Factors associated with utilization of visual inspection with acetic acid in Nepal

Tara Ramtel[1], Kamaliah Mohamad Noh[2], Krishna Gopal Rampal[2], Narbada Thapa[3]
[1]Asian College for Advance Studies, Purbanchal University, Biratnagar, Nepal
[2]Department of Medical Sciences, Faculty of Medicine, University of Cyberjaya, Selangor, Malaysia
[3]Institute of Crisis Management, Tribhuvan University, Kathmandu, Nepal

Article Info	ABSTRACT
	Visual inspection with acetic acid (VIA) is an optional cervical cancer screening method. National guideline of Nepal has emphasized using the VIA and intended to achieve at least a 50% screening rate by 2015 but the overall coverage is only 2.4% in 2019. A cross-sectional study was conducted to identify the factors associated with the utilization of VIA screening in Bagmati Province, Nepal. A convenience sample of 400 women aged 30 to 60 years was included in the study. A semi-structured questionnaire was used to elicit information on VIA test and factors associated with it. Awareness, economic status, socio-psychological beliefs, service availability and accessibility, perception on service providers' performance were associated with low VIA use in the province. VIA screening was associated with socio-demographic variables (χ^2=29.9; df=4; p=<0.001), knowledge factors (χ^2=69.29; df=3; p=<0.001) and with the perception on service providers' performance (χ^2=433.82; df=6; p=<0.001). Service providers' approach during the VIA screening mattered to the acceptance of this service. The disparity was observed in the knowledge of cervical cancer and screening by the women. Based on this, there is a need for massive improvement on the awareness of the community about cervical disease and screening services. *This is an open access article under the CC BY-SA license.*

Corresponding Author:

Tara Ramtel
Asian College for Advance Studies, Purbanchal University
M9J3+PQW, Pushpalal Chowk, Biratnagar 56600, Nepal
Email: tara.ramtel@gmail.com

1. INTRODUCTION

Cancer is one of the main causes of adult deaths worldwide. Globally, cervical cancer poses the first most common cancer among women, with an estimated 604,127 new cases and 341,831 deaths in 2020, and the second most common cancer in women living in low-income regions [1]. About 311,000 women died every year due to cancer of the cervix and more than 85% of these deaths occurred in low and middle-income countries [2]. Cervical cancer is a public health problem in developing countries like Nepal. It is one of the first leading causes of female cancer and the second most common cancer in women aged 15 to 44 years in Nepal. The estimated incidence of cervical cancer in 2020 was 2,244 and 1,493 died from this disease [3]. The death rate of cancer of the cervix was estimated as 19.3% [4]. Visual inspection with acetic acid (VIA) is an optional strategy that combines "screen and treats" on a single visit in low-resource settings. It is a visual examination of the uterine cervix after the application of 3% to 5% acetic acid [5]. Health care providers such as physicians, nurses, midwives and health technicians can perform it. It is recommended by the Alliance for Cervical Cancer Prevention for cervical cancer screening in low-income countries. It is easy inexpensive and

requires minimal infrastructure. If abnormal acetowhite lesions are observed during screening, the client can be treated immediately [6]. Screening can detect cancer at an early stage. The cure rate would be high if treated at an early stage because pre-cancerous lesions take 15 to 20 years for cervical cancer to develop in women with normal immune systems [7]. The more cost-effective way to prevent cervical cancer in women of 30 years is screening and treatment of pre-cancer lesions. Up to 80% of cervical cancers are prevented by early treatment [8].

The national guideline for cervical cancer screening in Nepal was developed in 2010 with the aim to achieve at least a 50% screening rate of the target population in women aged between 30 to 60 years by 2015. The guideline also advocated VIA as the prime screening method at all levels, from primary to tertiary health care settings. However, the outcomes and implications of the screening strategy still have not been made easily accessible. Cancer screening and early detection programmes such as; Pap smear, and VIA are not commonly available at the all-public primary health care level and has also not maintained a nationwide screening programme. The scope of cancer plans, monitoring, and surveillance are hospital-based and their coverage is subnational [9]. VIA trained auxiliary nurse midwife (ANM), staff nurses and the medical officer and if available the gynaecologist are the service providers in this tier as well as in camp settings [10]. Based on cervical cancer screening with VIA in Eastern Nepal a three years analysis from March 2012 to April 2015, 12,444 clients were screened for cervical cancer. The VIA positivity rate was 5.9%, repeat VIA positivity rate at the end of one year during follow-up was 1.2%. More than 98% had been screened for cervical cancer for the first time and the complication following cryotherapy was low. The study has recommended scaling up the facility up to grass root level that is linked to an appropriate referral system [11].

In Nepal, a hospital-based cancer registry (HBCR) programme was initiated in 2003, while a population-based cancer registry (PBCR) started in Nepal in January 2018. However, PBCR data is currently not available and existing HBCRs in Nepal are not generalizable to the population. PBCR can have a different role in planning and evaluating cancer control programmes [12]. In the current demonstration, projects screening ages are 30 to 60 years and the screening interval or frequency of screenings is five years. The quality assurance structure and mandate to supervise and monitor the screening process are not maintained. There is no active invitation to screening. The coverage of cervical cancer screening in Nepal is only 2.4%. The estimated coverage of cervical cancer screening in rural and urban Nepal is 2% and 4.7% respectively [13], [14]. While the national guidelines of screening for cervical cancer have prioritized VIA as the prime screening method at all levels of health care settings but still it has not been made easily accessible and has not intervened effectively. Although the country made a commitment to reduce cervical cancer through a praiseworthy screening program, there are still challenges to the implementation of this service. If the provision of cervical cancer screening services is fixed in certain service sites, it could potentially improve the accessibility and utilization of services for women living in rural and remote areas. The effectiveness of cervical cancer screening tests in low resources settings can be expressed by the accessibility, acceptability and utilization of the service. To fulfil the research gaps, this research aimed to identify and describe the factors that are associated with the utilization of VIA among women in Nepal so that it helps to increase the uptake of screening services. Recommendations will be made to related authorities to increase access and utilization of the VIA service by improving identified factors and barriers so that women may accept and utilize the service and maintain a healthy life.

2. RESEARCH METHOD
2.1. Study design and participants
This research was a cross-sectional study conducted on 400 women aged between 30 years to 60 years residing in rural municipalities and urban municipalities of Dolakha, Sindhupalchowk and Bhaktapur Districts of Bagmati province in Nepal. Selected by convenient sampling, the criteria for study participants were women attending health centers who were aged 30 to 60, willing to participate in this study, available at the time of data collection and permanent residents in the study areas. The study excluded women who did not meet the inclusion criteria.

2.2. Data collection strategy
Semi-structured questionnaires were used for the interview in collecting the data. Questionnaires were arranged into three sections. Section one consisted of socio-demographic information of respondents, section two consisted of factors associated with the utilization of VIA and questions related to women's perception of VIA screening performed by service providers were in section three. The researcher tested the readability and understandability of the study instrument before it was administered in the field. The researcher first contacted the content expert to select the appropriate words to be used in the questionnaire

and then contacted the language expert to translate the questionnaire into the local language. The language was dependent on the local language of the respondents. In the second stage, pre-testing of the study instrument was done on 10% of the total sample size, 40 women, for validity and reliability. Cronbach alpha was used to measure the internal consistency of the instrument. The Cronbach alpha of most of the questions was >0.7, indicating high levels of reliability. After the pilot study, appropriate changes were made to modify the questionnaires.

Data were collected from October 2020 to December 2020. Women were invited to attend an informal orientation and education session on cervical cancer prevention and VIA as cervical cancer screening. Women who accepted and were eligible were screened by the VIA test. VIA was independently performed by trained nurses/ANMs and by trained medical officers. In case VIA was not accepted by participants, they were required to record the reason for not accepting. The researcher provided all the essential information about the research and VIA screening procedures to the study participants and written informed consent was obtained. Participant involvement in this study was voluntary. Respondents were free to refuse to participate in VIA screening at any time or withdraw from the participation and refuse to answer any particular question during participation/interview that they felt uncomfortable with. All the information obtained was kept confidential and anonymity was maintained throughout the process of the research.

2.3. Data analysis

The data were analyzed by using statistical package for social sciences (SPSS version 25). Demographic data were analyzed using descriptive statistical methods including frequencies, mean and standard deviations. Bivariate analysis was conducted to study the relationship between the use of the VIA test and independent variables (socio-demographic factors, knowledge factors of cervical cancer screening and the women's perception of VIA for cervical cancer screening performed by service providers) using chi-square (χ^2) test, calculation of odds ratio (OR) with a confidence level (CI) of 95% and P-value. The level of significance was set at ≤ 0.05 level. Subsequently, multivariate analysis was performed using logistic regression through a multilevel analysis approach to assess the strength of the association between screened for VIA (the dependent variable) and socio-demographic, knowledge factors and the perception of VIA for cervical cancer screening performed by service providers (predictor variables).

2.4. Ethical approval

The University of Cyberjaya ethics review committee in Malaysia granted its approval for this study (Reference number: UOC/CRERC/EXTERNAL/03/2020, date: February 25, 2020). The ethical approval of the Nepal health research council was also obtained (Reference number: 287/2020). The chosen study areas were formally notified through letter that data collection was taking place with their consent.

3.   RESULTS AND DISCUSSION
3.1. Results

The demographic characteristics show that 40% of study subjects is from Bhaktapur District, 40% were from Dolakha District and 20% were from Sindhupalchowk District. The majority (60%) of the women were residing in urban municipalities. Most of the women (93.7%) were married and the biggest proportion of women (38.8%) was in the age group of 40-49 years, as shown in Table 1. The majority (78.7%) of the respondents were Hindus. By highest education level achieved, the largest proportion (29.3%) had attained at least college level, while 21.5% had no formal schooling. Most of the women (55.0%) were jobholders. The largest proportion of women (30%) had a monthly family income of less than 10,000 Nepal rupees.

As shown in Table 2 below, the majority of the respondents (75.8%) had heard about cervical cancer. More than half (66.7%) of the respondents cited health personnel as their source of information. Multiple responses were allowed for participants to respond to on signs and symptoms of cervical cancer. Only a minority of the respondents admitted they did not know about the signs and symptoms of cervical cancer, at 20.5%. The symptom most commonly identified by the women was irregular vaginal bleeding and foul offensive vaginal discharge, at 67.5%. The majority (53.5%) of the respondents did not know that a cervical cancer-screening program is available in Nepal. Respondents were asked for their thought on cervical cancer screening procedure is painful or not. The majority (47.5%) were not aware and 15.8% of the respondents disagreed. Only one fourth (25.3%) of the respondents thought that cervical cancer was curable if detected early and 41.0% of the respondents knew where to go for cervical cancer screening.

Table 1. Respondentssocio-demographic characteristics (n =400)

Characteristics		Frequency	Percentage
District	Bhaktapur	160	40.0
	Dolakha	160	40.0
	Sindhupalchowk	80	20.0
Urban municipality/Rural municipality	Urban municipality	240	60.0
	Rural municipality	160	40.0
Marital status	Married	375	93.7
	Not married	25	6.3
Age in years	40-49	155	38.8
	30-39	145	36.2
	50-59	79	19.8
	60 and above	21	5.2
Religion	Hindu	314	78.7
	Christian	19	4.7
	Buddhist	61	15.3
	Other	5	1.3
Education level	No formal schooling	86	21.5
	Primary school	93	23.2
	School leaving certificate level	104	26.0
	College level and above	117	29.3
Occupation	Job Holder	220	55.0
	House wife	180	45.0
Family income per month in rupees	less than 10,000	120	30.0
	10,000-20,000	117	29.2
	21,000-30,000	96	24.0
	More than 30,000	67	16.8

Just 10.5% had screened for cervical cancer before, with the majority 85.7% acting on the advice of health personnel. Most of the 52.4% had done a Pap smear. Surprisingly 26.2% had been screened by VIA before. However, an overwhelming majority of 89.5% reported they had not been screened before and most of (58.9%) did not know where the test is done. The biggest proportion of women (42.8%) was undecided ongoing screening if they had to pay for it while a few (18.8%) of them admitted they were interested in being screened for cervical cancer even if they had to pay. Just half (52.5%) of the respondents would tell their family members to screen for cervical cancer. The two most common reasons equally cited for not recommending family members to screen for cervical cancer were that the test could be dangerous and the need to pay at 47.6% each. The majority (72.8%) of the respondents affirmed that screening service was not available in all health institutions and the main barrier facing them in the community was not being involved in the cervical cancer screening program.

Table 3 reveals very few of the respondents (17.8%) were aware of the availability of VIA as a cervical cancer screening program in Nepal. Among 71 respondents who were aware of VIA screening, just a half of the participants 50.8% knew by self-study. Very few (9%) of the respondents knew who should be screened for VIA. Only 15.3% of women knew that the frequency of VIA should be done every five years. Among all the respondents, only 2.8% of the women had been screened for VIA before. Only 36.3% of the respondents would recommend their family members be screened by VIA. Respondents (11.8%) who would not recommend their family members to be screened by VIA, the majority (66.0%) of them thought that the test could be dangerous and risky. The majority of the participants 84.0% confessed that VIA service was not available in nearby health centers. The majority 60.8% of the participants were not willing to do VIA screening if they needed to pay. Most of the respondents 81.2% would accept VIA screening if the service was available in the health centers. Among the non-acceptors (18.8%), the majority (89.3%) admitted that they were not aware of VIA screening and 32.0% were not willing to be examined by male service providers. The major barrier to VIA screening reported by most of the respondents was the unavailability of the screening service as a regular service in all health institutions at 70.3%. As a result, most of the respondents (69.8%) admitted uptake of VIA screening could be maximized byproviding regularly availability of VIA services in all health institutions. Of the total 400, 11 already had VIA.

Table 2. Distribution of respondent's knowledge on cervical cancer and screening (n =400)

Variable	Category	Frequency	Percentage
Heard about cervical cancer	Yes	303	75.8
	No	97	24.2
If yes, from where heard about cervical cancer *(multiple responses allowed)*	Health personnel	202	66.7
	Media (Television/Radio/News)	142	46.9
	Friends	93	30.7
	Others	61	20.1
The signs and symptoms of cervical cancer *(multiple responses were allowed)*	Offensive vaginal discharge	270	67.5
	Irregular vaginal bleeding Foul	270	67.5
	Weight loss	86	21.6
	Pelvic pain	72	18
	Postcoital vaginal bleeding	58	14.5
	Fever	49	12.3
	No symptoms	23	5.8
	Don't know	82	20.6
Aware that a cervical cancer screening is available in Nepal	Yes	186	46.5
	No	214	53.5
Thought cervical cancer screening is painful	Yes	22	5.5
	No	63	15.8
	Maybe	190	47.5
	Don't know	125	31.3
If cervical cancer is found early, is it curable	Yes	101	25.3
	No	45	11.3
	Not aware	254	63.5
Aware of where to go for cervical cancer screening	Yes	164	41.0
	No	236	59.0
Had cervical cancer screening before	Yes	42	10.5
	No	358	89.5
If yes, requested by self or screening was done on the advice of health personnel	Done the screening on the advice of the health personnel	36	85.7
	Requested by self	6	14.3
If yes, what type of screening was done	Pap smear	22	52.4
	VIA	11	26.2
	Others	9	21.4
If No, the reason for not screening *(multiple responses were allowed)*	Lack of awareness of test	212	59.2
	Don't know where the test is done	211	58.9
	Not thought of it	134	37.4
	Procedure being cumbersome	51	14.2
	Fear of result	25	7.0
	No time	13	3.6
	Not sexually active	4	1.1
	Cost	1	0.3
	Others	5	1.4
Would get screened for cervical cancer even if had to pay	Yes	75	18.8
	No	31	7.8
	May be	171	42.8
	Don't know	123	30.8
Would tell or recommend a family member to be screened for cervical cancer	Yes	210	52.5
	Maybe	169	42.3
	No	21	5.3
If No, reasons for not recommending cervical cancer screening *(multiple responses were allowed)*	The test could be dangerous	10	47.6
	Need to pay	10	47.6
	No reason	6	28.6
	No need	5	23.8
	Procedure is painful	2	9.5
The major barrier facing women in the community is not being involved in the cervical cancer screening program *(multiple responses were allowed)*	Service is not available in all health institutions	291	72.8
	Women are not aware	258	64.5
	Need to pay	192	48.0
	Health personnel had not explained all screening services	130	32.5
	No reasons	15	3.8
	Others	4	1.0

Table 3. Distribution of factors associated with utilization of via (*n* =400)

Variables	Category	Frequency	Percentage
Aware of a VIA screening available in Nepal	Yes	71	17.8
	No	329	82.2
If aware, how they know *(multiple responses were allowed)*	Self-study	33	50.8
	Health personnel	30	46.2
	Media	17	26.2
	Friends and Family	12	18.5
	Other	5	7.7
Who should be screened for VIA	Above 21 years/sexually active	130	32.5
	Married women only	40	10.0
	Women above 30 years	36	9.0
	Don't know	194	48.5
The frequency of VIA	Monthly	7	1.8
	Every six months	34	8.5
	Every year	88	22.0
	Every five year	61	15.3
	Don't Know	210	52.5
Have ever been screened for VIA	Yes	11	2.8
	No	389	97.2
Would tell or recommend a family member to be screened by VIA	Yes	145	36.2
	Maybe	208	52.0
	No	47	11.8
If No, reasons for not recommending VIA screening	The test could be dangerous and risky	31	66.0
	No reason	13	27.7
	No need	8	17.0
	Procedure is painful	4	8.5
	Others	1	2.1
Is it easy to access VIA service in the VIA service center	Yes	8	2.0
	Not available in nearby health centers	336	84.0
	It has a long distance to reach	122	30.5
	Need to pay for travel cost	101	25.3
	Need to request to family to pay	32	8.0
Willing to do VIA screening if need to pay for it	Yes	157	39.2
	No	243	60.8
Accept VIA screening service if it were available in the health centers	Yes	325	81.2
	No	75	18.8
If No, the reason for not acceptance of VIA screening	Unwilling to be examined by male service providers	24	32.0
	Not aware of it	67	89.3
	Others	7	9.3
The major barrier facing women in the community is not being involved in the VIA cervical cancer screening program *(multiple responses were allowed)*	Not available in all health institutions as regular service	281	70.3
	Not aware of the choice of screening services	235	58.8
	Expensive	145	36.3
	No reason	15	3.8
	Others	1	0.3
Barriers that can be overcome for maximum uptake of VIA screening *(multiple responses were allowed)*	Should regular available in all health Institutions	279	69.8
	Should provide awareness program	254	63.5
	Health personnel should explain about all screening services and choices should be given to women	191	47.8
	It should be free	170	42.5
	Others	1	0.3

Table 4 shows the majority of respondents (84.3%) involved in the VIA screening program informed by the health personnel. After providing awareness and free VIA screen service, out of 400 women, 307 (76.8%) respondents accepted and screened for VIA. Women who were accepted and screened for VIA were asked for the positive and negative experiences that have perceived during the screening. Encouragingly, 72.0% of the women had a positive perception of the performance of service providers. Most (90.6%) of the respondents perceived a respectful approach from health service providers during the VIA screening time. The reported main reason for not having been screened by 23.3% of respondents was fear of the results of cervical cancer screening at 51.6%. The majority (65.0%) of the respondents suggested improving the knowledge and awareness of the community about the disease and screening services through the existing health extension program that will help women's involvement in the VIA screening process.

Most of the respondents (55.8%) informed the major strength of VIA screening is as it is not a lengthy procedure.

Table 4. Distribution of perception of women on via screening performed by service providers

Variables	Category	Frequency	Percentage
Involvement in the VIA screening program	Informed by health personnel	337	84.3
	Informed by friends/family	60	15.0
	Found out from social media	3	0.8
Screened for VIA as cervical cancer (after providing awareness and free VIA screening)	Yes	307	76.8
	No	93	23.3
Positive things that have been perceived during the screening (Multiple responses allowed)	Obtained information about VIA	221	72.0
	VIA received as a free service	149	48.5
	Others	5	1.6
Negative things that have been perceived during the screening (Multiple responses allowed)	Long time to wait for screening	25	9.9
	Feel ashamed of male health care providers	10	4.0
	Other	218	86.5
The health service providers' approach during the VIA screening time (Multiple responses allowed)	Respectful	278	90.6
	Defensive	34	11.1
	Rigid	11	3.6
If having not been screened for cervical cancer, the main reason for not have been screened (Multiple responses allowed)	Fear of result of cervical cancer screening	48	51.6
	Screening for cervical cancer is not important for healthy women	23	24.7
	Others	45	48.4
Suggestions that will help increase women's involvement in the VIA screening process (Multiple responses allowed)	Make this service should available regularly at nearby health centers	253	65.0
	This service be given by female health service providers	178	44.5
	This service be given free	132	33.0
	Others	13	3.3
	It is not a lengthy procedure and can get the quick result	223	55.8
The major strengths of VIA screening	Can detect the early symptoms of cervical cancer	129	32.3
	Get it as a free service in the nearby health center	38	9.5
	Others	129	32.3

Bivariate analysis was used to measure at how the dependent and independent variables were related. Dependent variables are women who underwent or did not undergo VIA screening. Selected socio-demographic factors such as; age, marital status, education, occupation, and family income were chosen as independent variables, along with knowledge factors like awareness of cervical cancer, screening, and women's perceptions of VIA for cervical cancer screening performed by service providers.

All the sociodemographic factors studied showed a statistically significant association with VIA screening except for family income as displayed in Table 5. A total of 83.0% of women ages 30 to 49 were 1.43 times more likely to use the VIA test as compared to those above 50 years old and it was statistically significant (OR=1.43; CI=1.20-1.70; p=<0.001). Married women were 1.3 times more likely to use the VIA test as compared to the unmarried and it was statistically significant (χ^2=4.19; OR= 1.3; CI=0.94-1.80; p=0.041). Those with higher education levels were 2.4 times more likely as compared to those with lower education levels to have gone for VIA screening and it was significant (χ^2=13.40; OR= 2.40; CI=1.49-3.86; p=<0.001). Jobholders were 1.17 times more likely to use the VIA test as compared to the housewives and it was significant (χ^2=8.35; OR= 1.17; CI=1.04-1.31; p=0.004).

Table 6 indicates that the women who had cervical cancer screening before could be a factor in increasing the likelihood of VIA screening. Those who had screened for cervical cancer before increases the odds of VIA screening (X^2=4.09; OR=0.82; CI=95%, lower =0.65, upper=1.04, p=0.043). Further, the OR according to types of cervical cancer screening was done by women who had been screened for VIA was 0.35 times greater than that for women who had never had been screened for cervical cancer. This means that as the types of screening were done increase the use of VIA screening increased (χ^2=8.89; OR= 0.35; CI=0.13-0.94; p=0.003). There is an association with screened for VIA among women who had had a VIA screening before ((χ^2=21.74; CI=0.66-0.81; p=<0.001). Knowledge of VIA screening by screening for VIA before could be a factor in increasing its use. The result also indicates that the women who had had a VIA screening before were 0.23 times more accepted and screened for VIA. Lastly, the OR for accepting VIA if it were available in a nearby health center among women who had had a VIA screening test was 1.85 times greater than that for women who had not accepted. In other words, women who accepted VIA in their nearby

health centers were more likely to have screened for VIA (χ^2=51.05; OR= 1.85; CI=1.43-2.39; p=<0.001). It indicates that the availability of VIA screening services in nearby health centers could be a factor in increasing the likelihood of VIA being used for cervical cancer screening.

Table 5. Socio-demographic factors associated with via screening (n=400)

Demographic variables	Category	Screened		Not screened		Total	χ^2	P-Value	OR (95% CI)
		N	%	N	%				
Age (in years)	30 to 49	249	83.0	51	17.0	300	26.27	<0.001*	1.43 (1.20-1.70)
	50 and above	58	58.0	42	42.0	100			
Marital status	Married	292	77.9	83	22.1	375	4.19	0.041*	1.30 (0.94-1.80)
	Not married	15	60.0	10	40.0	25			
Education	SLC and College level and above	185	83.7	36	16.3	221		<0.001*	2.40 (1.49-3.86)
	No formal schooling and primary school	122	68.2	57	31.8	179			
Occupation	Job Holder	181	82.3	39	17.7	220	8.35	0.004*	1.17 (1.04-1.31)
	Housewife	126	70.0	54	30.0	180			
Family Income (Nepalese rupees)	<10,000 to <20,000	180	75.9	57	24.1	237	0.21	0.648	0.98 (0.87-1.08)
	20,000 to >30,000	127	77.9	36	22.1	163			

Note: *=Significant, χ^2=Chi Square, OR=odds ratio, CI=confidence interval, *p* value <0.05.

Table 6. Bivariate data analysis of knowledge factors associatedwith via screening (n=400)

Knowledge factors	Category	Screened		Not screened		Total	χ^2	P-Value	OR (95% CI)	
		N	%	N	%					
Heard about cervical cancer	Yes	239	78.9	64	21.1	303	3.17	0.075	0.89	(0.77-1.02)
	No	68	70.1	29	29.9	97				
Aware that a cervical cancer screening is available in Nepal	Yes	149	80.1	37	19.9	186	2.79	0.095	110	(0.98-1.22)
	No	145	72.9	54	27.1	199				
Had cervical cancer screening before	Yes	27	64.3	280	78.2	42	4.09	0.043*	0.82	(0.65-1.04)
	No	15	35.7	78	21.8	358				
If yes	On the advice of health personnel	24	66.7	12	33.3	36	0.62	0.43	2.00	(0.35-11.43)
	Requested by self	3	50.0	3	50.0	6				
If yes, what type of screening was done	VIA	3	27.3	8	72.7	11	8.89	0.003*	0.35	(0.13-0.94)
	Pap Smear	24	77.4	7	22.6	31				
	Others	5	55.6	4	44.4	9				
Aware of a VIA screening program available in Nepal	Yes	56	78.9	15	21.1	71	0.22	0.649	1.03	(0.90-1.18)
	No	251	76.3	78	23.7	329				
Screened for VIA before	Yes	9	81.8	2	18.2	11	21.74	<0.001*	0.23	(0.66-0.81)
	No	305	78.4	84	21.6	389				
Willing to do VIA screening if need to pay	Yes	125	79.6	32	20.4	157	1.19	0.27	0.94	(0.84-1.05)
	No	182	74.9	61	25.1	243				
Would accept VIA if it were available in the health centers	Yes	273	84.0	52	16.0	325	51.05	<0.001*	1.85	(1.43-2.39)
	No	34	45.3	41	54.7	75				

Note: *=Significant, χ^2=Chi Square, OR=odds ratio, CI=confidence interval, p-value <0.05.

Those factors of women that were statistically significant in bivariate analysis, multivariate was calculated to assess the strength of the association between screened for VIA as cervical cancer (the dependent variable) and socio-demographic, knowledge factors and the perception on VIA for cervical cancer screening performed by service providers (predictor variables). Table 7 represents the results of the multivariate analysis. The number of variables observed was eight at level 1 with the number of observations were 400. It is observed that when the age increases the use of VIA screen tests decreases and the women at a young age are 75% time more likely to have VIA screened (b=-1.0; χ^2=11.67; Exp(B)=0.36;95% CI=0.20 to 0.65; p= 0.001). Regarding knowledge factors of cervical cancer screening, women who had Pap smear, VIA and other screening before 9.1 times more screened for VIA (b=2.21; χ^2=7.61; Exp(B)=9.14;95% CI=1.89 to 44.01; *p*=0.006). Women who had done VIA screening before 30.3 times more likely to test for VIA (b=3.41; χ^2=13.57; Exp(B)=30.38;95% CI=4.91 to 186.76; p=<0.001). With accept VIA test if it were available in the

health center, the women are 81.3% more likely to go for VIA screening service (b=-2.02; χ^2=50.86; Exp(B)=0.13;95% CI=0.07 to 0.23; p=<0.001).

Therefore the results of model fitting criteria, the likelihood of VIA screened was associated with socio-demographic variables; age, marital status, education and occupation (χ^2 =29.9; df =4; p=<0.001). It is also associated with the knowledge factors of cervical cancer screening; women who had cervical cancer screening before, were screened for VIA and they would accept VIA screening service if it were available in the health centers (χ^2=69.29; df=3; p=<0.001). Women's perceptions of VIA screening performed by service providers is independently associated with positive things, negative things, service providers' approaches during screening and women's reasons for not screening for cervical cancer (χ^2=433.82; df=6; p=<0.001).

Table 7. Multivariate logistic analysis of screened for via as cervical cancer(n=400)

Had screened for VIA as cervical cancer	B	χ^2	Exp(B)	95% Confidence interval for exp(B)		P-Value
				Lower bound	Upper bound	
Socio-demographic variables						
Age (Low-high)	-1	11.67	0.36	0.20	0.65	0.001*
Marital status (Married and not married)	-0.81	3.19	0.44	0.18	1.08	0.074
Education (No formal schooling and primary school and SLC & college level and above)	0.44	1.71	1.56	0.80	3.05	0.190
Occupation (Job holder and housewife)	-0.05	0.02	0.94	0.49	1.82	0.876
Knowledge factors of cervical cancer screening						
Had cervical cancer screening before	-0.07	0.02	0.92	0.34	2.51	0.883
If yes, the type of screening was done	2.21	7.61	9.14	1.89	44.01	0.006*
Screened for VIA before	3.41	13.57	30.38	4.94	186.76	<0.001*
Would accept VIA if it were available in the health centers	-2.02	50.86	0.13	0.07	0.23	<0.001*

3.2. Discussion

In this study, the researcher assessed VIA as cervical cancer screening and evaluated the association between the use of VIA and the socio-demographic characteristics of respondents. A remarkable association had been observed between acceptance and use of the VIA test with age, marital status, education level and occupation of women. Young women aged 30 to 49, married and attained higher education (SLC, College level and above) increased to accept and screened for VIA. This validated with the findings of various investigations [15]–[17]. Likewise, women who used the VIA test were jobholders. Numerous studies proposed that the use of the VIA test is influenced by sociodemographic factors such as age, marital status, education level and occupation [18], [19]. There is an association with screened for VIA among women who had had a VIA screening before and knowledge of VIA screening. The result also indicates that the women who had had a VIA screening before were 0.23 times more accepted and screened for VIA. Women who accepted VIA in their nearby health centers were more likely to have screened for VIA. It indicates that the availability of VIA screening services in nearby health centers could be a factor in increasing the likelihood of VIA being used for cervical cancer screening. The results of this study are similar to other studies that VIA tests were positively affected by knowledge, distance, attending health center and service availability [20]–[22].

The majority of respondents 84.3% involved in the VIA screening program informed by the health personnel. After providing awareness and free screening, a majority (76.8%) of respondents had accepted and screened for VIA. Respondents had perceived a long time to wait for screening and feel ashamed of male health care providers. The reported main reason for not having been screened was fear of results of cervical cancer screening 51.6%, thought of not important for healthy women 24.7%. Most of the respondents 65.0% reported that improving the knowledge and awareness of the community about the disease and screening services through the existing health extension program will help women's involvement in the VIA screening process. Similar to previous studies health workers' role to be aware and increase community-based screening programmes and screening by female service providers were found to be affected factors on VIA utilization [23]–[26].

More than half of the respondents 63.3% reported VIA screen service should available regulalry at nearby health centers, 44.5% reported this service being given by female health service providers and 33.0% reported the service to be given free. Most respondents 55.8% reported that the major strengths of VIA screening were found, as it is not a lengthy procedure, 32.3% stated it can detect the early symptoms of cancer of the cervix and 9.5% got it as a free service in the nearby health center. The previous studies reported screening programs need to be improved by focusing on the increase of accessibility, affordability, education and the necessity of screening to improve screening uptake [27]–[29]. Women's perceptions of

VIA screening performed by service providers are independently associated with positive things, negative things, service providers' approaches during screening and women's reasons for not being screened for cervical cancer. Various studies suggested that strategies for improving uptake and utilization of cervical screening should focus on improving cervical health education, addressing cultural beliefs and practices, improving spousal support, empowering women and addressing physical access problems as well as service costs and improving service providers' attitude [30]–[33].

The limitation of the study was government administrative restrictions on the size of public gatherings due to the coronavirus pandemic made it difficult to reach a large number of participants and obtain information. Only respondents who met the criteria and were available during the data collection period were included in the study.

4. CONCLUSION

Inconclusion, the women observed the disparity in the knowledge of cervical cancer and screening. In view of the knowledge discrepancy about cervical cancer and screening in women, there is a need for massive improvement in the knowledge and awareness of the community about the disease and screening services through the existing health extension programmes at all levels of health services. This has to include highlighting the effects of women screened for VIA along with providing informal orientation and free VIA tests. Hence, further programmes need to be developed into new and innovative strategies that involve clear and simple educational messages and counselling about cervical cancer and the screening and extension of regular availability, free cost of the service and easy accessibility of screening services in nearby health centers should be taken to minimize barriers for maximum uptake of VIA screening by women.

REFERENCES

[1] W. H. O. (WHO), "Cancer," *World Health Organization (WHO)*, 2022. https://www.who.int/news-room/fact-sheets/detail/cancer.

[2] World Health Organization, "Cancer," *World Health Organization*, 2022. https://www.who.int/news-room/fact-sheets/detail/cancer.

[3] W. H. O. Ico and H. P. V Information, "Human Papillomavirus and Related Cancers--Netherlands," *ICO/IARC Information Centre on HPV and Cancer*, 2022.

[4] M. Brisson *et al.*, "Impact of HPV vaccination and cervical screening on cervical cancer elimination: a comparative modelling analysis in 78 low-income and lower-middle-income countries," *The Lancet*, vol. 395, no. 10224, pp. 575–590, 2020, doi: 10.1016/S0140-6736(20)30068-4.

[5] S. Lokhande, Neethika Raghuwanshi, Madhuri Dhakne, and Sushma Deshmukh, "Efficacy of Visual inspection with acetic acid (VIA) and PAP smear as a screening method for diagnosis of premalignant lesions of cervix in high-risk patient," *Asian Journal of Medical Sciences*, vol. 13, no. 4, pp. 98–105, 2022, doi: 10.3126/ajms.v13i4.41268.

[6] M. Alec and P. Vassilakos, "Cervical Cancer in Developing Countries," *Cervical Cancer*. pp. 173–191, 2009, doi: 10.1002/9780470988046.ch9.

[7] WHO, "Cervical cancer," *WHO*, 2019. https://www.who.int/cancer/cervical-cancer (accessed Nov. 20, 2021).

[8] WHO, "Human papillomavirus (HPV) and cervical cancer," *WHO*, 2020. https://www.who.int/news-room/fact-sheets/detail/human-papillomavirus-(hpv)-and-cervical-cancer.

[9] E. Darj, P. Chalise, and S. Shakya, "Barriers and facilitators to cervical cancer screening in Nepal: A qualitative study," *Sexual and Reproductive Healthcare*, vol. 20, pp. 20–26, 2019, doi: 10.1016/j.srhc.2019.02.001.

[10] Department of Health Services, "Annual Report 2016-17," *Government of Nepal, Ministry of Health and Population, Kathmandu*, 2018.

[11] P. Rijal, S. Chhetri, A. Agrawal, T. Pradhan, and R. Bhatta, "Cervical Cancer Screening with VIA in Eastern Nepal-3 Years Analysis," *Nepal Journal of Obstetrics and Gynaecology*, vol. 12, no. 2, pp. 28–31, 2018, doi: 10.3126/njog.v12i2.19945.

[12] A. K. Jha *et al.*, "Report of Population Based Cancer Registries at Kathmandu, Bhaktapur, Lalitpur, Siraha, Saptari, Dhanusha, Mohattari, West Rukum and East Rukum Districts, Nepal, 2018," *Nepal Health Research Council*, 2018.

[13] R. Subedi *et al.*, "Differences in cancer incidence and pattern between urban and rural Nepal: One-year experience from two population-based cancer registries," *Ecancermedicalscience*, vol. 15, 2021, doi: 10.3332/ECANCER.2021.1229.

[14] I. C. O. I. C. on H. P. V Cancer, "Nepal Human Papillomavirus and Related Cancers, Fact Sheet 2018," *ICO Information Center on HPV and Cancer*, 2018.

[15] A. Rani *et al.*, "Evaluating sociodemographic factors influencing cervical cancer and detection of cervical lesion by screening methods; visual inspection with acetic acid (VIA) and Papanicolaou (Pap) smear among Pakistani women," *International Journal of Biosciences (IJB)*, vol. 15, no. 1, pp. 144–154, Jul. 2019, doi: 10.12692/ijb/15.1.144-154.

[16] A. G. Ampofo, A. D. Adumatta, E. Owusu, and K. Awuviry-Newton, "A cross-sectional study of barriers to cervical cancer screening uptake in Ghana: An application of the health belief model," *PLoS ONE*, vol. 15, no. 4, p. e0231459, 2020, doi:

10.1371/journal.pone.0231459.

[17] R. B. Hassan, E. Armawan, and I. F. D. Arya, "Visual Inspection Test with Acetic Acid for Cervical Cancer Screening: Willingness and Acceptability among Reproductive Age and Married Women," *Althea Medical Journal*, vol. 5, no. 2, pp. 98–104, 2018, doi: 10.15850/amj.v5n2.1419.

[18] H. I. Martaningrum, U. R. Budihastuti, and B. Murti, "Factors Affecting the Use of Visual Inspection Acetic Acid Test in Magelang, Central Java," *International Conference on Public Health , Solo, Indonesia*, 2020, doi: 10.26911/the7thicph.03.90.

[19] A. R. Menon, "Factors Influencing the Provision and Uptake of Visual Inspection with Acetic Acid (VIA) Screening for Cervical Cancer among Women Accessing Antenatal and Postpartum Care at a Tertiary Center in Blantyre, Malawi," The Johns Hopkins University, 2019.

[20] C. C. Nwabichie, R. A. Manaf, and S. B. Ismail, "Factors Affecting Uptake of Cervical Cancer Screening Among African Women in Klang Valley, Malaysia," *Asian Pacific Journal of Cancer Prevention*, vol. 19, no. 3, pp. 825–831, 2018, doi: 10.22034/APJCP.2018.19.3.825.

[21] and, S. Kholifah, U. R. Budihastuti, and B. Murti, "Factors Affecting the Use of Visual Inspection Acetic Acid Test: Multilevel Analysis on the Contextual Effect of Health Center," *Journal of Health Promotion and Behavior*, vol. 4, no. 1, pp. 1–11, 2019, doi: 10.26911/thejhpb.2019.04.01.01.

[22] B. Young, L. Bedford, D. Kendrick, K. Vedhara, J. F. R. Robertson, and R. Das Nair, "Factors influencing the decision to attend screening for cancer in the UK: A meta-ethnography of qualitative research," *Journal of Public Health (United Kingdom)*, vol. 40, no. 2, pp. 315–339, 2018, doi: 10.1093/pubmed/fdx026.

[23] M. Gizaw *et al.*, "Reasons for not attending cervical cancer screening and associated factors in Rural Ethiopia," *Cancer Prevention Research*, vol. 13, no. 7, pp. 593–599, 2020, doi: 10.1158/1940-6207.CAPR-19-0485.

[24] S. Q. Al-amro, M. K. Gharaibeh, and A. I. Oweis, "Factors Associated with Cervical Cancer Screening Uptake: Implications for the Health of Women in Jordan," *Infectious Diseases in Obstetrics and Gynecology*, vol. 2020, pp. 1–9, Mar. 2020, doi: 10.1155/2020/9690473.

[25] M. Ur Rashid, Msam. Ahmed, S. Chowdhury, and S. Ahmed, "Effectiveness of visual inspection with acetic acid as a test for cervical cancer screening," *International Journal of Noncommunicable Diseases*, vol. 2, no. 1, p. 3, 2017, doi: 10.4103/jncd.jncd_26_16.

[26] P. Devarapalli, S. Labani, N. Nagarjuna, P. Panchal, and S. Asthana, "Barriers affecting uptake of cervical cancer screening in low and middle income countries: A systematic review," *Indian Journal of Cancer*, vol. 55, no. 4, pp. 318–326, 2018, doi: 10.4103/ijc.IJC_253_18.

[27] R. Asgary *et al.*, "Acceptability and implementation challenges of smartphone-based training of community health nurses for visual inspection with acetic acid in Ghana: mHealth and cervical cancer screening," *BMJ Open*, vol. 9, no. 7, 2019, doi: 10.1136/bmjopen-2019-030528.

[28] J. N. W. Lim and A. A. Ojo, "Barriers to utilisation of cervical cancer screening in Sub Sahara Africa: a systematic review," *European Journal of Cancer Care*, vol. 26, no. 1, 2017, doi: 10.1111/ecc.12444.

[29] A. M. Fentie, T. B. Tadesse, and G. B. Gebretekle, "Factors affecting cervical cancer screening uptake, visual inspection with acetic acid positivity and its predictors among women attending cervical cancer screening service in Addis Ababa, Ethiopia," *BMC Women's Health*, vol. 20, no. 1, 2020, doi: 10.1186/s12905-020-01008-3.

[30] M. Laurant, M. van der Biezen, N. Wijers, K. Watananirun, E. Kontopantelis, and A. J. A. H. van Vught, "Nurses as substitutes for doctors in primary care," *Cochrane Database of Systematic Reviews*, vol. 2018, no. 7, 2018, doi: 10.1002/14651858.CD001271.pub3.

[31] A. O. Raifu *et al.*, "Determinants of cervical cancer screening accuracy for visual inspection with acetic acid (VIA) and lugol's iodine (VILI) performed by nurse and physician," *PLoS ONE*, vol. 12, no. 1, 2017, doi: 10.1371/journal.pone.0170631.

[32] P. and T and G. C, "Visual inspection with acetic acid screening for cervical cancer: perceptions of Zimbabwean women: A case of Kwekwe hospital," *International Journal of Sport, Exercise and Health Research*, vol. 1, no. 1, pp. 12–17, 2017, doi: 10.31254/sportmed.1103.

[33] C. C. Ifemelumma *et al.*, "Cervical Cancer Screening: Assessment of Perception and Utilization of Services among Health Workers in Low Resource Setting," *International Journal of Reproductive Medicine*, vol. 2019, pp. 1–8, 2019, doi: 10.1155/2019/6505482.

BIOGRAPHIES OF AUTHORS

Tara Ramtel 🆔 🆚 SC Ⓟ is an Associate Professor working as a Campus Chief in the Asian College of Health Sciences, Purbanchal University, Kathmandu, Nepal. She has experience in public health education and health care organizations. She worked as a Senate member and faculty board in the university and executive board member of the Nepal Nursing Council. Registered in Nepal health professional council as a public health specialization and in Nepal nursing council as a Community health speciality. Currently studying for her PhD Medical Science in University of Cyberjaya, Malaysia. She has completed MPH, Netherlands and MSc in nursing, India. She can be contacted at email: tara.ramtel@gmail.com.

Kamaliah Mohamad Noh ⓘ 🔢 SC P is an Associate Professor in Public Health and Community Medicine from the Faculty of Medicine, University of Cyberjaya.Prior to this academic appointment, she had worked in the MOH and has more than 35 years of experience at various levels of the public health delivery system in Malaysia, retiring as the Deputy Director for Primary Health Care in the Family Health Development Division in 2016. At the global health level, her work directly contributed to the nation's efforts in attaining global public health targets, namely Universal Health Coverage in the post-2015 SDGs, ASEAN's post-2015 health development agenda, the United Nation's MDGs. Her consultancies include appointments as WHO technical expert in Primary Health Care and an independent consultant to Primary Health Care collaboratives. Her research interests include primary health care, health care quality and performance measurements. She can be contacted at email: kamaliahmn@gmail.com.

Narbada Thapa ⓘ 🔢 SC P is the visiting professor of epidemiology and public health at the ICMS (Institute of Crisis Management) and Tribhuvan University. She have been an academicsince 2002. During the period she have taught over 1000 Masters students including PublicHealth (MPH), Nursing (MN) and Crisis Management. She has been a research guide/ supervisorto more than 10 PhD students. Her area of interest and engagement is research and educationmainly on women and children, alcohol consumption among pregnant, reproductive health andmigration issues. She has conducted various researches mainly on women and children subjectsand published those articles in national and international journals. She is mainly involved inscientific advice throughout out the study and manuscript preparation. She can be contacted at email: narbada2013@gmail.com.

Krishna Gopal Rampal ⓘ 🔢 SC P is a Professor of Community and Occupational Medicine at the Faculty of Medicine, University of Cyberjaya. Prof Rampal has the following academic qualifications M.B.B.S, Master of Public Health (Urban Health), Master of Public Health and Doctor of Philosophy (PhD). He is also a Fellow of the Faculty of Occupational Medicine (FFOM) Ireland and Fellow of the Faculty of Occupational Medicine London. In October 2012 he was inducted as a Fellow of the Collegium Ramazzini based in Italy. He received the first Lifetime Achievement Award from the Academy of Occupational Environment Malaysia in 2019. He has edited books in his field, written chapters in books, written scientific reports and policy documents and published articles in both in local and international journals. He is regularly invited to present papers at local and regional scientific conferences. Dr Rampal has been involved in numerous research projects and consultancies. He can be contacted at drkgrampal@cyberjaya.edu.my.