

# Practice and Associated Factors of Human Papillomavirus Vaccination Among Primary School Students in Minjar-Shenkora District, North Shoa Zone, Amhara Regional State, Ethiopia, 2020

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**Background:** Human papillomavirus infection, a causative factor for cervical cancer, remains a topic of great interest. About 80% of sexually active women are at risk of acquiring HPV infection while having a 70% global target to eliminate intensive cervical cancer.

**Objective:** This study aimed to assess the practice of human papillomavirus vaccination and associated factors among primary school female students in Minjar-Shenkora district, 2020.

**Methods:** A school-based quantitative cross-sectional study was conducted from February 1 to 30 2020, in primary school female students of Minjar-Shenkora district, North Shoa zone, Ethiopia. A structured self-administered questionnaire was used for data collection. Associations between dependent and independent variables tested in binary and multiple logistic regression and variables with p-value  $\leq 0.25$  were entered into multiple logistic regression with considered significant level of P-value  $\leq 0.05$  and at 95% confidence interval (CI).

**Results:** A total of 591 students participated in the study with a response rate of 96.3%. Of the total, 393 (66.5%) (CI 0.63–0.7) participants have been vaccinated for HPV. The factors associated with the practice of vaccination were; being knowledgeable about HPV vaccination (AOR, 8.65, CI=5.2–14.3) and a positive attitude towards HPV vaccination (AOR, 1.85, CI=1.18–3). Students in rural areas were 88% less likely to practice HPV vaccine than students in urban areas (AOR, 0.12, CI=0.07–0.21).

**Conclusion and Recommendation:** Overall, HPV vaccination practice was relatively good (66.5%). Knowledge on HPV vaccination, positive attitude towards HPV vaccination, and being a rural residence were associated with HPV vaccination practice. Families, health-care workers, and schools should work together to improve the knowledge and attitude of the community towards HPV vaccination.

**Keywords:** human papillomavirus vaccine, knowledge, attitude, practice

## Introduction Background

Globally, cervical cancer is one of the major public health problems and the most common sexually transmitted infection among the female population.<sup>1</sup> It is estimated that 75% of sexually active persons were infected with HPV during their lifetime.<sup>2</sup> Cervical cancer is the second most common form of cancer worldwide

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among females aged 15 to 44 years.<sup>3</sup> It accounts for 5.2% of the cancer burden, leading to 530,000 new cases and 270,000 deaths every year globally.<sup>4</sup> Apart from cervical cancer, HPV can cause precancerous lesions, ano-genital warts, and other cancers of the vulva, vagina, penis, anus, and oropharynx.<sup>5</sup> Types 16 and 18 are the most important causes of cervical cancer,<sup>6,7</sup> and the non-oncogenic types of HPV 6 and 11 are identified as the causes for 90% of genital warts.<sup>8,9</sup> Major risk factors include: history of STDs, multiple sex partners, and sex at a young age.<sup>10</sup> It is prevented through vaccination, early detection and treatment, proper condom use, and limited sexual partners.<sup>11</sup>

The quadrivalent (Gardasil) and bivalent (Cervarix) prophylactic vaccines have been approved by the Food and Drug Administration (FDA) in June 2006 and October 2009, respectively.<sup>12</sup> Globally, about 70% of invasive cervical cancer in women is prevented by HPV vaccination.<sup>13</sup> HPV vaccination is highly protective against HPV infection that can reduce 56% of HPV infection cases of a 14 to 19 years old female.<sup>14</sup> HPV vaccines have been formally recommended, although not uniformly adopted, for large-scale use in the public health-care systems and the national immunization programs of the wealthier countries of Europe, North America and Australia.<sup>15,16</sup> In developing countries, however, HPV vaccines are not available through national immunization programs.<sup>17</sup> In Ethiopia, recently the vaccine is given for 9–14 years females in two doses at 6-month intervals. Various factors affect the uptake of vaccinations; including awareness and knowledge. The acceptability of a vaccine, or the willingness of an individual to be vaccinated, is another factor that contributes to its uptake.<sup>18</sup> Other related factors for the uptake of vaccines are child age, perceived access to the vaccine, societal norms, religious background and perceptions about disease severity and susceptibility.<sup>19–21</sup>

Cervical cancer is one of the most common adverse events in the health-care delivery system and has a significant impact on the quality of life. It presents an economic burden at the societal, national, and international levels.<sup>22,23</sup> Over 80% of deaths were reported at a late stage, primarily due to lack of awareness on cervical cancer and inadequate preventive services leading to a poor prognosis.<sup>22</sup> In Sub-Saharan Africa, cervical cancer accounts for 22.5% of all cancer cases in women.<sup>24</sup> In Ethiopia, it is the leading cause of cancer mortality among women next to breast cancer. Around 4648 women are found to have cervical cancer each year while 3235 women die from this

disease.<sup>25</sup> Lack of proper education and knowledge on the risks of HPV, the benefits of HPV vaccination, and the effects of not becoming vaccinated could lead to lifelong health complications from HPV infection.

Since HPV vaccination is a new program in Ethiopia, there is no study conducted on the practice of HPV vaccine and associated factors. Thus, this study assessed the practice of HPV vaccination and identified the factors that affect the practice of vaccination.

Vaccinating female primary school students are the most cost-effective public health intervention against cervical cancer because the vaccine targets girls who have not started sexual debut. Major risk factors for cervical cancer are sex at a young age and multiple sex partners, so they are highly vulnerable to HPV infection. HPV vaccination is appropriate for controlling and preventing the incidence, prevalence, morbidity, and mortality of cervical cancer in all health systems. HPV vaccination is a new program in Ethiopia, so this study contributes to assess the practice of HPV vaccination and associated factors in the study area. Moreover, it serves as a baseline document for health stakeholders and those who are interested in future research undertaking this area.

## Methods and Materials

### Study Setting

The study was conducted in Minjar-Shenkora district which is located 133 km far from the capital city of Addis Ababa and 690 km far from Bahir Dar, the capital city of Amhara regional state. Minjar-shenkora district is one of the 24 districts of North Shoa Zone in Amhara regional state. The *woreda* is located 263km far from North Shoa Zone city, Debre Berhan. The *woreda* has 3 urban and 27 rural “*Kebeles*”. The total population of the district were 167,155, and has 65 Primary Schools, of which 58 of them are in rural “*Kebeles*” and 7 are in urban “*Kebeles*”. There were 23,744 students, of whom 11,398 (48%) of them were females enrolled in 65 primary schools in the 2020 academic year.

### Study Design

A school-based quantitative cross-sectional study design was conducted from February first to February 29, 2020, on selected primary school of Minjar-shenkora district.

### Source Population

All-female students enrolled at primary schools for the 2020 academic year in Minjar-shenkora district.

## Study Population

All selected primary school female students enrolled in the selected primary school for the 2020 academic year in Minjar-Shenkora district.

## Sample Size Determination

The sample size was determined by using a single population proportion formula and calculated by using the prevalence of different factors to consider the larger sample size.

## Sampling Procedures

In the Minjar-shenkora district, there are 65 primary schools, 7 urban and 58 rural Kebeles. A total of 11,398 female students were enrolled in those primary schools in the 2019/20 academic year. To select study participants from the study population (N= 11,398) by employing the study subjects multistage sampling methods and procedures were applied (Figure 1).

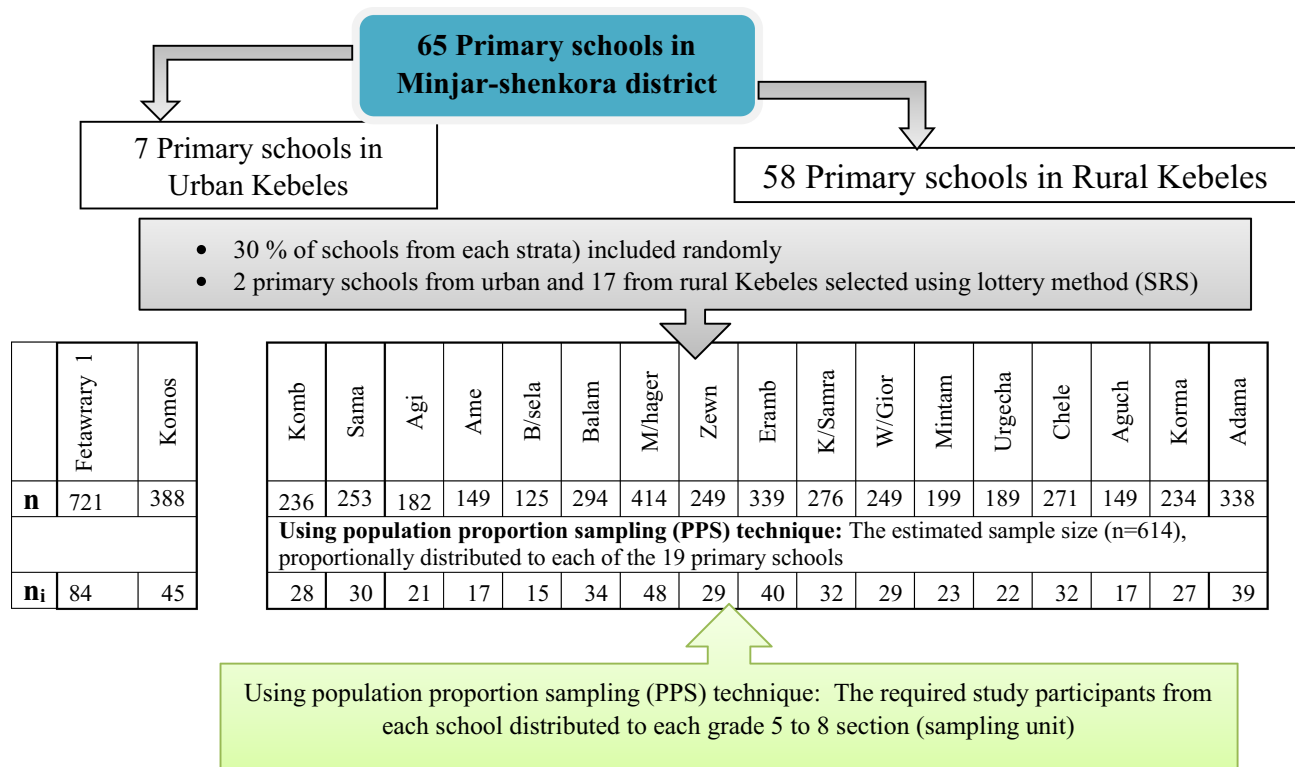
## Data Collection Tools and Procedures

A structured self-administered questionnaire was used to collect data. The questionnaire included socio-demographic characteristics like age, family occupation, educational status,

and household income and assessment questions like knowledge, attitude, and practices about human papillomavirus vaccination. English version of the structured questionnaire was translated into the local language, Amharic. Before real data collection, the questionnaire was pretested in school which is not selected as the study area. The data were collected by eight nurses with two health officers as a supervisor.

## Data Quality Control

Training was provided to eight data collectors and two supervisors on the data collection tool and sampling techniques. Pretest was done before the actual data collection with 10% of the sample size in one primary school. Based on the pretest findings, some modification was made before duplicating them for the actual data collection. Data collectors were supported by supervisors during study participant selection from each school and each section; followed by on-site supervision during the actual data collection period. In addition, all questionnaires, which were declared completed by data collectors were checked for completeness, accuracy, consistency, and clarity by supervisors and investigators.



**Figure 1** Diagrammatic presentation of multi-stage sampling methods and procedures employed to select study participants for the assessment of the practice of HPV vaccination on primary school female students in Minjar-shenkora districts, 2020.

## Data Processing and Analysis

Before data analysis, the data was cleaned using descriptive statistics like running frequency of each variable to check the range, sorting the data as ascending or descending to check if there is a missing value and outliers in the given value of data. The cleaned data were exported from Epi data version 4.6 to SPSS version 25 for further data management and analysis. Hosmer–Lemeshow test was used to check the model fitness. Binary logistic regression analysis was used to see the association between dependent and independent variables. All variables with a p-value <0.25 were taken into the multivariable model to minimize possible confounders. The multi-co-linearity test was carried out to see the correlation between independent variables by using a variance inflation factor (VIF). The odds ratio along with 95% CI were estimated to measure the strength of association and to identify factors associated with outcome variables using multivariable logistic regression. Based on multivariable logistic regression, all variables with a p-value less than 0.05 on multivariable results were taken as a significant determinant of the practice of HPV vaccination. Finally, the findings of the study were presented in the text, figures, and table.

## Operational Definition

HPV vaccination practice: a student who ever received HPV vaccination at least once and measured as a binary outcome; practiced and not practiced.

Knowledge: was assessed by six “yes” or “no” knowledge-based questions, and then the knowledge score was done to categorize in two:

Knowledgeable on HPV vaccine: From six questions, those answering three and above questions were considered as knowledgeable.

Not knowledgeable on HPV vaccine: From the six questions, those answering three or less questions were considered as not knowledgeable.

Attitude for HPV vaccine: measured by 8 Likert scale questions with a score of 3 (1 agree, 2 disagree, and 3 neutral), then a mean score was calculated and classified as:

Positive attitude: student score equal and above the mean score (1.82) would have a positive attitude.

Negative attitude: student score below the mean score (1.82) would have a negative attitude.

## Results

### Socio-Demographic Characteristics

Out of 614, a total of 591 students participated in the study with a response rate of 96.3%. A total of 475 (80.4%) respondents were at the age of 14. Most of the respondents 480 (81.2%) were grade 7 and 8 students and about 461 (78%) of the respondents were from rural districts.

The majority, 427 (72.3%) of the respondents reported their mothers' occupations were housewives. The most 315 (58.3%) mentioned respondents' family income per month was in the range of 2000–4000 ETB (Table 1).

**Table 1** Socio Demographic Characteristics of Primary School Female Students in Minjar-Shenkora Woreda, North Shoa Zone, Amhara Region, Ethiopia, 2020 (n=591)

| Variables               | Category             | Frequency | Percent |
|-------------------------|----------------------|-----------|---------|
| Age                     | 11 to 13 years       | 74        | 12.5    |
|                         | 14 and 15 years      | 517       | 87.5    |
| Religion                | Orthodox             | 518       | 87.6    |
|                         | Muslim               | 53        | 9       |
|                         | Protestant           | 20        | 3.4     |
| Educational level       | Grade 5 and 6        | 111       | 18.8    |
|                         | Grade 7 and 8        | 480       | 81.2    |
| Residence               | Urban                | 130       | 22.0    |
|                         | Rural                | 461       | 78.0    |
| Family income per month | <2000ETB             | 166       | 28.1    |
|                         | 2000 to 4000 ETB     | 315       | 58.3    |
|                         | >4000ETB             | 110       | 18.6    |
| Mother Education level  | No formal education  | 257       | 43.5    |
|                         | Elementary           | 217       | 36.7    |
|                         | Secondary            | 83        | 14.0    |
|                         | College and above    | 34        | 5.8     |
| Father education level  | No formal education  | 256       | 43.3    |
|                         | Elementary           | 221       | 37.4    |
|                         | Secondary            | 51        | 8.6     |
|                         | College and above    | 63        | 10.7    |
| Mother occupation       | House wife           | 427       | 72.3    |
|                         | Farmer               | 71        | 12.0    |
|                         | Private owned bisnis | 44        | 7.4     |
|                         | Government           | 49        | 8.3     |

## Knowledge About Human Papilloma Virus and HPV Vaccine

The majority of female primary schools, 494 (83.6%) have had an exposure to any source of information and 398 (80.5%) of them knew that HPV can cause cervical cancer. About 311 (62.9%) and 413 (83.6%) of participants know that one might get HPV through sexual contact and HPV infection have a vaccine respectively. One-third of the respondents 166 (33.5%) said that HPV infection heal by itself without treatment and most of the respondents 444 (89.8%) wants to get HPV vaccine. Furthermore, knowledge level was evaluated by knowledge score (Table 2).

## Primary Sources of Information About HPV

In more than half of the respondents (60%), the primary sources of information were health professionals and 29% of them were teachers. Other identified sources of information were peers (8%) and printed materials (3%).

Nearly 97 (17%) of the respondents neither have heard nor ever seen information about HPV, and the most identified reasons were absence/not being exposed to the potential source of information (91.8%) followed by

cultural and religious influences 6% and 1%, respectively (Figure 2).

## Attitude of Respondents Towards HPV Vaccination

About one-fourth of respondents 118 (20%) agree that they may have cervical cancer in the future and the majority of respondents 322 (54%) neither agree nor disagree about the chance of getting cervical cancer in the future. The majority of respondents 458 (75.5%) agree that cervical cancer is a severe disease and 41 (6.9%) of students disagree that cervical cancer is a severe disease. Half of the respondents 296 (50.1%) agree that HPV vaccination effectively prevents cervical cancer and most of the 266 (45%) respondents neither agree nor disagree about the prevention of HPV vaccine for cervical cancer. Regarding the side effects, 288 (48.7%) of students agreed on being afraid of the side effect of HPV vaccination and 303 (51.3%) of respondents disagree on the side effect of HPV vaccination. Most of the respondents 321 (54.3%) disagreed that health professional counseling affects their decision to receive HPV vaccination. Overall 300 (50.8%) have a positive attitude towards HPV vaccination (Table 3).

**Table 2** Primary School Female Students' Knowledge Level About HPV and Their Primary Source of Information: Minjar-Shenkora Woreda, North Shoa Zone, Amhara Region, Ethiopia, 2020 (n=591)

| I. Knowledge Status                                                |                                                             | Frequency | Percent |
|--------------------------------------------------------------------|-------------------------------------------------------------|-----------|---------|
| I. Have heard about HPV                                            |                                                             | 494       | 83.6    |
| II.                                                                | Knowledge HPV can cause cervical cancer                     | 398       | 80.5%   |
| III.                                                               | Knowledge HPV infection have vaccine                        | 413       | 83.6%   |
| IV.                                                                | Knowledge one can get HPV through sexual contact            | 311       | 62.9%   |
| V.                                                                 | Do you think HPV infection heal by itself without treatment | 166       | 33.5%   |
| VI.                                                                | Do you want to get HPV vaccine                              | 444       | 89.8    |
| 2. Primary source of information From where do you get information |                                                             |           |         |
| VII.                                                               | Leaflets, posters, and other printed materials              | 13        | 2.6%    |
| VIII.                                                              | Health professionals                                        | 297       | 60.1%   |
| IX.                                                                | Peers                                                       | 40        | 8.1%    |
| X.                                                                 | School                                                      | 144       | 29.1%   |

## HPV Vaccination Practice Among Female Primary School Students

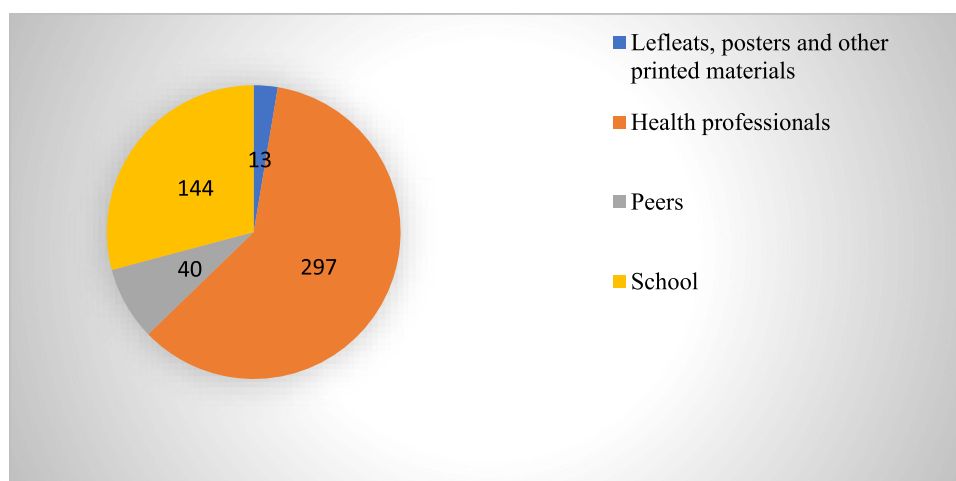
Of the total 591 students who participated in the study, 393 (66.5%, CI 0.63–0.7) have ever received HPV vaccine, of whom 249 (42.1%, CI 0.58–0.67) of them received one dose and the rest 144 (24.4% CI 0.32–0.42) received two doses.

One hundred ninety-eight students (33.5%) students were not receiving the vaccine and they were responding the reasons for failure to take the vaccine were; 75 (38%) worried about the vaccine safety, 72 (36.7%) students did not know where to get the vaccine, 33 (5.6%) not being informed by health-care providers and 18 (3%) believe no need for the vaccine (Table 4).

## Factors Associated with HPV Vaccination Practice in Multivariable Logistic Regression

Residence, knowledge, attitude, maternal occupation, religion, father educational status had an association with HPV vaccination practice in binary logistic regression at p-value of <0.25. After multiple logistic regression





**Figure 2** Primary source of information about HPV for adolescent girls in primary school, Minjarshenkora Woreda, North Shoa Zone, Amhara region, Ethiopia, 2020.

analysis variables of residence, knowledge and attitude had a significant association with HPV vaccination practice at  $p$ -value  $<0.05$ .

**Table 3** Attitude of HPV Vaccination Towards Primary School Female Students' in Minjar-Shenkora-Woreda, North Shoa Zone, Amhara Region, Ethiopia, 2020

| Variable                                                                                       | Category  | Frequency | Percent |
|------------------------------------------------------------------------------------------------|-----------|-----------|---------|
| I may have cervical cancer in the future                                                       | Agree     | 118       | 20      |
|                                                                                                | Dis agree | 151       | 25      |
|                                                                                                | Neutral   | 322       | 54      |
| Do you think Cervical cancer is severe disease                                                 | Agree     | 458       | 75.5    |
|                                                                                                | Dis agree | 41        | 6.9     |
|                                                                                                | Neutral   | 92        | 15.6    |
| Do you think HPV vaccines can effectively prevent cervical cancer                              | Agree     | 296       | 50.1    |
|                                                                                                | Dis agree | 29        | 4.9     |
|                                                                                                | Neutral   | 266       | 45      |
| Do you think not easy to find HPV vaccine                                                      | Agree     | 276       | 46.7    |
|                                                                                                | Dis agree | 315       | 53.3    |
|                                                                                                | Neutral   | 0         | 0       |
| I am afraid of the side effects of HPV vaccination                                             | Agree     | 288       | 48.7    |
|                                                                                                | Dis agree | 303       | 51.3    |
|                                                                                                | Neutral   | 0         | 0       |
| Health professional counseling affects my decision as to whether or not to receive vaccination | Agree     | 106       | 17.9    |
|                                                                                                | Dis agree | 321       | 54.3    |
|                                                                                                | Neutral   | 164       | 27.7    |
| I am afraid of being perceived as having STI if I receive HPV vaccination'                     | Agree     | 120       | 20.3    |
|                                                                                                | Dis agree | 471       | 79.7    |
|                                                                                                | Neutral   | 0         | 0       |

The odds of being knowledgeable students were 8.65 (AOR, 8.65, CI=5.2–14.3) times more likely to practice HPV vaccination than not being knowledgeable. The likelihoods of practicing HPV vaccination were 1.85 (AOR, 1.85, CI=1.18–3) times more likely in students with a positive attitude than students with a negative attitude. Students who lived in the rural areas were 88% (AOR, 0.12, CI=0.07–0.21) less likely to practice HPV vaccine than students who live in urban area (Table 5).

## Discussion

The practice of HPV vaccination was 66.5% (CI, 0.63–0.7) and from whom 24.4% (CI= 0.32–0.42) received two doses HPV vaccine and 42.1% (CI, 0.58–0.67) took one dose and 34.5% of students did not take any dose of HPV vaccination. The practice of HPV vaccination was found to be higher than similar studies conducted in female

**Table 4** HPV Vaccination Practice of Primary School Female Students' in Minjar-Shenkora District, North Shoa Zone, Amhara Region, Ethiopia, 2020

| Practice Variables                     | Frequency | Percent |
|----------------------------------------|-----------|---------|
| Receive HPV vaccination                | 393       | 66.5    |
| Receive one dose of vaccination        | 249       | 42.1    |
| Receive two dose of vaccination        | 144       | 24.4    |
| Not receive HPV vaccination            | 198       | 33.5    |
| <b>Reasons not to take vaccination</b> |           |         |
| Worried about the vaccine              | 75        | 38      |
| Do not know where to get the           | 72        | 36.7    |
| Not informed by health care            | 33        | 5.6     |
| Believe no need for vaccine            | 18        | 3       |

**Table 5** Factors Associated with Primary School Female Students' HPV Vaccination Practice in Minjar-Shenkora Woreda, North Shewa Zone, Amhara Region, Ethiopia, 2020

| Variable          |                     | HPV Vaccination Practice level |               |      |                    |
|-------------------|---------------------|--------------------------------|---------------|------|--------------------|
|                   |                     | Practiced                      | Not Practiced | COR  | AOR 95% CI         |
| Knowledge         | Knowledgeable       | 343 (58%)                      | 96 (16.2%)    | 7.21 | 8.65 (5.2–14.3) ** |
|                   | Not knowledgeable   | 50 (8.5%)                      | 101 (17%)     | 1    |                    |
| Attitude          | Positive attitude   | 220 (37.2%)                    | 71 (12%)      | 2.27 | 1.85 (1.18–3) **   |
|                   | Negative attitude   | 173 (29.2%)                    | 127 (21.5%)   | 1    |                    |
| Residence         | Rural               | 44 (7.4%)                      | 86 (14.6%)    | 0.16 | 0.12 (0.07–0.21)** |
|                   | Urban               | 349 (59%)                      | 112 (18.9%)   | 1    |                    |
| Religion          | Muslim              | 22 (3.72%)                     | 31 (5.2%)     | 3.24 | 1.97 (0.93–4.17)   |
|                   | Protestant          | 10 (1.7%)                      | 10 (1.7%)     | 2.29 | 1.54 (0.53–4.42)   |
|                   | Orthodox            | 361 (61.0%)                    | 157 (26.5%)   | 1    |                    |
| Mother occupation | House wife          | 31 (5.2%)                      | 40 (6.8%)     | 2.8  | 1.54 (0.76–3.1)    |
|                   | Private             | 29 (4.9%)                      | 15 (2.5%)     | 1.16 | 0.5 (0.18–1.5)     |
|                   | Government          | 38 (6.4%)                      | 11 (1.9%)     | 0.64 | 0.45 (0.19–1.06)   |
|                   | Farmer              | 295 (50%)                      | 132 (22.3%)   | 1    |                    |
| Father education  | Elementary          | 166 (28.0%)                    | 55 (9.3%)     | 0.64 | 0.85 (0.51–1.42)   |
|                   | Secondary           | 27 (4.6%)                      | 24 (4%)       | 1.72 | 0.77 (0.33–1.8)    |
|                   | College and above   | 31 (5.2%)                      | 32 (5.4%)     | 2    | 1.9 (0.71–4.9)     |
|                   | No formal education | 169 (28.6%)                    | 87 (14.7%)    | 1    |                    |

Note: \*\*p-value ≤ 0.001.

adolescents in Lira district, Uganda (17.61%). These might be due to the definition difference in the practice HPV vaccination in Uganda study were still defined as completing three doses of the vaccine as per the recommended schedule, whereas in this study those who ever received HPV vaccine at least one schedule. In addition, in Uganda study, adolescent girls aged 12–17 years regardless of being enrolled in school, were the study participants; and attaining the ordinary level of education was found to be determinant for HPV vaccination practice.<sup>26</sup> Therefore, female students in this study might be favored in primary school. In another population level survey conducted among Malaysian women, HPV vaccination uptake was 50.1%, which also lowered from this study and higher from the Uganda study. In a Malaysia study, where the recommended 3 dose course costs 360 USD in private facilities, monthly family income was found to significantly influence the service uptake.<sup>27</sup> However, in this study, monthly family income and HPV uptake were not significantly associated. Since HPV vaccination is for free in Ethiopia, family income is not expected to have a direct influence on the service uptake.

In this study, primary school female students who had a positive attitude towards HPV vaccination were practiced HPV vaccination. This is supported by the study conducted in Uganda. The finding was also inline with a qualitative study in Canada showing that at the individual and interpersonal level, the most frequently invoked barrier was negative attitudes toward the HPV vaccine<sup>28</sup> whereas A cross-sectional study in China showed that attitude predictors, agreed that “HPV vaccines can effectively prevent cervical cancer” was found to be positively associated with HPV vaccination.<sup>29</sup>

Most of the female students (85%) have had exposure to information regarding the human papillomavirus and HPV vaccine, which is much higher than the nationwide survey study conducted in Malaysia in 2016 where only 50.8% of respondents reported having heard information about the HPV vaccine.<sup>27</sup> This might be due to the difference in the assessment approach and method. In this study, 83.6% of students who had exposure to the information knew HPV infection has a vaccine, 80.5% of them knew HPV infection can cause cervical cancer, 89.8% of students want to get HPV vaccine and 62.9% of them knew one can get HPV infection through sexual contact. Similar

study conducted among young Italian women 75.2% of respondents knew that HPV transmits through sexual contact.<sup>30</sup> In this study, the main sources of information were health-care providers and schools, which agrees with most studies conducted among adolescent girls in Malaysia<sup>31</sup> and California high school girls.<sup>32</sup> Similar to this study, in Malaysian study, knowledge indicator questions that significantly influence the practice of HPV vaccine by women, the odds of a person willing to be vaccinated were 1.66 times higher for someone who had good knowledge of cervical cancer than for a person who does not have good knowledge of it.<sup>31</sup> In this study, knowledgeable students were practicing HPV vaccination 8.65 times than not knowledgeable students. This is in line with a study on Korean American college women from six states in the Northeastern region, we found that most were not aware of the HPV vaccine and had low knowledge of HPV, HPV vaccine, and cervical cancer.<sup>33</sup> A cross-sectional study in Hong Kong, China showed that the mean percentage of correct answers to questions about HPV was only 52.7%.<sup>34</sup>

In this study, being rural residences were 88% less likely to practice HPV vaccination than an urban residence, the possible justification might be poor message delivery system of the responsible body and lack of awareness by the students, which also might be due to less vaccine availability in the rural area. Study conduct in Malaysian intention of rural secondary school students to receive the HPV Vaccine was higher 86.6%<sup>31</sup> this may be due to Malaysia have improved national HPV immunization program so the vaccine was easily accessible to a rural area and they have improved message delivery system similarly in Uganda study higher prevalence of uptake of HPV vaccine among adolescents who reported that HPV vaccine community outreaches were conducted in their residences compared to those who reported that the outreaches were not conducted in their residences.<sup>26</sup>

Generally, being knowledgeable on the HPV vaccine, the positive attitude towards HPV vaccine, and the residence of students being rural, were significant associated factors for the practice of HPV vaccination by female students; however, in this study, there was a limitation to address behavioral-based predictors with a qualitative approach while appreciating such studies importance with limited evidence of such study in our context.

## Conclusion and Recommendations

Significant proportions (66.5%, CI, 0.63–0.7) of the participants have been vaccinated for HPV. However, it is a new program in the study area, it is a good proportion. The factors being knowledgeable, having a positive attitude, and residence of students, being rural were significantly associated with HPV vaccination practice by primary school female students.

Health facilities should include mop-up and routine strategies for vaccine delivery in addition to the campaign-based delivery to increase the practice (uptake) of HPV vaccination, especially in rural areas. However, schools and health professionals were the primary sources of information; they should strengthen the messages delivery strategy and increase the knowledge level of the students. And to build a positive attitude among the students, we use behavioral change communication strategies and activities for HPV vaccination. Families should allow and support female students for the uptake of the recommended dose of HPV vaccination as per the schedule.

## Data Sharing Statement

The data can be accessed on request to the authors.

## Ethical Approval and Consent of the Participant

We declare that the research is governed by the Declaration of Helsinki.

Ethical clearance was obtained from Debre Berhan University, Health Science College research committee. And a supportive letter was obtained from Minjar-Shenkora district education office to all selected schools. Each study participant was adequately informed about the purpose, method, and anticipated benefits and risks of the study by their data collector. Respondents had the right to respond or refuse the interview. Written consent was received from the study participant's principal family member. All information given by the respondents was used for research purposes only and confidentiality and privacy were kept by omitting the name of the respondents during the data collection procedure.

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## Author Contributions

All authors contributed to data analysis, drafting and revising the article, have agreed on the journal to which the article will be submitted, gave final approval of the version to be published, and agreed to be accountable for all aspects of the work.

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## Disclosure

The authors report no conflicts of interest for this work.

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