

# Knowledge about cervical cancer and awareness about human Papillomavirus vaccination amid Medical students in Jordan

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## Research Article

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# Abstract

## Background

Cervical cancer (CC) is the most common gynecologic malignancy worldwide and the fourth most common cancer in women. Most cases of cervical cancer are attributed to Human Papillomavirus (HPV). Assessment of knowledge about cervical cancer and HPV vaccination is needed.

## Results

504 students took part in the study. 42.3% of males and 57.7% of females. The mean knowledge score of students in our survey  $21.4 \pm 4.4$  out of 34, which was categorized as a moderate level of knowledge regarding cervical cancer and HPV. Only 40.5% knew about the availability of HPV vaccine in Jordan, and 65.9% accept the idea that it is necessary to introduce HPV vaccine in schoolgirls in Jordan.

## Conclusions

This study highlights inadequate knowledge about cervical cancer and its screening among medical students in Jordan. Despite the limited awareness about HPV vaccine among the study's participants, there is a favorable opinion towards the introduction of the vaccine in school girls in Jordan. The data provide a benchmark on the level of knowledge about cervical cancer and awareness about HPV, which can be used to formulate an effective awareness program.

## 1. Introduction

Cervical cancer (CC) is the fourth most common cancer in females with 270,000 women dying from the disease annually; 90% of whom live in developing countries. In North Africa and the Middle East, CC affects 19,500 women per year, leading to 9,930 deaths annually. By 2035, these numbers are expected to double in this region, unless effective public health interventions are introduced [1].

In Jordan, current estimates indicate that 104 women are diagnosed with cervical cancer every year and 61 die from the disease. Data on the HPV burden in the general population of Jordan is not yet available [2].

Amongst all known risk factors, persistent infection with high-risk human papillomavirus (HPV) plays a considerable role in the pathogenesis of CC. Almost all cases of CC are attributed to HPV, with subtypes 16 and 18 accounting for more than half of all CC cases cervical cancers worldwide [3–7].

Introducing HPV testing and the production of efficacious prophylactic HPV vaccines have expanded the possibilities of CC prevention [5]. It is well-known that efficient cervical screening programs can reduce CC incidence and mortality. Diagnostic screening programs for HPV lesions are generally available in the developed countries, however all Middle East countries including Jordan don't have a national CC screening program due to the lack of public health policy, professional and general education, clinical

settings, financial resources, and media awareness. Noteworthy, most female cancer awareness campaigns are mainly focused on breast cancer [8].

Several studies, mostly from developed countries, have demonstrated that the knowledge about HPV infection and the acceptability of HPV vaccines amongst health care professionals and the general public vary from low to high [9–12]. Recommendation of using HPV vaccines by physicians has been recognized as one the most significant factors in the individual's willingness to receive the vaccine. Updated physician's knowledge about the HPV vaccine and the elimination of any barriers to prescribe the vaccine are the main determinant factors [13–14].

The awareness of physicians and medical students will greatly impact the success of CC prevention as physicians can play a crucial role in circulating knowledge about CC and the available preventive vaccines. Therefore, the awareness programs should focus on family physicians and gynecologists. Targeted public education that responds to fears and concerns about HPV vaccine has proven to be effective [15]. It is therefore important to enhance promotion, communication, and social mobilization strategy to increase awareness among decision makers and demand among the population. The strategy should include several buddies including non-governmental organizations, women's groups, religious leaders, and professional organizations.

The objectives of this study were to evaluate the knowledge on CC and HPV infection, and the awareness towards and perceived barriers of HPV vaccination among Medical students in Jordan. This comes from their essential role as health care providers to raise community awareness and to modify population behavior.

## **2. Methods**

### **2.1 Study design and Purpose**

The present study is a cross sectional survey, that was designed to investigate knowledge about CC and awareness about HPV vaccine among medical students in Jordan.

### **2.2 Study Participants and ethical Considerations**

The protocol of the study was approved by the Scientific Research Committee at Yarmouk University. The study was conducted after obtaining ethical approval from the Institutional Review Board (IRB) of Jordan University of Science and Technology (JUST) and King Abdulla University Hospital (KAUH), Irbid, Jordan (13/128/2019). All methods were performed in accordance with the relevant guidelines and regulations

The questionnaire was distributed utilizing an electronic format, through Google Forms. The link to the survey was shared with medical students in six universities in Jordan. The questionnaire was prefaced by a page explaining the nature and objectives of the study and the voluntary nature of participation with a consent statement, if they would like to take part in the study. Informed consent was obtained from all

subjects. The questionnaire was terminated automatically if participants declined to take part. This procedure was approved by the IRB committee.

The participants were assured that the outcomes of the research would not be used for routine appraisal of the participants. The individuals were requested to complete the questionnaire without textbooks or consulting materials.

The study was conducted for a period of 3 months in the colleges of Medicine at six different Universities in Jordan. Third year to sixth year students from all medical colleges in Jordan were invited to participate in the study.

### **2.3 Study Instruments**

The study questionnaire was developed by authors by extensive review of literature. A Printed English version of a pre-validated questionnaire, consisting of items as modified from questionnaires used in other studies [14,16] was used. The questionnaire was reviewed by the authors and then subjected to pilot testing by 30 participants to ensure clarity of the questions, which resulted in several minor amendments.

The final version of the questionnaire consists of 3 parts. The first one was about demographic information of participants which included age, gender, year of study, and average monthly income. The second part assesses the knowledge about CC and HPV. Finally, the third part assessed the awareness and acceptance of HPV vaccination.

The knowledge of the students about CC was evaluated using 14 multiple choice questions with 34 statements related to disease etiology, risk factors, clinical features and screening recommendations according to world health organization (WHO). Each answer was scored as incorrect or correct. The respondent was given a zero point for each wrong answer and one point for each correct answer.

Total knowledge score was calculated for each participant out of 34. Participants were categorized to have poor, moderate, and good knowledge if their score was 0–17, 18-25, and 26-34, respectively.

Regarding respondents' awareness about the HPV vaccination, this part consists of 7 questions. Each question was scored out of 2 points. Poor awareness was given to the students with maximum %39 of awareness mean, average awareness level was allocated to those with at most %40-%69 of awareness mean and good awareness level was assigned to people with over %70 of awareness mean i.e. if their awareness score was 0–5, 6-9, and 10-14 respectively.

Last three questions in the questionnaire assessed the acceptance of HPV vaccination in Jordan among Medical students in Jordan, perceived barriers of HPV vaccination and source of information about it.

### **2.4 Statistical Analysis**

Data was analyzed using SPSS software version 24. Descriptive data was expressed as frequencies and percentages. Chi square was used to analyze significant differences between categorical variables. Student's t-test was used to compare the means between two groups. All p-values were two sided and any p-value of less than 0.05 was considered statistically significant.

## **2.5 Sample Size Calculation**

The sample size was calculated utilizing the online Raosoft software sample size calculator. The minimum required sample size assuming a 95% confidence level, 50% recruitment rate, 5% margin of error and a maximal sample size of 6000 students, would be 362 participants.

# **3. Results**

## **3.1 Demographic Characteristics**

The number of total responses was 508, 4 students disagree to take part in the study while 504 of the students completed the questionnaire. Recruited students were from all medical colleges in Jordan including: Yarmouk University (33.3%), Jordan University of Science and Technology (25.0%), University of Jordan (16.1%), Hashemite University (13.5%), Mutah University (6.3%), and Albalqa University (5.8%). About 42.3% were males and the mean age was  $22.3 \pm 1.6$  years. Table 1 shows participants' demographic characteristics.

## **3.2 Knowledge Assessment about CC**

Knowledge was assessed using 14 questions with total 34 points related to disease diagnosis, risk factors, symptoms and relation to HPV. Regards knowledge about CC, the mean knowledge score for students was  $21.4 \pm 4.4$ . Table 2 shows the proportion of students who correctly answered questions related to CC and HPV. Most participants knew that CC is caused by infection ( $n = 413, 81.9\%$ ) and that HPV is responsible for a wide array of diseases including CC ( $n = 455, 90.3\%$ ).

Concerning its epidemiology, (60.7%) of students answered correctly that CC is a leading cause among gynecological cancer.

Student' knowledge about the clinical features of CC wide-ranging and percentages of correct answers were 35.5% for no symptoms and 80.6% for bleeding per vagina. The percentages of students who were aware that fever, itching and swelling of cervix were not among the clinical features of the disease were 87.5%, 70.0% and 54.85 respectively. The mean percentage knowledge score of this part was  $59.7\% \pm 16.5\%$ .

Concerning knowledge about CC screening and vaccine, 26.4% of participants knew correctly that women aged 45-60 years should be present for screening according to WHO once every 5 years. On the other hand, 76.6% were aware that there is a vaccine that protects from CC. The mean percentage knowledge score of this part was  $55.2\% \pm 25.9\%$ .

Most of students (90.3%) knew that HPV is responsible for a wide array of diseases including CC. Most of them (88.9%) were aware that HPV is transmitted sexually. About two third of students were aware that HPV subtypes 6 and 11 are commonly associated with Genital warts (65.1%) and HPV subtypes 16 and 18 are commonly associated with CC (70.4%). The mean percentage knowledge score of this domain was  $67.9\% \pm 21.5\%$ .

The association of socioeconomic factors with knowledge score was assessed using t-test analysis and there was a significant difference between mean knowledge score for male students  $20.6 \pm 4.7$  and female students  $22.0 \pm 4.0$  ( $p$ -value=0.001). Knowledge score was significantly associated with the year of study with highest mean score among students in the 6th year level with  $23.6 \pm 3.5$  ( $p$ -value<0.001) and the least mean score was among 3<sup>rd</sup> year level students  $18.4 \pm 4.2$ . No significant association between family income or place of living or Nationality or University and knowledge score ( $p$ -value >0.05).

### **3.3 Awareness about HPV vaccine and acceptance**

Regarding student's awareness about HPV vaccine, only 40.5% knew about the availability of HPV vaccine in Jordan, 71.4% were aware that the HPV vaccine should be given at age between 11 and 29 and that it can be given to boys also (54.0%). Moreover, CC protection provided by HPV vaccine is 70% (21.0%). The mean awareness score of students about HPV vaccine was  $5.7 \pm 2.8$  with (Range 0-13) which is classified as average awareness. (Table 3)

About 322 students (65.9%) accept the idea that it is essential to introduce HPV vaccine in schoolgirls in Jordan. Among obstacles preventing from receiving or advice taking HPV vaccination were high cost (53.8%) and Inadequate information about the vaccine (62.5%) as shown in Figure 1.

Figure 2 presents the sources of information about HPV vaccination as reported by students with Medical school teaching being the main source of information (87.7%) followed by internet sources (33.3%) and books (23.2%).

The association of socioeconomic factors with awareness score was assessed using t-test analysis and there was a significant difference between mean awareness score for students in the 6th year level with  $6.3 \pm 2.8$  ( $p$ -value=0.01). On the other hand, the awareness score was not associated with all other demographic data ( $p$ -value>0.05).

## **4. Discussion**

CC caused by HPV, is the major single cause of years of life lost to cancer in the developing world. Since it affects women in their most productive years, CC has a disturbing effect on the well-being of families [17]. Data is not yet available on the HPV burden in Jordan, however, in Western Asia, the region Jordan belongs to, 72.4% of invasive cervical cancers are contributed to HPV [1]. Therefore, conducting comprehensive evaluations of HPV prevalence, examining knowledge, attitudes, and practices toward HPV vaccination will provide a clear description of the situation in the region. Introducing a successful

HPV vaccination program will directly reduce morbidity and mortality from HPV types, improve women health, increase healthcare cost savings, and extend positive externalities on women's immediate communities.

In the current study, general CC and HPV knowledge was moderate which was similar to the result of a study done on nurses in Thailand [18]. Most of participants in the present study were aware that CC is caused by infection and that HPV infection can lead to CC. These results show adequate knowledge about CC epidemiology and similar to other studies conducted on health care professionals [12,19].

In our study most medical students were able to recognize that infection and risky sexual practices are common risk factors to CC, these results were similar to other studies [20-22], however, some students had incorrect information that old age and nulliparity were among risk factors of CC. In the current study a high percentage of participants were unaware that lower pelvic pain and anemia are common clinical features of CC and some of them wrongly thought that fever, itching and swelling of cervix were symptoms of CC. This highlights the need to increase the consciousness about CC among physicians who act as the main source of health information to their patients.

Less than half of students correctly reported PCR as a test used for detection of HPV infection and knew the appropriate frequency of CC screening in women (i.e. women aged 25-44 years should be screened every 3 years and women aged 45-60 years should be screened every 5 years). This showed inadequacy of knowledge about is important as preventive measure for CC. In addition,

The knowledge score was significantly associated with gender and year of study and this was consistent with other studies where the score was higher among female students [23-24] and higher level of study [25].

The HPV vaccine offer a major breakthrough to limit the global burden of CC [26]. Many studies have been conducted worldwide recently on the knowledge, attitude, beliefs and awareness about HPV vaccine [12,19,27-29]. In the current study, only 40.5% of medical students were aware about the availability of HPV vaccine in Jordan which protect from CC and only 21.6% were aware that no need to screen girls before getting vaccinated. Less than one third of students were aware about the appropriate frequency of doses of HPV vaccine (3 doses) and the appropriate protection level (70%) provided by vaccine with an overall awareness score  $5.7 \pm 2.8$ . This indicates inadequate awareness about HPV vaccine. Our results were similar to a result from study on University students in Turkey [30].

In the current study, about two third of students (65.9%) thought that it is important to introduce the vaccine in schoolgirls in Jordan which indicates favorable acceptance of using the vaccine in Jordan. Hoque et al., 2016 indicated that most of the physicians in their study reported that they intended to prescribe the HPV vaccine to patients; as they expected an important advantage from HPV vaccination [31].

In the present study, more than half of the students (62.5%) reported inadequate information about CC and HPV vaccine as an obstacle preventing from receiving or advice taking HPV vaccination. Our results were similar to a study on medical students in India [14]. Therefore, it is recommended that physicians should receive information about HPV from educational campaigns to improve their communication practices for recommending HPV vaccination [32].

## **5. Strength And Limitations Of The Study**

The high response rate and the inclusion of all medical colleges in Jordan enhance the generalizability of our results. However, this is across sectional study and therefore causal relationship between variables cannot be established. We could not also detect the response rate as the questionnaire was distributed electronically. Our study is considered a starting point for future studies on this sensitive topic exploring attitudes and barriers to vaccination among women in Jordan.

## **6. Conclusion**

This study highlights insufficient knowledge about CC and its screening among medical students in Jordan. Despite the limited awareness about HPV vaccine among the study's participants, there is a favorable opinion towards the introduction of the vaccine in school girls in Jordan. More emphasis should be placed on medical curriculum taught in undergraduate education. Suitable Educational campaign should be stratified at hospitals along with workshops and seminars which highlight the importance of CC screening in women and increase the awareness about HPV among physicians. Medical students who are the future health care providers can educate their patients, address their sensitive cultural concerns and later increase the health seeking behavior in women in Jordan especially if they are properly aware of CC and hence its burden reduced.

## **Declarations**

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### **Funding**

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### **Ethics approval and consent to participate**

The study was approved by the Institutional Review Board (IRB) of Jordan University of Science and Technology (JUST) and King Abdulla University Hospital (KAUH), Irbid, Jordan (13/128/2019). All study participants provided informed consent to participate in the study.

### **Consent for publication**

Not applicable.

### **Availability of data and materials**

Raw data of the study is available from the corresponding author upon reasonable request.

### **Competing interests**

The authors declare that they have no competing interests.

### **Authors contributions**

Mervat Alsous conceived and designed the research, performed the study, analyzed the data, and wrote and revised the manuscript.

Ahlam Ali conceived and designed the research, performed the study, and wrote and revised the manuscript.

Sayer Al-azzam conceived and designed the research, performed the study, and revised the manuscript.

Reema Karasneh conceived and designed the research, performed the study, and revised the manuscript.

Haneen Amawi conceived and designed the research and revised the manuscript.

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## Tables

Table 1: Participant's demographic data (n=504)

Age (Year), Mean±SD	22.3±1.6
Age range	20-29
<b>Gender, N (%)</b>	
Male	213 (42.3)
Female	291 (57.7)
<b>University, N (%)</b>	
All Public Universities in Jordan	504 (100)
<b>Level of Education, N (%)</b>	
3 <sup>rd</sup> year	131 (26.0)
4 <sup>th</sup> year	63 (12.5)
5 <sup>th</sup> year	113 (22.4)
6 <sup>th</sup> year	197 (39.1)
<b>Know someone with cervical cancer, N (%)</b>	
Yes	22 (4.4)
No	482 (95.6)
<b>Nationality, N (%)</b>	
Jordanian	454 (90.1)
Not Jordanian	50 (9.9)
<b>Place of living, N (%)</b>	
Urban	395 (78.4)
Rural	109 (21.6)
<b>Family Income JD, N (%)</b>	
<500	33 (6.5)
501-1000	128 (25.4)
1001-1499	111 (22.0)
1500-2000	94 (18.7)
>2000	138 (27.4)

N: number, SD: standard deviation.

Table 2: Participant's knowledge about Cervical cancer (n=504)

Question	Correct answer N (%)	Wrong answer N (%)
<b>Epidemiology of cervical cancer</b>		
1. Is Cervical cancer the leading cause among gynecological cancer? <sup>1</sup>	306 (60.7)	198 (39.3)
2. The cause of cervical cancer	413 (81.9)	91 (18.1)
<b>Mean % score=71.3%±30.8%</b>		
<b>3. Risk factors of cervical cancer</b>		
- Multiple sexual partner	422 (83.7)	82 (16.3)
-Infection with HPV	482 (95.6)	22 (4.4)
-Early age of first coitus	245 (48.6)	259 (51.4)
-Smoking	301 (59.7)	203 (40.3)
-Family History of disease	324 (64.3)	180 (35.7)
-Poor Hygiene	201 (39.9)	303 (60.1)
-Old age (False)	366 (72.6)	138 (27.4)
-Contraception	178 (35.3)	326 (64.7)
-Nulliparity (False)	426 (84.5)	78 (15.5)
<b>Mean % score=64.9%±21.0%</b>		
<b>4. Clinical features of cervical cancer</b>		
-No symptom	179 (35.5)	325 (64.5)
-Lower pelvic pain	200 (39.7)	304 (60.3)
-Bleeding per vagina	406 (80.6)	98 (19.4)
-Fever (False)*	441 (87.5)	63 (12.5)
-Discharge per vagina	318 (63.1)	186 (36.9)
-Itching (False)*	353 (70.0)	151 (30.0)
-Weight loss	264 (52.4)	240 (47.6)
-Swelling of cervix (False)*	276 (54.8)	228 (45.2)
-Anemia	202 (40.1)	302 (59.9)
-Post coital bleeding	370 (73.4)	134 (26.6)
<b>Mean % score=59.7%±16.5%</b>		

<b>Cervical cancer screening</b>		
5. Time of screening for women aged 25-44 years	180 (35.7)	324 (64.3)
6. Time of screening for women aged 45-60 years	133 (26.4)	371 (73.6)
7. Is there a vaccine to protect from cervical cancer? <sup>1</sup>	386 (76.6)	118 (23.4)
8. Does the vaccine protect against all cervical cancer? <sup>2</sup>	332 (65.9)	172 (34.1)
9. Girls who have been vaccinated will need to attend for cervical cancer screening <sup>1</sup>	359 (71.2)	145 (28.8)
<b>Mean % score=55.2%±25.9%</b>		
<b>Knowledge about HPV</b>		
10. Is HPV responsible for a wide range of diseases including cervical cancer? <sup>1</sup>	455 (90.3)	49 (9.7)
11. Transmission of HPV	448 (88.9)	56 (11.1)
12. The Technique available for HPV detection		
- Pap smear	376 (74.6)	128 (25.4)
- Biopsy	169 (33.5)	335 (66.5)
- PCR	218 (43.3)	286 (56.7)
- Blood (False)*	390 (77.4)	114 (22.6)
13. HPV subtypes 6 and 11 are commonly associated with Genital warts <sup>1</sup>	328 (65.1)	176 (34.9)
14. HPV subtypes 16 and 18 are commonly associated with Cervical carcinoma <sup>1</sup>	355 (70.4)	149 (29.6)
<b>Mean % score=67.9%±21.5%</b>		
<b>Overall % Knowledge score=63.0%±12.9%</b>		

1 Yes

2 No

\*Student get one point if the answer for this statement is false

Table 3: Participant's awareness and acceptance of HPV vaccination (n=504)

Question	Correct answer	Wrong answer
	N (%)	N (%)
1.Is the HPV vaccine available in Jordan? <sup>1</sup>	204 (40.5)	300 (59.5)
-Yes (2 points)	204 (40.5)	
-No	64 (12.7)	
-Don't know	236 (46.8)	
2.Which age group HPV vaccine should be given?	443 (87.9) *	51 (12.1)
-(0-10) Years	48 (9.5)	
-(11-29) Years (2 points)	360 (71.4)	
-(30-50) Years (1 point)	83 (16.5)	
-(51) years and above	13 (2.6)	
3.Can HP vaccine be given to boys? <sup>1</sup>	272 (54.0)	132 (46.0)
-Yes (2 points)	272 (54.0)	
-No	50 (9.9)	
-Don't know	182 (36.1)	
4.Do girls/women need to be screened for HPV before getting vaccinated? <sup>2</sup>	109 (21.6)	395 (78.4)
-Yes	237(47.0)	
-No (2 points)	109 (21.6)	
-Don't know	158 (31.3)	
5.Can HP vaccine be given to a woman already having HPV infection? <sup>2</sup>	155 (30.8)	349 (69.2)
-Yes	141 (28.0)	
-No (2 points)	155 (30.8)	
-Don't know	208 (41.3)	
6.How many doses of HPV vaccine are required for protection in women?	96 (19.0)	408 (81.0)
-One	49 (9.7)	
-Two	70 (13.9)	

-Three (2 points)	96 (19.0)	
-Four	8 (1.6)	
-Don't Know	281 (55.8)	
7.Cervical cancer protection provided by HPV vaccine is:	275 (54.6) *	263 (45.4)
-100%		
-90% (1 points)	21(4.2)	
-70% (2 point)	135(26.8)	
-50% (1 point)	106 (21.0)	
-Don't know	34 (6.7)	
	208 (41.3)	
<b>Overall % awareness score=40.5%±19.8%</b>	332 (65.9)	172 (34.1)

1 Yes

2 No

\*Number of students who had a score of 1 or 2 points

## Figures

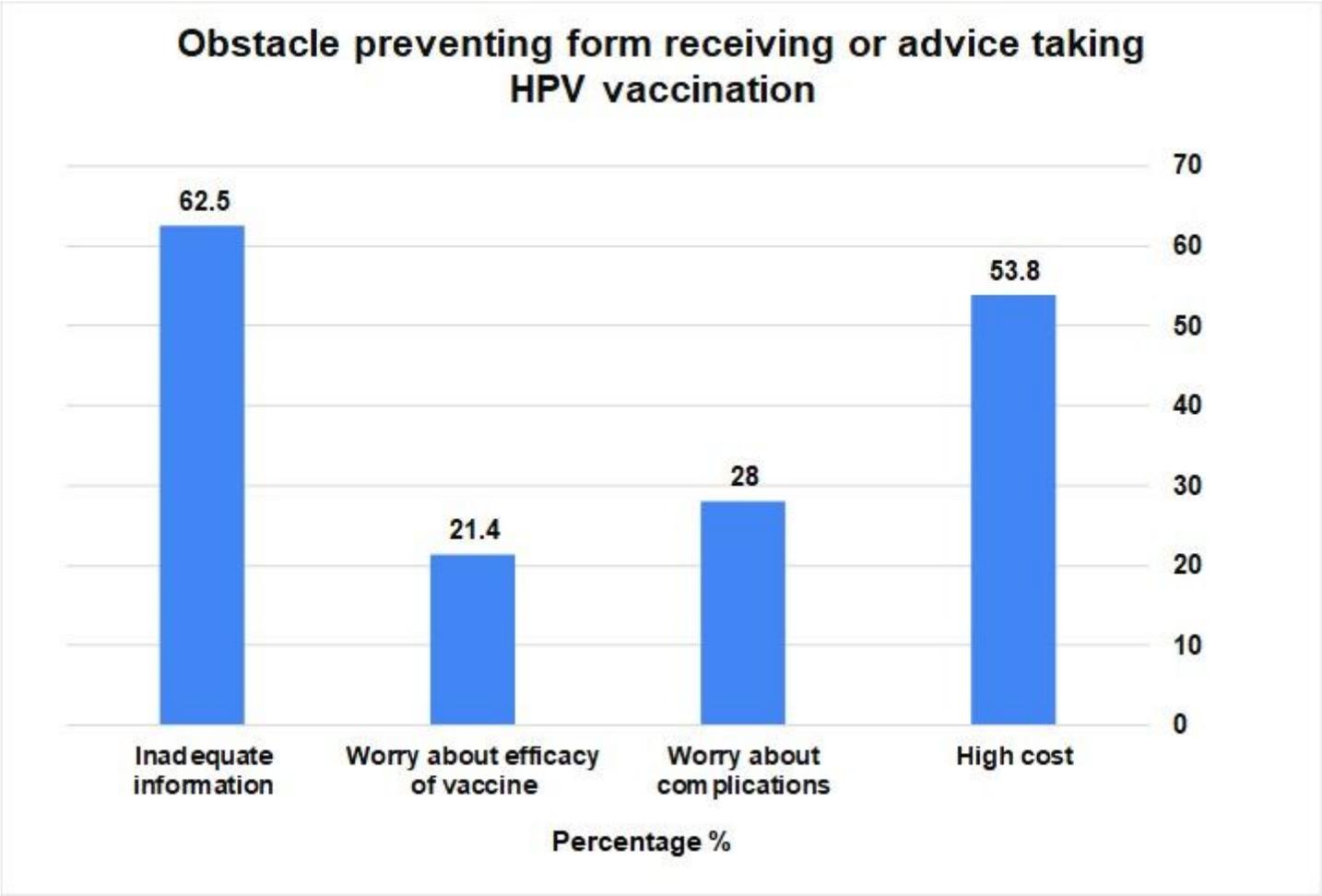
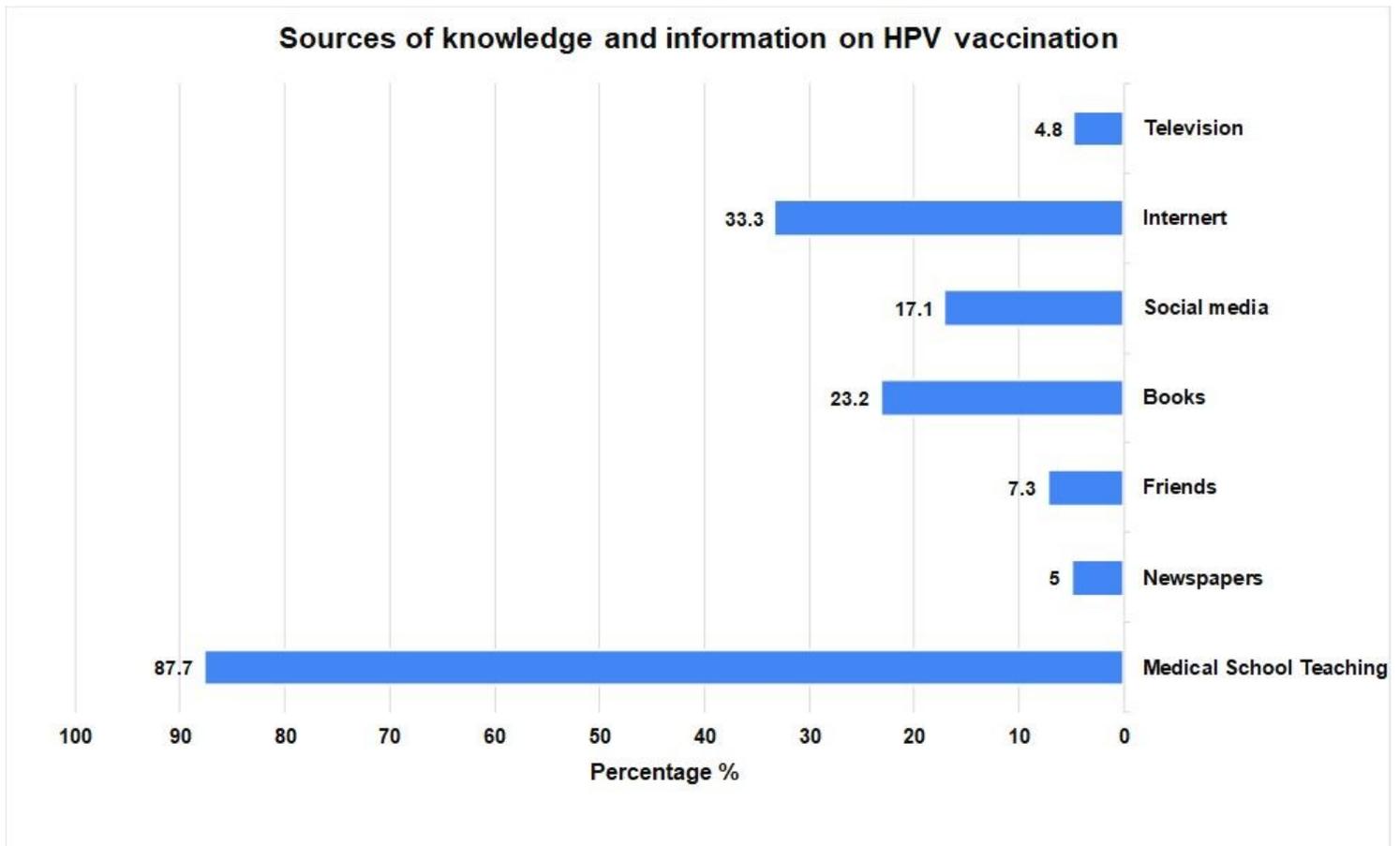


Figure 1

Obstacle preventing form receiving or advice taking HPV vaccination



**Figure 2**

Sources of knowledge and information on HPV vaccination