

# Women's Knowledge of Cervical Cancer

## A cross-sectional study in Al Buraimi Governorate, Oman

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**ABSTRACT: Objectives:** This study aimed to assess knowledge of cervical cancer and its prevention among Omani women aged 20–65 years. **Methods:** This cross-sectional study took place across eight primary healthcare institutions in Al Buraimi Governorate, Oman, between November 2018 and February 2019. It was carried out on the basis of a pre-designed, validated and self-administered questionnaire containing 55 questions. **Results:** Data from 791 completed questionnaires were included in the final analysis, which represents a response rate of 79.1%. The results indicated that 86.7% of surveyed women had previously heard of cervical cancer and 13.0% expected this disease to affect them in the future. The results also showed that women were less aware of the association between the human papillomavirus (HPV) and cervical cancer (24.7%). The participants considered the HPV infection and initiation of sexual intercourse below 17 years of age as the lowest risks associated with cervical cancer. Moreover, 63.8% of the participants were unaware of the availability of a vaccination 'against HPV-related cervical cancer' and many respondents were unaware of a Pap test. Those women aged over 30 years, married and with a high level of education were more likely to be aware of cervical cancer. **Conclusion:** Generally, there was inadequate knowledge and awareness of cervical cancer among women aged 20–65 years. Young women aged 20–30 years showed relatively lesser knowledge of cervical cancer as compared to their older counterparts. Thus, concerted efforts are needed to promote such awareness among women in Oman.

**Keywords:** Cervical Cancer; Risk Factor; Human Papillomavirus; Vaccine; Pap Test.

### ADVANCES IN KNOWLEDGE

- This study provides a broad overview of the level of knowledge of cervical cancer among women aged 20 years and above in Al Buraimi Governorate, Oman.

### APPLICATION TO PATIENT CARE

- The results of this study help determine the existing knowledge gaps. This is of great importance for the planning of a cervical cancer prevention programme or awareness-raising campaigns on this subject in Oman.

IT IS IMPERATIVE TO INCREASE AWARENESS concerning cervical cancer, which is the world's fourth most common cancer among women.<sup>1</sup> In the less developed regions world, cervical cancer ranks as the second most common cancer among women. In 2018 alone, globally, about 570,000 were diagnosed with cervical cancer and about 311,000 deaths were attributed to it.<sup>1</sup> It is also noteworthy that about 85% of the women dying from cervical cancer belong to low- and middle-income countries.<sup>2</sup>

The incidence of cancer in Oman is rapidly on the rise.<sup>3,4</sup> The country's figures concerning current incidence of and mortality due to cervical cancer suggest that, 77 women are annually diagnosed with the disease and 41 die from it.<sup>5</sup> In Oman, cervical cancer ranks third among the most common cancers affecting women aged 15–44 years; its crude incidence rate is 4.7 and mortality rate is 2.5.<sup>5</sup> Almost all the cases of cervical cancer are related to infection with the human papillomavirus (HPV) that is sexually transmitted.<sup>6</sup> A recent study carried out in Oman found that the prevalence of HPV in the country was 17.8%.<sup>7</sup>

Cervical cancer is fatal once it reaches the invasive stages but preventable if detected early and adequately treated. Vaccination and cytological screening with Pap smear are important measures for preventing cervical cancer. The incidence of cervical cancer and the death rate have decreased in developed countries over the last four decades mainly due to improved awareness, better screening and better preventive approaches.<sup>8–11</sup>

The incidence of cervical cancer in the Extended Middle East and North Africa, including Oman, is low. However, age-standardised cervical cancer mortality is disproportionately high relative to that in the Western countries, which points to possible barriers to screening and treatment.<sup>12</sup> A lack of adequate knowledge about the disease was found to be one of the key barriers at the individual level.<sup>13</sup>

In Oman, only one study has been conducted, to date, to estimate the level of awareness of cervical cancer among women.<sup>14</sup> However, the study was restricted to women living in a city, and data were collected from a single hospital. The reported results

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indicated a low level of knowledge of cervical cancer among women. Studies carried out in other Gulf Cooperation Council (GCC) countries have reached similar findings.<sup>15,16</sup>

To start with, current data on the level of knowledge of cervical cancer among women in Oman need to be collected. This will help in determining knowledge gaps and creating effective programmes for raising public awareness about this disease. The data can also help in organising focused prevention campaigns. Therefore, this study aimed to assess the knowledge concerning various aspects of cervical cancer among Omani women, aged 20 years and above, visiting outpatient primary care services in the Al Buraimi Governorate. The recommended screening ages for cervical cancer is 25–65. Assessing the level of knowledge at a younger age is imperative because of the relatively lower ages of marriage and childbirth in Oman.<sup>17</sup>

## Methods

This analytical cross-sectional survey was carried out between November 2018 and February 2019. A proportional stratified sampling technique was used to access approximately 5% of women aged 20–65 years, living in the catchment area of the eight primary healthcare institutions in Al Buraimi Governorate. The required sample size for the study was calculated using Raosoft® (Raosoft, Inc., Seattle, Washington, USA). The final sample size was 1,000, assuming a 95% confidence level and a 3% margin of error. A proportional size approach was implemented to calculate the sample size from each healthcare institution. The women attending primary healthcare centres for any reason during the said period of data collection were approached to participate in this study if they met the following inclusion criteria: Omani women who were aged 20 years and above, those who did not have cervical cancer and those who could understand the consent form and answer the questionnaire in writing. Thus, those women who had been diagnosed with cervical cancer and had undergone a hysterectomy were excluded from the study. Pregnant and lactating women were not excluded from the study, as the aim was to assess the knowledge of all women—single or married.

An Arabic questionnaire was designed specifically for this study. Many validated tools covering a wider spectrum of knowledge assessment relating to cervical cancer were reviewed.<sup>18–20</sup> The questionnaire was initially developed in the English language based on the reviewed literature and then translated into

Arabic. A pilot study was conducted among 70 women in June 2018. The questionnaire contained 55 general questions to assess women's knowledge of cervical cancer covering the following three aspects: 1) general knowledge; 2) factors associated with the occurrence of the disease; 3) preventive measures. All sections included multiple choice questions on qualitative data, except for those related to the section on risk factors assessment that used a six-point Likert scale (0 indicating no relationship and 5 indicating a very strong relationship between risk factors and occurrence of cervical cancer).<sup>20</sup> The Cronbach alpha coefficient was 0.940 for the whole questionnaire and ranged between 0.57 and 0.93 for each of the sections. The test-retest reliability was examined in a subsample ( $r = 0.769, P < 0.001$ ).<sup>21</sup>

A total of 791 responses were received, which represented a response rate of 79.1%. The convenience sampling method was used to recruit the participants. The data were coded and entered into a computer using Statistical Package for Social Sciences (SPSS), Version 25.0 (IBM Corp., Chicago, Illinois, USA).

Descriptive statistics were used to describe the participants' characteristics, scores on general knowledge, knowledge of risk factors of cervical cancer and knowledge of primary and secondary prevention. A bivariate analysis using the chi-squared and Fischer's exact tests was also employed to assess the correlation of demographic factors concerning the participants with their knowledge of cervical cancer prevention. *P* value was used to present the results at 95% confidence intervals. *P* < 0.05 indicated significance.

This study was approved by the Research and Ethical Review and Approval Committee of the Ministry of Health. The questionnaire was accompanied by a consent form and a cover letter with the latter explaining the study's purpose and letting the respondents know about their participation being voluntary and their anonymity being maintained.

## Results

The sociodemographic data of the 791 respondents participating in the study (79.1%) have been presented in Table 1 along with their replies to questions on general knowledge of cervical cancer in Table 2.

Concerning the association of cervical cancer with an infection, two-thirds of the women ( $n = 320$ ; 40.5%) reported that they did not know of any association, while 276 (34.8%) stated that cervical cancer was not associated with an(y) infection. When the respondents were asked whether there was 'a method of significantly reducing the risk of cervical

**Table 1:** Sociodemographic characteristics of female participants from eight primary healthcare institutions in Al Buraimi Governorate, Oman (N = 791)

Characteristics	n (%)
<b>Age (in years)</b>	
20–30	310 (39.2)
31–40	380 (48.0)
41–50	93 (11.8)
Above 50	8 (1)
<b>Educational level</b>	
No education	5 (0.6)
Primary	37 (4.7)
Secondary	327 (41.3)
Tertiary	422 (53.4)
<b>Marital status</b>	
Single	100 (12.7)
Married	663 (83.8)
Other (divorced or widow)	28 (3.5)
<b>Work status</b>	
Working	306 (38.7)
Not working	485 (61.3)

**Table 2:** General knowledge about the subject of cervical cancer among 791 female participants from eight primary healthcare institutions in Al Buraimi Governorate, Oman

General knowledge about cervical cancer	n (%)		
	Yes	No	Do not know
Have you ever heard of cervical cancer?	686 (86.7)	88 (11.1)	17 (2.1)
Cervical cancer leading ultimately to death?	576 (72.8)	60 (7.6)	155 (19.6)
Could cervical cancer be associated with another infection?	195 (24.7)	276 (34.8)	320 (40.5)
Is there any effective way of significantly reducing the risks of this disease?	447 (56.5)	51 (6.4)	293 (37.1)
Has any one of your relatives suffered from this disease?	106 (13.4)	609 (77.0)	76 (9.6)
Do you believe you could be affected by this disease in future?	103 (13.0)	219 (27.7)	469 (59.3)

cancer', 447 participants (56.5%) responded positively, while 293 (37.1%) did not know whether there was an effective method.

**Table 3:** Knowledge of the relationship between various risk factors and the likelihood of cervical cancer occurrence among 791 female participants from eight primary healthcare institutions in Al Buraimi Governorate, Oman

Risk factors	n (%)		
	No relationship	Moderate	Very strong relationship
Young age	500 (63.2)	193 (24.4)	98 (12.4)
Genetic factors (e.g. cervical cancer in a close family member)	288 (36.4)	197 (24.9)	306 (38.7)
Human papillomavirus infection	354 (44.8)	203 (25.6)	234 (29.6)
Human immunodeficiency virus infection	308 (38.9)	182 (23.0)	301 (38.1)
Younger than 17 years at first full-term pregnancy	407 (51.5)	185 (23.3)	199 (25.2)
Multiple sexual partners	257 (32.5)	149 (18.8)	385 (48.7)
History of sexually transmitted diseases	269 (34.0)	178 (22.5)	344 (43.5)
Alcohol abuse	286 (36.2)	201 (25.4)	304 (38.4)
Smoking or exposure to smoke	309 (39.1)	176 (22.2)	306 (38.7)
Miscarriages and abortions	266 (33.6)	238 (30.1)	287 (36.3)
High parity	334 (42.3)	210 (26.5)	247 (31.2)
Using birth control pills for a long time (five or more years)	429 (54.2)	187 (23.6)	175 (22.2)
Use of condoms	369 (46.6)	231 (29.2)	191 (24.2)
Early menarche	254 (32.1)	259 (32.7)	278 (35.2)
Breastfeeding	431 (54.5)	187 (23.6)	173 (21.9)
Use of drugs or psychoactive substances	316 (40.0)	235 (29.7)	240 (30.3)
Using public swimming pools	317 (40.1)	224 (28.3)	250 (31.6)

The women's knowledge regarding the association of 17 factors with the occurrence of cervical cancer was assessed in the second section of the questionnaire. Two major aetiological factors

**Table 4:** Knowledge of primary prevention of cervical cancer development among 791 female participants from eight primary healthcare institutions in Al Buraimi Governorate, Oman

Lifestyle	n (%)		
	Yes	No	Do not know
Antioxidant-rich diet	547 (69.2)	70 (8.8)	174 (22.0)
Regular physical exercise	645 (81.5)	47 (5.9)	99 (12.6)
Avoiding highly processed food	531 (67.2)	77 (9.7)	183 (23.1)
Restraining from casual sex	665 (84.0)	55 (7.0)	71 (9.0)
<b>HPV vaccine</b>			
Have you ever heard of a vaccine that reduces cervical cancer risk?	167 (21.1)	505 (63.8)	119 (15.0)
Does HPV vaccine reduce the development of cervical cancer in a woman?	66 (8.3)	130 (16.4)	595 (75.2)
Have you ever been vaccinated (HPV vaccine)?	48 (6.1)	635 (80.3)	108 (13.6)
Would you accept being vaccinated if the vaccine was available?	584 (73.8)	145 (18.3)	62 (7.8)
Would you agree to include this vaccine in the national immunisation programme for girls in Oman?	559 (70.7)	66 (8.3)	166 (21.0)
What is the best age to get vaccinated?	Age (in years)		n (%)
	≤ 8		187 (23.6)
	9–13		61 (7.7)
	14–26		42 (5.3)
	19–25		22 (2.8)
	>26		479 (60.6)

were given a higher percentage by the respondents as having 'no relationship' with the incidence of cervical cancer. These factors are as follows: HPV infection (44.8%) and being younger than 17 at first full-term pregnancy (51.5%) [Table 3].

More than three-fifths of the women who participated in the survey (n = 505, 63.8%) responded negatively, i.e. 'no', when asked, 'Have you ever heard of a vaccine that reduces cervical cancer risk?' [Table 4] A majority of the respondents (n = 595, 75.2%) did not know that the risk of cervical cancer development can be reduced by HPV vaccine. Only 5.3% answered

**Table 5:** The awareness of symptoms and cytological examination related to cervical cancer among 791 female participants from eight primary healthcare institutions in Al Buraimi Governorate, Oman

Distressing symptoms	n (%)	
	Yes	No
No genital-area symptoms	459 (58.0)	332 (42.0)
Excessive vaginal bleeding between periods	672 (85.0)	119 (15.0)
Bloodstained mucus	662 (58.0)	129 (42.0)
Postcoital bleeding	564 (71.3)	227 (28.7)
Cytological examination	Responses (in years)	n (%)
At what age will females undergo cytological examination in Oman (Pap smear test)?	17–25	203 (25.7)
	20–65	481 (60.8)
	≥ 60	107 (13.5)
After what period of time should women undergo Pap smear test (after marriage and initiation of sexual activity)? (in years)	<1	253 (32.0)
	1–3	283 (35.8)
	4–6	98 (12.4)
	>6	157 (19.8)
How regularly should women be obliged to take the test?	Every year	450 (56.9)
	Once every three years	212 (26.8)
	Once every five years	66 (8.3)
	Once every 10 years	46 (5.8)
	Once only	17 (2.1)

correctly about the best age for this vaccination. A majority of the respondents (n = 584, 73.8%) agreed to be vaccinated if the vaccine was available and agreed to the vaccine being included in the national immunisation programme for girls in Oman (n = 559, 70.7%,  $P < 0.000$ ) [Table 4].

Over half of the participants (58.0%) were aware that cervical cancer can affect women even with a lack of symptoms in the genital areas. To a question in the survey asking how old women must be 'to undergo cytological examination (Pap smear test)', three-fifths of the women (n = 481, 60.8%) replied that women would undergo the Pap test when they were between 20 and 65 years of age; however, 35.8% (n = 283) reported that this test should be done between 1 and 3 years after marriage. The participants' knowledge of distressing symptoms and cytological examination have been presented in Table 5.

The knowledge scores were combined, and according to their mean values, they were categorised as poor knowledge or good knowledge. The bivariate

**Table 6:** Sociodemographic factors associated with the knowledge of cervical cancer among 791 female participants from eight primary healthcare institutions in Al Buraimi Governorate, Oman

Socioeconomics factors		Knowledge of cervical cancer			Bivariate test results		
		n (%)		Total	Chi-squared	DF	P value
		Poor	Good				
Women's age (in years)	20–30	212 (68)	98 (32)	310	10.78	3	0.013*
	31–40	216 (57)	164 (43)	380			
	41–50	54 (58)	39 (42)	93			
	>50	6 (75)	2 (25)	8			
Educational level	No education	4 (80)	1(20)	5	10.78	3	0.013*
	Primary	30 (81)	7 (19)	37			
	Secondary	210 (64)	117 (36)	327			
	Tertiary <sup>†</sup>	244(58)	178 (42)	422			
Marital status	Single	73 (73)	27 (27)	100	6.41	2	0.041*
	Married	397 (60)	266 (40)	663			
	Other	18 (64)	10 (36)	28			
Work status <sup>‡</sup>	Working	160 (57)	119 (43)	279	7.49	1	0.006 <sup>§</sup>
	Not working	298 (67)	144 (33)	442			

\*Significant at 5% level of significance; <sup>†</sup>Tertiary (institute, college, university); <sup>‡</sup>70 missing cases; <sup>§</sup>Significant at 1% level of significance.

analysis using the chi-squared and Fischer's exact tests revealed that sociodemographic factors were significantly associated with the knowledge of cervical cancer prevention [Table 6].

The participants' age is significantly associated with the knowledge of cervical cancer prevention ( $\chi^2 = 10.78$ ,  $df = 3$ ,  $P < 0.05$ ). The Omani women between 20 and 30 years of age were more likely to have poor knowledge. Furthermore, a significant statistical association was found between their marital status and knowledge of cervical cancer prevention ( $\chi^2 = 6.41$ ,  $df = 2$ ,  $P < 0.05$ ) and single women were more likely to have poor knowledge.

## Discussion

There is limited information in Oman regarding the level of knowledge and awareness of cervical cancer. A majority of women participating in this study poorly linked the relationship between HPV infection and occurrence of cervical cancer, which is considered to be the most important aetiological factor for the latter.<sup>22</sup> Similar results were obtained from studies conducted in other countries.<sup>23,24</sup> Therefore, it is important to educate women about the role of HPV in the aetiology of cervical cancer and the prevention of this cancer. A well-planned public health campaign to raise awareness will go a long way. It must be noted,

however, that the impact that such a campaign would have would largely depend on how well it reaches out to and involves the target group.<sup>25</sup>

Regarding the HPV vaccine, only 21.1% of the participants knew about the vaccine and 5.3% correctly answered the best age for the vaccination. It was expected that a large number of the participants would not know about the HPV vaccine as it is not available in the national immunisation programme. The majority agreed to take the vaccine themselves once it became available and to the inclusion of the vaccine in the national immunisation programme for girls in Oman. The acceptability levels for the HPV vaccine were similarly high in other GCC countries.<sup>13,14,26</sup> The findings of this study should encourage health policymakers to duly promote the HPV vaccine. One study has shown that implementing a school-based vaccine programme is an effective way of ensuring primary prevention. It ensures high completion and on-time dosing of vaccination.<sup>27</sup>

The respondents of the current study appeared not to have enough knowledge of cytological screening. The percentages of the study participants who responded correctly to the questions about the recommended Pap test time and frequency of routine testing were very low. This may explain why most instances of cervical cancer in the region are discovered rather late in the cancer's stage.<sup>1</sup> The

uptake of the test will not increase until awareness concerning it is strengthened and the related obstacles are eliminated.<sup>28</sup>

Unlike other studies carried out in other Arab, Latin and Asian communities,<sup>29–31</sup> this study showed that women aged between 20 and 30 years had poor knowledge of cervical cancer when compared with older women. This finding is in line with a previous study conducted in Oman which shows high uptake of Pap smear among women aged  $\geq 30$  years.<sup>32</sup>

For religious reasons, many Omani women begin sexual activity after marriage. This study found that there is better knowledge of cervical cancer among women aged over 30 years. An increase in visits to gynaecology clinics and gynaecological check-ups in the case of older, married women is believed to be having a positive impact on their knowledge of such diseases. Hence, marital status appears to be an influential factor regarding knowledge about cervical cancer. A supporting observation for this finding of the present study comes from the positive correlation found between knowledge of cervical cancer and marital status by a previous study conducted in Oman.<sup>32</sup>

A major limitation of this study is that the findings are based on data from a single region in Oman. However, the results of the present study do provide valuable information and could be of use when planning cervical cancer prevention programmes or awareness-raising campaigns on cervical cancer in Oman.

## Conclusion

The general level of the participants' knowledge of cervical cancer in this study is inadequate, especially among those of a younger age. The participants, all of whom were Omani women, appear to lack knowledge about the role of HPV infection in the aetiology of cervical cancer and their awareness of the preventive measures is also low. Accordingly, an increase in cervical cancer awareness among women in Oman is necessary. Such efforts should especially include young women. The awareness campaign(s) in this regard could be implemented with the help of appropriate mobile technologies and/or as on-ground campaigns. It is of paramount importance to strengthen the cervical cancer prevention and control initiatives at Oman's primary healthcare facilities to increase the understanding of this disease and, consequently, the women's willingness concerning the uptake cervical cancer screening services.

## CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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## AUTHORS' CONTRIBUTION

ANS conceptualised the idea and research design. The data collection/field work and data management was done by ANS and AHM. Data Analysis and interpretation of results was done by ANS and ED. Report writing, critical reviewing with intellectual input and writing the manuscript were done by ANS. All authors approved the final version of the manuscript.

## References

1. Arbyn M, Weiderpass E, Bruni L, Sanjosé SD, Saraiya M, Ferlay J, et al. Estimates of incidence and mortality of cervical cancer in 2018: a worldwide analysis. *Lancet Glob Health* 2019; 8:191–203. [https://doi.org/10.1016/S2214-109X\(19\)30482-6](https://doi.org/10.1016/S2214-109X(19)30482-6).
2. World Health Organization. Human papillomavirus (HPV) and cervical cancer. From: [www.who.int/en/news-room/fact-sheets/detail/human-papillomavirus-\(hpv\)-and-cervical-cancer](http://www.who.int/en/news-room/fact-sheets/detail/human-papillomavirus-(hpv)-and-cervical-cancer). Accessed: Mar 2020.
3. Dey S, Soliman AS. Cancer in the global health era: Opportunities for the Middle East and Asia. *Asia Pac J Pub Health* 2010; 22: 75–82. <https://doi.org/10.1177/1010539510372846>.
4. Al-Lawati JA, Mabry R, Mohammed AJ. Addressing the threat of chronic diseases in Oman. *Prev Chronic Dis* 2008; 5:A99.
5. HPV Information Centre. Statistics. From: [www.hpvcntr.net/datastatistics.php](http://www.hpvcntr.net/datastatistics.php) Accessed: Apr 2020.
6. Tewari KS, Monk BJ. *Invasive Cervical Cancer*, 8th ed. Philadelphia: Elsevier, 2012. Pp. 24–8.
7. Al-Lawati Z, Khamis FA, Al-Hamdani A, Al-Kalbani M, Ramadhan FA, Al-Rawahi TR, et al. Prevalence of human papilloma virus in Oman: Genotypes 82 and 68 are dominating. *Int J Infect Dis* 2020; 93:22–27. <https://doi.org/10.1016/j.ijid.2019.12.038>.
8. Adegoke O, Kulasingam S, Virnig B. Cervical cancer trends in the United States: a 35-year population-based analysis. *J Womens Health* 2012; 21:1031–7. <https://doi.org/10.1089/jwh.2011.3385>.
9. Bray F, Loos AH, McCarron P, Weiderpass E, Arbyn M, Møller H, et al. Trends in cervical squamous cell carcinoma incidence in 13 European countries: Changing risk and the effects of screening. *Cancer Epidemiol Biomarkers Prev* 2005; 14:677–86. <https://doi.org/10.1158/1055-9965.EPI-04-0569>.
10. Torre LA, Bray F, Siegel RL, Ferlay J, Lortet-Tieulent J, Jemal A. Global cancer statistics, 2012. *CA Cancer J Clin* 2015; 65:87–108. <https://doi.org/10.3322/caac.21262>.
11. Torre LA, Islami F, Siegel RL, Ward EM, Jemal A. Global cancer in women: Burden and trends. *Cancer Epidemiol Biomarkers Prev* 2017; 26:444–57. <https://doi.org/10.1158/1055-9965.EPI-16-0858>.
12. Arbyn M, Weiderpass E, Bruni L, de Sanjosé S, Saraiya M, Ferlay J, et al. Estimates of incidence and mortality of cervical cancer in 2018: A worldwide analysis. *Lancet Glob Health* 2020; 8:e191–e203. [https://doi.org/10.1016/S2214-109X\(19\)30482-6](https://doi.org/10.1016/S2214-109X(19)30482-6).

13. Yang H, Li SP, Chen Q, Morgan C. Barriers to cervical cancer screening among rural women in eastern China: a qualitative study. *BMJ Open* 2019; 9:e026413. <https://doi.org/10.1136/bmjopen-2018-026413>.
14. Alwahaibi N, Alsalami W, Alzaabi A, Alramadhani N. Awareness of cervical cancer and Pap smear testing among Omani women. *Asian Pac J Cancer Prev* 2016; 17:4825–30. <https://doi.org/10.22034/APJCP.2016.17.11.4825>.
15. Jassim G, Obeid A, Al Nasheet HA. Knowledge, attitudes, and practices regarding cervical cancer and screening among women visiting primary health care centres in Bahrain. *BMC Public Health* 2018; 18:128. <https://doi.org/10.1186/s12889-018-5023-7>.
16. Al-Meer FM, Aseel MT, Al-Khalaf J, Al-Kuwari MG, Ismail MF. Knowledge, attitude and practices regarding cervical cancer and screening among women visiting primary health care in Qatar. *East Mediterr Health J* 2011; 17:855–61. <https://doi.org/10.26719/2011.17.11.856>.
17. Islam MM, Dorvlo AS, Al-Qasbi AM. The pattern of female nuptiality in Oman. *Sultan Qaboos Univ Med J* 2013; 13:32–42. <https://doi.org/10.12816/0003193>.
18. Asgarlou Z, Tehrani S, Asghari E, Arzanlou M, Naghavi-Behzad M, Piri R, et al. Cervical cancer prevention knowledge and attitudes among female university students and hospital staff in Iran. *Asian Pac J Cancer Prev* 2016; 17:4921–7. <https://doi.org/10.22034/APJCP.2016.17.11.4921>.
19. Bansal AB, Pakhare AP, Kapoor N, Mehrotra R, Kokane AM. Knowledge, attitude, and practices related to cervical cancer among adult women: A hospital-based cross-sectional study. *J Nat Sci Biol Med* 2015; 6:324–8. <https://doi.org/10.4103/0976-9668.159993>.
20. Jaglarz K, Tomaszewski KA, Kamzol W, Puskulluoglu M, Krzemieniecki K. Creating and field-testing the questionnaire for the assessment of knowledge about cervical cancer and its prevention among schoolgirls and female students. *J Gynecol Oncol* 2014; 25:81–9. <https://doi.org/10.3802/jgo.2014.25.2.81>.
21. Saadi AA. Development and Validation of Questionnaire to Assess Knowledge About Cervical Cancer Among Women Aged 20 to 65 years in Oman. *Asian Pac J Cancer Prev* 2021; 22:69–74. <https://doi.org/10.31557/APJCP.2021.22.1.69>.
22. Donders GG, Gabrovská M, Bellen G. Knowledge of cervix cancer, human papilloma virus (HPV) and HPV vaccination at the moment of introduction of the vaccine in women in Belgium. *Arch Gynecol Obstet* 2007; 277:291–8. <https://doi.org/10.1007/s00404-007-0487-1>.
23. Onan A, Ozkan S, Korucuoglu U, Aksakal N, Taskiran C, Aygun R et al. Knowledge on and attitude toward human papillomavirus infection and its vaccine in a Turkish subpopulation. *Turkiye Klinikleri J Med Sci* 2009; 29:594–8.
24. Schiffman MH, Bauer HM, Hoover RN, Glass AG, Cadell DM, Rush BB, et al. Epidemiologic evidence showing that human papillomavirus infection causes most cervical intraepithelial neoplasia. *J Natl Cancer Inst* 1993; 85:958–64. <https://doi.org/10.1093/jnci/85.12.958>.
25. Low EL, Simon AE, Lyons J, Romney-Alexander D, Waller J. What do British women know about cervical cancer symptoms and risk factors? *Eur J Cancer* 2012; 48:3001–3008. <https://doi.org/10.1016/j.ejca.2012.05.004>.
26. Mwaka AD, Orach CG, Were EM, Lyratzopoulos G, Wabinga H, Roland M. Awareness of cervical cancer risk factors and symptoms: cross-sectional community survey in post-conflict northern Uganda. *Health Expect* 2015; 19:854–67. <https://doi.org/10.1111/hex.12382>.
27. Lim WT, Sears K, Smith LM, Liu G, Lévesque LE. Evidence of effective delivery of the human papillomavirus (HPV) vaccine through a publicly funded, school-based program: the Ontario Grade 8 HPV Vaccine Cohort Study. *BMC Public Health* 2014; 14:1029. <https://doi.org/10.1186/1471-2458-14-1029>.
28. Elbarazi I, Raheel H, Cummings K, Loney T. A content analysis of Arabic and English newspapers before, during, and after the human papillomavirus vaccination campaign in the United Arab Emirates. *Front Public Health* 2016; 4:176. <https://doi.org/10.3389/fpubh.2016.00176>.
29. Gowda C, Dempsey AF. Medicaid reimbursement and the uptake of adolescent vaccines. *Vaccine* 2012; 30:1682–9. <https://doi.org/10.1016/j.vaccine.2011.12.097>.
30. Acharya Pandey R, Karmacharya E. Cervical cancer screening behavior and associated factors among women of Ugrachandi Nala, Kavre, Nepal. *Eur J Med Res* 2017; 22:32. <https://doi.org/10.1186/s40001-017-0274-9>.
31. Al Sairafi M, Mohamed FA. Knowledge, attitudes, and practice related to cervical cancer screening among Kuwaiti women. *Med Princ Pract* 2009; 18:35–42. <https://doi.org/10.1159/000163044>.
32. Alwahaibi N, Alsalami W, Alramadhani N, Alzaabi A. Factors influencing knowledge and practice regarding cervical cancer and Pap smear testing among Omani women. *Asian Pac J Cancer Prev* 2018; 19:3367–74. <https://doi.org/10.31557/APJCP.2018.19.12.3367>.