HPV/Pap co-tests is necessary. Screening guidelines advice that women aged 21-29 undergo a Pap test every 3 years. For women aged 30-65, options include an HPV test every 5 years, an HPV/Pap co-test every 5 years, or a Pap test every 3 years (Rayner et al., 2023). The prognosis of cervical cancer varies depending on the stage of the disease as well as other factors, as stated by the American Cancer Society. The survival rate for early-stage cervical cancer is 91%, the survival rate for cancer that has spread adjacent organs is 60%, the survival rate for cancer that has spread to distant locations is 19%, and the overall survival rate is 67% (National Cancer Institute (US), 2024). The World Health Organization (WHO) reports that 20% of children who lose their mother to cancer tend to do so because of cervical cancer since younger women are more likely to be affected making a bigger threat to the future (Reza et al., 2024).

1.2 Cervical Cancer Prevalence in Bangladesh & Worldwide

Cervical cancer is a significant concern for women's health, being the fourth most prevalent disease among women globally and the second most prevalent cancer among women in Bangladesh (Sung et al., 2021). The World Health Organization report revealed around 350,000 women succumbing to the disease in 2022 and 660,000 new cases identified globally; as for Bangladesh, in 2023, there were 8,268 new cases and 4,971 deaths, according to the International Agency for Research on Cancer. Annually, cervical cancer results in 311,000 deaths, with 90% occurring in low- and middle-income countries (Perehudoff et al., 2020) and one woman dying from the disease every two minutes, with nine out of ten fatalities in developing nations (Sung et al., 2021). According to International Collaboration on Cancer and International Agency for Research on Cancer (ICO/IARC) Information Centre on HPV and Cancer 2023 in Bangladesh, 64.0 million women aged 15 and older are at risk for cervical cancer. In Bangladesh, the incidence of new cases was 8,068 (10.6 per 100,000 women), and the mortality rate was 5,214 (7.1 per 100,000 women) in 2018 (Uddin et al., 2023). Without clinical intervention, it is estimated that there will be 505,703 women diagnosed with cervical cancer in Bangladesh by the year 2070 (Canfell et al., 2020). Unequivocally, it remains a major problem in under-developed areas such as sub-Saharan Africa and South Asia; Bangladesh included, has greater rates of its occurrence due to poor access to screening programs coupled with vaccinations (Denny et al., 2006). In Bangladesh, the burden is further underestimated due to non-functional national cancer registries and presence of many unconfirmed cases which emphasize on public health interventions for this preventable disease (Sankaranarayanan et al. 2008).

1.3 Association of HPV with Cervical Cancer

Human Papillomavirus (HPV) is the most dominant etiological cause of cervical cancer. Particularly through persistent infections with high-risk HPV genotypes like 16, 18, 31, 33, 34, 35, 39, 45, 51, 52, 56, 58, 59, 66, 68, and 70 among these around 14 are considered high-risk for causing cervical cancer, 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 66, 68, 70 and remaining HPV type are responsible for squamous intraepithelial lesions (Burd, 2003). There are more than 200 strains of HPV genotypes, where type 16 and18 believed to be the most carcinogenic (Ahmed et al.,2017). These two strains account for nearly 70% of all cervical cancer cases worldwide (Okunade, 2019). Chronic infection with these two genotypes results in the formation of cervical intraepithelial neoplasia (CIN), a precancerous state that may advance to invasive cervical cancer if not treated. (Serrano et al., 2017). Infection with the human papillomavirus (HPV) is responsible for around 500,000 instances of cancer each year, including cervical, vulvar, anal, penile, and oropharyngeal cancer, as recorded by the HPV Information Centre (Oyouni, 2023).

Sexual contact is the principal means of transmission for human papillomavirus (HPV), and the majority of sexually active individuals will contract some variant of the virus at some stage in their lives, but the initial occurrence is considered after the first sexual activity. Nonetheless, most infections occur in adolescents or young ages, which are transient and are naturally eradicated by the immune system. However, in some cases, high-risk HPV infections persist, leading to genetic mutations and the eventual development of cancer (Bodily & Laimins, 2010). Effective prevention strategies include regular cervical screening, such as Pap smears, and HPV vaccination, both of which have potential to reduce the incidence of cervical cancer by 90% (Basoya & Anjankar, 2022). Vaccination is most crucial, as it can prevent the initial infection with high-risk HPV types, thereby reducing the overall cervical cancer burden.

1.4 HPV Vaccines and Their Effectiveness

Currently, there are six approved HPV vaccinations (3 bivalent, 2 quadrivalent, and 1 nona-valent) available globally to prevent the proliferation of cervical cancer. These vaccines consist of virus-like particles (VLPs) that are sourced from the surface components of the HPV virus. These VLPs are non-infectious due to the absence of the virus's genome, although they closely mimic the original virus. The immune response elicited by VLPs efficiently targets the native virus. VLPs, attributable to their stability, significantly stimulate antibody production, making the vaccines very efficacious in preventing HPV infections (Wang & Roden, 2013). The three types of HPV vaccines: the bivalent vaccine (protecting against high-risk HPV types 16 and 18), the quadrivalent vaccine (which covers low-risk HPV types 6 and 11 addition to 16 and 18), and the nona-valent vaccine (which provides protection against HPV types 6, 11, 16, 18, 31, 33, 45, 52, and 58) (Garnock-Jones & Giuliano, 2011; Jiang et al., 2019; Kavanagh et al., 2014).

The HPV vaccines have been demonstrated to be highly effective in the prevention of cervical cancer, majorly in case of administration in earlier age. Furthermore, the bivalent vaccine offers significant cross-protection against additional high-risk types, such as 31, 33, 35, 45, 53, and 58, and demonstrates an efficacy of 91-100% against HPV types 16 and 18, which are primarily responsible for cervical cancers (Kamolratanakul & Pitisuttithum, 2021). A research from the United States indicated that among women aged between 14 to 19, the prevalence of HPV 6/11/16/18 infections decreased by total 56-88%, where 80.9% reduction in infections from the 4-valent vaccine types and 71% reduction from the 9-valent vaccine types along with reduction of 90% in genital warts, 45% in low-grade cervical abnormalities, and 85% in high-grade cervical lesions indicating vaccine effectiveness ranging from 83-96.1%, underscoring its powerful role in cervical cancer prevention (Garland et al., 2016).

1.5 Available HPV Vaccines

HPV vaccines play a critical role in preventing cervical cancer by targeting high-risk HPV types. Globally, six vaccines are marketed and have demonstrated significant effectiveness (Williamson, 2023). In Bangladesh, domestically manufactured vaccinations like Papilovax are accessible; nonetheless, pricing continues to be a significant obstacle for many individuals. The table below contrasts essential vaccinations, their coverage, and prices on a worldwide scale and specifically within Bangladesh.

Table 1: Available HPV Vaccines Worldwide and in Bangladesh

Name of the Vaccine	**Company Name**	**HPV Genotypes Covered**	**Doses Required**	**Cost Per Dose**	**Availability (Globally vs. Bangladesh)**
Gardasil (Akhatova et al., 2022)	Merck & Co	4 types (6, 11, 16, 18)	2-3 dose	$ 50-70 globally, 5887 BDT in Bangladesh	Available globally and in Bangladesh. In Bangladesh, produced by Healthcare Pharmaceuticals Ltd.
Gardasil 9 (Akhatova et al., 2022)	Merck & Co	9 types (6, 11, 16, 18, 31, 33, 45, 48, 52, 58)	2-3 dose	$ 70-90 globally	Widely used globally but unavailable in Bangladesh due to higher cost and limited distribution in rural areas.
Cervarix (Akhatova et al., 2022)	GlaxoSmithkline	2 types (16, 18)	2-3 dose	$ 50-70 globally,	Available globally but not in Bangladesh.

Cecolin (Akhatova et al., 2022)	Xiamen, Innovax Biotechnology	2 types (16, 18)	2-3 dose	$ 25-30 globally,	Available in several countries, but not available in Bangladesh.
Walvarinvax (Li et al., 2023)	Yuxi Zerun Biotechnology Co., Ltd	2 types (16, 18)	2-3 dose	Price varies, generally lower than Gardasil	Available in China and some Asian countries. Not yet introduced in Bangladesh.
Cervavac (Cervavac, 2023)	Serum Institute of India	4 types (6, 11, 16, 18)	2-3 dose	Estimated to be below $10	Affordable alternative, primarily available in India. Not yet introduced in Bangladesh.
Papilovax (*List of Available Brand Names With Prices in Bangladesh*, 2022)	Incepta Pharmaceuticals Ltd.	2 types (16, 18)	3 doses	2500 BDT	Manufactured locally in Bangladesh, more affordable than Gardasil but still expensive for low-income groups
HPvax (*List of Available Brand Names With Prices in Bangladesh*, 2022)	Popular Pharmaceuticals Ltd.	2 types (16, 18)	3 doses	2500 BDT	Even if it is produced locally and has a price that is more reasonable compared to Gardasil, it is still excessively costly for people living in Bangladesh.

HPV, including Gardasil, Papilovax, and Hpvax. Gardasil, manufactured domestically by Healthcare Pharmaceuticals, targets four HPV varieties and is priced at 5887 BDT per dosage, making it unaffordable for several low-income persons. Papilovax and Hpvax, produced by Incepta Vaccine Ltd and Popular Pharmaceuticals Ltd., provide a little more economical alternative at 2500 BDT each dosage, although remain prohibitively expensive for a significant portion of the populace. Cecolin, WalrinvaxV, and Cervavac, cost-effective alternatives available internationally, have not yet been extensively launched in Bangladesh. The prevalence of cervical cancer may be reduced and immunization rates may be increased by improving access to these vaccinations through government initiatives and lowering the cost.

1.6 Vaccination Program Worldwide

Numerous nations globally have implemented government-initiated HPV vaccination that positively decreasing the prevalence of cervical cancer worldwide. Since 2007, Australia has implemented a program providing free HPV vaccinations to school-aged girls and boys. Due to its comprehensive vaccination coverage, it is predicted that cervical cancer will be virtually eliminated as a public health problem by 2035 (Hall et al., 2018). In the United Kingdom, it was in 2008 when girls aged between 12 and 13 first received their vaccinations against HPV. The program subsequently included boys and girls of different ages; by 2021, more than 80% of eligible individuals had received vaccinations. The reduction in cervical cancer rates was estimated 34% for women vaccinated at the age of 16-18, 62% for those vaccinated at 14-16, and 87% for those vaccinated at 12-13 years. This data highlights the need of early vaccination for maximum protection and a substantial decline in HPV-related illnesses. (Falcaro et al., 2021; Human Papillomavirus (HPV) Vaccine Coverage Estimates in England: 2020 to 2021, 2022). Rwanda a low-income country also introduced an effective school-based HPV vaccination program by the

government of it collaborating with international organization, Gavi. The program achieved a coverage rate of over 90% vaccination among girls who were eligible for the program during its first dissemination. This exceptional achievement has been praised as an example for other countries that are still in the process (*e.g.,* Bangladesh) of developing to eradicate this preventable disease (Binagwaho et al., 2012). In Sweden, a nationwide HPV vaccination program for girls was initiated in 2010 which resulted in 88% decrease in the incidence of cervical cancer among women who had vaccinations before the age of 17 (Bruni et al., 2016). In Canada, the HPV vaccine is administered through school-based vaccination programs to both girls and boys in 2007 (Goyette et al., 2021). According to Dubé et al. (2019) this initiative has reduced both the prevalence of HPV infections and the diseases related to them, including genital warts as well as cervical pre-cancerous lesions. These country's scenario demonstrates the potential of government-based measures do have significant impact on decreasing the rates of cervical cancer. Therefore, it indicates a greater urgency in government led HPV vaccination programs to increase access and cost efficiency.

1.7 Vaccination Program in Bangladesh and Prospective

In 2009 with the registration of a bivalent HPV vaccine the journey of HPV Vaccination program began in Bangladesh. Then it was followed by the registration of a quadrivalent HPV vaccine (qHPV) in 2014. The Ministry of Health and Family Planning (MoHFP) improve the actions by initiating an HPV vaccination campaign in partnership with the Global Alliance for Vaccines and Immunization (GAVI). This initiative started with an initial trial in Gazipur in 2015, followed by the initiation of broad immunizations in 2016. This effort mainly focused on fifth-grade girls or girls aged 10 years old through a school-based immunization program. Girls not attending school receive vaccine *via* standard Expanded Program on Immunization (EPI). As a result of this

program, the awareness and accessibility about HPV vaccine has been significantly increased, and the government is continuing to make progress in its efforts to prevent cervical cancer. For instance, in 2018, partnerships with Bangabandhu Sheikh Mujib Medical University and NGOs like CANSUP facilitated the rollout of a cervical cancer screening program. This program initially covered 31 districts and has since expanded across the country. Again in 2012, the Government of Bangladesh has extended opportunistic cervical cancer screening using Visual Inspection of Cervix with Acetic Acid (VIA) at over 400 centers for women aged 30 and above (*ICCP Portal*, 2022).

Significant progress toward universal HPV vaccination was observed in 2023. The Honorable Health and Family Welfare Minister inaugurated the HPV Vaccination Campaign 2023, which launched a multi-age cohort vaccination effort targeting school-going girls from 5th to 10th standard and girls aged 10 to 14 years out of school. This campaign aligns with international goals set by GAVI and WHO to eliminate cervical cancer globally by 2030 (Initiative, 2020).

Bangladesh's prospective include the national rollout of free HPV vaccines, which began in mid-October 2023, covering all districts and sub-districts in the Dhaka division, with the remaining divisions expected to follow (*GAVI, the Vaccine Alliance*, 2023). The online registration program also started for vaccination at the end of September 2024 which was a follow-up to HPV vaccination campaign (*Citizen Portal*, 2024). The government aims to achieve 95% vaccine coverage through cost-effective and equitable distribution. The introduction of online registration for vaccinations will guarantee that eligible girls including those from deprived backgrounds are allowed to be vaccinated. Together these developments show Bangladesh´s commitment to cervical cancer and reduction of mortality from HPV-related diseases.

1.8 Rationale of the Survey

The HPV vaccination that prevents the viral infection could lead to a global reduction of cervical cancer rates by as much as 90% (Basoya & Anjankar, 2022). Nevertheless, vaccine uptake remains low even in well-informed groups such as young educated women.

Cervical cancer is the second most common cancer in Bangladesh among women (Sung et al., 2021). Despite their efficacy, little is known about concern for viral associated cancers and vaccination rates remain low (Banik et al., 2020). The purpose of this study is to understand the perception and readiness of educated Bangladeshi women for receiving HPV vaccine. This includes their intention to vaccinate themselves and other women they know personally.

Consequently, this research will help to understand the multiple factors that contribute to hesitancy in vaccination, providing clarity on the most important reasons. Further, it focuses on identifying which types of information sources are more credible in influencing individual's decisions about vaccination. This information will help in addressing the ongoing gap of cervical cancer awareness, acceptance and developing intervention strategies to improve WHO recommended human papillomavirus (HPV) vaccination coverage in Bangladesh (Initiative, 2020).

1.9 Objectives and Aims

The primary objectives of this study are to:

1. Evaluate the readiness of educated Bangladeshi women to receive the HPV vaccine for themselves.
2. Assess their willingness to vaccinate their female children or other known females.
3. Identify the elements that affect their decision to accept or decline the HPV vaccine, encompassing concerns, motivations, and social or cultural influences.

4. Identify critical domains necessitating enhanced focus and control to augment the adoption of the HPV vaccine.
5. Propose measures to enhance vaccination acceptability, specifically targeting educated young women in Bangladesh, to achieve sustained decreases in cervical cancer incidence.

Chapter 2

2.1 Methodology

This study employed a questionnaire survey to assess the acceptability of the Human Papillomavirus (HPV) vaccine among educated women in Bangladesh. The survey was conducted from March 2024 till August 2024, using a combination of social media platforms including Facebook, Instagram and WhatsApp groups along with direct personal interactions on these platforms. The principle of non-probability purposive sampling was used to select the participants (women) who agreed voluntarily and were eligible.

2.2 Survey Distribution

The questionnaire was distributed across different social media channels through which participants could voluntarily respond to the survey by clicking on a web link. The web link was posted in public groups and sent to individuals´ private messages on these platforms. All participants were informed about the aim of the study and gave their consent before any participation. We reached out to women via personal messaging and simply asked if it was ok, we use their responses which secured verbal consensus, the participants understood the nature of the survey and were able to offer their response.

2.3 Participant Criteria

The survey targeted the population of educated women. Women having minimum Secondary School Certificate Examination (SSC) or equivalent was a standard to participate in this survey. To provide assurance that they can answer question related to cervical cancer and HPV vaccination.

Representatives from diverse backgrounds were selected to ensure the broadest range of views on HPV vaccine acceptability.

2.4 Questionnaire Design

The questionnaire was methodically created following an extensive literature study and modified from prior analogous studies regarding HPV vaccine awareness and acceptability in diverse contexts. It was crafted to correspond with the research aims of this study, concentrating on:

1. The demographic information of the respondents, encompassing age, marital status, educational attainment, and income level.
2. Their present vaccination status (if they have been administered the HPV vaccine).
3. Their readiness to accept the HPV vaccine in the future for themselves and other female relatives or acquaintances.
4. The determinants affecting their choice to accept or decline the vaccine, include apprehensions, fallacies, or cultural influences.
5. The information sources people utilize to comprehend cervical cancer and HPV vaccination.
6. Their perceived obstacles to obtaining the HPV vaccine.

The questionnaire comprised of 22 questions, including multiple-choice and open-ended questions to collect both quantitative and qualitative data. The questionnaire is accessible in the appendix A.

2.5 Data Collection

All data was gathered digitally *via* Google Forms, facilitating accessibility and safeguarding participant privacy. Responses were systematically archived in a secure database for analytical purposes. The utilization of social media channels for survey dissemination facilitated a broader reach throughout several regions of Bangladesh, ensuring a diversified sample of educated women.

2.6 Data Analysis

Following data collection, responses were examined by descriptive statistics to encapsulate demographic information and vaccination status. Graphical representations, including graphs and charts, were employed to elucidate trends in vaccine acceptance, willingness, and apprehensions among participants. This investigation included a summary of the principal parameters affecting the acceptability of the HPV vaccine among educated Bangladeshi women.

Chapter 3

3.1 Result

A total of 196 individuals responded to the questionnaire distributed through multiple online platforms and personal accounts. Table 2 presents the key demographic characteristics of the survey participants. The average age of the participants was approximately 24.64 years, with a standard deviation of ± 4.03 years. Among the respondents, 1.5% were under the age of 18, 94.9% were between 18-30 years, and 3.6% were above 30 years. A significant portion of participants (88.8%) came from urban areas, whereas the remaining 11.2% lived in rural areas. In terms of educational background, a notable percentage of respondents achieved advanced levels of education: 2.0% had secondary education, 28.6% completed higher secondary education, and 69.4% possessed other or higher educational qualifications. The employment data indicated that 84.2% of the respondents identified as students, while 6.1% were employed. Additionally, 5.6% reported being unemployed, 3.6% chose "Other" for their employment status, and 0.5% preferred not to disclose their status.

Table 2: Demographic Characteristics of Participants (N = 196)

Characteristic	**Number of the Participants**	**Frequency %**
Age		
<18 years	3	1.5
18-30 years	186	94.9
>30 years	7	3.6
Residence		
Urban	174	88.8
Rural	22	11.2
Education		
Primary	0	0
Secondary	4	2
Higher Secondary	56	28.6
Other or above	136	69.4
Employment Status		
Student	165	84.2
Employed	12	6.1
Unemployed	11	5.6
Other	7	3.6
Prefer not to say	1	0.5

Table 3: Awareness and Uptake of HPV Vaccine (N = 196)

Characteristic	Number of the Participants	Frequency %
Awareness of HPV Vaccine		
Yes	156	79.6
No	40	20.4
Vaccinated against HPV		
Yes	11	5.6
No	185	94.4
Willingness to get vaccinated		
Yes	153	78.1
Unsure	37	18.9
No	6	3.1

Table 3 exhibit the awareness and uptake of HPV vaccine among the participants. Among the 196 participants, 79.6% (156 women) reported being aware of the HPV vaccine prior to the survey, while 20.4% were not aware of it. Despite the relatively high awareness of the HPV vaccine, only 25.5% of respondents had been offered the vaccine by the government or healthcare providers. The remaining 74.5% had not been approached regarding the vaccine, highlighting gaps in outreach and accessibility. Among the respondents, only 5.6% of women had been vaccinated, while a significant 94.4% (185 women) had not yet received the vaccine. Of those who were aware of the vaccine, 78.1% expressed a willingness to receive it if made available, 18.9% were unsure, and 3.1% were unwilling to get vaccinated. Figure 1 illustrate the most common sources of information about cervical cancer were internet (34.1%), followed by friends and family (26.3%)

and educational institute (22.8%) and doctors (7.8%). Television, newspaper, workplace and other also played a role in disseminating information respectively (4.8%), (1.8%), (0.6%) and (1.8%) but their influence is in lesser extent.

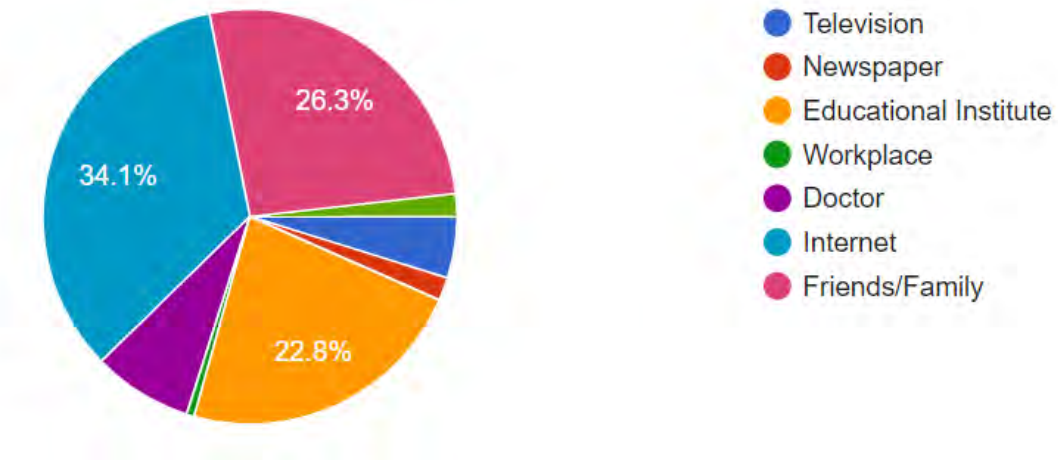

Figure 1: Sources of Information about Cervical Cancer

When examining awareness regarding HPV vaccination initiatives and availability, 45.4% of the participants were informed about the government's HPV vaccination program targeting school-going girls in Classes 5-9. However, 54.6% had no knowledge of this program. Moreover, a substantial 61.7% of the respondents were unaware of the availability of the HPV vaccine outside of traditional vaccination programs, while only 38.3% were aware of this option. Additionally, only 20.9% of participants knew someone who had been vaccinated against cervical cancer and 79.1% of the participants answered negatively. Among these, the majority indicated that the vaccinated person was a family member or friend. This low exposure to others who had been vaccinated suggests that direct, personal experiences with the HPV vaccine remain limited among the surveyed population.

Table 4: Government HPV Vaccination Program Awareness

Characteristic	**Frequency (%)**
Aware of Government HPV Vaccination Program	
Yes	45.4
No	54.6
Aware of Vaccine Availability Outside the Government HPV Vaccination program	
Yes	38.3
No	61.7
Participants Children Were Offered This Vaccine from School as Government Initiative	
Yes	10
No	90

Among the respondents, 7.7% reported having children. Notably, 90% of these children were not offered the HPV vaccine at school, while only 10% were provided with this opportunity. However, a positive finding is shown on figure 2 that 84.2% of participants expressed a willingness to vaccinate their children or other children in their family, reflecting a strong desire for vaccination despite the lack of school-based offers.

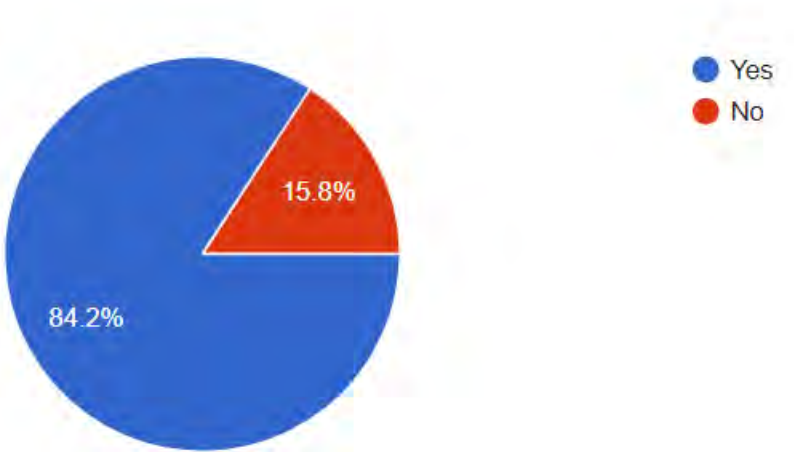

Figure 2: Participants Willingness to Vaccinate Children or Others in Their Family

On a scale of 1 to 5, with 1 being "not concerned at all" and 5 being "extremely concerned," participants expressed their concern regarding the risk of cervical cancer for themselves or their loved ones. The results showed on figure 3 that 32.7% of respondents rated their concern as a 3, indicating a moderate level of concern. Additionally, 31.1% rated their concern as a 5, reflecting extreme concern, while 26.5% rated it as a 4. Conversely, 5.6% of participants indicated a concern level of 2, and 4.1% rated it as a 1, suggesting they were not concerned at all.

Factors influencing participants' decisions regarding vaccination is presented by figure 4 included knowledge about the vaccine's safety and effectiveness (67.3%), recommendations from healthcare providers (48%), awareness of the vaccine's availability (46.9%), and considerations about the cost of the vaccine (43.4%). Additionally, 33.7% expressed concerns regarding potential side effects, while 6.6% cited cultural or religious beliefs as factors affecting their willingness to get vaccinated.

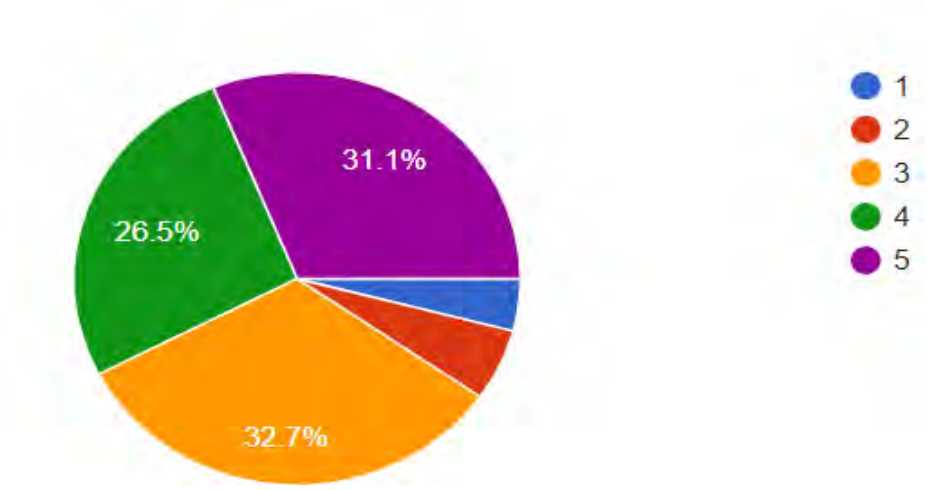

Figure 3: Concern about Cervical Cancer Risk (Scale 1-5)

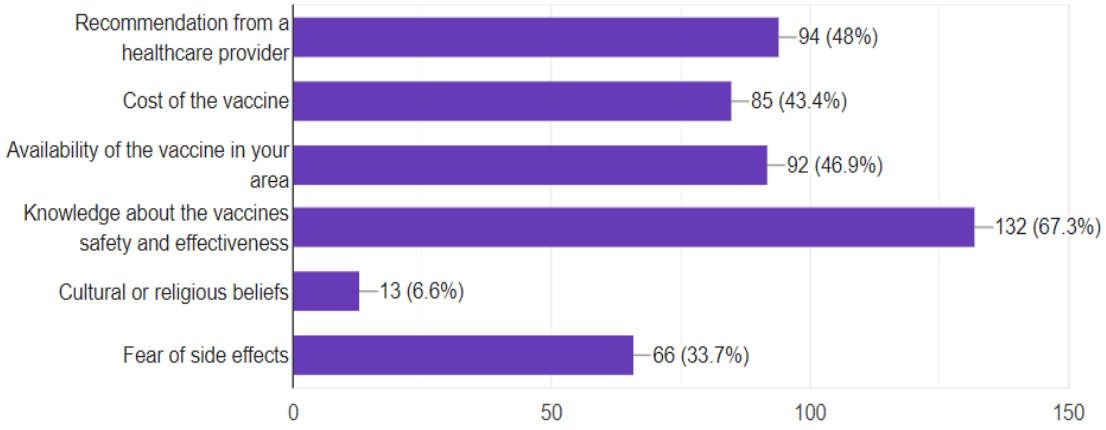

Figure 4: Factors Influencing Vaccination Decisions

3.2 Discussion

The acceptability of the HPV vaccine reveals positive aspects as well as areas that needed to be improved. A high percentage of participants (79.6%) were aware of the HPV vaccine but only 5.6% of women had received it as shown in Table 3 which indicate the significant gaps in vaccine uptake. These findings align with previous research in Bangladesh, which has consistently demonstrated low vaccination rate (5.3%) despite (81%) awareness levels (Islam et al., 2018; Banik et al., 2022). In comparison to developed nations like the USA, UK, and Australia, where

HPV vaccine awareness is significantly higher (ranging from 61.6% to 91.8%), this study highlights the need for more effective outreach in Bangladesh (Mohammed et al., 2018). The impact of socio-demographic factors on the formation of awareness and attitudes regarding the vaccine among urban participants significantly greater compared to their rural counterparts, aligning with previous research that highlights an urban-rural disparity in HPV vaccine awareness (Eva et al., 2024). Moreover, age and education emerged as strong determinants of vaccine awareness. Older participants and those with higher levels of education demonstrated greater awareness, aligning with findings from previous research (Marlow et al., 2009). This suggests that educated women, particularly in urban areas, are more likely to understand the importance of HPV vaccination.

The participants' willingness to vaccinate their children or family (84.2%) suggests considerable demand for the vaccination program expansion and vaccines availability in lower price outside the program. The research also found reasons to discourage HPV vaccination, such side effects (33.7%) and cultural or religious views (6.6%), which are common in worldwide HPV vaccination studies (Islam et al., 2018). Cost of HPV vaccines (43.4%) and knowledge of availability (46.9%) of it are some factors that significantly influenced vaccination choices. Addressing these barriers through mass awareness, need-based information, education and public health programs will be imperative to improve vaccine coverage in Bangladesh.

3.3 Findings of the Study

This study has been able to address the acceptance and knowledge of cervical cancer vaccine (HPV vaccine) among educated Bangladeshi women. The results found poor awareness about HPV vaccine availability and government-initiated HPV vaccination program in Bangladesh. Awareness of the HPV vaccine was moderate in a majority of the participants, however the

compliance for vaccination was very low amongst them. Main reasons for low uptake include lack of awareness, few healthcare provider recommendations, as well as service level barriers including vaccine availability, high costs and concerns about the recipient's medical history. Crucially, a sizeable number of women who did have awareness of the vaccine still reported that healthcare practitioners had not offered it to them, suggesting very poor public health outreach efforts. Overall, these views are promising with most respondents being willing to receive the vaccine if it becomes available and would vaccinate their child or other children in their family. The high level of interest is an encouraging result for vaccination favorability yet it remains hindered by structural barriers and a lack of knowledge.

The results indicate a critical need for targeted interventions. Government initiatives such as the existing Expanded Program on Immunization (EPI) have the potential to enhance the availability of the HPV vaccination, thereby contributing to reduced costs and improved accessibility. This study emphasizes the internet and social media as potentially effective methods for raising awareness about the HPV vaccine and cervical cancer. Government as well as private health initiatives could leverage these platforms to touch more people. Significantly, a large number of the participants were willing to influence within their social network for the vaccine, hinting at seeping in to improve public health outcomes.

3.4 Drawbacks of this Study

This study elucidates the viewpoints and comprehension of educated Bangladeshi women concerning the HPV vaccine. This study illuminates the perspectives of educated Bangladeshi women, despite certain critical limitations that must be acknowledged. A notable drawback of the poll is that it was conducted exclusively with women who have completed their schooling. This indicates that the results do not comprehensively represent Bangladesh in its entirety. Future

research on vaccination acceptance should encompass both males and females from diverse social, educational, and geographical backgrounds. Males significantly influence the decision-making process for family health, and females ought to be incorporated into this research as well. This would facilitate a more thorough comprehension.

The research effort employed non-probability, purposive sampling, which may have resulted in selection bias affecting participant selection. Considering all of this, it is likely that the findings may not accurately represent the entire population. The study's cross-sectional methodology complicates the determination of a causal relationship between the variables. This is because the study merely depicts the present circumstances and does not facilitate the examination of shifts in attitudes or behaviours that have transpired over time.

Moreover, individuals may amplify or minimize specific behaviours or attitudes as a result of social desirability bias. This results in diminished trustworthiness of self-reported data about vaccination status and awareness. For instance, individuals may amplify or minimize specific behaviours or sentiments. Future study should employ a mixed-method approach, integrating both quantitative and qualitative data, to elucidate the factors that affect individuals' acceptance or resistance to vaccination. This will facilitate a deeper comprehension of the elements that affect vaccine opinions.

Chapter 4

Conclusion and Future Work

The HPV (Human Papillomavirus) vaccine acceptability study among educated Bangladeshi women has added significant information on the awareness, acceptability and vaccination coverage among this group. Although the majority of participants were familiar with the HPV vaccine, only 5.6% reported history of vaccination. Several barriers to vaccine uptake were identified, including limited healthcare provider recommendations, high vaccine costs, and insufficient awareness of vaccine availability outside government programs.

However, the outcomes suggest that many of them will be keen to get vaccinated once it becomes more available with 78.1% declaring their intention to receive vaccination. Positively, 84.2% of participants indicated a willingness to vaccinate the future generations (children and family members) against cervical cancer.

Furthermore, we need specific actions to ensure vaccination uptake among individuals. Initiatives by the government like The Expanded Programe on Immunization (EPI) and efforts from both private as well public health must key into this by making available affordable vaccines and creating awareness especially through digital channels such social media. Additionally, efforts should be made to ensure broader availability of the HPV vaccine, particularly in rural areas where awareness and acceptability are significantly lower. The study underscores the need for ongoing public health campaigns to address misconceptions and foster a supportive environment for HPV vaccination across Bangladesh.

This research provides a foundation for future initiatives aimed at improving vaccination rates and reducing the burden of cervical cancer among Bangladeshi women. It also calls for further studies to include a broader demographic spectrum, incorporating women from various educational and

socio-economic backgrounds to gain a more comprehensive understanding of vaccine acceptability across the country.

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