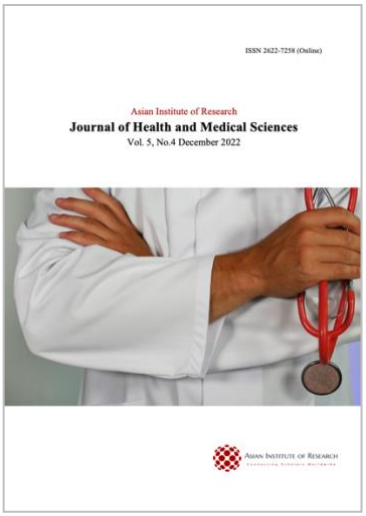

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Mental Model of Mothers of Adolescent Girls and Health Service Providers on HPV Vaccination in Urban Slum Areas of Dhaka, Bangladesh: A Mixed-Method Study

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Abstract
Background: The study aimed to explore the perception of mothers of adolescent girls and health service providers in urban slums toward HPV vaccination. Methodology: A cross-sectional mixed-method study in the slums of Rayer Bazaar, Kamlapur and Mohakhali was conducted. The quantitative part included a household survey of mothers (n=150) and service providers (n=30) through a semi-structured pre-tested questionnaire and qualitative interviews included in-depth interviews (IDI) with mothers (n=10) and key-informant interviews (KII) with service providers (n=10). Results: Around 96% of mothers had never heard of HPV, and 98% were unaware that the virus's transmission could be halted. Only 3.3% of mothers were aware that HPV can cause cervical cancer, although, during IDI, it was seen that the majority of mothers said that cervical cancer is a communicable disease. Nearly 98% of mothers wanted their daughters to get vaccinated. Service providers had a good understanding of HPV, HPV vaccine, and cervical cancer. All service providers during KII agreed that if they had received adequate training on HPV vaccination and cervical cancer, they could have treated their patients better. Conclusion: The findings of this study have important implications for the design and advocacy of HPV immunization programs in Bangladesh.

Keywords: HPV Vaccination, Cervical Cancer, Mothers, Service Providers, Bangladesh

1. Introduction

Globally, cervical cancer ranks 4th among all gynaecological cancers and in Bangladesh it ranks 2nd among all gynaecological cancer. The crude incidence and mortality rate estimates for cervical cancer in Bangladesh are 10.2 and 6.1 per 100 000, respectively (Globocan, 2020). Early identification and timely screening are challenging in slum areas due to a lack of knowledge about cervical cancer among the general public and healthcare professionals, as well as restricted access to healthcare facilities. The awareness is crucial and it allows people to better grasp the issue by gaining knowledge and, as a result, changing their attitudes. This empowers them to identify problem areas and make the necessary improvements (Chandana et al.,2020). The Government of Bangladesh has developed a National Strategy for Cervical Cancer Prevention and Control (2017-2022). The goal of this strategy is to improve cervical cancer prevention and control activities to reduce the incidence, prevalence, morbidity and death from cervical cancer and to promote women's good health which is in alignment with Sustainable Development Goals 3, 5 and 10 (DGHS, MoH&FW, 2017). The WHO Secretariat modelled the health and socioeconomic impacts of cervical cancer by achieving the 90-70-90 targets by 2030 in 78 low- and lower-middle-income. This model proposes that 90% of girls are fully vaccinated with HPV by the age of 15, 70% of women screened with the high-performance test by the age of 35, and then again by the age of 45 and 90% of women with cervical cancer receive treatment (WHO, 2020).

Slums are home to about one-third of the world's urban population. From 689 million in 1990 to 880 million in 2014, the population increased significantly, and by 2030, it is projected to double (Singh et al., 2018). Every day, at least 1500 new migrants arrive in Dhaka, making it one of the world's megacities with the fastest rate of expansion. The majority of these new immigrants settle in slums, contributing to an alarming yearly growth rate of more than 7%. (Adams et al., 2015). These slum residents are socially and economically impoverished. They frequently have poor nutrition, low income, lack of knowledge about health issues and preventive behaviour; and limited access and utilization of health care services. The unhealthy surroundings of the slum provide fertile ground for several infectious diseases as well as perilous living conditions render harmful practices such as poor menstrual hygiene practices, child marriage, hence early and multiple childbearing. (Hridi et al., 2022) all of which makes the women and adolescent girls of the slum prone to a preventable yet life-threatening condition – cervical cancer (Haseen et al.,2020).

The first infection of the Human Papillomavirus often occurs soon after first sexual intercourse, so early age at sexual intercourse is a substitution for the early age of exposure to HPV, this is because the adolescent cervix is vulnerable to HPV infection. Early age at marriage also results in multiple pregnancies, which can cause injury to cervical tissue leaving it vulnerable to infections. (Chandana et al.,2020). Studies conducted in the slums of Dhaka found that the mean marriage age in slums was 13.6 years. Because the living conditions of adolescents and their families in the slums are sometimes unsafe, they were married off early. Adolescent girls do not usually visit facilities if they have menstrual problems or during pregnancy. Girls do not foster good menstrual hygiene. All of these make adolescent girls and women in slums more susceptible to HPV infections and eventually cervical cancer if not treated (Hridi et al.,2022 & Haseen et al.,2020).

HPV immunization is most effective when given before the sexual debut and HPV infection. Girls aged 9 to 13 years old are recommended to be vaccinated against HPV using effective, economical, and equitable delivery systems, according to World Health Organization (WHO) recommendations. It is more cost-effective to vaccinate a single age cohort within the intended age range (WHO, 2018). In Bangladesh, the Expanded Program on Immunization (EPI) is one of the well-established and successful programs aimed at lowering child and maternal morbidity and mortality from vaccine-preventable diseases. Even during the recent pandemic, it was seen that Bangladesh was able to achieve the target set by the WHO for COVID-19 vaccination with the Ministry of Health and Family Welfare (MOH&FW) by successfully inoculating 70% of the country's population with two full doses (WHO, 2022).

The fact that sexual contact is the primary mode of transmission of vaccine-preventable HPV serotypes appears to be concealed from vaccine recipients, their parents/guardians, or teachers. The failure to reveal the mode of transmission of the virus against which the girls are being immunized creates ethical problems. In some cases,

incomplete information may be presented to avoid societal controversies for the greater good. In the case of vaccination, which primarily serves a practical purpose, it may be argued that complete information may impede vaccine adoption. Several low- and middle-income countries (LMICs) have reported that promoting the HPV vaccine's anti-cancer role to the public while ignoring its genuine significance in preventing sexually transmitted HPV infection is associated with high vaccination coverage. (Salwa & Abdullah Al-Munim, 2018 and Haseen & Sony, 2017).

With support from the Global Alliance for Vaccines and Immunizations (GAVI), the EPI Program of Directorate General of Health Services (DGHS) piloted the introduction of HPV vaccination in Gazipur, Bangladesh in 2016 for two years. The aim of the piloting was to examine the implementation capacities with the intention that if the experience is positive GAVI, UNICEF, WHO and other stakeholders will support the Government of Bangladesh for the nationwide rollout of the HPV vaccine. (Haseen & Sony, 2017). The 2-years implementation experience was good with minimal challenges. Even though Bangladesh is in a good position to start its nationwide HPV vaccination, public awareness and acceptance of the vaccine are critical to including a novel vaccine in a national immunization program. Although HPV infection is common and its repercussions can be severe, the majority of people have little or no knowledge about it. Previous research has also found that women lacked information regarding HPV preventive techniques. This was especially true for those from lower socioeconomic backgrounds (Haseen et al., 2020). Attitudes and cultural factors linked with HPV infection and cervical cancer might influence infection rates, preventative approaches such as vaccine uptake, and the cost, morbidity, and mortality associated with HPV-related diseases. The vaccine policy will be more widely accepted as people's perceptions of the danger of HPV infection and the advantages of immunization improve (Ezenwa, 2013).

Studies found parental acceptance was higher if a physician recommended immunization (Markowitz et al., 2013). Parental decisions to vaccinate their adolescent children were enabled by various factors such as awareness of the serious consequences of HPV infection, vaccine efficacy, personal knowledge of someone with cancer, and whether they believed that their children were at risk for acquisition of HPV infection or chance of developing cervical cancer (Madhivanan et al., 2014). Adolescents expect parental help when making immunization decisions. Furthermore, most mothers of adolescent girls are eager to discuss immunization with their daughters. In this light, the opinions of both parents and adolescents are recognized to be analyzed jointly for the acceptability of HPV vaccines (Tsu et al., 2014).

City corporations and NGOs provide primary healthcare services in urban slums. Slum dwellers usually sought treatment at pharmacies for general health issues or from homoeopaths and traditional healers for diseases like hepatitis, and STIs/RTIs, and they prefer inexpensive home births by traditional birth attendants despite knowledge of the high-quality maternity services (Adams et al., 2015). Therefore, the knowledge and attitude of health service providers in slums are crucial, because they play critical roles in disease prevention and health promotion by teaching these vulnerable populations through culturally relevant health education and promotion initiatives (Ebu et al., 2021). The study conducted in Gazipur found that HPV Vaccine was accepted more by the community as the health workers and/or teachers had a good relationship with parents, and they were able to follow up effectively with families who asked for more information. It also ensured the presence of girls during both doses of the vaccine (Haseen et al., 2017).

Parents and health service providers are the critical gatekeepers of adolescents and thus it is plausible to assume that when mothers and health service providers are well informed, they may have positive perceptions about HPV vaccination. This study aimed to assess mothers' knowledge of HPV and their willingness to vaccinate their adolescent daughters against HPV as well as to understand the perception of health service providers regarding HPV, cervical cancer and vaccination in the urban slums of Dhaka. This study is important because there is a paucity of research examining mothers' perspectives and health service providers' awareness of HPV vaccination in Dhaka's urban slums. Herein we present findings that would be useful to administrators and managers to plan the advocacy activities during the introduction of HPV vaccine in the national immunization program.

2. Methods and materials

The cross-sectional study was conducted in the slums of Rayer Bazaar, Kamlapur and Mohakhali of Dhaka city along with health centres in these slums. Ward number 20 of Mohakhali slum and ward number 34 of Rayer Bazar slums of Dhaka North City Corporation (DNCC) and ward no 8 of Kamlapur TT para slum of Dhaka South City Corporation (DSCC) were purposively selected to meet a selection of our participants and sample size. We selected a mixed-method approach for this study, linking common themes across the survey and semi-structured interviews.

For the survey with mothers, sampled households were chosen from a list of pre-prepared slum households, where a mother has an adolescent daughter, using simple random sampling. A lottery method was used to select a mother from each household. Data were collected through face-to-face interviews in Bangla in a private setting at household with informed written consent. With a separate questionnaire service providers were interviewed, who were giving services from the health facilities situated in the slum areas. Data were collected through face-to-face interviews in Bangla in their free time with informed written consent. The completed questionnaires were entered into a database in SPSS version 23. Descriptive statistics were replaced.

For the qualitative interviews, purposive sampling was used. In total ten mothers of adolescent girls from the slum for in-depth interviews (IDIs) and ten service providers who provide services to slum people for the key informant interviews were purposively selected. The interviews were carried out in Bangla with informed written consent. In-depth interviews were performed in a private environment at the household and key informant interviews (KIIs) were done in the respective workplace of service providers. During the interview, informed written consent was taken, notes were taken and interviews were recorded with voice recorders and then transcribed. Data were manually coded. All the transcripts were reviewed and themes were generated based on the analysis plan. Thematic analysis was used for this research (Barun and Clarke, 2006). Data validity was ensured by triangulation, which was again verified by comparing the data from the IDI and KII. The study got ethical approval from the Institutional Review Board of BSMMU.

3. Results

3.1 Sociodemographic characteristics of the participants

One hundred and fifty mothers and thirty service providers participated in the survey and ten mothers and ten service providers took part in the qualitative interviews. The average age of the mothers of female adolescents was 36.54 years. Around 53.3% of mothers had no education. Most of the mothers (59.3%,) were housewives and around 26% of them were house helpers. The mean age at marriage of these mothers was 16.67 years.

As for the service providers, their average age was 35.7 years. Approximately 10% of the service providers were medical doctors and around 3% of them had a specialized degree in gynaecology and obstetrics. Around 43.3% of service providers were paramedics/nurse/midwife/assistant nurse/medical assistant/SACMO.

3.2 Knowledge of mothers of adolescents and service providers on HPV

Knowledge of mothers of adolescents during the survey:

Around 96% of the mothers never heard about HPV. Only 4% of the mothers thought this virus produced diseases like cervical cancer; another 2% thought this virus was transmitted from one person to another. Only 1% said the virus was transmissible through intimate partners and 1.3% said through sexual intercourse. Approximately 98% of mothers did not know that HPV was transmissible and 98% of them were not aware that this transmissibility could be halted. Almost 66% of mothers wanted information about HPV from a specialized physician, for instance, an obstetrician and gynaecologist, another 23.3% of mothers wanted information from public health workers and only 4.7% preferred this information from a general physician.

During the qualitative interview, it was seen that 3 out of 10 mothers had heard about Human Papilloma Virus and knew it was the reason for cervical cancer. However, none of the mothers knew about HPV, they learned about HIV through television.

"I do not about HPV…something like this I heard on TV... maybe the name was HIV…it is a dangerous disease" (mother of an adolescent, Mohakhali Slum)

Most of the mothers (9 out of 10) knew that cervical cancer is a communicable disease. Among 10 mothers, 3 stated that it spreads from one person to another through physical relations as well as by using clothes or other things.

"This can be spread in many ways…. like when one has physical relation with many people or use the things of people who have the disease" (mother of an adolescent, Kamlapur TT para slum).

Out of 10 mothers interviewed only 2 of them stated that bleeding from the uterus, itching, unusual vaginal discharge and uterus coming down were the symptom of cervical cancer. Three out of 10 mothers did not have any knowledge about the prevention of HPV infection. Two out of 10 mothers stated that cervical cancer is preventable through vaccination and proper treatment. Two mothers said if they get suggestions from doctors then they can help their daughters to prevent cervical cancer from a young age. One mother stated that if married females are aware and use condoms during physical relations with their husbands then infection can be preventable and another mother said, they have to be more careful during normal delivery so that the uterus may not become injured and use a new blade to prevent disease.

"If doctors suggest us vaccine it would help us understand why it is important and also if they give it for free…we are poor people" (mother of an adolescent, Rayer Bazar slum)

Knowledge of service providers during the survey:

All service providers had heard about HPV. Almost 98% of them knew that HPV produces diseases; they specifically mentioned it produces cervical cancer. Around 30% of the service providers said that the virus was transmissible, the majority (60%) said that HPV was not transmissible and another 10% of them said they did not know if HPV was transmissible or not. Of those who said the virus was transmissible the majority of them (30%) said it was through unprotected sexual intercourse. Almost all service providers (97%) said the transmission of HPV could be halted and the majority of them said (90%) through vaccination.

During the qualitative interview, it was seen that nine out of 10 service providers have heard about HPV but 5 out of 9 service providers did not give any information about the source where they learnt. One service provider learned about HPV from training, one service provider learned during her diploma course, one service provider learned from his workplace and one service provider does not know about HPV.

"I was taught about HPV during my medical diploma course…we were taught in detail about this" (Service provider, Kamlapur TT Para-Slum).

"We are trained by our supervisors regarding HPV…that how I come to know about HPV" (Service provider, Rayer Bazar Slum).

Seven out of 10 service providers think that HPV is the cause of cervical cancer and the rest 3 service providers do not know anything about the cause of cervical cancer. However, all (10) service providers think that cervical cancer might be transmitted in the human body but they each gave a different opinion about the reason for infection like early marriage and genetics, unsafe normal delivery, unsafe physical relation, tumour, cyst, using the common bathroom.

3.3 Perception of HPV Vaccination among mothers of adolescents

It was found in a survey that 29% of mothers knew that HPV infection is a fatal disease however 72% did not know that HPV infection was life-threatening. Around 24% of mothers believed HPV vaccines completely protect against cervical cancer and 75.3% believed their daughters can easily get affected by HPV. Only 7.3% of urban slum mothers knew the government would provide free vaccination to their daughters. Around 77% of these mothers said that decision of a doctor would influence their decision to vaccinate their daughters. According to these mothers, the hindering factors to vaccinating their daughters were due to the uncertainty of the effectiveness of the vaccine (52%) followed by the side effect of the vaccine (47%). The enabling factor that would influence them to vaccinate their daughters will be free vaccination (96.7%). Almost 99% of the mothers in these slums wanted their daughters to be vaccinated against HPV.

Table 1: Perception of mothers of adolescents towards HPV vaccination (N=150)

Variables	Response Category	Frequency (percentage) n (%)
HPV infection is fatal	Yes	42 (28.9)
	No	0 (0.0)
	Don't Know	108 (72.0)
HPV vaccines protect against cervical cancer	Yes	36 (24.0)
	No	0 (0.0)
	Don't Know	114 (76.0)
The government provides vaccines to girls from 9 years onwards	Yes	11 (7.3)
	No	2 (1.3)
	Don't Know	137 (91.3)
Person influencing the decision for vaccination	Doctor	125 (83.3)
	Family members	12 (8.0)
	Mass Media	5 (3.3)
	Personal Opinion	8 (5.4)
Hindering factors of HPV vaccination	High Dose	2 (1.0)
	Side Effects	70 (47.0)
	Uncertain effectiveness	78 (52.0)
Enabling factors for HPV vaccination	Free vaccination	145 (96.7)
	Information	14 (9.3)
	Physician's recommendation	7 (4.7)
	Method other than vaccination	8 (5.3)
	Others	4 (2.7)
Your daughter can easily get affected by HPV	Yes	113 (75.3)
	No	5 (3.3)
	Don't Know	32 (21.3)
Want to vaccinate your daughter	Yes	148 (98.7)
	No	2 (1.3)

During the qualitative interview, it was seen that all the mothers were interested to vaccinate their daughters against HPV. Three mothers did not feel any barrier towards vaccination but they have fear about side effects like fever, pain, and infection. Three mothers were worried about the cost of the vaccine. They expected free vaccination from the government. One mother did not have any idea about the prevention of vaccination.

"I want to vaccinate my daughter, but I do not know what are the side effects of this vaccine…I am scared about the side effects of this vaccine" (Mother, Rayer Bazar slum)

3.4 Knowledge of service providers on cervical cancer

During the survey, it was found that all service providers thought cervical cancer was a complex disease. Around 90% of service providers said cervical cancer was the leading cause of death among all gynaecological cancers. Among the risk factors for cervical cancers, the service providers thought sexual intercourse at an early age is a common risk factor (86.7%), followed by delivering more children (73%) and having more than one sexual partner (67%). As for the clinical features of cervical cancer, the service providers mentioned lower abdominal pain as a primary clinical feature (80%), followed by bleeding during sexual intercourse and massive bleeding through the genitals (60%).

Table 2: Knowledge of service providers on cervical cancer (N=30)

Variables	Response Category	Frequency (percentage) n (%)
Cervical cancer in females is a complex disease	Yes	30 (100.0)
	No	0 (0.0)
Cervical cancer death is the highest among the gynaecological cancers	Yes	27 (90.0)
	Don't Know	3 (10.0)
Risk factors of the Cervical cancer *(Multiple choice)*	Uterus Infection	8 (26.7)
	Family history	3 (10.0)
	Sexual intercourse at an early age	28 (93.3)
	Long-time uses of the contraceptive pill	4 (13.3)
	More than one sexual partner	20 (66.7)
	Less education	4 (13.3)
	More childbirth	22 (73.3)
	Others	4 (13.3)
Clinical features of Cervical cancer	Massive bleeding through genitals	18 (60.0)
	Bad smell	19 (63.3)
	Lower abdominal pain	24 (80.0)
	Rapid weight loss	8 (26.7)
	Pain during sexual intercourse	19 (63.3)
	Bleeding during sexual intercourse	21 (70.0)
	Others	8 (26.7)

During the qualitative interviews, 7 out of 10 service providers stated that uterine cancer and cervical cancer are not the same. Two out of 10 service providers do not know the symptoms of cervical cancer. The rest of the 8 service providers have mentioned different types of symptoms of cervical cancer.

"Symptoms are bleeding through the vagina, pain in the lower abdomen and sometimes uterus comes out" (service provider, Kamplapur TT para slum).

"I do not know if these two cancers are the same…I do not know much about all these" (service provider, Mohakhali Slum).

3.5 Perception of HPV Vaccine among service providers

In the survey questionnaire, we have included the knowledge question about 3 doses of the HPV vaccine. It was seen through the survey that 83% of service providers knew that the 3 doses of the HPV vaccine. Around 73.3% of service providers knew that the vaccine dosage needs to be completed by 6 months and 20% did not know this period of completion. The majority of them (70 %) thought the age range of HPV vaccination was 15 years and above and 23.3% said that the age range for vaccination was from 9 to 14 years. As for the attitude it was seen that around 80% of service providers were worried about the safety of HPV vaccination although all of them said that people should be assured of the effectiveness of the vaccine.

Table 3: Perception of HPV vaccine among service providers (N=30)

Variables	Response Category	Frequency (percentage) n (%)
Doses of HPV vaccination	3 Doses of HPV	25 (83.3)
	2 Doses of HPV	5 (16.7)
	Don't Know	3 (10.0)
Time for completion of vaccine dose	6 Months	22 (73.3)
	3 Months	2 (6.7)
	Don't Know	6 (20.0)
The age range for vaccination	9-14 years	7 (23.3)
	15 years and above	21 (70.0)
	Don't know	2 (6.7)
Do you think you have enough information about HPV	Yes	4 (13.3)
	No	26 (86.7)
People worried about the safety of vaccination	Yes	24 (80.0)
	No	6 (20.0)
People should be assured of vaccine effectiveness	Yes	30 (100.0)
	No	0 (0.0)

During the qualitative interview, it was seen that all service providers stated that, cervical cancer is preventable and 8 out of 10 service providers mentioned that cervical cancer is preventable through the HPV vaccine. Additionally, 2 service providers stated that by stopping early marriage cervical cancer can be prevented, 1 service provider mentioned that cervical cancer could be prevented through institutional delivery and 3 service providers mentioned that cervical cancer can be prevented through treatment.

All service providers stated that they do not have enough information on HPV, cervical cancer HPV vaccination. They all feel the need for a structured training program including a leaflet, and flipchart on HPV and related issues for the people who live in slum settings. They want to enrich themselves so that they counsel the clients (Adolescents and their mothers) successfully for prevention, vaccination and treatment. They all expect at least 2-3 days of training on HPV and cervical cancer.

"If there is regular training for us, we can aware people in this slum more about HPV, now we serve them with the limited knowledge we have" (Service provider, Mohakhali slum).

4. Discussion

Our findings regarding the knowledge of the mother regarding HPV is similar to a study conducted in the slums of Hubli in Karnataka, India where it was seen that only 7.5% of the mother had heard that HPV can cause cervical cancer (Bathija et al., 2016). In 2019 a study conducted in the urban slums of Nigeria found that only 12.8% of the mothers had heard about cervical cancer. Knowledge of cervical cancer, screening and HPV)immunization was poor among these mothers (Olubodun et al., 2019). Another study conducted in the "*Sat Tola'* slum of

Mohakhali, Dhaka among mothers of daughters aged 10 and below found that 55% of mothers had poor knowledge of cervical cancer transmission and prevention (Khan et al.,2019). Our study revealed that around 96% of the mothers never heard about HPV. Only 4% of the mothers thought this virus produced diseases like cervical cancer.

A 2018 study in Bangladesh revealed that one in five urban women and one in twenty rural women heard about a vaccine that can prevent cervical cancer (Islam et al., 2018). Another study conducted in the '*Sat Tola*' slum of Mohakhali Dhaka revealed that 18% of mothers had heard about the HPV vaccine but nobody knew the age at which the vaccines must be administered (Khan et al.,2019). Likewise in our study Around 24% of mothers who heard about the HPV vaccine believed HPV vaccines completely protect against cervical cancer.
A study conducted in Kenya among the hard-to-reach population in 2015 found that despite little prior knowledge of cervical cancer and HPV, communities were interested in receiving HPV vaccination for themselves as well as their daughters (Watson-Jones et al., 2015). In another study conducted in the slums of Odisha, 75% of the mothers said they wanted to vaccinate their daughters against the HPV virus. Another study conducted in 2014 in Karnataka found that mothers wanted vaccination for their daughters through government-subsidized programs (Montgomery et al., 2014). Over 60% of the mothers in a study conducted in Hong Kong in 2017 agreed that the HPV vaccine costs more than they can afford. The majority of mothers (81.8%) agreed that the government should subsidize the full cost of the vaccine. Only about one-third of the mothers (35.3%) indicated that they would be "very likely" to accept HPV vaccination for their daughters if the vaccines were available for the free vaccine (Loke et al., 2017). In another study conducted in Bangladesh in 2018, it was seen that 92% of urban mothers and 99% of rural mothers wanted HPV vaccination for their daughters (Islam et al., 2018). Indistinguishably in our quantitative survey as well as in qualitative interviews, it was seen that the majority of the mothers in slums were keen to vaccinate their daughters against HPV although they had limited knowledge. These mothers also said during the IDI that they wanted free vaccination from the government. In our survey also 99% of the mothers wanted HPV vaccinations for their daughters.

The majority (76%) of the mothers in a study in Hong Kong stated that doctors' recommendations would influence them to vaccinate their daughters Also 65% of mothers were worried about the side effects of the vaccine (Loke et al., 2017). Similarly, in our study, only 7.3% of urban slum mothers knew the Ministry of Health and Family Welfare (MoH&FW) provides free vaccination to girls 10 years old and above. Around 77% of these mothers said that decision of a doctor influenced their decision to vaccinate their daughter. According to these mothers, the hindering factors to vaccinating their daughters were due to the uncertainty of the effectiveness of the vaccine (52%) followed by the side effect of the vaccine (47%). The enabling factor that would influence them to vaccinate their daughters were free vaccination (96.7%). Almost 99% of the mothers in these slums wanted their daughters to be vaccinated against HPV

In a study conducted in India in 2016, it was seen that 84% of service providers agreed that cervical cancer was the most commonly occurring cancer among all the gynaecological cancers in Indian women (Chawla et al., 2016). A study conducted in China in 2020, found that in general, service providers had satisfactory baseline knowledge regarding HPV and its vaccines compared with other populations (Chen et al., 2020). Analogously in our survey, we found that almost 98% of service providers knew that HPV produces diseases; they specifically mentioned it produces cervical cancer and its transmission can be prevented. Correspondingly in our survey around 90% of service providers knew cervical cancer was the leading cause of death among all gynaecological cancers.

5. Conclusion

The Government of Bangladesh is going to introduce the HPV vaccine for adolescent girls in school and out of school, soon. The results of this study offer the nation-specific substantiation required for the creation of this program. These results highlight the necessity for culturally relevant and focused educational programs to increase understanding of the fundamental causes of cervical cancer and its primary prevention through the HPV vaccine. Despite low knowledge about the disease and its prevention, there was a high level of willingness to receive a vaccine to prevent cervical cancer. As a result, our study implies that adding the HPV vaccine to Bangladesh's regular vaccination schedule would be well-received with well-planned advocacy plan specially with vulnerable segment of the community. The results of this study have significant ramifications for the planning and execution of HPV vaccine programs across the nation.

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Ethics approval

This study was conducted according to the Declaration of Helsinki and performed after getting ethical clearance from the Institutional Review Board of Bangabandhu Sheikh Mujib Medical University (Reference No. BSMMU/2018/42).

Competing interests

The authors declare that there are no competing interests.

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Author Contribution

All of the authors have made significant contributions to this paper and have given their approval for its submission. The concept came from SAS, DKB and FH; statistical analysis and qualitative analysis were handled by SAS, DKB, MMI, SAS, Hridi and SSI. Data curation was handled by Hridi and FH, Data analysis and interpretation were carried out by Hridi, SAS and DKB. The revisions were given by FH, SAS, DKB and Hridi. During the article's drafting or editing, each author contributed essential intellectual content and acknowledges responsibility for the entire project

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