

Facilitators and Barriers to Human Papilloma Virus (HPV) Vaccine Uptake among Adolescent Girls in Kathmandu District: A Mixed Method Study

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Outline



- **Background**
- **Objectives**
- **Methodology**
- **Results**
- **Conclusion and Recommendation**
- **References**

Background

WHO recommends

- 2 doses of HPV vaccine for 9 to 14-year-old girls
- Primary prevention against cervical cancer.¹
- To achieve 2030 Sustainable Development Goal of vaccinating 90% girls by age 15.²

HPV immunization

- Control nearly 70% of all cervical cancers.^{3,4}

HPV vaccines availability

- Available in 124 countries, including Nepal.⁵
- 64 High Income Countries had launched NIP of HPV vaccine

Vaccination coverage

Global

12% adolescent girls fully vaccinated. ⁶

LMICs

Vaccine uptake 1.1% in LMICs and < 80% in high-income countries. ³

56 LMICs (41% of all LMICs) initiated national HPV vaccine. ⁴

South- east Asia

Only 3% coverage of vaccine. ^{7,8}

In Nepal

- Only 13.9% of school-going girls knew about the HPV vaccine. ⁹
- No nationwide HPV vaccination program at the time of study.
- In 2023, MOHP launched HPV vaccination demo campaign by purchasing 20000 HPV vaccines
- Distributed from seven major hospitals in each province.
- For 14 years old girls with two doses of the vaccine over six months. ^{10,11}
- Study will identify the factors associated, facilitators and barriers early.
- Will inform public health policymakers to develop tailor interventions and programs.

Objectives

General Objective

- To estimate the prevalence of HPV vaccine uptake, identify factors associated with HPV vaccination prevalence and explore the facilitators and barriers to HPV vaccination program among 14-15 old girls in Kathmandu district.

Specific Objectives

- To estimate the **prevalence of HPV vaccine uptake** among 14-15 years old girls in Kathmandu.
- To identify **factors associated with HPV vaccine uptake** among adolescents' girls in Kathmandu.
- To explore **facilitators and barriers** related to HPV vaccination from adolescent girls, parental, policymakers/policy implementers perspectives in Kathmandu.

Methodology

Study design: Combined mixed-method

Study time: July 2024 to September 2024

Study site: Eight municipalities of Kathmandu district(Kathmandu metropolitan city, Kageshwori Manohara , Nagarjung , Dakshinkali , Kirtipur, Gokarneshower, Budhanilkantha and Chandragiri)

Justification:

- These Municipalities received HPV vaccines provided by MOHP and targets for immunizing girls aged 14 years in 2023.

Study population

Quantitative: Adolescent girls aged 14-15 years

Inclusion criteria:

- Females
- Aged 14-15 years
- Enrolled in schools within the study site at the time of data collection

Exclusion criteria:

- Girls with hearing /visual impairment
- Absent in school during the time of data collection

Study population(Qualitative)

| Study population | Inclusion criteria |
|---------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| Adolescents' girl's parents | Father or mother of the adolescent girl |
| Municipality level stakeholders(Mayor, Up mayor) | Full-time employee and working at least 6 month in municipality |
| School authority (principle/ vice-principal) | Full-time employee and working at least 6 month in school |
| Policymakers(person from FWD) | Full-time employee and working at least 6 month in FWD |
| Program implementers(DHO, PHO, municipality health coordinator, healthcare workers from district and municipality) | Full-time employee or working at least 6-month in district and municipality |
| Adolescent girls 14- 15 years(both vaccinated and unvaccinated) | <ul style="list-style-type: none"> •Participated in the quantitative part of study •Girls aged 14-15 years |

Sample size

Quantitative: Single population proportion formula

Prevalence= **19.6**¹² %

Intra class correlation coefficient(ICC) = **0.54**¹³

Design effect = **5.868**

Cluster size= **10**

Total sample size= **1418**

Sample size adjusting for 10%nonresponse rate= **1560**

Qualitative:

A total of **27 IDIs** based on the principle of saturation.¹⁴

11 (4 stakeholders/policymakers, 4 program implementers and 4 school authority)

8 adolescent's girls(4 vaccinated and 4 unvaccinated)

8 adolescents girl's parents(4 from vaccinated and 4 unvaccinated girls)



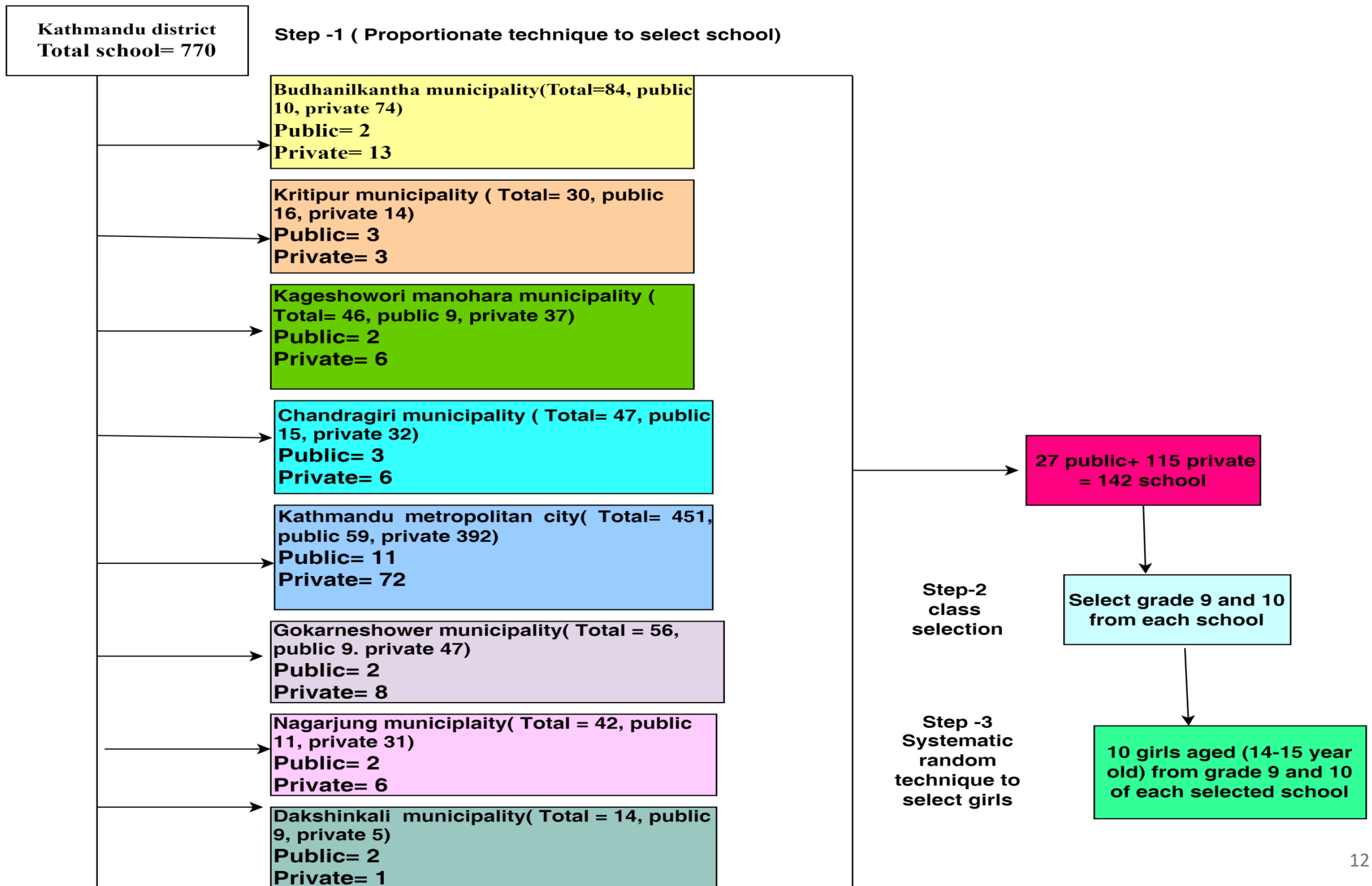
Sampling technique

For quantitative

- Multi-stage cluster random sampling in each municipality.
- Clusters are secondary level schools of eight different municipalities
- Cluster size= 10 (Ten participants from each school)
- Both public and private schools was included (**Total 142 schools**)

For qualitative

- Purposive sampling



Study variables

Dependent variables: HPV Vaccine Uptake

Dichotomized: Fully vaccinated and not fully vaccinated.

Fully vaccinated if received all two doses of the HPV vaccine over six months.

Not fully vaccinated if received one or no dose.

Independent variables:

Socio-demographic characteristics

Knowledge and perception about HPV infection, cervical cancer, and HPV vaccine

Presence of promotion and sources of information about HPV vaccination

Data collection tools (Quantitative)

| Variables | Tools | Validity and Reliability |
|-------------------------------------------------------------------------------------------------|------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| Sociodemographic characteristics | Structured questionnaire of NDHS survey ¹ | Standard tool used in the previous study in Nepa ¹ |
| Presence of promotion and sources of information about HPV vaccination, HPV and cervical cancer | From various literature | Translated in the Nepali language, pretesting, consult with experts and checking consistency with Cronbach alpha |
| HPV vaccine uptake-related information | From literature | |

Data collection tools (Quantitative)

| Variables | Measurement unit | Tools | Validity and reliability |
|-------------------------------------------------------------------------------------------------|-----------------------|----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| Knowledge about cervical cancer, HPV infection and HPV vaccine | Mean knowledge score | Structured questionnaire adapted from Ethiopia study ² | Translated in the Nepali language, pretesting, consult with experts and checking consistency with Cronbach alpha |
| Perception towards cervical cancer, HPV infection and HPV vaccination (five-point Likert scale) | Mean perception score | From literature and structural tool from Ethiopia study ² | |



Data collection tools (Qualitative)

Based on five domains of Consolidated Framework for Implementation Science (CFIR) framework

- Intervention characteristics
- Outer setting
- Inner setting
- Individual characteristics
- Implementation process

Data collection technique

For quantitative

- Self-administered questions in Nepali language for eligible girls to fill out in school classroom.

For qualitative

- Face to face in depth interview(IDIs)
- In private space as per their convenience of participants
- All interview was audio recorded.
- Interview lasted for 30 min to 45 minute

Validity and reliability

- Vaccine cards of the participants were checked
- Cronbach alpha to check internal validity(Scale reliability coefficient:0.87)
- Questionnaires pre-tested among 10% of the eligible participants

Ethical considerations

- Ethical approval by the Institutional Review Committee (IRC) of Kathmandu University School of Medical Sciences(IRC-KUSMS Approval NO. 68/24)
- Written informed consent from parents and assent from participants
- Voluntary participation
- Confidentiality and anonymity are maintained

Data analysis

Under descriptive statistics

- After adjusting for individual sample weights frequency and percentage was calculated for categorical variables and mean and standard deviation for continuous variables.

Under analytical strategy

- Generalized estimating equations (GEE) with bivariate and multivariate Poisson regression, exchangeable working correlation and robust variance was used after accounting for cluster sampling and adjusting for individual sample weights to calculate the Prevalence ratio.

Qualitative

- Audio recordings transcribed verbatim in Nepali
- Framework analysis using CFIR framework

Result Quantitative Table1: Socio-demographic characteristics of participants(n=1510)

| Variables | Weighted Percent (%) | Weighted frequency | Unweighted Frequency |
|------------------------------------|---------------------------------|-------------------------------|---------------------------------|
| School type | | | |
| Government | 32.57 | 492 | 321 |
| Private | 67.43 | 1018 | 1189 |
| Class | | | |
| Nine | 51.94 | 784 | 792 |
| Ten | 48.06 | 726 | 718 |
| Age, in years (Mean±SD) | | (14.63 ±0.482) | 14.62 ± 0 .48 |
| Ethnicity | | | |
| Adibasi/janajati | 42.07 | 635 | 633 |
| Brahmin/Chettri | 47.14 | 712 | 711 |
| Terai/Madhesi | 6.38 | 96 | 91 |
| Dalit and others | 4.41 | 67 | 75 |
| Religion | | | |
| Hindu | 77.65 | 1173 | 1197 |
| Non-Hindu | 22.35 | 337 | 313 |

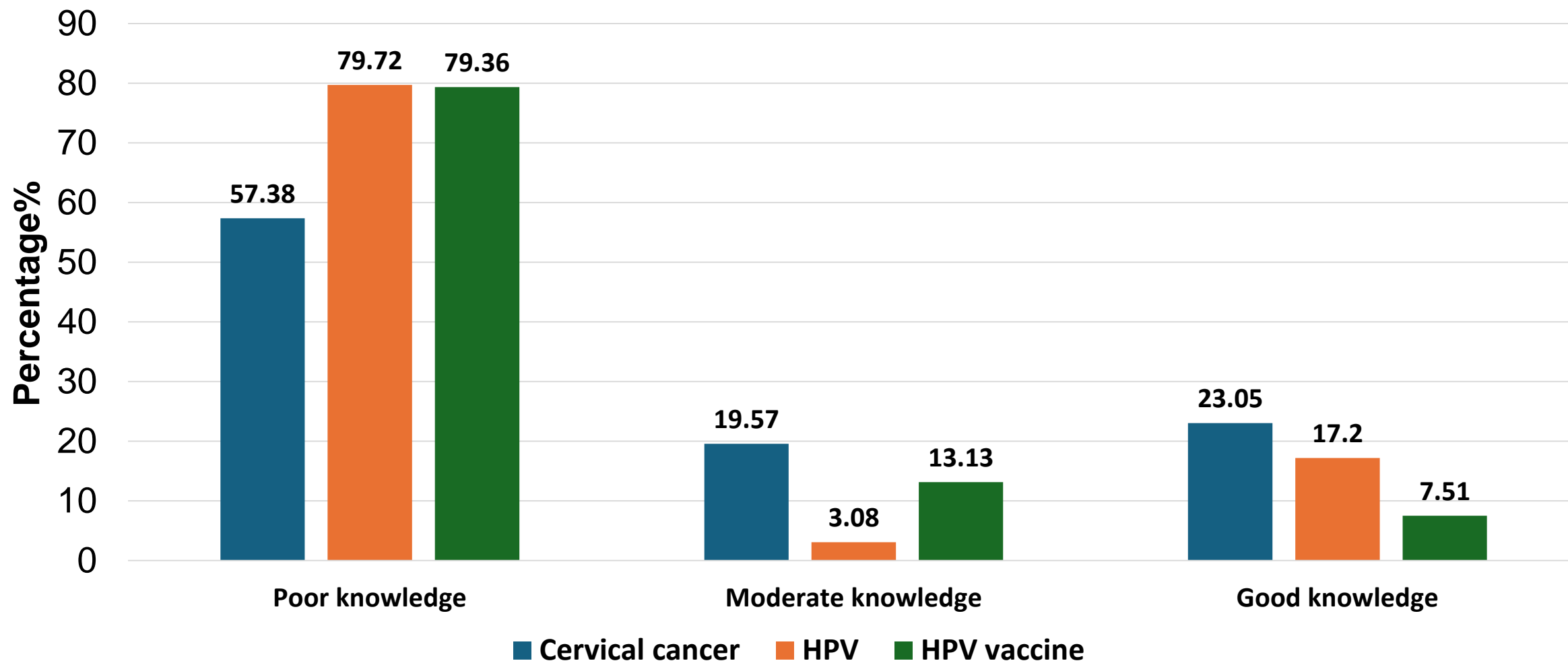
Table1: Socio-demographic characteristics of participants(n=1510)

| Variables | Weighted Percent (%) | Weighted frequency | Unweighted Frequency |
|---------------------------------------------------------------|---------------------------------|-------------------------------|---------------------------------|
| Mother's education | | | |
| No formal education | 19.37 | 292 | 273 |
| Basic education (1-8) | 29.23 | 441 | 437 |
| Secondary (9-12) | 41.64 | 629 | 643 |
| Higher Secondary and above | 9.76 | 147 | 157 |
| Father's education | | | |
| No formal education | 13.18 | 199 | 163 |
| Basic education (1-8) | 20.94 | 316 | 315 |
| Secondary (9-12) | 48.97 | 739 | 761 |
| Higher Secondary and above | 16.92 | 255 | 271 |
| Family Type | | | |
| Nuclear | 81.81 | 1235 | 1,229 |
| Joint | 18.19 | 275 | 281 |
| Number of Family members (n, Mean \pm SD) | | (5.081 \pm 2.162) | 1510 (5.03 \pm 2.07) |
| Number of siblings (n, Mean\pmSD) | | (2.28 \pm 1.157) | 1,510, (2.24 \pm 1.12) |

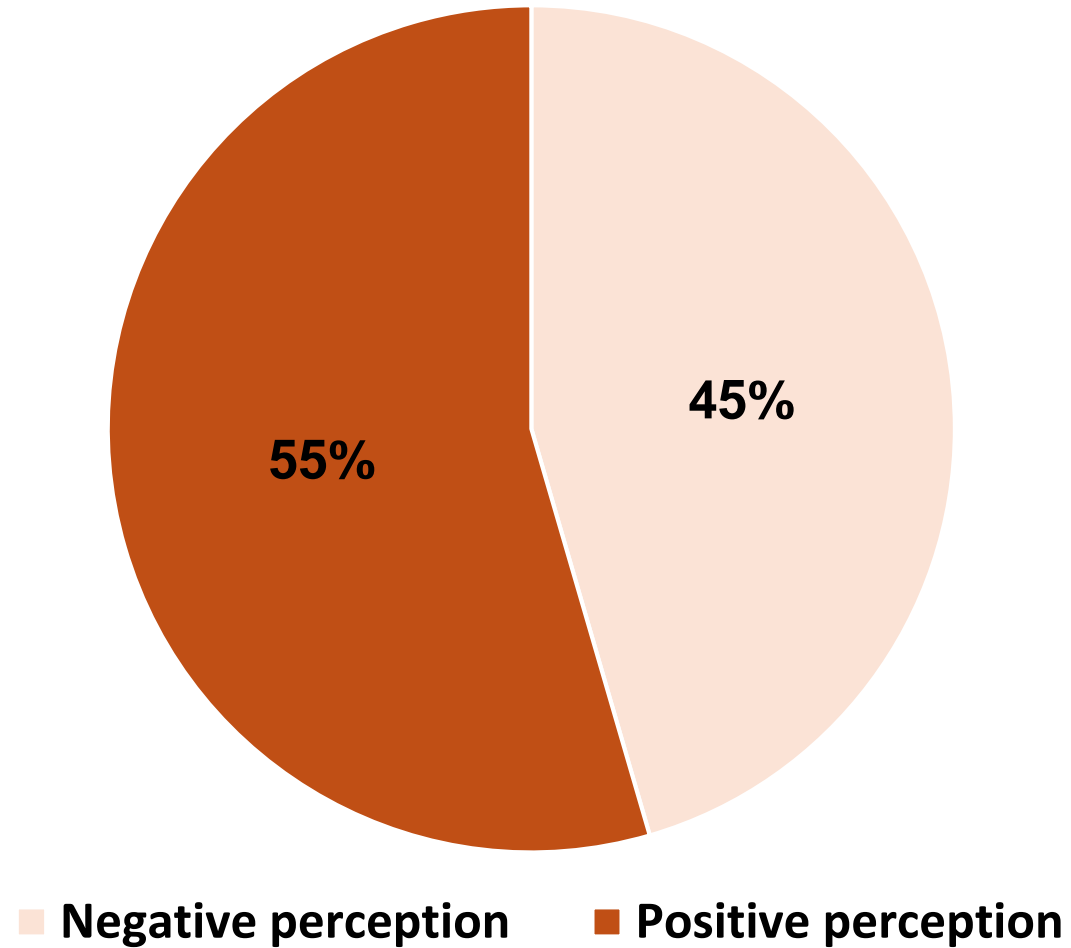
Table1: Socio-demographic characteristics of participants(n=1510)

| Variables | Weighted Percent (%) | Weighted frequency | Unweighted Frequency |
|------------------------------------------------------------|---------------------------------|-------------------------------|---------------------------------|
| Fathers' occupation | | | |
| Agriculture | 7.26 | 107 | 81 |
| Daily waged labor | 9.60 | 141 | 143 |
| Government job | 11.98 | 177 | 160 |
| Private job | 16.98 | 250 | 269 |
| Business(self-employed) | 22.00 | 324 | 343 |
| Foreign Employment | 14.86 | 219 | 235 |
| Others(carpet weaver, drive, homemaker etc) | 17.33 | 256 | 243 |
| Mothers' occupation | | | |
| Agriculture | 5.77 | 87 | 75 |
| Daily waged labor | 9.19 | 138 | 140 |
| Government job | 5.76 | 87 | 80 |
| Private job | 12.46 | 187 | 205 |
| Business(self-employed) | 17.60 | 265 | 285 |
| Homemaker | 39.18 | 589 | 569 |
| Others(house helper, carpet weaver,foreign employment etc) | 10.05 | 151 | 149 |
| Annual per capita income USD (Mean ± SD) | 1579.22± 4123.73 | | 1630.54±4274.11 |

Knowledge level about cervical cancer, HPV and HPV vaccine(n=1510)



Perception towards cervical cancer, HPV infection, and HPV vaccination(n=1510)



Prevalence of HPV vaccine uptake (n=1510)

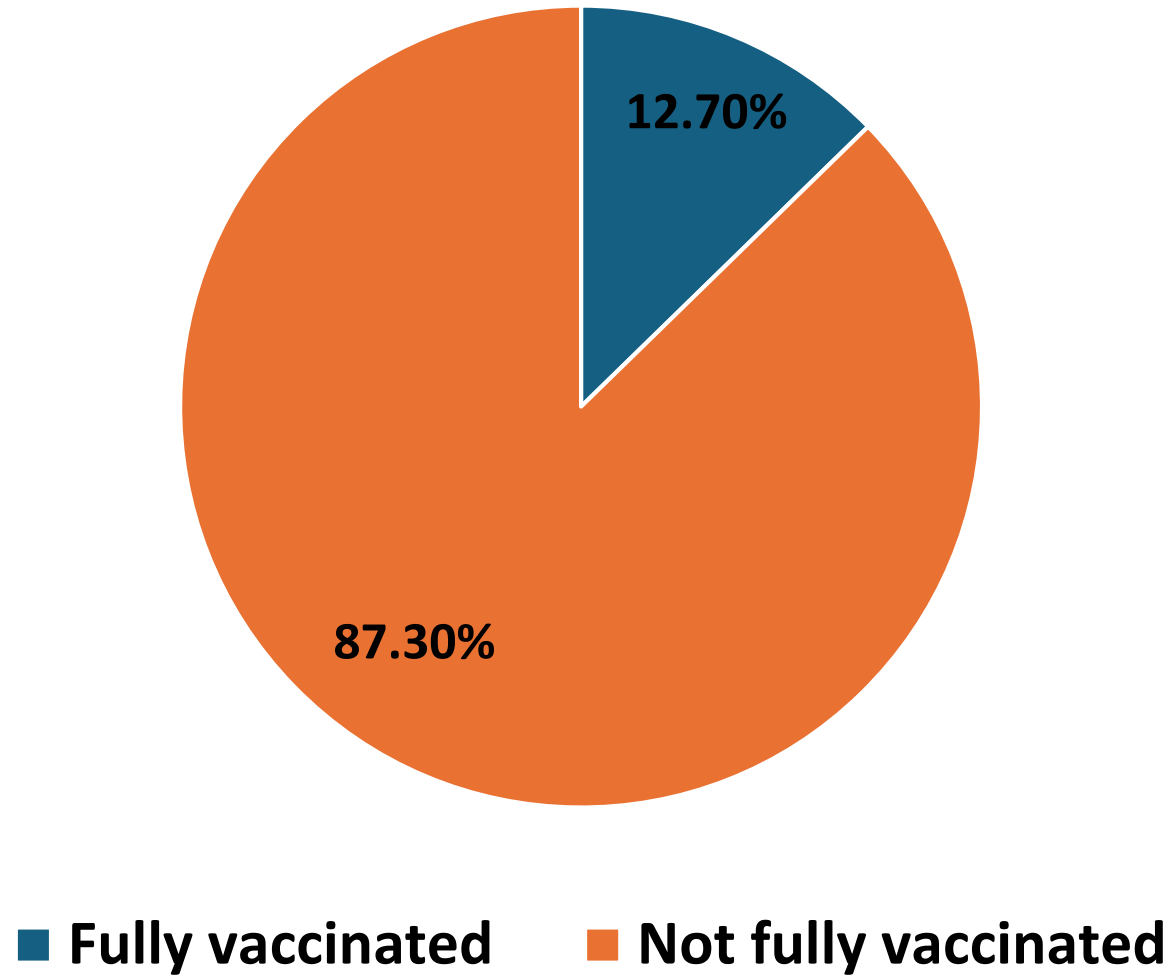


Table2: Association of HPV vaccine uptake with socio-demographic factors(n=1510)

| Variables | Bivariate* | | | Multivariate** | | |
|------------------------------|-------------|------------------|-------------------|----------------|------------------|-------------------|
| | CPR | 95% CI | P-value | APR | 95% CI | P-value |
| School type | | | | | | |
| Public | Ref | | | | | |
| Private | 0.04 | 0.01,0.12 | <0.0001 | 0.05 | 0.02,0.13 | <0.0001 |
| Age | | | | | | |
| 14 | Ref | | | | | |
| 15 | 1.95 | 1.23,3.08 | 0.003 | 2.28 | 1.49,3.50 | <0.0001 |
| Ethnicity | | | | | | |
| Adibasi/Janjati | Ref | | | | | |
| Brahmin/Chettri | 0.77 | 0.55,1.07 | 0.13 | 0.77 | 0.58,1.02 | 0.07 |
| Terai/Madhesi | 0.86 | 0.63,1.17 | 0.35 | 0.60 | 0.34,1.06 | 0.08 |
| Dalit and others | 0.95 | 0.57,1.59 | 0.85 | 0.94 | 0.66,1.49 | 0.97 |
| Religion | | | | | | |
| Hindu | Ref | | | | | |
| Non-Hindu | 1.25 | 0.88,1.76 | 0.20 | 1.10 | 0.78,1.56 | 0.56 |
| Earns money in family | | | | | | |
| Father | Ref | | | | | |
| Mother | 0.97 | 0.60,1.56 | 0.91 | 0.55 | 0.31,0.97 | 0.03 |
| Others family members | 0.70 | 0.42,1.17 | 0.18 | 0.52 | 0.26,1.05 | 0.06 |

CPR = Crude Prevalence Ratio, APR= Adjusted Prevalence Ratio

Table 2: Association of HPV vaccine uptake with socio-demographic factors(n=1510)

| Variables | Bivariate* | | | Multivariate** | | |
|----------------------------|-------------|------------------|-------------|----------------|------------------|-------------------|
| | CPR | 95% CI | P-value | APR | 95% CI | P-value |
| Fathers' occupation | | | | | | |
| Agriculture | Ref | | | | | |
| Daily wages | 0.89 | 0.63,1.25 | 0.50 | 0.59 | 0.39,0.90 | 0.015 |
| Government job | 0.94 | 0.85,1.54 | 0.83 | 0.83 | 0.48,1.44 | 0.53 |
| Private job | 0.61 | 0.36,1.03 | 0.06 | 0.51 | 0.25,1.05 | 0.07 |
| Business | 0.74 | 0.56,0.99 | 0.04 | 0.65 | 0.43,0.97 | 0.03 |
| Homemaker | 0.98 | 0.62,1.55 | 0.96 | 1.09 | 0.56,2.13 | 0.79 |
| Foreign Employment | 0.67 | 0.45,1.02 | 0.06 | 0.61 | 0.38,0.98 | 0.04 |
| Others | 0.75 | 0.47,1.21 | 0.25 | 0.62 | 0.39,1.01 | 0.05 |
| Mothers' occupation | | | | | | |
| Homemaker | Ref | | | | | |
| Daily wages | 1.08 | 0.70,1.66 | 0.71 | 1.41 | 0.87,2.54 | 0.14 |
| Government job | 1.53 | 1.05,2.25 | 0.02 | 2.70 | 1.55,4.69 | <0.0001 |
| Private job | 1.29 | 0.98,1.70 | 0.06 | 2.15 | 1.11,4.14 | 0.02 |
| Business | 0.70 | 0.41,1.19 | 0.19 | 0.93 | 0.52,1.86 | 0.97 |
| Agriculture | 0.97 | 0.59,1.58 | 0.90 | 1.27 | 0.73,2.22 | 0.38 |
| Foreign Employment | 1.68 | 0.96,2.92 | 0.06 | 2.58 | 1.31,3.86 | 0.003 |
| Others | 0.77 | 0.4,1.33 | 0.36 | 0.97 | 0.50,1.94 | 0.97 |

Table 2: Association of HPV vaccine uptake with socio-demographic factors(n=1510)

| Variables | Bivariate* | | | Multivariate** | | |
|-------------------------------------------------|-------------------|---------------|----------------|-----------------------|---------------|----------------|
| | CPR | 95% CI | P-value | APR | 95% CI | P-value |
| Mothers' education | | | | | | |
| No formal education | Ref | | | | | |
| Basic education (1-8) | 0.97 | 0.78,1.19 | 0.77 | 0.90 | 0.72,1.12 | 0.35 |
| Secondary (9-12) | 0.90 | 0.64,1.27 | 0.56 | 0.93 | 0.66,1.33 | 0.72 |
| Higher Secondary and above | 0.95 | 0.59,1.52 | 0.83 | 1.28 | 0.48,3.40 | 0.61 |
| Fathers' education | | | | | | |
| No formal education | Ref | | | | | |
| Basic education (1-8) | 1.03 | 0.82,1.31 | 0.74 | 1.13 | 0.92,1.38 | 0.22 |
| Secondary (9-12) | 0.86 | 0.71,1.06 | 0.16 | 1.02 | 0.78,1.27 | 0.99 |
| Higher Secondary and above | 0.84 | 0.56,1.25 | 0.39 | 0.87 | 0.45,1.67 | 0.69 |
| Family Type | | | | | | |
| Nuclear | Ref | | | | | |
| Joint | 1.10 | 0.90,1.36 | 0.30 | 1.25 | 0.76,1.38 | 0.37 |
| Total family members | 1.01 | 0.96,1.06 | 0.58 | 0.95 | 0.88,1.02 | 0.21 |
| Total siblings | 1.02 | 0.85,1.22 | 0.81 | 1.04 | 0.91,1.19 | 0.50 |
| Household Annual per capita income (USD) | 0.99 | 0.99,0.99 | 0.01 | 0.99 | 0.99,1 | 0.41 |

Table 3: Association of HPV vaccine uptake with knowledge and perception level of the participants(n=1510)

| Categories | Bivariate* | | | Multivariate** | | |
|----------------------------------------|-------------------|------------------|----------------|-----------------------|------------------|----------------|
| | CPR | 95% CI | P-value | APR | 95% CI | P-value |
| Knowledge about cervical cancer | | | | | | |
| Poor knowledge | Ref | | | | | |
| Moderate knowledge | 1.52 | 0.76,3.04 | 0.23 | 1.44 | 0.67,3.05 | 0.34 |
| Good Knowledge | 2.03 | 1.24,3.34 | 0.005 | 1.59 | 0.99,2.56 | 0.05 |
| Knowledge about HPV infection | | | | | | |
| Poor knowledge | Ref | | | | | |
| Moderate knowledge | 1.57 | 0.73,3.37 | 0.23 | 1.76 | 0.95,3.27 | 0.07 |
| Good Knowledge | 2.72 | 1.51,4.88 | 0.001 | 1.88 | 1.13,3.15 | 0.01 |

***Adjusting for age, ethnicity, religion, parents' marital status, family type, mothers' education, fathers' education, fathers' occupation, mothers' occupation, annual per capita income, initiatives or campaigns promoting HPV vaccination awareness, taught about sexually transmitted disease in school, taught about HPV or cervical cancer at school, school provided any information about the HPV vaccine, health workers inform/teach about cervical cancer or HPV*

Table 3: Association of HPV vaccine uptake with knowledge and perception level of the participants(n=1510)

| Categories | Bivariate* | | | Multivariate** | | |
|-------------------------------------------------------------------------------|-------------------|-------------------|----------------|-----------------------|------------------|----------------|
| | CPR | 95% CI | P-value | APR | 95% CI | P-value |
| Level of knowledge about HPV vaccine | | | | | | |
| Poor knowledge | Ref | | | | | |
| Moderate knowledge | 2.73 | 1.31,5.71 | 0.007 | 2.02 | 1.07,3.82 | 0.029 |
| Good Knowledge | 3.91 | 1.51,10.11 | 0.005 | 2.73 | 1.33,5.60 | 0.006 |
| Perception towards cervical cancer, HPV infection, and HPV vaccination | | | | | | |
| Negative perception | Ref | | | | | |
| Positive perception | 1.33 | 0.88,2.02 | 0.17 | 1.31 | 0.88,1.95 | 0.18 |

***Adjusting for age, ethnicity, religion, parents' marital status, family type, mothers' education, fathers' education, fathers' occupation, mothers' occupation, annual per capita income, initiatives or campaigns promoting HPV vaccination awareness, taught about sexually transmitted disease in school, taught about HPV or cervical cancer at school, school provided any information about the HPV vaccine, health workers inform/teach about cervical cancer or HPV*

Result Qualitative Table 4: Facilitators for HPV vaccine program

| Category | Codes |
|-----------------------------------|-----------------------------------------------------------------------------|
| Innovation characteristics | |
| Evidence-Base | Reduction of 90% cases of cervical cancer and WHO recommended |
| Cost | Free of cost |
| Inner setting | |
| Accessibility of vaccine | Vaccine site within school |
| Access to information | Pre information about vaccine (school, HF, social media) |
| Motivation | Motivation from SHN, School principal, teacher and parents |
| Human Resources | Competent health workforce and school health nurse within government school |
| Capacity building | Availability of training manual and guideline |
| Outer setting | |
| Partnerships and connections | Partnership and support from GAVI and integration within NIP |
| Coordination | School authority/SHN positive attitude |
| | Coordination between division/section of FWD, municipality, DHO |

Table 4: Facilitators for HPV vaccine program

| Category | Codes |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Individual characteristics | |
| Perceived benefit | Prevent future infections and health risks |
| Self-efficacy | Confidence in vaccine efficacy Avoiding Future Hospital Visits and Family Problems |
| Influence and motivation | Prioritization of health and wellbeing Fear of financial burden Future generation health protection |
| Implementation process | |
| Perceived benefits/outcome | Prevention of cervical cancer Improved overall quality of life |
| Reflecting and evaluating | Timely distribution Supervision of vaccine sites and cold chain by municipality health section Proper reporting and recording system |

Table 5: Barriers for HPV vaccine program

| Category | Codes |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Innovation characteristics | |
| Complexity | Crowded vaccination site Vaccination timing not aligned with school schedule Disturbance due to public holidays |
| Cost | Cost of vaccine (missed job/school, food, vaccine, transportation) |
| Inner setting | |
| Accessibility of vaccine | Private schools not included Limited availability of vaccine |
| Access to information | Lack of proper information dissemination and IEC materials Lack of knowledge and awareness raising activity |
| Human Resources | Limited number of school health nurse |
| Capacity building | lack of training to health worker No proper implementation plan |
| Access to resources | Wastage of vaccine |

Table 5: Barriers for HPV vaccine program

| Category | Codes |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| Outer setting | |
| Coordination | Difficulty coordinating with health office |
| Financing support | No specific budget for HPV vaccine program |
| External pressure | Political pressure from municipality/ward leaders |
| Individual characteristics | |
| Influence and motivation | Parents' negative attitude/refusal towards vaccine Being under age |
| Beliefs and values | Miss information and misconception about vaccine Belief vaccine not necessary at young age |
| Vaccine hesitancy | Vaccine safety concerns Due to cost concern Fear of injection/needle Fear of side effects (infertility/ death) |
| Implementation process | |
| Reflecting and evaluating | Lack of coverage of vaccine to all age group Rural areas not included |

Conclusion

- Our study found the prevalence of HPV vaccine uptake among adolescent girls was 12.74% which is very low.
- Majority of adolescent girls had a poor level of knowledge and perception about cervical cancer, HPV infection, and HPV vaccine.
- This study highlights that increasing awareness, improving accessibility, and addressing misconceptions are key to enhancing HPV vaccine uptake.

Recommendations

Raising awareness among adolescent girls and their parents through information campaigns, mass media, and school-based health education can boost HPV vaccine uptake and address misconceptions.

A larger-scale Nationwide study to assess the coverage of vaccine, knowledge and awareness regarding vaccine, factors associated, and overall barriers and facilitators can be representative.

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Thank You.

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