Research article

Knowledge, attitudes and associated factors regarding cervical cancer and its screening practice among women of central Nepal

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A B S T R A C T

Background: Cervical cancer is a severe public health problem worldwide including developing countries like Nepal. Cervical cancer screening has decreased the incidence and mortality of cervical cancer worldwide. Although it is highly preventable disease, cervical cancer is the leading cause of mortality among Nepalese women due to poor knowledge, negative attitude, poor practice, and late diagnosis. 1928 women died from cervical cancer in Nepal in 2018, this number was higher than that in 2017.
Objectives: This study aimed to identify the knowledge, attitudes, and associated factors related to cervical cancer and its screening practices among women in Nepal.
Methods: A community-based cross-sectional study was conducted after following the ethical approval from the Nepal Health Research Council, Ref No-115 in Kathmandu, Nepal. A total of 426 married women aged 18–49 were selected using a probability proportionate simple random sampling technique. After obtaining the written informed consent, the participants were interviewed using a validated questionnaire. Data entry and analysis were performed using IBM SPSS Statistics version 23, and we interpreted the findings using both descriptive and inferential statistics. To assess the factors associated with knowledge and attitude levels, we employed Chi-square analysis and subsequently conducted binary logistic regression analysis.
Results: The average age of respondents was 31.18 ± 8.375 and 85 % of respondents heard about cervical cancer mainly from Television/Radio. Slightly more than half (51.8 %) of respondents had favorable attitude towards cervical cancer and its screening. Regarding knowledge, 46.5 % had adequate knowledge about cervical cancer and its screening. However, majority of (91.5 %) the respondents had never done cervical cancer screening test. In logistic regression analysis, respondent's education, occupation and heard about cervical cancer were significantly associated with adequate level of knowledge. Women with secondary education (AOR = 3.875 95 % CI: 1.741–8.623) and higher education (AOR = 7.818 95 % CI: 3.386–18.048) had more adequate knowledge compared with illiterate women. Age and heard about cervical cancer and type of family were positively associated with favorable attitude. There was a very weak positive correlation between knowledge and attitude of cervical cancer and its screening (r = 0.078).
Conclusion: Cervical cancer is a severe public health problem of Nepal. From the result, we can say that about half of the subjects had knowledge and favorable attitude towards cervical cancer, despite the fact that still there is gap to transform it in to practice. There is a need for some measures to improve the cervical cancer screening practice by using information, Education, Communication materials and Behavior Change Communication (IEC/BCC)

1. Introduction

Cervical cancer is a condition characterized by the uncontrolled growth of cells in the cervix. It originates in the cervix and can potentially spread to the entire uterus, ovaries, and fallopian tubes [1]. Most cases of cervical cancer develop slowly within the lining of the cervix as precancerous lesions. If left undetected or untreated, these precancerous lesions can progress into cervical cancer.

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However, it's important to note that in some instances, these lesions may not be malignant and could resolve on their own. Cervical cancer is unique among gynecological cancers because it can be prevented [2,3].

Cervical cancer is primarily caused by a sexually transmitted infection involving specific types of HPV (Human Papilloma Virus). There are numerous types of HPV, with at least 13 known to be associated with cancer, and types 16 and 18 responsible for 70 % of cervical cancer cases. Precancerous cervical lesions exhibit distinct changes in the epithelial cells of the cervix's transformation zone. If an HPV infection occurs during this stage, the lesion may progress into cervical cancer. The primary mode of HPV transmission is through sexual contact [4]. Other risk factors contributing to the development of cervical cancer include early initiation of sexual activity, having multiple sexual partners, experiencing multiple pregnancies, prolonged use of oral contraceptives, having a weakened immune response, and smoking [2].

Precancerous cervical lesions often do not present noticeable symptoms. However, in later stages, abnormal cervical cells can become cancerous and invade nearby tissues. Abnormal vaginal bleeding, such as post-coital bleeding, inter-menstrual bleeding, or post-menopausal bleeding, is the most common symptom. Women experiencing abnormal vaginal bleeding as an early symptom are less likely to receive a late diagnosis compared to those with foul-smelling vaginal discharge, which contributes to higher mortality rates, particularly in Nepal [3,5].

Globally, cervical cancer is a significant threat to women's health, ranking as the second most common cancer among women worldwide and the most prevalent in developing countries [3,5]. In 2018 alone, there were over half a million new cases, accounting for 7.5 % of all female cancer-related deaths. An estimated 311,000 women die from cervical cancer each year, with one woman diagnosed every minute. The mortality rate from cervical cancer remains high on a global scale, with over 85 % of cases occurring in less developed regions. This condition represents a global pandemic that is increasingly becoming a major public health concern in both developed and developing nations. However, it is crucial to emphasize that cervical cancer is a preventable and treatable disease [2,3,6].

Cervical cancer screening involves systematically testing asymptomatic individuals to identify cervical abnormalities. Women targeted for screening may appear healthy and may not see a reason to visit healthcare facilities. According to WHO criteria for age and screening frequency, it is recommended that every woman between the ages of 30 and 49 undergo screening at least once in their lifetime. The screening interval, or frequency, should not be less than every five years, with variations depending on financial, infrastructural, and resource-related factors [7]. In Nepal, the national guidelines for cervical cancer screening and prevention recommend screening for all women aged 30–60 years at five-year intervals [8].

There are three primary types of cervical cancer screening tests available:(i) Pap smear and liquid-based cytology,(ii) Visual inspection with Acetic Acid (VIA), and(iii) HPV testing for high-risk HPV types, such as types 16 and 18.VIA involves the detection of early cell changes visible to the naked eye when a speculum is used to inspect the cervix after applying a dilute (3–5%) acetic acid solution [9].

While regular screening with Pap smears has proven effective in reducing the risk of invasive cervical cancer by detecting precancerous lesions, it may not be as effective in developing countries due to its high cost and resource requirements [6,10].This study aimed to identify the knowledge, attitudes, and associated factors related to cervical cancer and its screening practices among women in Nilakantha Municipality, Dhading, Nepal.

1.1. Methodology

A community-based cross-sectional study was conducted after following the ethical approval from the Nepal Health Research Council, Ref No-115 in Kathmandu, Nepal. A total of 426 married women aged 18–49 were selected using a probability proportionate simple random sampling technique. After obtaining the written informed consent, the participants were interviewed using a validated questionnaire. Data entry and analysis were performed using IBM SPSS Statistics version 23, and we interpreted the findings using both descriptive and inferential statistics. To assess the factors associated with knowledge and attitude levels, we employed Chi-square analysis and subsequently conducted binary logistic regression analysis.

2. Results

2.1. Sociodemographic characteristics of respondents

Out of the 426 participants, the majority (58.0 %) fell within the age range of 18–30 years, with an average age of 31.18 years. The predominant religion among respondents was Hinduism (82.2 %), and about half (50.2 %) identified as Janajati in terms of their ethnic group. In terms of education, only 14.6 % of the women were illiterate. Among those who were literate, 26.5 % could only read and write, while 26.1 % had completed higher education. Among the total participants, more than half (57 %) listed their primary occupation as homemaker, with 7.3 % being students. Additionally, the majority (63.1 %) of the participants lived in nuclear families, with most of them (63.4 %) having 4–6 family members in their households. Regarding economic status, 58.5 % of the respondents reported that their income was sufficient for more than 12 months. Regarding the education of the respondents' husbands, only 7.5 % were illiterate. Among the literate husbands, 26.5 % had completed higher education. In terms of their occupations, the most common occupation among husbands was businessman (28.6 %), followed closely by farmers (27.2 %).Regarding the mean age of marriage, more than half (57.5 %) of the respondents reported a mean age of marriage of 18.75 years with a standard deviation of 2.95. Regarding family history of cervical cancer among all participants, only 8 % of them had a family history of cervical cancer (Table 1).

2.2. Knowledge about cervical cancer screening

Most of the respondents (72.1 %) provided correct answers when asked if cervical cancer is the most common cancer in Nepal. Among all participants, a majority (70.9 %) correctly indicated that cervical cancer is preventable. Additionally, more than half (66.7 %) gave the correct response regarding the curability of cervical cancer. Regarding the symptoms of cervical cancer, the majority (58.7 %) of respondents identified bleeding between periods as a symptom. Furthermore, over half (56.6 %) reported that bleeding and spotting after menopause are associated with cervical cancer. Additionally, almost two-thirds (38.0 %) of respondents correctly recognized that cervical cancer may be without noticeable signs in its early stages. Turning to risk factors, more than two-thirds (68.3 %) of the participants correctly identified early marriage as increasing the risk of cervical cancer. However, only about two-fifths (39.7 %) of respondents provided the correct response regarding the role of Pap smear in detecting cervical cancer at an earlier stage. Only 28.6 % of respondents correctly indicated that Pap smear should be performed after the age of 20. A smaller proportion (8.0 %) of respondents correctly stated that Pap smear is necessary after the age of 65. Additionally, more than two-fifths (44.4 %) correctly mentioned the recommended interval for cervical cancer screening (Table 2).

2.3. Attitude of cervical cancer and its screening

Among the participants, 24.6 % strongly agreed that Pap smear tests are effective for early detection of cervical cancer. A significant portion of the women neither agreed nor disagreed with the statement that Pap smear tests are not effective for preventing cervical cancer. Approximately three-fifths (60.8 %) of the women also neither agreed nor disagreed that Pap smear tests are expensive.

Table 1
Sociodemographic Characteristics of the respondents (n = 426).

Characteristics	Frequency	Percentage
Age Group		
Mean ± SD	31.18 ± 8.375	
≤30	247	58.0
≥31	179	42.0
Ethnicity		
Dalit	54	12.7
Janajati	214	50.3
Madhesi	6	1.4
Brahmin/chhetri	144	33.3
Thakuri/Sanyasi	10	2.3
Religion		
Hindu	350	82.2
Buddhism	26	11.7
Christian	50	11.9
Education of Women		
Illiterate	62	14.6
Only read and write	113	26.5
Primary	51	12.0
Secondary	89	20.9
Higher education	111	26.0
Student	31	7.3
Business	65	15.3
Type of Family		
Nuclear	269	63.1
Joint	157	36.9
Education of Husband		
Illiterate	32	7.5
Only read and write	107	25.1
Primary	62	14.6
Secondary	112	26.3
Higher education	113	26.5
Occupation of Husband		
Farmer	116	27.2
Employee	89	20.9
Student	14	3.3
Business	122	28.6
Foreign employee	85	20.0
Age of marriage		
Mean ± SD	18.75 ± 2.95	
6–19	245	57.5
20–30	181	42.5
Family History of cervical cancer		
Yes	34	8.0
No	392	92.0

Table 2

Knowledge regarding cervical cancer and its screening(n = 426).

Knowledge	Correct Response	Incorrect Response
	N (%)	N (%)
Cervical cancer is the most common cancer among women	307 (72.1)	119 (27.9)
Cervical cancer is preventable	302 (70.9)	142 (29.1)
Cervical cancer is curable	284 (66.7)	142 (33.3)
Risk factors of cervical cancer		
Early marriage increases the risk of cervical cancer	291 (68.3)	135 (31.7)
Genitourinary infection increase the risk of Cervical cancer.	260 (61.0)	166 (39.0)
Symptoms of cervical cancer		
Bleeding between menstrual period is a symptom of cervical cancer	250 (58.7)	176 (41.3)
Bleeding and spotting after menopause are associated with cervical cancer	241 (56.6)	185 (43.4)
Bleeding and feeling pain after intercourse are symptoms of cervical cancer	170 (39.9)	256 (60.1)
Cervical cancer may be without sign in early stage.	162 (38.0)	264 (62.0)
Pap smear Test		
Pap smear helps to detect the cervical cancer earlier	169 (39.7)	256 (60.3)
Pap smear should be done after 20 years of age	122 (28.6)	304 (71.4)
Pap smear is necessary after 65 years of age[a]	34 (8.0)	392 (92.0)
Pap smear test should be done every 3 years by all married women	189 (44.4)	237 (55.6)
Pap smear is only recommended only for elderly women[a]	70 (16.4)	356 (83.6)
Pap smear test should be done only if infection and bleeding was seen[a]	48 (11.3)	377 (88.7)
Pap smear test can be done among pregnant women.[a]	49 (11.5)	377 (88.5)
Pap smear test may cause cervical infection[a]	86 (20.2)	340 (79.8)

Note.

[a] The variables were reversed when calculating the score.

Similarly, more than half (56.6 %) neither agreed nor disagreed that Pap smear tests are painful, and 50 % of the respondents were neutral about whether these tests are time-consuming. Only 5.6 % of the women strongly disagreed that performing Pap smear tests invades women's privacy. In contrast, only 30 % strongly agreed, followed by 25.4 % who agreed that screening tests should be done before experiencing cervical cancer symptoms. Regarding the necessity of Pap smear tests for asymptomatic individuals, 34 % of the participants neither agreed nor disagreed, while 29.1 % disagreed, and 7.7 % strongly disagreed. The majority (56.3 %) of women had mixed opinions about the quality of Pap smear test equipment, with neither agreement nor disagreement. However, 3.3 % strongly disagreed, and 17.6 % disagreed with the notion that Pap smear test equipment lacks quality (Table 3).

2.4. Practice of cervical cancer screening

Moving on to Pap smear test utilization, 8.5 % of the women had undergone Pap smear tests. Among those who had undergone Pap screening, approximately 47.22 % did so between the ages of 26–35 years, and 30.55 % did it between the ages of 36–45 years. Additionally, a significant majority (77.77 %) had undergone Pap smear tests at least once. However, only 16.66 % of women had Pap tests every 3 years. The majority (69.44 %) had their Pap tests within 3 years, and more than half (61.11 %) had these tests done regularly.

Among the 22 participants who had regular Pap tests, all of them did so for both diagnostic purposes and preventive measures. Notably, 75.8 % of women had not undergone Pap tests due to a lack of awareness, and 73 % felt it was unnecessary because they were not experiencing any health issues (Table 4) (see Tables 1, 2, 3, 4, 5, 6, 7, 8 and 9).

Table 3

Attitude about cervical cancer and its screening(n = 426).

Item	1	2	3	4	5
	N (%)	N (%)	N (%)	N (%)	N (%)
Pap smear test is effective in early detection of cervical cancer.	65 (15.3)	77 (18.1)	79 (18.5)	100 (23.4)	105 (24.7)
Pap smear test is not effective for cervical cancer prevention.[a]	29 (6.8)	81 (19.0)	188 (44.1)	105 (24.6)	23 (5.5)
Pap smear test is expensive.	13 (3.1)	64 (15.0)	259 (60.8)	82 (19.2)	8 (1.9)
Pap smear test is painful.	14 (3.2)	71 (16.7)	241 (56.6)	81 (19.0)	19 (4.5)
Pap smear test is time consuming.	14 (3.3)	73 (17.1)	230 (54.0)	97 (22.8)	12 (2.8)
Performing pap smear test disturbs the privacy of women.[a]	24 (5.6)	97 (22.8)	153 (35.9)	122 (28.6)	30 (7.1)
Pap smear test is not necessary in asymptomatic individuals.[a]	33 (7.7)	124 (29.1)	145 (34.0)	97 (22.8)	27 (6.4)
Equipment of the pap smear test doesn't have a good quality.[a]	14 (3.3)	75 (17.6)	240 (56.3)	79 (18.5)	18 (4.3)

Note.

1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree.

f = frequency, % = percent.

[a] The variables were reversed when calculating the score.

2.5. Association between level of knowledge and sociodemographic variables

Participants' level of knowledge was statistically significant with some of the sociodemographic information collected during the survey, including age ($X2 = 15.800$, p-value = 0.000), education ($X2 = 76.245$, P-value = 0.000), occupation ($X 2 = 38.847$, p-value = 0.000), education of husband ($X 2 = 41.563a$, P-value = 0.000), occupation of husband ($X 2 = 18.829a$, P-value = 0.001), age of marriage ($X 2 = 15.252a$, P-value = 0.000), heard about cervical cancer ($X 2 = 56.906a$, P-value = 0.000).

However, sociodemographic characters related to ethnicity, religion, family type, family size, family income, and family history of cervical cancer were not statistically significant with the participant's knowledge level [ethnicity ($X 2 = 0.649$, p-value = 2.549), religion ($X 2 = 0.007$, pvalue = 0.997), type of family ($X 2 = 0.167$, p-value = 0.683), member of family ($X 2 = 4.052a$, p-value = 0.132), monthly family income($X 2 = 5.151a$, P value = 0.076), family history of cervical cancer ($X 2 = 0.620a$, P-value = 0.431)] (Table 4).

2.6. Association between attitude level and socio-demographic variables

Similarly participants' attitude level was found to be statically significant with age ($X2 = 15.225a$, p-value = 0.000), type of family ($X2 = 8.556a$, p-value = 0.003), heard about cervical cancer ($X2 = 12.837a$, p-value = 0.000). However, attitude level was not statically significant with ethnicity ($X 2 = 6.733$, pvalue = 0.151), religion($X 2 = 0.113$, pvalue = 0.945), education($X2 = 3.003$, Pvalue = 0.557), occupation ($X 2 = 4.848$, p-value = 0.303), education of husband ($X 2 = 4.750a$, P-value = 0.314), occupation of husband($X 2 = 5.692a$, p-value = 0.223), age of marriage ($X 2 = 0.031a$, P-value = 0.860), member of family ($X 2 = 1.959a$, p-value = 0.375), monthly family income($X 2 = 1.016a$, P-value = 0.602), family history of cervical cancer ($X 2 = 0.237a$, P-value = 0.626) (Table 6).

2.7. Correlation of knowledge and attitude

The correlation between knowledge and attitude of women regarding cervical cancer and its screening was investigated using Spearman's (rho) correlations coefficient, because the data were nonparametric and category. There was a very weak positive correlation between knowledge and attitude of cervical cancer and its screening, rho = 0.078*. Who had more adequate knowledge about cervical cancer and its screening; they had more positive attitudes about cervical cancer and its screening. However there was not

Table 4
Practice about cervical cancer screening among respondents (n = 426).

Variables	Frequency	Percentage
Never done Pap smear test	390	91.5
Ever done Pap smear test	36	8.5
What age did you do first pap Smear (n = 36)		
15–25	6	16.67
26–35	17	47.22
36–45	11	30.55
>45	2	5.56
No of times pap smear done.		
1 time	28	77.77
2 or more times	8	22.23
Interval of performing pap smear test		
Every one year	3	8.34
Every 3 year	6	16.66
As needed	27	75.0
When was the pap smear test done		
Within 3 years	25	69.45
Long ago	11	30.55
Pap smear done regularly		
Yes	22	61.11
No	14	38.88
Reason for screening regularly (n = 22[a])		
Diagnostic purpose	22	100.0
Preventive measure	22	100.0
Health worker recommendation	19	82.60
Available in health camps	8	34.78
Reason for not performing pap smear test[a](n = 390)		
Not ill, so it is not necessary	311	73.0
Fear of the procedure	22	5.2
Lack of awareness	323	75.8
Cultural religious reason	12	2.8
Family member's decisions	9	2.1
No access to health facilities	119	27.9

Note.
[a] = Multiple Responses.

Table 5

Association between level of knowledge regarding cervical cancer screening and selected Sociodemographic factors(n = 426).

Variables	Level of knowledge		X^2 value	P value
	Adequate n (%)	Inadequate n (%)		
Age group			15.800	**<0.001**[a]
18–30	135(54.7)	112 (45.3)		
31–49	63 (35.2)	116 (64.8)		
Ethnicity			2.549	0.649
Dalit	21(38.9)	33 (61.1)		
Janajati	102 (47.7)	112 (52.3)		
Madhesi	2 (33.3)	4 (66.7)		
Brahmin/Chhetri	67 (47.2)	75 (52.8)		
Thakuri/Sanyasi	6(60.0)	4(40.0)		
Religion			0.007	0.997
Hindu	163 (46.6)	187 (53.4)		
Buddhism	12 (46.6)	14 (53.8)		
Christian	23 (46.0)	27 (54.0)		
Education of women			76.245	**<0.001**[a]
Illiterate	13 (21.0)	49 (79.0)		
Only read and write	30 (26.5)	83 (73.5)		
Primary	21 (41.2)	30 (58.8)		
Secondary	50 (56.2)	39 (43.8)		
Higher education	84 (75.7)	27 (24.3)		
Occupation of women			38.847	**<0.001**
Housemaker	85 (35.0)	158 (65.0)		
Farmer	27 (55.1)	22 (44.9)		
Employee	30 (78.9)	8 (21.1)		
Student	22 (71.0)	9 (29.0)		
Business	34 (52.3)	31 (47.7)		
Type of Family			0.168	0.683
Nuclear	123 (45.7)	146 (54.3)		
Joint	75 (47.8)	82 (52.2)		
Economical Status			5.151	0.076
Sufficient for below than 6 months	37 (52.9)	33 (47.1)		
Sufficient for up to 12 months	40 (37.4)	67 (62.6)		
Sufficient for more than 12 months	121 (48.6)	128 (51.4)		
Husband Education			41.563	**<0.001**[a]
Illiterate	7 (21.9)	25 (78.1)		
Only read and write	29 (27.1)	78 (72.9)		
Primary	32 (51.6)	30 (48.4)		
Secondary	56 (50.0)	56 (50.0)		
Higher education	74 (65.5)	39 (34.5)		
Occupation of husband			18.829	**0.001**[a]
Farmer	35 (30.2)	81 (69.8)		
Employee	51 (57.3)	38(42.7)		
Student	7 (50.0)	7 (50.0)		
Business	59 (48.4)	63 (51.6)		
Foreign Employee	46 (51.1)	39 (45.9)		
Age of marriage			15.252	**<0.001**[a]
6–19	94 (38.4)	151 (61.6)		
20–30	104 (57.5)	77 (42.5)		
Family history of cervical cancer			0.620	0.431
No	180 (45.9)	212 (54.1)		
Yes	18 (52.9)	16 (47.1)		
Have you heard about cervical cancer			56.906	**<0.001**[a]
No	2 (3.1)	62 (96.9)		
Yes	196 (54.1)	166 (45.9)		

f = frequency, p = percent.

[a] p-value <0.05, which variables are significant with knowledge level.

significantly association between adequate knowledge and favorable attitude of cervical cancer and its screening (Table 7).

2.8. Associated factors of knowledge of cervical cancer and itScreening

Associated factors of knowledge on cervical cancer and its screening were analyzed into SPSS by binary logistic regression. Direct logistic regression was performed to access the impact of number of factors on the likelihood that respondents would report that they had inadequate or adequate knowledge about cervical cancer. Eight variables which were significantly associated in bivariate analysis were entered in logistic regression analysis. The model contained three independent variables (education, occupation and heard about cervical cancer). The full model containing all predictors were statistically significant x^2 (df = 9, n = 426) = 134.14, p-value <0.001,

Table 6
Association between level of attitude regarding cervical cancer screening and selected associated factors (n = 426).

Variables	Level of attitude		X^2 value	P value
	Favorable n (%)	Unfavorable n (%)		
Age group			15.225	**<0.001[a]**
18–30	148 (59.9)	99 (40.1)		
31–49	73 (40.8)	106 (59.2)		
Ethnicity of women			6.783[a]	0.147
Dalit	31 (57.4)	23 (42.6)		
Janajati	120 (56.1)	94 (43.9)		
Madhesi	3 (50.0)	3 (50.0)		
Brahmin/Chhetri	64 (45.1)	78 (54.9)		
Thakuri/Sanyasi	7 (70.0)	3 (30.0)		
Religion of women			0.113[a]	0.945
Hindu	182 (52.0)	168 (48.0)		
Buddhism	14 (53.8)	12 (46.2)		
Christian	25 (50.0)	25 (50.0)		
Education of women			3.003[a]	0.557
Illiterate	36 (58.1)	26 (41.9)		
Only read and write	53 (46.9)	60 (53.1)		
Primary	26 (51.0)	25 (49.0)		
Secondary	44 (49.4)	45 (50.6)		
Higher education	62 (55.9)	49 (44.1)		
Occupation of Women			4.848[a]	0.303
Housemaker	119 (49.0)	124(51.0)		
Farmer	28 (57.1)	21(42.9)		
Employee	21(55.3)	17 (44.7)		
Student	21(55.3)	17 (44.7)		
Business	32 (49.2)	33 (50.8)		
Type of Family			8.556	**0.003[a]**
Nuclear	125 (46.5)	144 (53.5)		
Joint	96 (61.1)	61 (38.9)		
Economic Status			1.016[a]	0.602
Sufficient for below than 6 months	35 (50.0)	35(50.0)		
Sufficient for up to 12 months	60 (56.1)	47 (43.9)		
Sufficient for more than 12 months	126 (50.6)	123 (49.4)		
Education of Husband			4.750[a]	0.314
Illiterate	20 (62.5)	12(37.5)		
Only read and write	47 (43.9)	60 (56.1)		
Primary	33 (53.4)	29(46.6)		
secondary	62(55.4)	50 (44.6)		
Higher secondary	59 (52.2)	54 (47.8)		
Occupation of husband			5.692	0.223
Farmer	65(56.0)	51 (44.0)		
Employee	47 (52.8)	42(47.2)		
Student	9 (64.3)	5 (35.7)		
Business	65(53.3)	57 (46.7)		
Foreign employee	35 (41.2)	50 (58.8)		
Marriage age			0.031[a]	0.860
6–19	128 (52.2))	117 (47.8)		
20–30	93 (51.4)	88 (48.6)		
Family history of cervical cancer			0.237	0.626
No	202 (51.5)	190 (48.5)		
Yes	19 (55.9)	15 (44.1)		
Have you heard about cervical cancer			12.837	**<0.001[a]**
No	20 (31.2)	44 (68.8)		
Yes	201 (55.5)	161 (44.5)		

Note.
f = frequency, p = percent.
[a] p-value <0.05, which variables are significant with attitude level.

Table 7
Spearman's (rho) correlations coefficient between knowledge and attitude of cervical cancer and its screening (n = 426).

S.N	Variables	1	2
1	Knowledge	–	0.078
2	Attitude	0.078	–

Correlation is significant at the 0.108 level (2-tailed).

indicating that the model was able to distinguish between respondents who had inadequate knowledge and adequate knowledge. The Chi-square value for Hosmer-Lemeshow Test is 7.140 with a significance level of 0.414, this value is larger than 0.05, therefore indicating support for the model. The model as a whole explained between 27 (Cox & Snell R Square) and 36 (Nagelkerke R Square) of the variance knowledge level for cervical cancer and its screening, and correctly classified 71.8 % of cases. As shown in Table 7 only three of the independent variables made a unique statistically significant contribution to the model (education, occupation and heard about cervical cancer).The strongest predictor of reporting adequate knowledge was heard about cervical cancer, recording an odds ratio of 26.167 (95 % C.I = 6.035, 113.460), indicating that heard about cervical cancer was 26 times more likely than who didn't heard about cervical cancer to have influence on outcome variable, controlling for all other factors in the model.

The odd ratio of 7.818 (95 % C.I = 3.386, 18.048) for higher education of women, this indicated that women who had higher education had about 8 times more likely than illiterate to have influence on adequate knowledge, controlling for all other factors in the model. The odd ratio of 3.875 (95 % C.I = 3.386, 18.048) who had secondary education, this indicated that respondents who had secondary education were about 4 times more likely than illiterate to have influence on adequate knowledge.The odd ratio of 2.675 (95 % C.I = 1.085, 6.594) who had primary education, were about 3 times more likely than illiterate to have influence on adequate knowledge. The odd ratio of 1.563(95 % C.I = 0.708, 3.449) for who could only read and write of women, were about 2 times more likely than illiterate to have influence on adequate knowledge.

The strongest predictor knowledge and occupation of women in regression analysis is farmer, odd ratio of 3.029 (95 % C.I = 1.442, 6.363) of women who were farmer, this indicated that farmer was about 3 times more likely than house maker to have influence on the adequate knowledge, controlling for all other factors in the model. Odd ratio of 2.351 (95 % C.I = 0.928, 5.953) of women who were employee, this indicated that employee was about 2 times more likely than house maker to have influence on the adequate knowledge, controlling for all other factors in the model. Odd ratio of 1.446 (95 % C.I = 0.594, 3.581) of women who were student, this indicated that students had about 1 times more likely than house maker to have influence on the adequate knowledge, controlling for all other factors in the model. Odd ratio of 1.245 (95 % C.I = 0.664, 2.334) of women who had business, this indicated that business was about 1 times more likely than house maker to have influence on the adequate knowledge, controlling for all other factors in the model (Table 8).

2.9. Associated factors of attitude of cervical cancer and its screening

Associated factors of attitude on cervical cancer and its screening were analyzed into SPSS by binary logistic regression. Direct logistic regression was performed to access the impact of number of factors on the likelihood that respondents would report that they had unfavorable or favorable attitude about cervical cancer and its screening. The model contained three independent variables (age group, type of family and heard about cervical cancer). The full model containing all predictors were statistically significant x^2 (df = 3, n = 426) = 32.503, p-value <0.001, indicating that the model was able to distinguish between respondents who had unfavorable attitude and favorable attitude. The Chi-square value for Hosmer-Lemeshow Test is 0.334 with a significance level of 0.988, this value is larger than 0.05, therefore indicating support for the model. The model as a whole explained between 7.3 (Cox & Snell R Square) and 9 (Nagelkerke R Square) of the variance knowledge level for cervical cancer and its screening, and correctly classified 62.4 % of cases. Only three of the independent variables made a unique statistically significant contribution to the model (age, type of family and heard about cervical cancer).The strongest predictor of reporting a favorable attitude was heard about cervical cancer, recording an odds ratio of 2.414 (95 % C.I = 1.352, 4.308), indicating that indicating that heard about cervical cancer was 2 times more likely than who didn't heard about cervical cancer to have influence on attitude level of women, controlling for all other factors in the model.

The odd ratio of 2.057 (95 % C.I = 1.379, 3.070) for age group ≤30 were, this indicated that respondents who were about 2 times

Table 8
Factors associated with knowledge about cervical cancer and its screening (n = 426).

Characteristics	B	S.E	Adjusted OR (95 % C.I)	P Value
Education				<0.001[b]
Illiterate[a]				
Only read and write	0.447	0.404	1.563 (0.708–3.449)	0.269
Primary	0.984	0.460	2.675 (1.085–6.594)	**0.033[b]**
Secondary	1.354	0.408	3.875 (1.741–8.623)	**0.001[b]**
Higher education	2.056	0.427	7.818 (3.386–18.048)	**<0.001[b]**
Occupation				**0.028[b]**
Housemaker[a]				
Farmer	1.108	0.379	3.029 (1.442–6.363)	**0.003[b]**
Employee	0.855	0.474	2.351 (0.928–5.953)	0.071
Student	0.369	0.454	1.446 (0.594–3.518)	0.416
Business	0.219	0.321	1.245 (0.664–2.334)	0.495
Heard About cervical cancer				**<0.001[b]**
No[a]		1		
Yes	3.265	0.74	26.167 (6.035–113.460)	

[a] Reference group, β for standardized regression coefficient; S.E = Standard Error; d.f = Degree of Freedom; knowledge level about cervical cancer was taken as a dependent variable whereas others were taken as independent variables.
[b] = Significant at *p* value of <0.05; CI = Confidence Interval; OR = Odds ratio.

more likely to report than who were ≥31 years to have influence the attitude level, controlling for all other factors in the model. The odd ratio of 1.687 (95 % C.I = 1.116, 2.550) who had joint family, this indicated that respondents who had joint family were about 2 times more likely than who had nuclear family to influence the attitude level (Table 9).

3. Discussion

Understanding cervical cancer screening is crucial for reducing maternal deaths caused by cervical cancer. Our study found that a significant majority, 85 % of the respondents, were aware of cervical cancer screening. Additionally, nearly half (46.5 %) of the participants demonstrated adequate knowledge about cervical cancer and its screening, aligning with findings from similar studies conducted in Nepal, Iran, and Congo [11–15]. Of the respondents, 45.8 % exhibited a moderate level of knowledge, with Television/Radio being the primary source of information. Notably, women who were aware of the term "cervical cancer" displayed more favorable attitudes toward cervical cancer and its screening, as reported in a study in Ethiopia [16].In terms of knowledge, menstrual bleeding emerged as the most commonly reported symptom among participants, consistent with studies conducted in Karnataka [17].

Our study revealed that 53.5 % of women held a favorable attitude towards cervical cancer and its screening, a finding comparable to a community-based study in Northwest Ethiopia. It was also noted that awareness of cervical cancer positively correlated with respondents' attitude levels [16].

Among the participants, only 8.5 % had ever undergone a Pap smear test, which is consistent with results from various countries, including Congo, Ethiopia, India, Cambodia, Nepal, Karnataka, Lao PDR, and Iran [11,17–26].These findings indicate that the rate of Pap smear test utilization falls below the average in developing countries. Factors contributing to this may include limited awareness and accessibility to Pap smear tests. Significant associations were found between adequate knowledge levels and independent variables such as age, women's education, occupation, age of marriage, husband's education, and husband's occupation, as well as awareness of cervical cancer [19]. This suggests that age, education, occupation, age of marriage, husband's education, husband's occupation, and awareness of cervical cancer play vital roles in enhancing knowledge about cervical cancer screening in rural Nepal.

Education was identified as a significant factor positively influencing women's knowledge of cervical cancer, highlighting the importance of a husband's education in motivating his wife to seek better health knowledge and behaviors. This is particularly relevant in settings like Nepal, where women often depend on their husbands for decision-making. Moreover, women with higher levels of education were more likely to possess adequate knowledge. Similar findings were reported in studies conducted in Qatar and Congo [11,27].

The study also found that farmers, employed participants, and students had better knowledge about cervical cancer and its screening compared to homemakers. This could be attributed to their increased opportunities for social interaction, which facilitate awareness and knowledge acquisition. Similar results were observed in an Indian study [17]. Occupation was also significantly associated with knowledge levels in other studies [16,28], emphasizing the role of employment status in influencing knowledge [29, 30].

In our study, the mean age of participants was 31.18, which closely aligns with a similar study conducted in Northern Ethiopia, where the mean age was 31.3 (with a standard deviation of 9.3) [31]. Age groups exhibited a significant association with attitude scores in our current study, indicating that those aged 30 or younger had more favorable attitudes compared to those aged 31 and older. This suggests that younger individuals held more positive attitudes. The reason behind this could be attributed to the fact that younger respondents tended to have higher levels of education in our study. This finding is consistent with a study conducted in India, which also reported that younger women tend to have higher levels of education in the context of Nepal and India. It stands to reason that higher education levels are linked to better knowledge and more positive attitudes [28].

Our study also found a significant association between the type of family and attitude levels. Women from joint families exhibited approximately twice as favorable attitudes compared to women from nuclear families. In the context of Nepal, women in joint families can discuss health-related issues with family members, which may contribute to more positive attitudes. Moreover, if any family member is educated and informed about cervical cancer and its screening, it can lead to better knowledge and more positive attitudes toward cervical cancer.

3.1. Limitation of the study

This study was conducted within a limited group of women residing in Nilakantha municipality. Therefore, the findings cannot be generalized to the entire population of Nepal, as the focus was exclusively on married women within the context of Nepal.

4. Conclusion

Among the study participants, approximately half of the respondents demonstrated adequate knowledge and held favorable attitudes toward cervical cancer and its screening tests. However, only 8.5 % had undergone a Pap smear test at least once in their lifetime, a rate lower than the global average and that of many developing countries. The level of education, occupation, and awareness of cervical cancer showed significant associations with adequate knowledge. Furthermore, age, family type, and awareness of cervical cancer were significantly linked to favorable attitudes toward cervical cancer and its screening. Television and radio emerged as the most important sources of information regarding cervical cancer. To improve Pap smear coverage, there is a critical need for effective health education programs that not only enhance knowledge about cervical cancer and Pap smear tests but also positively influence attitudes toward these tests. Tailored cervical cancer education interventions for Nepali women, considering their

Table 9

Factors associated with Attitude regarding cervical cancer and its screening (n = 426).

Characteristics	B	S.E.	Adjusted OR (95 % C.I)	P value
Age Group				<0.001[b]
≥31[a]				
≤30	0.721	0.204	2.057 (1.379–3.070)	
Type of Family				0.013[b]
Nuclear[a]				
Joint	0.523	0.211	1.687 (1.116–2.550)	
Heard About Cervical Cancer				0.003[b]
No[a]				
Yes	0.881	0.296	2.414 (1.352–4.308)	

[a] Reference group, β for standardized regression coefficient; S.E = Standard Error; df = Degree of Freedom; attitude level about cervical cancer was taken as a dependent variable whereas others were taken as independent variables.

[b] = Significant at *p* value of <0.05; CI = Confidence Interval; OR = Odds ratio.

varying levels of education, are essential to increase awareness and foster positive attitudes. Since screening plays a pivotal role in early cancer diagnosis and better prognosis, efforts should be directed towards improving the coverage and utilization of screening services, with education serving as a crucial facilitator. Awareness campaigns focused on Pap smear tests are imperative to enhance knowledge, attitudes, and the practice of these tests, ultimately reducing the burden of cervical cancer in Nepal, both currently and in the future.

Funding

Ethics approval and consent to participate

Ethical approval was obtained from The Ethical Review Board of Nepal Health Research Council Ref No-115. Written inform consent was obtained from all the participants prior to their enrollment in the study.

Consent for publication

Not applicable since there are no details, images, or videos relating to an individual person.

Availability of data and materials

All authors had full access to the data and materials. Data are available within this article. Detailed data is available from the authors upon reasonable request.

CRediT authorship contribution statement

Bishnu Maya Rijal: Conceptualization, Investigation, Methodology. **Pratima Dawadi:** Conceptualization, Data curation, Investigation, Methodology, Writing – original draft, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.heliyon.2024.e34886.

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