Knowledge about cervical cancer and awareness about human papillomavirus vaccination among medical students in Jordan

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Objectives To assess the knowledge about cervical cancer and HPV infection and the awareness towards and perceived barriers of HPV vaccination amid medical students in Jordan.

Methods The present study is a cross-sectional survey that was conducted for a period of three months in the College of Medicine at six different universities in Jordan. Third-year to sixth-year students from these medical colleges in Jordan were invited to participate in the study.

Results There were 504 students that took part in the study with 42.3% being males and 57.7% females. The mean knowledge score of students in our survey was 21.4 ± 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 the HPV vaccine in Jordan, and 65.9% accepted the idea that it is necessary to introduce the HPV vaccine for school girls in Jordan.

Conclusions This study highlights that there is inadequate knowledge about cervical cancer and its screening among medical students in Jordan. Despite the limited awareness about the HPV vaccine among the study's participants, there is a favorable opinion towards the introduction of the vaccine for 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 **Knowledge about Cervical Cancer and Awareness about Human Papillomavirus**

2 **Vaccination among Medical Students in Jordan**

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44 This study highlights that there is inadequate knowledge about cervical cancer and its screening

45 among medical students in Jordan. Despite the limited awareness about the HPV vaccine among

46 the study's participants, there is a favorable opinion towards the introduction of the vaccine for

47 school girls in Jordan. The data provide a benchmark on the level of knowledge about cervical

48 cancer and awareness about HPV, which can be used to formulate an effective awareness

49 program.

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51 **Keywords: Cervical cancer, Jordan, knowledge, medical students, Human Papillomavirus,**
52 **vaccine**

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57 **What is already known about this topic?**

58 Cervical cancer (CC) is the most common gynecologic malignancy worldwide and the fourth most

59 common cancer in women. Most cases of cervical cancer are attributed to Human Papillomavirus

60 (HPV). Assessment of the knowledge about cervical cancer and HPV vaccination is needed.

61 **What does this paper add?**

62 The awareness of physicians and medical students will greatly impact the success of cervical

63 cancer prevention. This is the first study in Jordan that assesses the knowledge about cervical

64 cancer and awareness about the HPV vaccine among medical students. The current study

65 highlights the need for a proper educational campaign about cervical cancer and the HPV vaccine.

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84 **1. Introduction**

85   Cervical cancer (CC) is the fourth most common cancer in females with 270,000 women

86   dying from the disease annually; 90% of whom live in developing countries. In North Africa and

87   the Middle East, CC affects 19,500 women per year, leading to 9,930 deaths annually. By 2035,

88   these numbers are expected to double in this region unless effective public health interventions

89   are introduced [1].

90   CC, caused by human papillomavirus (HPV), is the major cause of years of life lost to

91   cancer in the developing world. Since it affects women in their most productive years, CC has a

92   disturbing effect on the well-being of families [2]. In Jordan, current estimates indicate that 104

93   women are diagnosed with cervical cancer every year and 61 die from the disease. Data on the

94   HPV burden in the general population of Jordan is not yet available [3]. However, in Western

95   Asia, where Jordan is located, 72.4% of invasive cervical cancers are attributed to certain types

96   of HPV [1]. Therefore, conducting comprehensive evaluations of HPV prevalence and examining

97   the knowledge, attitudes, and practices toward HPV vaccination will provide a clear description

98   of the situation in the region. Introducing a successful HPV vaccination program will directly

99   reduce morbidity and mortality from HPV types, improve women health, increase healthcare cost

100   savings, and extend positive externalities on women's immediate communities.

101   Amongst all known risk factors, persistent infection from high-risk HPV plays a

102   considerable role in the pathogenesis of CC. The available screening tests for cervical cancer

103   include conventional and liquid-based cytologic tests (i.e., Pap tests) while the most common test

104   to detect HPV is to use a polymerase chain reaction (PCR) assay [4]. Almost all cases of CC are

105   attributed to HPV, with subtypes 16 and 18 accounting for more than half of the CC cases

106   worldwide [5-9]. According to the International Agency for Research on Cancer (IARC), ten

107 additional HPV types (31, 33, 35, 39, 45, 51, 52, 56, 58, and 59) are associated with cervical cancer

108 as they have adequate evidence of carcinogenicity in humans. On the other hand, other HPV

109 types, including types 6 and 11, can cause genital warts, benign or low-grade cervical cell changes,

110 and recurrent respiratory papillomatosis [4].

111 Successful achievements in basic and clinical research have expanded the possibilities of

112 CC prevention by introducing HPV testing as part of the screening technology and, most

113 importantly, by the production of efficacious prophylactic HPV vaccines [7]. It is established that

114 well-organized cervical screening programs or widespread good quality cytology can reduce CC

115 incidence and mortality. Diagnostic screening programs for HPV lesions are generally available in

116 the developed countries. However, all Middle East countries including Jordan do not have a

117 national CC screening program due to the lack of public health policy, professional and general

118 education, clinical settings, financial resources, and media awareness. Noteworthy, most female

119 cancer awareness campaigns in the Middle East are mainly focused on breast cancer [10].

120 The first vaccine against HPV for the primary prevention of CC was licensed in 2006 by the

121 Food and Drug Administration (FDA) of the United States of America (USA). Currently, two

122 prophylactic vaccines against HPV are registered: quadrivalent Gardasil (Merck, USA) and

123 bivalent Cervarix (GlaxoSmithKline, Belgium). Both vaccines have good profiles for efficacy in

124 preventing HPV infection and are well tolerated. Published studies have recognized a high

125 efficacy of over 92% against precancerous lesions among women [11]. However, the uptake of

126 these vaccines has been slow in the extended Middle East and North Africa regions due to several

127 factors such as financial limits, weak infrastructure for adolescent vaccine delivery, lack of reliable

128 data on the burden of HPV disease, and competition with high priority vaccines. Other barriers

129   include religious and cultural sensitivities as the vaccines are given to prevent a sexually

130   transmitted disease in young girls.

131   Several studies, mostly from developed countries, have demonstrated that the

132   knowledge about HPV infection and the acceptability of HPV vaccines amongst health care

133   professionals and the general public vary from low to high [12-15]. Recommendation of HPV

134   immunization by physicians has been recognized as one the most significant factors in the

135   individual's willingness to receive the vaccine. Updated knowledge about the HPV vaccine and

136   the elimination of any barriers to prescriptions among physicians are the main determinant

137   factors [16-17].

138   Physicians can play an imperative role in circulating knowledge about CC and the available

139   preventive vaccines. Therefore, the awareness of physicians and medical students will greatly

140   impact the success of CC prevention. The awareness programs should focus on family physicians

141   and gynecologists depending on the known immunizer in each country. Targeted community

142   education that responds to concerns about the HPV vaccine has proven to be effective [18]. It is

143   therefore important to enhance promotion, communication, and social mobilization strategies

144   to increase awareness among decision makers and demand among the population. The strategy

145   should include several companion organizations in the communities such as non-governmental

146   organizations, women's groups, religious leaders, and professional organizations.

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148   The objectives of this study were to evaluate the knowledge about CC and HPV infection

149   and awareness towards and perceived barriers of HPV vaccination among medical students in

150   Jordan who have the essential role as health care providers to raise community awareness and

151   to modify population behavior. This is the first time in Jordan that the assessment of their

152   knowledge about CC and HPV is being done.

153   **2. Methods**

154   **2.1 Study Design and Purpose**

155   The present study is a cross sectional survey that was designed to investigate the

156   knowledge about CC and awareness about the HPV vaccine among medical students in Jordan.

157   **2.2 Study Participants and Ethical Considerations**

158   The protocol of the study was approved by the Scientific Research Committee at Yarmouk

159   University. The study was conducted after obtaining ethical approval from the Institutional

160   Review Board (IRB) of Jordan University of Science and Technology (JUST) and King Abdulla

161   University Hospital (KAUH), Irbid, Jordan (13/128/2019).

162   The questionnaire was distributed utilizing an electronic format, through Google Forms.

163   The link to the survey was shared with medical students in six universities in Jordan. The

164   questionnaire was prefaced by a page explaining the nature and objectives of the study and the

165   voluntary nature of participation with a consent statement if they would like to take part in the

166   study. Participants who completed the questionnaire gave electronic informed consent by

167   declaring their acceptance to fill out the questionnaire. The questionnaire was terminated

168   automatically if participants declined to take part. This procedure was approved by the IRB

169   committee.

170   The participants were assured that the outcomes of the research would not be used for

171   routine appraisal of the participants. The individuals were requested to complete the

172   questionnaire without textbooks or consulting materials.

173   The study was conducted for a period of three months in the College of Medicine at six

174   different universities in Jordan. Third-year to sixth-year medical students from these medical

175   colleges in Jordan were invited to participate in the study.

176   **2.3 Study Instruments**

177   The study questionnaire was developed by authors after an extensive review of literature.

178   A pre-validated questionnaire, consisting of items modified from questionnaires in other studies

179   [17,19] was used. The questionnaire was reviewed by the authors and then subjected to pilot

180   testing by 30 participants to ensure the clarity of the questions, which resulted in several minor

181   amendments.

182   The final version of the questionnaire consisted of three parts. The first one was about

183   the demographic information of participants which included age, gender, year of study, and

184   average monthly income. The second part assessed the knowledge of participants about CC and

185   HPV. Finally, the third part assessed the participants' awareness and acceptance of HPV

186   vaccination.

187   The knowledge of the students about CC was evaluated using 14 multiple choice

188   questions with 34 statements related to disease etiology, risk factors, clinical features, and

189   screening recommendations according to the World Health Organization (WHO). Each answer

190   was scored as incorrect or correct. The respondent was given a zero point for each wrong answer

191   and one point for each correct answer.

192   The total knowledge score was calculated for each participant out of 34. Participants were

193   categorized to have poor, moderate, and good knowledge if their score was 0–17, 18-25, and 26-

194   34, respectively.

195   Regarding respondents' awareness about HPV vaccination, this part consisted of seven

196   questions. Each question was scored out of two points. A poor awareness level was allocated to

197   the medical students with a maximum 39% of awareness mean score (0-5 points), an average

198   awareness to those with at a 40-69% of awareness mean (6-9 points), and a good awareness level

199   to people with over 70% of awareness mean (10-14 points).

200   The last three questions in the questionnaire assessed the acceptance of HPV vaccination

201   among medical students in Jordan, the perceived barriers of HPV vaccination, and their source of

202   information about it.

203   **2.4 Statistical Analysis**

204   Data was analyzed using SPSS software version 24. Descriptive data was expressed as

205   frequencies and percentages. Chi square was used to analyze significant differences between

206   categorical variables. Student's t-tests were used to compare the means between two groups.

207   Analysis of Variance (ANOVA) was used to compare the means between three or more groups.

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209   The questionnaire's internal consistency and reliability was assessed by measuring Cronbach's

210   alpha coefficient (α), values ≥ 0.70 were considered adequate. All p-values were two sided and

211   any p-value of less than 0.05 was considered statistically significant.

212

213 **2.5 Sample Size Calculation**

214 Around 9,218 students are currently enrolled to study medicine at Jordanian universities

215 [20]. The sample size was calculated utilizing the online Raosoft software sample size calculator.

216 The minimum required sample size assuming a 95% confidence level, 50% recruitment rate, 5%

217 margin of error, and a maximal sample size of 6,000 students would be 362 participants.

218 **3. Results**

219 **3.1 Demographic Characteristics**

220 The number of total responses was 508, with 4 students disagreeing to take part in the

221 study and 504 of the students completing the questionnaire. Recruited students were from all

222 six medical colleges in Jordan including Yarmouk University (33.3%), Jordan University of Science

223 and Technology (25.0%), University of Jordan (16.1%), Hashemite University (13.5%), Mutah

224 University (6.3%), and Albalqa University (5.8%). About 42.3% were males and the mean age was

225 22.3 ± 1.6 years. Table 1 shows participants' demographic characteristics. The questionnaire was

226 deemed reliable based on the result of Cronbach alpha coefficient (0.759) and its 95% CI (0.728-

227 0.788).

228 **3.2 Knowledge Assessment about CC**

229 Knowledge was assessed using 14 questions with a total of 34 points related to disease

230 diagnosis, risk factors, symptoms, and relation to HPV. In regards to knowledge about CC, the

231 mean knowledge score for students was 21.4 ± 4.4. Table 2 shows the proportion of students

232 who correctly answered questions related to CC and HPV. Most participants knew that CC is

233   caused by an infection (n = 413, 81.9%) and that HPV is responsible for a wide array of diseases

234   including CC (n = 455, 90.3%).

235   Concerning its epidemiology, 60.7% of students answered correctly that CC is a leading

236   cause of gynecological cancer.

237   Student knowledge about the clinical features of CC and percentages of correct answers

238   were 35.5% for no symptoms and 80.6% for bleeding of the vagina. The percentages of students

239   who were aware that fever, itching, and swelling of the cervix were not among the clinical

240   features of the disease were 87.5%, 70.0%, and 54.85% respectively. The mean percentage

241   knowledge score of this part was 59.7% ± 16.5%.

242   Concerning knowledge about CC screening and vaccine, 26.4% of participants knew

243   correctly that women aged 45-60 years should screen according to WHO once every 5 years. On

244   the other hand, 76.6% were aware that there is a vaccine that protects from CC. The mean

245   percentage knowledge score of this part was 55.2% ± 25.9%.

246   Most students (90.3%) knew that HPV is responsible for a wide array of diseases including

247   CC. Most of them (88.9%) were aware that HPV is transmitted sexually. About two thirds of

248   students were aware that HPV subtypes 6 and 11 are commonly associated with genital warts

249   (65.1%) and HPV subtypes 16 and 18 are commonly associated with CC (70.4%). The mean

250   percentage knowledge score of this domain was 67.9% ± 21.5%.

251   The association of socioeconomic factors with knowledge score was assessed using t-test

252   and analysis of variance and there was a significant difference between the mean knowledge

253   score for male students 20.6 ± 4.7 compared to female students 22.0 ± 4.0 (p-value = 0.001). The

254   knowledge score was significantly associated with the year of study with the highest mean score

255   among students in the sixth year with 23.6 ± 3.5 (p-value < 0.001) and the least mean score

256   among third-year students 18.4 ± 4.2. There was no significant association between family

257   income, place of living, or nationality and knowledge score (p-value > 0.05).

258   **3.3 Awareness about HPV Vaccine and Acceptance**

259   Regarding student's awareness about the HPV vaccine, only 40.5% knew about the

260   availability of the HPV vaccine in Jordan, 71.4% were aware that the HPV vaccine should be given

261   at an age between 11 and 29, and about half (54.0%) knew that it could be given to boys also.

262   There were 21.0% that were familiar that girls or women do not need to be screened for HPV

263   before getting vaccinated and that CC protection provided by the HPV vaccine is 70%. Less than

264   one third of the students (30.8%) were aware that the HPV vaccine cannot be given to a woman

265   already having HPV infection while 19.0% of students knew that three doses are required for

266   protection in women. The mean awareness score of students about the HPV vaccine was 5.7 ±

267   2.8 with a range 0-13 which is classified as average awareness (Table 3).

268   The awareness score about the HPV vaccine was significantly associated with the year

269   level of study as there was a significant difference between the mean awareness score for

270   students in the sixth year with 6.3 ± 2.8 (p-value < 0.001). On the other hand, the awareness

271   score was not associated with all other demographic data (p-value > 0.05) as shown in Table 4.

272   There were 332 students (65.9%) that accepted the idea that it is essential to introduce

273   the HPV vaccine for schoolgirls in Jordan. The association of demographic data with the

274   acceptance of introducing the HPV vaccine was assessed using chi-square analysis, and it was

275   higher among students in the sixth year at 71.1% (p-value = 0.005). On the other hand, the

276   acceptance of introducing the vaccine was not associated with all other demographic data nor

277   with the knowledge score or awareness score (p-value > 0.05).

278   Among the obstacles that prevent the receipt of the vaccine or advice about taking HPV

279   vaccination were high cost (53.8%) and inadequate information about the vaccine (62.5%) as

280   shown in Figure 1.

281   Figure 2 presents the sources of information about HPV vaccination which were reported

282   by students as medical school teaching being the main source of information (87.7%) followed

283   by internet sources (33.3%) and books (23.2%).

284   **4. Discussion**

285   In the current study, general CC and HPV knowledge was moderate which was similar to

286   the result of a study done with medical, dental, and nursing students in South India [21]. Most of

287   participants in the present study were aware that CC is caused by an infection and that the HPV

288   infection can lead to CC. These results show adequate knowledge about CC epidemiology and are

289   similar to other studies conducted with health care professionals [15,22].

290   In our study, most medical students were able to recognize that infection and risky sexual

291   practices are common risk factors for CC; these results were similar to other studies [23-25].

292   However, some students had incorrect information that old age and nulliparity were among the

293   risk factors of CC. In the current study, a high percentage of participants were unaware that lower

294   pelvic pain and anemia are common clinical features of CC, and some of them wrongly thought

295   that fever, itching, and swelling of the cervix were symptoms of CC. This highlights the need to

296   increase the consciousness about CC among physicians who act as the main source of health

297   information to their patients.

298   Less than half of students correctly reported PCR as a test used for the detection of HPV

299   infection and knew the appropriate frequency of CC screening in women (i.e., women aged 25-

300   44 years should be screened every three years and women aged 45-60 years should be screened

301   every 5 years). This showed an inadequacy of knowledge which is important as a preventive

302   measure for CC. In addition, the knowledge score was significantly associated with gender and

303   year of study and this was consistent with other studies where the score was higher among

304   female students [26-27] and higher level of study [28].

305   The HPV vaccine offers a major breakthrough to limit the global burden of CC [29]. Many

306   studies have been conducted worldwide recently on the knowledge, attitude, beliefs, and

307   awareness about the HPV vaccine [15,22,30-32]. In the current study, only 40.5% of medical

308   students were aware of the availability of the HPV vaccine in Jordan which protects from CC

309   and about 20.0% were aware that there is no need to screen girls before getting vaccinated.

310   Also, 70% were aware that CC protection is provided by the HPV vaccine. This could be due to

311   the lack of awareness and guidance campaigns in Jordan to shed light on the importance of this

312   vaccine, and it has not been introduced officially in the national vaccination program in Jordan.

313   In addition, topics about cervical cancer and the HPV vaccine are not sufficiently addressed in

314   the curricula of medical schools.

315   Less than one third of students were aware that the HPV vaccine cannot be given to a

316   woman already having the HPV infection, and 19% of students knew that the appropriate number

317   of doses of the HPV vaccine is three with an overall awareness score of 5.7 ± 2.8. This indicates

318   an inadequate awareness about the HPV vaccine which was similar to a result from a study of

319   university students in India [33].

320   In the current study, about two thirds of students (65.9%) thought that it is important to

321   introduce the vaccine in school girls in Jordan which indicates a favorable acceptance of using

322   the vaccine in Jordan. Hoque *et al*. (2016) indicated that most of the physicians in their study

323   reported that they intended to prescribe the HPV vaccine to patients as they expected an

324   important advantage from HPV vaccination [34].

325   In the present study, more than half of the students (62.5%) reported inadequate

326   information about CC and the HPV vaccine as an obstacle preventing the receipt of the vaccine

327   or advice about taking HPV vaccination. Our results were similar to a study on medical students

328   in India [17]. Therefore, it is recommended that physicians should receive information about HPV

329   from educational campaigns to improve their communication practices for recommending HPV

330   vaccination [35].

331   **5. Strength and Limitations of the Study**

332   The high response rate and the inclusion of all medical colleges in Jordan enhance the

333   generalizability of our results. However, this is a cross sectional study and therefore causal

334   relationships between variables cannot be established. We could also not detect the response

335   rate as the questionnaire was distributed electronically. In addition, a systematic sampling

336   method must be used to identify respondents from each level, but a convenient sampling method

337   was used in the current research to reach the determined sample number. Our study is

338 considered a starting point for future studies on this sensitive topic exploring the attitudes and

339 barriers to vaccination among women in Jordan.

6. Conclusion

341 This study highlights insufficient knowledge about CC and its screening among medical

342 students in Jordan. Despite the limited awareness about the HPV vaccine among the study's

343 participants, there is a favorable opinion towards the introduction of the vaccine in school girls

344 in Jordan. More emphasis should be placed on the medical curriculum taught in undergraduate

345 education. Suitable educational campaigns should be stratified at hospitals along with workshops

346 and seminars which highlight the importance of CC screening in women and increase the

347 awareness about HPV among physicians. Medical students who are the future health care

348 providers can educate their patients, address their sensitive cultural concerns, and later increase

349 the health seeking behavior in women in Jordan especially if they are properly aware of CC and

350 hence its burden reduced.

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Ethics Approval and Consent to Participate

356   The study was approved by the Institutional Review Board (IRB) of Jordan University of

357   Science and Technology (JUST) and King Abdulla University Hospital (KAUH), Irbid, Jordan

358   (13/128/2019). All study participants provided informed consent to participate in the study.

359   **Consent for Publication**

360   Not applicable.

361   **Availability of Data and Materials**

362   Raw data of the study is available as supplementary data.

363   **Competing Interests**

364   The authors declare that they have no competing interests.

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

Question	Correct answer N (%)	Wrong answer N (%)
1.Is the HPV vaccine available in Jordan?[1]	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?1	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?2	109 (21.6)	395 (78.4)
-Yes	237(47.0)	
-No (2 points)	109 (21.6)	
-Don't know	158 (31.4)	
5.Can HP vaccine be given to a woman already having HPV infection?2	155 (30.8)	349 (69.2)
-Yes	141 (28.0)	
-No (2 points)	155 (30.8)	
-Don't know	208 (41.2)	
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%	21(4.2)	
-90% (1 points)	135(26.8)	
-70% (2 point)	106 (21.0)	
-50% (1 point)	34 (6.7)	
-Don't know	208 (41.3)	
Overall % awareness score=40.5%±19.8%	332 (65.9)	172 (34.1)

483 1 Yes
484 2 No
485 *Number of students who had a score of 1 or 2 points
486

Tables

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

Age (Year), Mean±SD	22.3±1.6
Age range	20-29
Gender, N (%)	
Male	213 (42.3)
Female	291 (57.7)
University, N (%)	
All Public Universities in Jordan	504 (100)
Level of Education, N (%)	
3rd year	131 (26.0)
4th year	63 (12.5)
5th year	113 (22.4)
6th year	197 (39.1)
Know someone with cervical cancer, N (%)	
Yes	22 (4.4)
No	482 (95.6)
Nationality, N (%)	
Jordanian	454 (90.1)
Not Jordanian	50 (9.9)
Place of living, N (%)	
Urban	395 (78.4)
Rural	109 (21.6)
Family Income JD, N (%)	
<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)

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

Table 2: Participant's knowledge about Cervical cancer (n=504)   1

Question	Correct answer N (%)	Wrong answer N (%)
Epidemiology of cervical cancer		
1. Is Cervical cancer the leading cause among gynecological cancer?[1]	306 (60.7)	198 (39.3)
2. The cause of cervical cancer	413 (81.9)	91 (18.1)
Mean % score=71.3%±30.8%		
3. Risk factors of cervical cancer		
- 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)
Mean % score=64.9%±21.0%		
4. Clinical features of cervical cancer		
-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)
Mean % score=59.7%±16.5%		

Cervical cancer screening

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?[1]	386 (76.6)	118 (23.4)
8. Does the vaccine protect against all cervical cancer?[2]	332 (65.9)	172 (34.1)
9. Girls who have been vaccinated will need to attend for cervical cancer screening[1]	359 (71.2)	145 (28.8)

Mean % score=55.2%±25.9%

Knowledge about HPV

10. Is HPV responsible for a wide range of diseases including cervical cancer? [1]	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 [1]	328 (65.1)	176 (34.9)
14. HPV subtypes 16 and 18 are commonly associated with Cervical carcinoma [1]	355 (70.4)	149 (29.6)

Mean % score=67.9%±21.5%

Overall % Knowledge score=63.0%±12.9%

1 Yes
2 No
*Student get one point if the answer for this statement is false

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

Table 3: Participant's awareness and acceptance of HPV vaccination (n=504)   1

Question	Correct answer N (%)	Wrong answer N (%)
1.Is the HPV vaccine available in Jordan?[1]	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?1	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?2	109 (21.6)	395 (78.4)
-Yes	237(47.0)	
-No (2 points)	109 (21.6)	
-Don't know	158 (31.4)	
5.Can HP vaccine be given to a woman already having HPV infection?2	155 (30.8)	349 (69.2)
-Yes	141 (28.0)	
-No (2 points)	155 (30.8)	
-Don't know	208 (41.2)	
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%	21(4.2)	
-90% (1 points)	135(26.8)	
-70% (2 point)	106 (21.0)	
-50% (1 point)	34 (6.7)	
-Don't know	208 (41.3)	
Overall % awareness score=40.5%±19.8%	332 (65.9)	172 (34.1)

1 Yes
2 No
*Number of students who had a score of 1 or 2 points

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Table 4: Knowledge and awareness about HPV vaccine scores and acceptance stratified by participants' characteristics (n=504)

Table 4: Knowledge and awareness about HPV vaccine scores and acceptance stratified by participants' characteristics (n=504)   1

Variable	N (%)	Knowledge score			Awareness score			Acceptance of the vaccine			
		Mean	SD	P-value	Mean	SD	P-value	Yes N (%)	No N (%)	Don't know N (%)	P-value
Gender				<0.001*			0.626				0.389
Male	213 (42.3)	20.6	4.7		5.6	2.7		138 (64.8)	39 (18.3)	36 (16.9)	
Female	291 (57.7)	22.0	4.0		5.7	2.8		194 (66.7)	60 (20.6)	37 (12.7)	
Place of living				0.266			0.959				0.551
Urban	395 (78.4)	21.5	4.2		5.7	2.8		261 (66.1)	80 (20.2)	54 (13.7)	
Rural	109 (21.6)	21.0	5.0		5.7	2.7		71 (65.1)	19 (17.4)	19 (17.4)	
Nationality				0.596			0.431				0.140
Jordanian	454 (90.1)	21.5	4.4		5.6	2.7		297 (65.4)	94 (20.7)	63 (13.9)	
Non-Jordanian	50 (9.9)	21.1	4.6		6.0	3.0		35 (70.0)	5 (10.0)	10 (20.0)	
Know someone with Cervical Cancer				0.638			0.373				0.060
Yes	22 (4.4)	21.9	5.2		6.2	3.5		12 (54.6)	3 (13.6)	7 (31.8)	
No	482 (95.6)	21.4	4.4		5.6	2.7		320 (66.4)	96 (19.9)	66 (13.7)	
University				<0.001*			0.272				0.644
Yarmouk University	168 (33.3)	21.8	4.3		5.9	2.9		116 (69.0)	30 (17.9)	22 (13.1)	
University of Jordan	81 (16.1)	22.4	4.4		5.7	2.6		54 (66.7)	15 (18.5)	12 (14.8)	
Mutah University	32 (6.3)	21.4	4.5		5.2	2.6		20 (62.5)	7 (21.9)	5 (15.6)	

The Jordan University of Science and Technology	126 (25.0)	20.4	4.4		5.4	2.8		82 (65.1)	26 (20.6)	18 (14.3)	
Albalqa University	29 (5.8)	18.7	4.0		5.2	2.6		13 (44.8)	8 (27.6)	8 (27.6)	
The Hashemite University	68 (13.5)	21.4	4.0		6.1	2.8		47 (69.1)	13 (19.1)	8 (11.8)	
Year Level				<0.001*			<0.001*				0.005*
Third year	131 (26.0)	18.3	4.2		5.1	2.6		90 (68.7)	16 (12.2)	25 (19.1)	
Fourth year	63 (12.5)	20.0	3.1		5.3	2.6		39 (61.9)	12 (19.0)	12 (19.0)	
Fifth year	113 (22.4)	22.1	4.3		5.4	2.8		63 (55.7)	30 (26.6)	20 (17.7)	
Sixth year	197 (39.1)	23.6	3.5		6.3	2.8		140 (71.1)	41 (20.8)	16 (8.1)	
Family Income				0.502			0.587				0.411
<500	33 (6.5)	22.0	5.4		6.2	3.0		19 (57.6)	5 (15.2)	9 (27.3)	
501-1000	128 (25.4)	21.0	4.4		5.6	2.9		87 (68.0)	26 (20.3)	15 (11.7)	
1001-1499	111 (22.0)	21.1	4.5		5.5	2.8		77 (69.4)	22 (19.8)	12 (10.8)	
1500-2000	94 (18.7)	21.7	4.4		5.9	2.7		62 (65.9)	20 (21.3)	12 (12.8)	
>2000	138 (27.4)	21.8	4.0		5.6	1.7		87 (63.0)	26 (18.8)	25 (18.1)	

*P<0.05

Figure 1

Figure1: Obstacle preventing form receiving or advice taking HPV vaccination
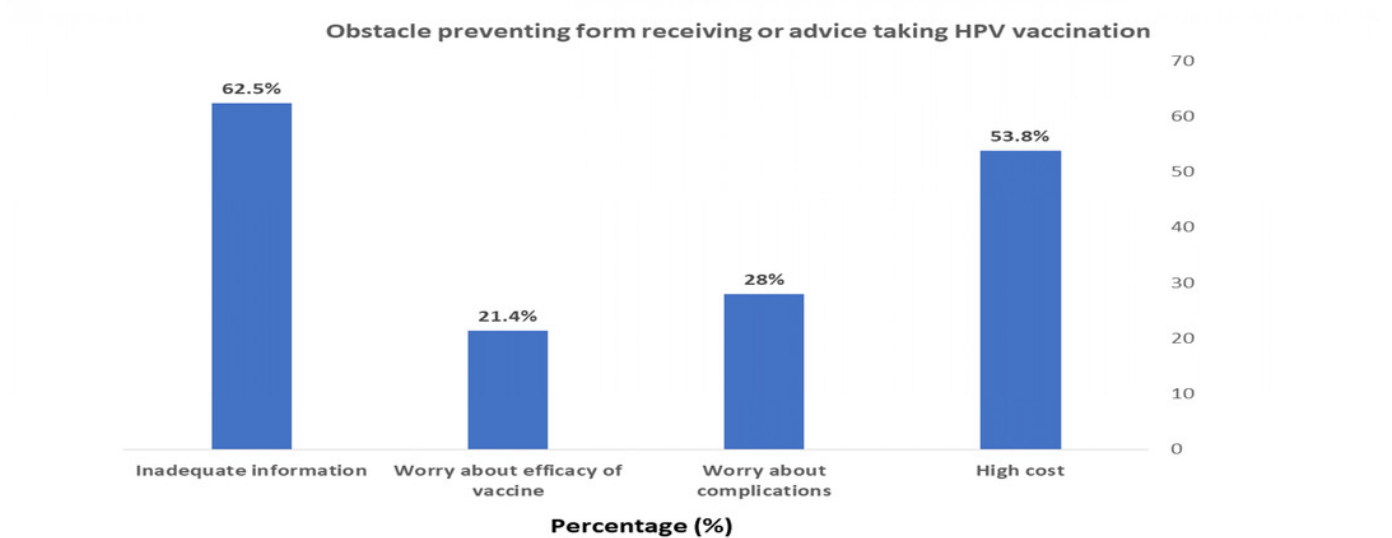
Figure 2

Figure1: Obstacle preventing form receiving or advice taking HPV vaccination

Figure2: Sources of knowledge and information on HPV vaccination