








Beliefs and Utilization of Cervical Cancer Screening by Female Health Care Workers in Saudi Arabia Using the Health Belief Model: A Nationwide Study

Nouf A AlShamlan ¹, Reem S AlOmar ¹, Assim M AlAbdulKader ¹, Faisal A AlGhamdi ², Abdullah A Aldakheel², Saud A Al Shehri ², Lyana Atif Felemban³, Marwa Mahmoud Shafey ¹, Malak A Al Shammari ¹

¹Department of Family and Community Medicine, College of Medicine, Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia; ²College of Medicine, Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia; ³College of Medicine, Fakeeh College of Medical Sciences, Jeddah, Saudi Arabia

Correspondence: Nouf A AlShamlan, Department of Family and Community Medicine, College of Medicine, Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia, Tel +966 504901406, Email nashamlan@iau.edu.sa

Purpose: Epidemiologically, cervical cancer is the fourth most commonly diagnosed cancer among females globally and the third most commonly diagnosed gynecological cancer in Saudi Arabia. Screening is an important measure to prevent it. The current study aimed to assess, epidemiologically, female healthcare workers' (HCWs) utilization of cervical cancer screening services and its association with their beliefs about cervical cancer and the screening test, as well as their personal characteristics.

Methods: This cross-sectional study included female HCWs in Saudi Arabia. A predesigned, self-administered survey was used to collect data, and it included questions about sociodemographic and reproductive characteristics, self-utilization of cervical cancer screening services, and the Health Belief Model (HBM) scale. Regression analyses were conducted to identify predictors of cervical cancer screening service utilization.

Results: A total of 1857 females participated. The cervical cancer screening test uptake was 24.6% of ever-married females. However, 45% of the participants were willing to have the test. The odds of utilizing a screening were significantly higher among older participants, those with a higher level of education, and those with a higher number of pregnancies. Furthermore, HCWs with a history of HPV infection, cervical cancer in the family, hormonal contraception, or immunocompromised diseases were more likely to have the screening. An increase in the mean scores of the perceived benefits and motives subscales of HBM was associated with an increase in the uptake of screening. However, an increase in perceived barrier scores was significantly associated with a lower likelihood of cervical cancer screening uptake.

Conclusion: Low cervical screening uptake and slightly higher intentions to have the test exist among HCWs. Certain personal factors and health beliefs significantly affect the utilization of the screening test. Approaches that target perceived benefits, health motivation, and perceived barriers to improve the screening rates of cervical cancer among HCWs are recommended.

Keywords: cervical cancer screening, health belief model, Pap smear, healthcare worker, utilizations, Saudi Arabia

Introduction

Cervical cancer is the fourth most common female cancer and the fourth leading cause of female cancer deaths worldwide. According to the Global Cancer Statistics 2020 report, 604,000 new cases of cervical cancer and 342,000 deaths were expected globally in 2020.¹ In the Gulf Cooperation Council (GCC) states, cervical cancer is the ninth most common malignancy among females.² It is the third most common gynecological malignancy in females in Saudi Arabia,



with an incidence rate of 1.9 cases per 100,000 female-years. Unfortunately, more than 40% of cases are diagnosed at a later stage, probably due to poor adherence to screening programs.³

The human papillomavirus (HPV) is a major contributor to the development of cervical cancer. However, other risk factors are also reported, such as smoking, sexual relations at a younger age, multiple sexual partners, a higher number of parities, HIV infection, and prolonged use of hormonal contraceptives.^{1,4} Cervical cancer can be a preventable cancer due to the availability of the HPV vaccine (primary prevention) and screening (secondary prevention).¹ Several recommendations are issued by various guidelines to assist healthcare workers (HCWs) in screening for cervical cancer, e.g., the US Preventive Services Task Force recommends cervical cytology alone every 3 years for females aged 21–29 years. For females aged 30–65 years, different options can be offered; cervical cytology alone every 3 years, the high-risk human papillomavirus (hrHPV) test alone every 5 years, or a combination of cervical cytology and hrHPV tests (cotesting) every 5 years.⁵ In Saudi Arabia, cervical cancer screening has been an opportunistic service to date, provided free of charge in governmental health sectors, and is available also in the private sector. Every institution has its own unique patient communication strategies, policies, and procedures regarding cervical cancer screening.⁶

Reports from the GCC states revealed that the utilization of Pap smear tests among females aged 25–49 years was 28.0% in the United Arab Emirates, 17.7% in Kuwait, 10.6% in Oman, and 7.6% in Saudi Arabia.⁷ Personal decisions to uptake the screening programs can be influenced by many internal and external factors. The Health Belief Model (HBM) focuses on an individual's health-associated behaviors to predict their future decisions. The following factors, according to this model, can influence the decision to participate in any disease detection or prevention program: perceived susceptibility to the disease, perceived severity of the disease on their health, perceived benefits of using the screening, and perceived barriers to the screening tests.⁴ Certain barriers that could affect the decision to uptake the cervical cancer screening services have been reported, such as knowledge, access to the services, a feeling of embarrassment or pain during the gynecological examination, fear of the results, and unawareness about the available services.^{8–10}

HCWs can play a significant role in the perspective of their patients regarding cancer and its preventive measures. Moreover, HCWs were expected to be more knowledgeable and aware about cervical cancer and its screening than the general population.¹¹ Usually, they are the first point of contact for their patients and even their relatives for health-related advice, regardless of their specialty. Their influence is evident by the significant decrease in the likelihood of testing among females who did not receive a recommendation from a HCW.¹² Furthermore, females usually feel more comfortable discussing their health conditions, especially those related to gynecological issues, with their female physicians.¹³ Therefore, assessing the beliefs of female HCWs about cancer and screening in addition to their own self-utilization of the services that they can transmit to their relatives or patients is crucial. There have been no published studies using the HBM with regards to cervical cancer in female HCWs in Saudi Arabia, and there is limited data on self-utilization of cervical cancer screening programs. Hence, this study aimed to assess, epidemiologically, the personal utilization of cervical cancer screening by female HCWs in Saudi Arabia and its association with their beliefs towards cervical cancer and screening using the HBM, as well as their sociodemographic and reproductive characteristics.

Materials and Methods

Study Design and Participants

This nationwide cross-sectional study targeted all female HCWs in Saudi Arabia via self-administered questionnaires.

Sample Size Calculation

The minimum required sample size was calculated to be 825 through Epi Info 7.0. This assumed that 26.2% of female HCWs had cervical cancer screening according to the Heena et al study in Riyadh, Saudi Arabia, with a precision of 3.0%, and an alpha level of 0.05.¹⁴

Data Collection Process, Tool, and Study Variables

Using the non-probability sampling technique, an online survey was sent to female HCWs between July and October 2022 through their social media accounts and were encouraged to send the link to their connections in Saudi

health institutions to include more participants. Moreover, leaders in the main hospitals and primary health care centers were also approached similarly. The questionnaire was developed by the researchers after a review of recent literature with similar objectives to the current study.^{4,11,14,15} The survey included questions on sociodemographic, occupational, and reproductive characteristics, the utilization of cervical cancer screening, and HBM components for cervical cancer and the Pap smear test (Tables 1–3).

Table 1 Distribution of Female Health Care Workers According to Their Sociodemographic and Reproductive Characteristics, Saudi Arabia (N=1857)

Characteristics	N (%)
Saudi region of practice	
Central	351 (18.9)
Western	527 (28.4)
Northern	124 (6.7)
Eastern	741 (39.9)
Southern	114 (6.1)
Nationality	
Saudi	1649 (88.8)
Non-Saudi	208 (11.2)
Level of education	
Bachelor	1213 (65.3)
Health Diploma	151 (8.1)
Master's degree	148 (8.0)
PhD or Residency	345 (18.6)
Occupation	
Physician	784 (42.2)
Nurse	536 (28.9)
Pharmacist	133 (7.2)
Technician	113 (6.1)
Applied medical scientist	291 (15.7)
Specialty of physician (n=784)	
General Practice	173 (22.1)
Family Medicine	94 (12.0)
Obstetrics and Gynecology	80 (10.2)
Others	437 (55.7)
Marital status	
Single (never married)	849 (45.7)
Current married	905 (48.8)
Ever married (widowed, divorced)	103 (5.5)
History of ever smoking	
Yes	387 (20.8)
No	1470 (79.2)
Age of first sexual activity (n=1008)^a	
Mean \pm SD	24.21 \pm 3.95
Range (Min.– Max.)	18–45
Number of marriages (n=1008)^a	
Mean \pm SD	2.23 \pm 0.89
Range (Min. – Max.)	1–5

(Continued)

Table 1 (Continued).

Characteristics	N (%)
Number of pregnancies (n=1008)^a Mean ± SD Range (Min. – Max.)	3.38±1.87 1–8
Have you ever been diagnosed with an HPV infection? Yes No	65 (3.5) 1792 (96.5)
Family history cervical cancer Yes No	116 (6.2) 1741 (93.8)
Use of oral contraceptives or hormonal intrauterine devices in the past Yes No	554 (29.8) 1303 (70.2)
History of chronic immunocompromising diseases Yes No	81 (4.4) 1776 (95.1)
History of ever having more than one legitimate sexual partner in a period of one year (n=1008)^a Yes No	53 (5.3) 955 (94.7)

Notes: ^aAverages were calculated from current and ever married health care workers excluding single.

Abbreviations: SD, standard deviation; Min, minimum; Max, maximum.

Table 2 Utilization of Cervical Cancer Screening by Female Health Care Workers, Saudi Arabia

Variable	N (%)
Have you ever had screening for cervical cancer? (n=1008)^a Yes No	248 (24.6) 760 (75.4)
Type of screening test^b Pap smear HPV Test Pap and HPV tests Not sure	188 (75.8) 18 (7.2) 16 (6.5) 26 (10.5)
How many times was the screening test performed?^b 1 2 3 ≥4 Not sure	95 (38.4) 72 (29.0) 28 (11.3) 39 (15.7) 14 (5.6)

(Continued)

Table 2 (Continued).

Variable	N (%)
Specialty of the physicians who performed the screening test most of the times^b	
Gynecologist	214 (86.3)
Family Physician	30 (12.1)
Others (oncologist, endocrinologist)	4 (1.6)
Ever diagnosed with cervical pathology^b	
Yes	21 (8.5)
No	227 (91.5)
Ever diagnosed with cervical cancer^b	
Yes	5 (2.0)
No	243 (98.0)
Willingness to do cervical cancer screening this year (N=1857)	
Yes	836 (45.0)
No	1021 (55.0)

Notes: ^aFrequencies and percentages were calculated from current and ever married HCWs excluding single;

^bFrequencies and percentages were calculated from current and ever married HCWs who were (yes) for screening for cervical cancer (n=248).

Table 3 Descriptive Distribution of the Components of Health Belief Model Among Females' Health Care Workers, Saudi Arabia (Single Participants Excluded, n=1008)

	Strongly Disagree N (%)	Disagree N (%)	Neutral N (%)	Agree N (%)	Strongly Agree N (%)
Perceived susceptibility for cervical cancer					
It is likely that I will get cervical cancer in the future	253 (25.2)	321 (31.8)	323 (32.0)	80 (7.9)	31 (3.1)
My chances of getting cervical cancer in the next few years are high	274 (27.2)	366 (36.3)	261 (25.9)	87 (8.6)	20 (2.0)
I feel I will get cervical cancer some time during my life	304 (30.2)	340 (33.7)	263 (26.1)	84 (8.3)	17 (1.7)
Mean ± SD	6.72±2.65				
Perceived seriousness of cervical cancer					
The thought of cervical cancer scares me	138 (13.7)	174 (17.3)	275 (27.3)	294 (29.2)	127 (12.6)
When I think about cervical cancer, my heart beats faster	164 (16.3)	257 (25.5)	320 (31.7)	204 (20.2)	63 (6.3)
I am afraid to think about cervical cancer	158 (15.7)	225 (22.3)	273 (27.1)	272 (27.0)	80 (7.9)
Problems I would experience with cervical cancer would last a long time	122 (12.1)	182 (18.1)	330 (32.7)	300 (29.8)	74 (7.3)
Cervical cancer would threaten a relationship with my husband	120 (11.9)	190 (18.8)	259 (25.7)	335 (32.2)	104 (10.3)
If I had cervical cancer my whole life would change	67 (6.6)	128 (12.7)	216 (21.4)	423 (42.0)	174 (17.3)
If I developed cervical cancer, I will not live longer than 5 years	117 (11.6)	319 (31.6)	408 (40.5)	131 (13.0)	33 (3.3)
Mean ± SD	21.02±5.58				

(Continued)

Table 3 (Continued).

	Strongly Disagree N (%)	Disagree N (%)	Neutral N (%)	Agree N (%)	Strongly Agree N (%)
The perceived benefit of undergoing cervical cancer screening					
I want to discover health problems early	34 (3.3)	51 (5.1)	141 (14.0)	365 (36.2)	417 (41.4)
Maintaining good health is extremely important to me	28 (2.8)	33 (3.3)	109 (10.8)	353 (35.0)	485 (48.01)
I look for new information to improve my health	27 (2.7)	36 (3.6)	158 (15.6)	429 (42.6)	358 (35.5)
I feel it is important to carry out activities which will improve my health	21 (2.0)	34 (3.4)	137 (13.6)	427 (42.4)	389 (38.6)
Having regular Pap smear tests will help to find changes to the cervix, before they turn into cancer	24 (2.4)	51 (5.1)	165 (16.3)	425 (42.2)	343 (34.0)
If cervical cancer was found at a regular Pap smear test its treatment would not be so bad	29 (2.9)	66 (6.4)	311 (30.9)	441 (43.8)	161 (16.0)
I think that having a regular Pap smear test is the best way for cervical cancer to be diagnosed early	22 (2.2)	47 (4.7)	203 (20.1)	444 (44.0)	292 (29.0)
Having regular Pap smear tests will decrease my chances of dying from cervical cancer	19 (1.9)	59 (5.9)	245 (24.3)	443 (43.9)	242 (24.0)
Mean ± SD	31.85±5.64				
Perceived health motivation					
I eat well-balanced meals for my health	35 (3.5)	111 (11.0)	291 (28.9)	390 (38.7)	181 (18.0)
I exercise at least 3 times a week for my health	73 (7.2)	255 (25.3)	289 (28.7)	250 (24.8)	141 (14.0)
I will have regular health checkups even when I am not sick	88 (8.8)	286 (28.4)	316 (31.3)	233 (23.1)	85 (8.4)
Mean ± SD	9.63±2.61				
Perceived barriers to undergoing cervical cancer screening					
I am afraid to have a Pap smear test for fear of a bad result	169 (16.7)	382 (37.9)	255 (25.3)	161 (16.0)	41 (4.1)
I am afraid to have a Pap smear test because I do not know what will happen	176 (17.5)	360 (35.7)	273 (27.1)	157 (15.5)	42 (4.2)
I do not know where to go for a Pap smear test	202 (20.0)	334 (33.1)	180 (17.9)	210 (20.8)	82 (8.2)
I would be ashamed to lie on a gynecologic examination table	150 (14.9)	262 (26.0)	272 (27.0)	231 (22.9)	93 (9.2)
Undergoing a Pap smear test takes too much time	156 (15.5)	366 (36.3)	321 (31.8)	132 (13.1)	33 (3.3)
Undergoing a Pap smear test is too painful	92 (9.1)	267 (26.5)	383 (38.0)	211 (20.9)	55 (5.5)
Health professionals performing Pap smear tests are rude to women	198 (19.6)	328 (32.6)	327 (32.4)	110 (10.9)	45 (4.5)
I neglect or do not remember to have a Pap smear test regularly	71 (7.0)	191 (18.9)	323 (32.0)	335 (33.2)	88 (8.7)
I have other problems in my life which are more important than having a Pap smear test	104 (10.3)	297 (29.5)	308 (30.6)	227 (22.5)	72 (7.1)
I am too old to have a Pap smear test regularly	231 (22.9)	466 (46.3)	201 (20.0)	85 (8.4)	24 (2.4)
There is no health center close to my house to have a Pap smear test	140 (13.9)	312 (31.0)	278 (27.6)	210 (20.8)	68 (6.7)

(Continued)

Table 3 (Continued).

	Strongly Disagree N (%)	Disagree N (%)	Neutral N (%)	Agree N (%)	Strongly Agree N (%)
If there is cervical cancer development in my destiny, having a Pap smear test cannot prevent it	120 (11.9)	310 (30.8)	347 (34.3)	182 (18.1)	49 (4.9)
I prefer that a female doctor conducts a Pap smear test	29 (2.9)	69 (6.8)	212 (21.0)	291 (28.9)	407 (40.4)
I will never have a Pap smear test if I have to pay for it	139 (13.8)	392 (38.9)	260 (25.8)	181 (18.0)	36 (3.5)
I do not have time to get a Pap smear test	110 (10.8)	295 (29.3)	302 (30.0)	238 (23.6)	63 (6.3)
The Pap smear test may move the intrauterine device	136 (13.5)	321 (31.8)	403 (40.0)	123 (12.2)	25 (2.5)
My husband does not want me to get a Pap smear test	325 (32.2)	387 (38.4)	217 (21.5)	61 (6.1)	18 (1.8)
It is difficult to get an appointment to have a Pap smear Test	152 (15.1)	318 (31.5)	336 (33.3)	153 (15.2)	49 (4.9)
Mean ± SD	48.86±10.56				

The HBM has been utilized among females from different cultures.^{4,15–21} The format of HBM items used in the current study was based on Victoria Champion's CHBM scale that already was adapted, validated and applied by Aldohaian et al's study among a sample of Saudi patients.⁴ Permission to use it in the current study was obtained from Victoria Champion.^{22–24}

The HBM items are under five main subscales: perceived susceptibility to having cervical cancer; perceived seriousness of having cervical cancer; perceived benefits of undergoing a cervical cancer screening; perceived motivation towards enhancing their health; and perceived barriers to undergoing cervical cancer screening (Table 3). Each item of the subscales has a five-point Likert-scale response option ranging from strongly agree (5 points) to strongly disagree (1 point). A mean score was calculated for each of the subscales. A higher score reveals stronger feelings with regards to the related construct.⁴ In the current study, Cronbach's alpha coefficients for the five subscales were observed to fall between 0.72 and 0.88.

The survey was in English, and three experts revised the tool to check the clarity and appropriateness of questions in the Saudi culture.

Data Processing and Analysis

The collected data was coded and analyzed using the Statistical Package for the Social Sciences (SPSS). For descriptive statistics, frequencies and percentages were used for categorical variables, and means with standard deviations for continuous variables. For the HBM, raw scores for each subscale were calculated with the mean and standard deviation; perceived susceptibility (3–15); perceived seriousness of having cervical cancer (7–35); perceived benefits of undergoing a cervical cancer screening (8–40); perceived motivation towards enhancing their health (3–15); and perceived barriers to undergoing a cervical cancer screening (18–90). A test of normality was performed, and accordingly, Chi-squared and *t*-tests were used to assess associations, followed by linear logistic regression analyses. An unadjusted linear regression model was performed with each independent variable and the uptake of screening for cervical cancer among HCWs, followed by 5 individual adjusted linear regression analyses of HBM subscales with the uptake of screening among HCWs. A P-value < 0.05 was set as the level of significance.

Ethical Approval

The institutional review board (IRB) committee at Imam Abdurrahman Bin Faisal University approved the study with IRB number IRB-2022-01-178. Anonymity and confidentiality of the data were assured. Participation in the study was

voluntary. Consent to participate was obtained from all participants. The study complied with the principles of the Declaration of Helsinki.

Results

Characteristics of the Participants

The current study included 1857 female HCWs with a mean age of 32.07 (SD±8.45) and an age range of 24–65 years. **Table 1** shows that about half of the participants were currently married, and 20.8% had ever smoked. Physicians constituted 42.2% of the sample, and 44.3% of them were family physicians, general practitioners, or gynecologists. Those are specialists who usually perform cervical cancer screening within their scope of service. Among non-single participants (ever and currently married), the mean age of first sexual activity was 24.21 (SD±3.95) years, the mean number of marriages was 2.23 (SD±0.89), and the mean number of pregnancies was 3.38 (SD±1.87). Only 3.5% of the respondents had been previously diagnosed with HPV infection, 6.2% had a positive family history of cervical cancer, and 29.8% had ever used oral contraceptive pills (OCPs) or hormonal intrauterine devices (IUDs). A small percentage (4.4%) had a previous history of immunocompromising diseases, and only 5.3% had more than one legitimate sexual partner in less than a year.

Utilization of Cervical Cancer Screening by the Participants

Table 2 shows that one quarter (24.6%) of ever-married and currently married HCWs have had screening for cervical cancer; mostly a Pap smear (75.8%), while only HPV testing was mentioned by 7.2%. Most participants reported performing only one test (38.4%). The majority of participants had the screening test with gynecologists (86.3%). Among those who performed cervical screening, 8.5% were diagnosed with cervical pathology and 2.0% with cervical cancer. HCWs who were willing to have cervical cancer screening accounted for 45.0% of the total respondents.

Health Belief Model Regarding Cervical Cancer Screening

Table 3 displays the distribution of different components of the HBM, where the mean scores for perceived susceptibility, seriousness, benefits, motives, and barriers were 6.72 (SD±2.65); 21.02 (SD±5.58); 31.85 (SD±5.64); 9.63 (SD±2.61) and 48.86 (SD±10.56). Most HCWs disagreed or strongly disagreed with statements regarding their personal chance to develop cervical cancer (perceived susceptibility). Less than half of participants were afraid of cervical cancer and its impact on their marital relationship, and 59.3% agreed that their lives would change after a cervical cancer diagnosis (perceived seriousness). Furthermore, the majority of respondents agreed with all statements measuring the perceived benefits of cervical cancer screening, such as more than three-quarters of females wanting to discover health problems early and agreeing that “having regular Pap smear tests will help to find changes to the cervix, before they turn into cancer.” Most participants were motivated to promote their health (perceived health motivation).

Regarding barriers to obtaining a Pap smear test, the highest percentage of HCWs agreed or strongly agreed that they prefer a female doctor to conduct a Pap smear test (69.3%), 41.9% neglect or do not remember to have a Pap smear test regularly, and nearly one third (32.1%) would be ashamed to lie on a gynecologic examination table. Having no time to get a Pap smear test has been reported by 29.9%, and having other problems in life that are more important than having a Pap smear test has been reported by 29.6%, and 29.0% of HCWs agreed that they do not know where to go for a Pap smear test. About 27.5% agreed that there was no nearby health center where they could get a Pap smear test. Reporting that undergoing a Pap smear test is too painful was agreed upon by 26.4% of HCWs. Around one fifth of HCWs agreed that they will never have a Pap smear test if they have to pay for it, that it is difficult to get an appointment to have a Pap smear test, and that they are afraid to have a Pap smear test for fear of a bad result. On the other hand, lower percentages of HCWs agreed that their husbands do not want them to get a Pap smear test (7.9%), they are too old to have a Pap smear (10.8%), health professionals performing Pap smear tests are rude to women (15.4%), and undergoing a Pap smear test takes too much time (16.4%).

Factors Associated with the Utilization of Cervical Cancer Screening

Uptake of cervical cancer screening was significantly higher among older HCWs (P-value < 0.001), those who are working in the central and eastern provinces of Saudi Arabia (P-value = 0.006), and those holding a Masters' degree or higher (P-value < 0.001). Having cervical cancer screening was reported more by physicians (32.4%) and applied medical scientists (25.4%) than other HCWs. Obstetricians (56.5%), followed by family physicians (33.3%), had a higher uptake of cervical cancer screening (P-value < 0.001). Pregnancy rates were higher among HCWs who had cervical cancer screening (P-value < 0.001). Utilizing screening was more common among those who had previously been diagnosed with HPV infection (P-value = 0.002), those with a family history of cervical cancer (P-value = 0.001), those who used oral contraceptives or hormonal intrauterine devices in the past (P-value < 0.001), and those with a history of immunocompromising diseases (P-value < 0.001). A significantly higher mean score for perceived benefits and motivations was encountered among HCWs who had cervical cancer screening. Those who had never had cervical cancer screening, on the other hand, had a higher mean perceived barrier score (P-value < 0.001) (Table 4).

Table 4 Demographic and Reproductive Characteristics as Well as Health Belief Model According to the Uptake of Cervical Cancer Screening by Female Health Care Workers, Saudi Arabia (Single Participants Excluded, n=1008)

Characteristics	Ever Screening for Cervical Cancer		
	Yes N (%) 248 (24.6)	No N (%) 760 (75.4)	P-value
Age (in years)^a	40.16±10.77	33.88±8.56	< 0.001
Saudi region of practice			0.006
Central	43 (28.5)	108 (71.5)	
Western	46 (18.5)	203 (81.5)	
Northern	10 (13.5)	64 (86.5)	
Eastern	133 (28.3)	337 (71.7)	
Southern	16 (25.0)	84 (75.0)	
Nationality			0.628
Saudi	218 (24.9)	659 (75.1)	
Non-Saudi	30 (22.9)	101 (77.1)	
Level of education			< 0.001
Health Diploma	8 (8.6)	85 (91.4)	
Bachelor	101 (18.3)	451 (81.7)	
Master's degree	42 (39.3)	65 (60.7)	
PhD or Residency	97 (37.9)	159 (62.1)	
Occupation			< 0.001
Physician	148 (32.4)	309 (67.6)	
Nurse	52 (18.5)	229 (81.5)	
Pharmacist	7 (9.0)	71 (91.0)	
Technician	9 (13.6)	57 (86.4)	
Applied Medical Scientist	32 (25.4)	94 (74.6)	
Specialty of physician (n=784)			< 0.001
General Practice	18 (26.1)	51 (73.9)	
Family Medicine	23 (33.3)	46 (66.7)	
Obstetrics/Gynecology	35 (56.5)	27 (43.5)	
Others	72 (28.0)	185 (72.0)	
History of ever smoking			0.710
Yes	45 (23.6)	146 (76.4)	
No	203 (24.8)	614 (75.2)	

(Continued)

Table 4 (Continued).

Characteristics	Ever Screening for Cervical Cancer		
	Yes N (%) 248 (24.6)	No N (%) 760 (75.4)	P-value
Age of first sexual activity ^a	24.26±4.26	24.19±3.86	0.827
Number of marriages ^a	2.34±0.892	2.32±0.898	0.742
Number of pregnancies ^a	4.06±1.87	3.10±1.81	< 0.001
Have you ever been diagnosed with an HPV infection?			0.002
Yes	17 (45.9)	20 (54.1)	
No	231 (23.8)	740 (76.2)	
Family history of cervical cancer			0.001
Yes	28 (41.2)	40 (58.8)	
No	220 (23.4)	720 (76.6)	
Use of oral contraceptives or hormonal intrauterine devices in the past			< 0.001
Yes	147 (32.8)	301 (67.2)	
No	101 (18.0)	459 (82.0)	
History of chronic immunocompromising diseases			< 0.001
Yes	21 (51.2)	20 (48.8)	
No	227 (23.5)	740 (76.5)	
History of ever having more than one legitimate sexual partner in a period of one year			0.194
Yes	17 (32.1)	36 (67.9)	
No	231 (24.2)	729 (75.8)	
Perceived susceptibility ^a	6.58±2.78	6.76±2.61	0.369
Perceived seriousness ^a	21.21±5.48	20.96±5.62	0.534
Perceived benefits ^a	33.64±5.62	31.27±5.50	< 0.001
Perceived motives ^a	10.04±2.66	9.5±2.58	0.004
Perceived barriers ^a	42.67±9.98	50.88±9.95	< 0.001

Note: ^aData are presented as mean ± SD.

Table 5 shows the logistic regression analyses of different variables (non-adjusted) with the uptake of screening among female HCWs. The odds of utilizing cervical cancer screening were significantly higher among older HCWs, those who had a master's degree or higher, and those with a higher number of pregnancies than their counterparts. Furthermore, HCWs with a history of HPV infection were more likely to undergo cervical cancer screening (unadjusted OR = 6.159, 95% CI = 3.721–10.195). Uptake of cervical cancer screening was significantly higher among HCWs who had a family history of cervical cancer (unadjusted OR = 2.291, 95% CI = 1.381–3.800), those with a history of hormonal contraception (unadjusted OR = 2.219, 95% CI = 1.65–2.972), and HCWs who had a history of immunocompromised diseases (unadjusted OR = 3.423, 95% CI = 1.823–6.428). Nurses, pharmacists, and technicians, on the other hand, were significantly less likely than physicians to utilize cervical cancer screening (P-value < 0.05). Furthermore, HCWs working in the western and northern regions were significantly less likely than those working in the central region to utilize the screening (P-value < 0.05).

Table 6 demonstrates the regression analyses of HBM with the uptake of screening among female HCWs. After adjustment with the different variables listed in Table 5, an increase in mean scores of perceived benefits and motives was

Table 5 Logistic Regression Analyses of Female Health Care Workers' Characteristics (Non-Adjusted) with the Utilization of Cervical Cancer Screening, Saudi Arabia (Single Participants Excluded, n=1008)

Characteristics	Ever Screening for Cervical Cancer		
	P-value	Unadjusted OR	95% CI
Age in years	< 0.001	1.066	1.050–1.081
Saudi region of practice (Ref: Central)			
Western	0.021	0.569	0.353–0.917
Northern	0.015	0.392	0.185–0.834
Eastern	0.966	0.991	0.660–1.488
Southern	0.602	0.837	0.430–1.631
Level of education (Ref: Bachelor)			
Health Diploma	0.025	0.420	0.179–0.895
Master's degree	< 0.001	2.885	1.851–4.489
PhD/ Residency	< 0.001	2.724	1.954–3.797
Occupation (Ref: Physician)			
Nurse	< 0.001	0.474	0.331–0.679
Pharmacist	< 0.001	0.206	0.092–0.458
Technician	0.003	0.330	0.159–0.684
Applied Medical Scientist	0.134	0.711	0.455–1.111
Age of first sexual activity	0.827	1.004	0.968–1.041
Number of marriages	0.742	1.027	0.877–1.022
Number of pregnancies	< 0.001	1.303	1.208–1.406
Have you ever been diagnosed with an HPV infection? (Ref: No)	< 0.001	6.159	3.721–10.195
Family history of cervical cancer (Ref: No)	< 0.001	2.291	1.381–3.800
Use of oral contraceptives or hormonal intrauterine devices in the past (Ref: No)	< 0.001	2.219	1.65–2.972
History of chronic immunocompromising diseases (Ref: No)	< 0.001	3.423	1.823–6.428
History of ever having more than one legitimate sexual partner in a period of one year (Ref: No)	0.197	1.480	0.816–2.685

Abbreviations: OR, odds ratio; CI, confidence interval.

Table 6 Logistic Regression Analyses of Health Belief Model with the Uptake of Screening Among Female Health Care Workers, Saudi Arabia

Components of Health Belief Model	Ever Screening for Cervical Cancer			
	Unadjusted OR (95% CI)	P-value	Adjusted OR (95% CI)	P-value
Perceived susceptibility	0.975 (0.924–1.030)	0.368	0.955 (0.896–1.018)	0.158
Perceived seriousness	1.008 (0.983–1.035)	0.533	1.001 (0.972–1.030)	0.959
Perceived benefits	1.094 (1.060–1.128)	< 0.001	1.074 (1.039–1.111)	< 0.001
Perceived motives	1.084 (1.025–1.146)	0.005	1.078 (1.014–1.146)	0.017
Perceived barriers	0.920 (0.905–0.935)	< 0.001	0.921 (0.905–0.938)	< 0.001

Notes: Health Belief Model has been adjusted with different variables listed in Table 5.

associated with an increase in the uptake of screening (adjusted OR = 1.074, 95% CI = 1.039–1.111, and adjusted OR = 1.078, 95% CI = 1.014–1.146, respectively). On the other hand, an increase in perceived barrier scores was significantly associated with a decreased likelihood of uptake of cervical cancer screening (adjusted OR = 0.921, 95% CI = 0.905–0.938).

Discussion

The current study is assessed the utilization of cervical cancer screening by female HCWs in Saudi Arabia, their sociodemographic and reproductive characteristics, as well as their health beliefs regarding cervical cancer and its screening test. Results show that 24.6% of participating HCWs underwent a cervical cancer screening test. On the other hand, nearly half (45%) of HCWs in this study were willing to have the test. The frequency of cervical cancer screening uptake by HCWs varies among countries, eg, Pakistan (17.6%), Jordan (19.1%), Saudi Arabia (26.2%), Turkey (4.2–45.2%), Qatar (42.2%), and Taiwan (70.6%).^{14,25–31} Differences in cultural background and demographic characteristics of participants, the risk factor profile and epidemiology of cervical cancer, the healthcare system, and methodologies could contribute to these differences.

Based on the HBM constructs as a framework, our findings suggest that the majority of our study participants considered themselves to have a low susceptibility to cervical cancer. Besides, less than half of the participants expressed fear of cervical cancer and how it may impact their marital relationship, reflecting the low level of perceived seriousness. A systematic review has reported that the higher the scores of perceived susceptibility and seriousness of illness, the higher the likelihood of screening.³² Such an association could not be confirmed in the current study; a possible explanation is the deficiency of large epidemiological studies on the prevalence of cervical cancer and its risk profile in the country, which consequently affects the HCWs understanding of the magnitude of the problem.⁴ This study shows high scores for perceived benefits of undergoing cervical cancer screening among Saudi HCWs. Most participants believed that maintaining good health was essential to them. They wanted to discover health problems early and agreed that “having regular Pap smear tests will help to find changes to the cervix before they turn into cancer.” Similarly, the perceived health motivation scores were high among most study participants. In line with prior work, these observations have been associated with a higher likelihood of screening.^{15,18,32} Hence, we recommend focusing on the benefits of screening and health motivations in interventions aiming to promote cervical cancer screening. When asked about perceived barriers to cervical cancer screening, the majority of respondents strongly expressed a preference for a female doctor. Although this can be explained by the modesty of Muslim women and Arabic culture, as documented by a study among Arab Muslim women in the USA, studies among participants from other Western countries reported a similar preference for a female physician to perform the test.^{33,34} Most study participants did not perceive the reasons mentioned in the scale as significant barriers (eg, being afraid of the Pap test results, not knowing what will happen during the Pap test, the Pap test will take a long time, and the Pap test may move the IUD), which can be understandably explained by the fact that our study targeted HCWs who are more knowledgeable and familiar with the Pap test compared to the general population. Furthermore, paying for the Pap test was not cited as a significant barrier for most respondents, which the free access to universal healthcare in Saudi Arabia can explain. On the other hand, not prioritizing the screening, forgetting to do the test, fear of a painful procedure, and lack of access to a nearby health center appeared as potential barriers to undergoing cervical cancer screening. Therefore, interventions to improve the uptake of cervical cancer screening should include strong emphasis from the doctor on the importance of the screening, regular patient reminders, a proper explanation of the procedure to reduce apprehension, and improved access to healthcare facilities equipped with testing for cervical cancer screening.

Findings from the current study demonstrate that certain demographic and reproductive factors were associated with the uptake of the screening test. This study finds that older participants utilized the screening test more than younger participants. A study from Ethiopia confirmed this association, in which females aged 40–49 were more likely to have undergone screening than their younger counterparts.³⁵

The present study demonstrates that participants with a higher level of education had higher utilization rates of screening, probably due to their knowledge and awareness regarding cancer and its preventive measures.^{16,19} Similar

justifications can explain the findings of a higher uptake among physicians, specifically gynecologists. Moreover, accessibility to the service and the scope of their practice could also be additional reasons for this finding.

This study shows that the rates of cervical cancer screening utilization vary among different regions in Saudi Arabia, and the highest uptake was reported among HCWs who work in the central region. This could be attributed to numerous factors, such as differences in the distribution of primary healthcare centers (PHCs), population density, and acceptance of the test.³⁶ Also, the geographical differences observed between regions within the country may be attributed to the socioeconomic differences between them. According to AlOmar's socioeconomic indices of Saudi Arabia, the central and eastern regions were the highest in terms of education and affluency.³⁷

This study demonstrates that a higher pregnancy rate, prior usage of oral contraceptives, and other factors that were present in a minority of participants, such as a history of HPV infection, immunocompromised conditions, or a family history of cervical cancer, were associated with a higher uptake of cervical cancer screening among HCWs. This might be attributed to their associations with the risk of cervical cancer, which could have an important motivational effect on the uptake of the screening test or be specifically targeted by their physicians due to their high-risk nature.^{5,38}

Results of regression analyses of HBM and cervical cancer screening uptake among female HCWs in the present study show that, after adjusting for demographic and reproductive health variables, an increase in mean scores of perceived benefits of screening and health motives was associated with higher odds of undergoing cervical cancer screening. On the other hand, the odds of cervical cancer screening uptake decreased with an increase in the mean scores of perceived barriers to screening. This study supports evidence from previous observations that perceived benefits, motivations, and barriers are associated with the uptake of cervical cancer screening.^{15–17,19} With regards to the impact of self-utilization and beliefs about preventive measures on patient care, it was found in earlier studies that HCWs' beliefs about such a preventive measure could affect their advice to their relatives and patients, not only their utilization.³⁹ Therefore, our study suggests considering approaches that target perceived benefits, health motivation, and perceived barriers to improve the screening rates of cervical cancer among HCWs in Saudi Arabia.

We acknowledged some limitations in this study. Its design may affect the generalizability of the findings, and the self-reported data could potentiate the risk of recall bias. Moreover, because of the sensitivity of this question in Saudi culture, we tried to partially assess the history of having multiple sexual partners by asking about the history of having more than one legitimate sexual partner in a period of one year. Additionally, since sexual relations outside of marriage in Saudi Arabia are culturally and religiously unacceptable, the cervical cancer screening is approached by those who were previously or are currently married; therefore, single participants were excluded from some questions in the survey.

Conclusion

This study confirms the low utilization rates of cervical cancer screening services, with a slightly higher willingness to have the test among the female HCWs in Saudi Arabia. Demographic and reproductive predictors of screening utilization include age, a higher level of education, higher pregnancy rates, the use of hormonal contraception, a history of HPV infection or cervical cancer in the family, or immunocompromised diseases. Moreover, health beliefs about cervical cancer and its screening test are significantly affecting HCWs uptake of the services. The study also uncovered various barriers hindering HCWs' utilization of the screening. To improve cervical cancer screening service uptake by female HCWs, acting on the perceived benefits of screening, perceived motivation toward enhancing health, and observed barriers to undergoing cervical cancer screening is crucial.

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Disclosure

The authors report no conflicts of interest in this work.

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