Williness to accept human papillomavirus vaccination in Jimma town, Ethiopia

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ABSTRACT
Vaccination against HPV is effective against cervical cancer, and the success of HPV vaccination is determined by the willingness to accept the vaccine. Therefore, the purpose of this study was to assess willingness to be vaccinated among female high school students in Jimma town, Ethiopia. A cross-sectional study was conducted with female high school students in Jimma town, Ethiopia. Study participants were selected using a simple random sampling method. Data were collected using a self-administered method. Data were entered using Epi-data version 3.5, exported, and analyzed using the statistical package for the social sciences (SPSS) version 21. Pearson’s chi-square test was used for data analysis. Finally, the results were narrated using text, tables, and graphs. A total of 366 study participants were interviewed and yielded a response rate of 94.8%. The majority of responders (267 or 72.9%) belonged to the age class 16–20 years. Two-thirds 68.9% of respondents were willing to take HPV vaccines. Respondents’ mother education (P = .041), respondents who had an older sister (P = .014), who had a smartphone (P = .043), knowledge (P = .001), and attitude (P = .006) variables were significantly associated with willingness to accept HPV vaccine. Only two-thirds of the study participants were willing to vaccinate. Responders’ mother education status, responders who had an older sister, smartphone, good knowledge, and a favorable attitude toward HPV vaccine were significantly associated with HPV vaccine acceptance. All concerned bodies have to enhance the willingness of the target population to take HPV vaccination.

Introduction
Human papillomavirus (HPV) is a non-enveloped double-stranded DNA virus and it is the most common sexually transmitted disease.1,2 HPV is mainly responsible for oral, oropharyngeal, vulvar, vaginal, and cervical cancers.3 There are different types of HPV serotypes, HPV types 18 and 16 HPV are causative agents of cervical cancer, accounting for approximately 90% of cases.4 In part, it causes genital warts beyond cervical cancer.5 The habitual mode of transmission of HPV from an infectious person to a healthy person is unprotected sexual intercourse. Women with early sexual activity, unprotected sex, multiple partners, gay or bisexual sex are more likely to become infected.6,7

Cervical cancer ranks as the 2nd leading cause of cancer in women and 6,294 new cervical cancer cases are diagnosed annually in Ethiopia.8 Prevention of the causative agent is the best means of mitigate morbidity and mortality due to cervical cancer. Cervical cancer screening using Pap smears is grouped under prevention and control strategies. The World Health Organization (WHO) declared that adolescent girls aged 9–14 years were the primary target group for HPV vaccination.9 The newly launched HPV vaccines (i.e. HPV quadrivalent and bivalent vaccines) and their potential to prevent the majority of cases of invasive cervical cancer represent remarkable public health achievements.10

The sustainable development goal target 3.8 states that achieve universal health coverage, including financial risk protection, access to quality essential healthcare services, and access to safe, effective, quality, and affordable essential medicines and vaccines.11 This couldn’t be achieved unless there was a deep investigation and recognition of the adolescent females’ intention to receive the HPV vaccine.

Providing HPV vaccination for eligible individuals has played a huge role in prevention, and decreasing the impact of cervical cancer. HPV vaccines targeting high-risk HPV (types 16 and 18) have a higher potential to eliminate approximately 70% of invasive cervical cancers in women.12 In a study conducted in Turkey among first-year students entering University, only 11.6% of the participants intended to be vaccinated.13 In Ethiopia, HPV vaccination was officially launched and approved on 6 December 2018 held at Tesfa Kokeb Primary School in Lideta Sub-city of Addis Ababa, and the Ministry of Health planned to vaccinate over one million girls aged 14 years.14

Despite of, female students are more likely susceptible to get human papillomavirus, in Ethiopia no study investigated the willingness of adolescent female students to obtain HPV vaccination. Therefore; this study aimed to assess the willingness of female high school students to obtain the HPV vaccine and its possible barriers.

Methods and materials
Study area and design
A cross-sectional study was conducted on May 13–10 September 2021 in the Jimma Town, Oromia region,
southwest Ethiopia. Jimma town is located 352 km from Addis Ababa to the southwest with a total population of 120,950, of whom 60,136 were women. According to the 2019/20 report of the Ethiopian ministry of education, there are 3688 secondary education facilities in Ethiopia of which 39% are located in Oromia. Jimma town has 8 non-governmental high schools and 7 governmental high schools and there are 7662 and 1056 female students in private and governmental high schools respectively.

**Study participants**

All-female students attending high schools in Jimma town were the source population of the study. Female students attending high schools at Jimma town while data collection times were the study population. Inclusion criteria: All preparatory female students in school at the time of data collection and students who were able to give information were included. Exclusion criteria:

Those who were critically sick or absent due to some other reason at the time of data collection were excluded.

**Sample size and sampling technique**

The sample size proportion was calculated using the single population proportion formula. The following assumptions were made: There is no previous data in Ethiopia on willingness to accept HPV vaccines among female high school students. Hence proportion 50% was used (p = 0.5), margin of error 5% and 95% confidence interval at Z α/2(1.96). The estimated sample size was 384. Finally by adding a 5% non-response rate the final sample size was 403. Five schools were randomly selected from a total of 15 schools in Jimma town. Proportional allocation of the sample to the size of the school, in terms of the number of students, was done to get study participants from each school.

**Data collection instrument and procedure**

Data were collected using a questionnaire that was adapted from previously conducted studies. The questionnaire contains information on socio-demographic characteristics, source of information, knowledge, perception, attitude toward the HPV vaccine, and willingness to obtain the HPV vaccine. The part of willingness to accept the vaccine questionnaire consisted of one question with two options either “Yes” or “No.” The respondents who answered the “Yes” option were categorized as willing to accept the HPV vaccine otherwise considered as unwilling. The Knowledge domain consisted of 8 items; The respondents who answer >50% of questions correctly were categorized as the group having a good knowledge of HPV while the respondents who answer <50% of questions correctly were categorized as the group having low knowledge about HPV. For Attitude, the domain consisted of 13 items: Respondents’ attitude toward HPV infection and vaccine were categorized as follows: negative if they obtained less than 50%, neutral for 50–75%, and positive for more than 75% of the total attitude score.

**Quality control**

A pretest study was conducted in Agaro with a small sample (5%) before the actual data collection period to ascertain whether participants understood the questions in similar ways to ensure consistency. Five data collectors and two supervisors were recruited for data collection and supervision respectively. Data collectors were trained in the data collection process for one day. The principal investigator checked the data for completeness and consistency at the end of every day.

**Data analysis**

Data coding and entry were carried out using Epidata version 3.5 and Data analysis was performed using SPSS version 22. Descriptive analysis frequencies, percentages, means, and standard deviations were computed to elaborate the socio-demographic characteristics of the study participants. Statistical significance between outcome variables and predictors was determined using the chi-squared test. The results were presented using texts, tables, figures, and graphs.

**Ethical consideration**

To conduct this study ethical clearance was obtained from the institutional review board (Ref. number IRB: midw119/2021) of the Jimma University. The study subjects obtained brief information about the importance and significance of the study. Furthermore, they were informed that their information was secure and verbal consent was obtained. The names of the participants were anonymous during the process of obtaining information to ensure confidentiality.

**Results**

**Socio-demographic characteristics**

A total of 366 study participants were interviewed giving a response rate of 94.8%. Most of the responders 267(72.9%) were between the ages of 16–20 followed by the age 11–15 years of 91(24.8%) responders. In terms of religion, the majority were Muslims 131 (35.8%) followed by orthodox 127 (34%). The majority of 100(27.3%) responders’ mothers had a diploma or above educational status. One-third 121(33%) of responders’ mothers were governmental employees and 174 (47.5%) had a monthly income of >3,501 ETB (Table 1).

**Source of information**

Most of the participants 335(91.5%) had TV or Radio at home and the majority of the responders 257(70.2%) had heard about HPV. The majority of responders received information on HPV mainly from mass-media 63 (17.2%) followed by the internet 31(8.5%).

**Perception of students toward HPV vaccine**

Of the 366 students, 159(51.6%) believed that women would no longer have to be screened for cervical cancer after vaccination.
Table 1. Socio-Demographic characteristics of female high school students, Jimma town, 2021.

| Variables                        | Category     | Frequency | Percentage (%) |
|----------------------------------|--------------|-----------|----------------|
| Age                              | 11-15        | 91        | 24.8           |
|                                  | 16-20        | 275       | 75.2           |
| Religion                         | Muslim       | 131       | 35.8           |
|                                  | Orthodox     | 127       | 34.8           |
|                                  | Protestant   | 70        | 19.1           |
|                                  | Catholic     | 29        | 7.9            |
|                                  | Other        | 9         | 2.5            |
| Respondents’ mother educational status | Illiterate  | 80        | 21.9           |
|                                  | Literate     | 286       | 78.1           |
| Respondents’ father educational status | Illiterate  | 42        | 21.5           |
|                                  | Literate     | 324       | 88.5           |
| Respondents’ mother occupation   | Employed     | 287       | 78.1           |
|                                  | Unemployed   | 28        | 7.7            |
|                                  | Other        | 51        | 13.9           |
| Respondents’ father occupation   | Employed     | 311       | 84.9           |
|                                  | Unemployed   | 26        | 7.1            |
|                                  | Other        | 29        | 8              |
| Monthly income                   | <1000        | 121       | 33.1           |
|                                  | 1001–1500    | 46        | 12.6           |
|                                  | 1501–2500    | 16        | 4.4            |
|                                  | 2501–3500    | 9         | 2.5            |
|                                  | >3501        | 174       | 47.5           |
| Had older sister                 | Yes          | 135       | 68             |
|                                  | No           | 231       | 31.4           |
| Participate in school mini-media club | Yes      | 135       | 36.9           |
|                                  | No           | 231       | 63.1           |
| Ownership of mobile phone        | Yes          | 302       | 82.5           |
|                                  | No           | 64        | 17.5           |

Of the 121(33.1%) believed that the vaccine was effective for both women and men. The majority (57.7%) also believed that they would be fully protected from cervical cancer after HPV vaccination. Of the 171(46.7%) responders believed that the HPV vaccine protects from genital warts (Table 2).

Overall respondents’ perception

More than half of the responders 210(57.3%) had a good perception of the HPV vaccine, and the remaining 156(42.6%) of study participants had a poor perception.

Willingness to obtain HPV vaccine

Of the 252(68.9%) responders were willing to take the vaccine and the remaining 114(31.1%) were not willing to take the vaccine for many reasons. Of the 252 participants, 87(34%) were willing to take the vaccine because of self-benefit and 59 (23.4%) were willing to take the vaccine because of advice from family and friends (Figure 1).

Barriers to obtaining HPV vaccination

Of the 114 responders who were unwilling to take the vaccine majority 32(28.1%) were due to the absence of health education programs to promote HPV vaccination (Figure 2).

Factors influencing willingness to take HPV vaccination

The predictors included parents’ education; responders who had an older sister, responders who had a hand smartphone, previous awareness status; and responders’ knowledge and attitude were significantly associated with willingness to obtain the HPV vaccine (Table 3).

Discussion

The aim of this study was to assess the willingness to obtain Human papillomavirus among female high-school students. More than two-thirds 68.9% with 95% CI [64.2%-73.8%] of responders were willing to take the HPV vaccine. This study finding was in line with a previous study conducted in mainland China, and Morocco revealed that 67.3% and 67% of adolescents were willing to receive the HPV vaccine. However, the results are relatively lower than those of studies conducted in Italy, India, Fujian province, China, Texas, USA, and Mali revealed that 81.7%, 92.5%, 80%,77%, and 80% of females students were willing to get vaccinated. This discrepancy may be due to the study conducted in China and India, where the participants were medical staff and students respectively. Health care providers have better health literacy.
willing to take HPV vaccine

Figure 1. Willingness to obtain HPV vaccine among high school female students at Jimma town, Ethiopia 2021.

Figure 2. Barrier to obtaining HPV vaccine among high school female students at Jimma town, Ethiopia 2021.

In this study, the predictors included; responders who had an older sister who were statistical significance with willingness to receive HPV vaccination ($\chi^2 = 1.841$, $p$-value =.014). This may be due to, responders that had an older sister at home; she gets health information from her older sister and her sister might have health seeking behaviors experience.

Furthermore, the study participants who had a smartphone were statistical significance with willingness to receive HPV vaccination ($\chi^2 = 1.66$, $P = .043$). This might be due to they have a chance to access and receive health-related information from the internet. In addition, The Minister of Health (MoH)

| Variables                          | Category  | Willingness to HPV vaccine | Chi-square ($\chi^2$) | p-value |
|------------------------------------|-----------|----------------------------|-----------------------|---------|
| Respondents’ mother education      | Illiterate| 54                         | 26                    | 1       |
| Respondents’ mother Occupation     | Literate  | 198                        | 88                    | 1.083   |
|                                   | Employed  | 203                        | 84                    | .618    |
|                                   | Unemployed| 21                         | 7                     | .939    |
|                                   | Other     | 28                         | 23                    | .055    |
| Have older sister                  | Yes       | 183                        | 68                    | 1.841   |
|                                   | No        | 69                         | 46                    | .014    |
| Ownership of mobile phone          | Yes       | 214                        | 88                    | 1.66    |
|                                   | No        | 38                         | 26                    | .043    |
| Aware on HPV vaccine               | Yes       | 158                        | 44                    | .374    |
|                                   | No        | 94                         | 70                    | .000    |
| knowledge status                   |          |                            |                       |         |
|                                   | Poor      | 104                        | 69                    | 2.182   |
|                                   | Good      | 148                        | 45                    | .001    |
| Attitude status                    | Unfavorable| 4                          | 7                     | .020    |
|                                   | Neutral   | 65                         | 44                    | 1.966   |
|                                   | Positive  | 183                        | 63                    | 5.083   |
| Perception                         | Poor      | 98                         | 58                    | .032    |
|                                   | Good      | 154                        | 56                    | 1.628   |

Furthermore, the current study finding was higher than that of studies conducted in Western China, Ottawa; Canada, Nigeria, and Malaysia, which revealed that 51.22%, 50%, 40.9%, and 60.3% of the responders were willing to receive the vaccine respectively. A possible reason for this discrepancy may be the variation in the study period, area, and education status of participants (involved medical students).

Of those who were unwilling to accept the HPV vaccine, the main reasons for unintentional vaccination were unavailability of vaccine (14.9%), limited information about the vaccine (22.8%), and fear of side effects (2.6%). Similarly, in a study conducted in Malaysia, 16.3% of respondents were unwilling to receive HPV vaccination because of worries about side effects.
sent updated health-related issues via short message service (SMS) for mobile users.

In this study, responders’ knowledge was significantly associated with their willingness to obtain HPV vaccines. This study finding is consistent with previous studies in Indonesia \(^{28}\) \((p = .045)\) and the United Arab Emirates \(^{29}\) found that knowledge was positively associated with acceptance of the HPV vaccine. In part, a systematic review and meta-analysis in South-Eastern Asia and Western Pacific Regions confirmed that lower knowledge levels and less confidence in the safety and efficacy of the vaccine negatively affected the intention to vaccinate. \(^{30}\) Responder who had better awareness and knowledge of the HPV vaccine had a chance to recognize benefit-risk analysis and more encouragement and motivation for future HPV acceptance.

This finding also revealed that responders’ mothers’ educational status was significantly associated with their willingness to obtain the HPV vaccine. Responders that had literate mothers were a better intention to obtain HPV vaccination than illiterate parents \((P\text{-value } 0.041)\). This is supported by a study conducted in Nigeria, \(^{31}\) participants who had completed secondary education \((p=0.040)\), had higher odds of encouraging their partners or family to receive a cervical vaccine. This might be due to the Parents’ educational status is indirectly related to the decision to vaccinate is influenced by general childhood vaccinations, and their level of health literacy leads to accepting globalization. \(^{15,32,33}\)

The present study indicated that study participants who had a favorable attitude toward the HPV vaccine were more willing to take the HPV vaccine \((\chi^2 = 5.083, P = .012)\). This study finding is consistent with previous studies in Gondar, Ethiopia and China revealed that responders that had a positive attitude about the HPV vaccination were significantly associated with the acceptability of the HPV vaccine. \(^{18,34}\). This might be due to the fact that, the general beliefs about the HPV vaccine’s propensity to cause harm or deliver benefits can determine the user decisions to HPV vaccination.

In this study, Perception was also statistically associated with a willingness toward the HPV vaccine \((\chi^2 = 1.628, p = .032)\). The previous studies conducted in Indonesia \(^{28}\) \((p = .002)\) and Nigeria \(^{15}\) \((P\text{ value } = 0.007)\) revealed there was a significant association between perception and acceptance of the HPV vaccine in young female students. This is because persons who had a good perception of a vaccine, were less likely affected by misconception and myth, and had good acceptance status.

**Limitation of the study**

This study focused on willingness to take HPV vaccination among female students; not addressing male students. The second limitation of this study; it was conducted in a specific area, so it may have been difficult to generalize.

**Conclusion**

Only two-thirds of responders (68.9\%) was willing to accept Human papillomavirus vaccines. Parents’ education, responders that had an older sister, responders who had a hand smartphone, previous awareness status; responders’ knowledge, perception, and attitude predictors were significantly associated with willingness to receive the HPV vaccine. There is still a need for continued health education to improve the willingness to accept HPV vaccination. Therefore, all concerned bodies have to work jointly to scale up the willingness to human Papillomavirus vaccination.

**Abbreviation**

| CC       | Cervical cancer       |
|----------|-----------------------|
| HPV      | human papillomavirus  |
| MoH      | Minister of Health    |

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**Data availability statement**

The data is available at the corresponding author upon reasonable request. [https://website.com/data availability statement](https://website.com/data availability statement).

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