

# Community-Based Cervical Cancer Screening Using VIA and Pap Smear in the Female Population of Eastern Nepal

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## ABSTRACT

**Background:** Cervical cancer is the second most common cancer among women in Nepal. Early diagnosis through screening plays a crucial role in preventing disease progression. In low-resource settings, visual inspection with acetic acid (VIA) and Pap smear are considered reliable and feasible screening tools. VIA is particularly useful in community-based programs, whereas Pap smears are more applicable in hospital-based settings.

**Methods:** This study was conducted in seven primary health care posts across different regions of Belbari, including Bahuni, Belbari-1, Lalbhitti, Danighat, Bahune, Kasai, and Darahara. Permission was obtained from each centre before implementation. All women attending the screening camps who met the inclusion criteria were enrolled in the study. Detailed histories were obtained, and participants first underwent VIA testing, followed by the collection of Pap smears at the community level. Pap smear samples were transported to the hospital for cytological examination by a pathologist. The results of both the VIA and the Pap smear were analyzed.

**Results:** A total of 179 women were screened according to the inclusion criteria. VIA was positive in 18.9% of cases. Pap smear findings revealed infection and inflammation in 55.8% of participants, while 37.9% demonstrated cervical erosion on examination. Among all participants, 50.83% had undergone prior screening, and 67.4% of them were educated.

**Conclusions:** VIA is a valuable screening tool in community-based settings, particularly where large numbers of women must be examined in a short period with limited manpower and the absence of a pathologist. However, Pap smear remains a more specific test for cervical assessment.

**Key-words:** Cervical cancer, Community-based screening, Visual inspection with acetic acid (VIA), Pap smear, Eastern Nepal

## INTRODUCTION

Cervical cancer remains one of the leading causes of cancer-related morbidity and mortality among women worldwide, particularly in low-resource settings <sup>[1]</sup>. In South Asia, including Nepal, cervical cancer is a major public health issue, and it ranks as third leading cause of

cancer deaths in women account for a significant proportion of cancer-related fatalities. According to GLOBOCAN 2022 data, cervical cancer contributes to 7.8% of all cancer deaths, with the majority of these deaths occurring in lower-resource countries where screening and early detection programs are limited or non-existent. The primary cause of cervical cancer is infection with the Human Papillomavirus (HPV), particularly strains HPV16 and HPV18. These viruses induce changes in the cervix, leading to carcinoma through the activity of oncoproteins E6 and E7, which disrupt the tumor suppressor genes p53 and Retinoblastoma (Rb). Persistent HPV infections can lead to preinvasive lesions, such as cervical intraepithelial

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neoplasia (CIN), which may progress to invasive carcinoma if left untreated <sup>[2]</sup>.

These simpler, cost-effective methods are critical for expanding cervical cancer screening to the broader population. This study aims to assess the utility of VIA and Pap smear in identifying cervical abnormalities in the female population of Eastern Nepal, focusing on early detection and prevention strategies for cervical cancer <sup>[3]</sup>. By conducting screenings in several subcenters and evaluating the The World Health Organization (WHO) has developed a global approach to eliminate cervical cancer by the end of the 21<sup>st</sup> century, with key targets: 90% of girls fully vaccinated by age 15, 70% of women screened by high-performance tests between the ages of 35 and 45, and 90% of women identified with cervical disease receiving appropriate treatment. Screening for cervical cancer is vital for early detection of preinvasive disease and preventing progression to cancer. The Pap smear, introduced in the 1940s, has long been a cornerstone of cervical cancer screening. The Pap smear has been identified as one of the convenient, easy-to-perform, and tolerated methods with a 50-53% capacity to identify preinvasive disease <sup>[4]</sup>.

However, in low-resource settings, alternative methods such as VIA and Visual Inspection with Lugol's Iodine (VILI) have been successfully utilized where Pap smear and HPV testing are not feasible. While VIA and VILI are less specific than Pap smear, they are more accessible and offer greater sensitivity in detecting cervical abnormalities <sup>[5-9]</sup>. In the context of Nepal, where access to advanced diagnostic facilities may be limited, this research aims to contribute to improving cervical cancer control programs and increasing awareness and access to early screening in resource-limited settings. The rationale and justification for this study stem from the high burden of cervical cancer in low-resource settings like Eastern Nepal, where the lack of widespread screening programs significantly contributes to late-stage diagnoses and high mortality rates. Cervical cancer remains one of the most common cancers among women in Nepal. Despite the availability of effective screening and preventive methods, a large proportion of women still lack access to these services <sup>[10-12]</sup>. By implementing a community-based screening program using affordable and accessible methods, such as VIA and Pap smears, this study aims to address the gap in early detection and prevention of cervical cancer.

## MATERIALS AND METHODS

**Study Design and Setting** - This was a cross-sectional, community-based study conducted in seven primary healthcare posts of Belbari, Eastern Nepal. The selected sites included Bahuni, Belbari-1, Lalbhitti, Danighat, Bahune, Kasai, and Darahara.

**Study Population** - The study population consisted of women aged 25 to 75 years from Eastern Nepal who attended community-based cervical cancer screening camps. Participants were enrolled voluntarily after providing informed consent.

**Inclusion and Exclusion Criteria**- Sexually active women between the ages of 25 and 75 years who consented to participate were included in the study. Women who were within seven days of their menstrual cycle, unmarried or sexually inactive, or above the age of 75 years were excluded.

**Sample Size**- The minimum calculated sample size was 139. However, since the study was conducted during community-based screening camps, all eligible women attending were included. A total of 180 women presented, of whom 179 met the inclusion criteria and were included in the analysis.

**Data Collection and Procedures**- Each participant's sociodemographic and reproductive health history was recorded. Cervical cancer screening was performed in two steps. First, VIA was conducted by applying 3–5% acetic acid to the cervix with a cotton swab. Acetowhite changes were observed within one to two minutes under adequate lighting by trained healthcare providers. Second, Pap smears were collected immediately after VIA testing at the community level and transported to the hospital for cytological examination by a pathologist.

**Statistical Analysis**- All data collected from the health centres were compiled and entered into IBM SPSS software (version 22). Descriptive statistics were used to analyse sociodemographic characteristics, VIA positivity, and cytological findings.

**Ethical approval**- Ethical approval was obtained from the Nepal Health Research Council (NHRC), and administrative permission was obtained from each health center before data collection.

**RESULTS**

Out of 179 subjects, smear was found to be positive for malignancy in one of the cases, 14 VIA positive cases had no malignancy in the pap smear, and 19 cases had

infection/inflammation in the pap smear. The total number of cases with infection/inflammation-positive pap smears is 91, out of which 19 were VIA-positive, as shown in Table 1.

**Table 1:** Cross-Tabulation of VIA Results and Pap Smear Findings among Screened Women (n = 179)

		Pap Smear			Total n (%)
		No Malignancy	Infection/ Inflammation	Malignancy	
Via	Positive	14(41.17)	19(55.88)	1(2.29)	34(18.9)
	Negative	73(50.34)	72(49.65)	0	145(81)
Total		87(48.60)	91(50.83)	1(0.55)	179

A total of 179 participants were assessed for education and previous screening, out of which 58 educated participants had previous screening for cervical cancer,

and 60 non-educated participants had no screening for cervical cancer (Table 2).

**Table 2:** Education Level and History of Cervical Cancer Screening

		Previous Screened		Total n (%)
		Yes n (%)	No n (%)	
Education	Yes	58(67.4)	28(32.5)	86(48.04)
	No	33(35.4)	60(64.51)	93(51.95)
Total		91(50.83)	88(49.16)	179

Out of 179 participants, 34 participants showed VIA positive, and 29 participants had cervical erosion on examination. Two had Uterovaginal prolapse. Out of 179

participants, 68 participants had cervical erosion followed by Uterovaginal prolapse as a finding on examination (Table 3).

**Table 3:** Correlation Between VIA Results and Clinical Examination Findings

		VIA		Total
		Positive	Negative	
Examination Findings	Cervical Erosion	29	39	68
	UV Proplapse	1	16	17
	PV Discharge	2	5	7
	Rectocele	0	5	5
	Cystocele	0	12	12
	Normal	1	40	41
	Others	1	28	29
Total		34	145	179

Out

of 179 participants, 34 VIA cases were found to be positive; 30 of them visited the hospital, and 12 of the

VIA-negative cases also visited the hospital for further checkups (Table 4).

**Table 4:** Correlation Between VIA Results and Subsequent Hospital Visits

		Hospital Visit		Total n (%)
		Hospital Not Visited n (%)	Hospital Visited n (%)	
Via	Positive	30(88.23)	4(11.7)	34(18.9)
	Negative	133(8.27)	12(91.7)	145(81)
Total		163(23.4)	16(76.5)	179(100)

Out of 179 patients, 68 had cervical erosion as a finding, 17 had uterovaginal prolapse, 7 had post-vaginal discharge, 5 had rectocele, 12 had cystocele, and 41

were normal. The remaining 29 patients had findings, including nabothian cysts, cervical polyps, or other gynecological problems (Fig. 1).

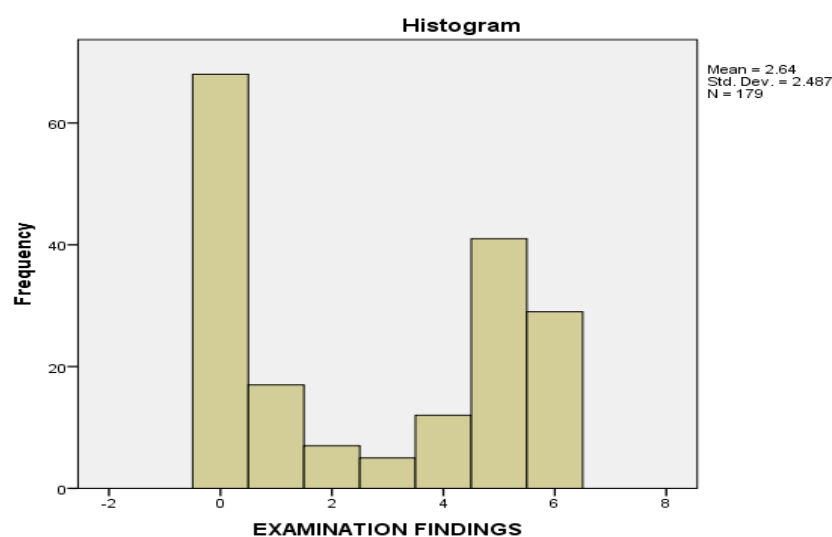
**Fig. 1:** Clinical Examination Findings in the Female Participants

Table 5 presents the correlation between occupation and screening. Out of 86 total participants involved in some form of occupation, 58 had been previously screened. A

total of 60 participants who were not involved in any form of occupation were not screened previously for cervical cancer.

**Table 5:** Correlation of Occupation with History of Cervical Cancer Screening

		Previous Screened		Total n (%)
		Yes n (%)	No n (%)	
Occupation	Yes	58(67.4)	28(32.5)	86(48.0)
	No	33(35.4)	60(64.5)	93(51.9)
Total		91(50.83)	88(49.1)	179(100)

## DISCUSSION

Cervical cancer screening plays a crucial role in both developed and developing nations, enabling the identification of cellular changes in the cervix that facilitate early detection and treatment, ultimately leading to disease cure <sup>[1,2]</sup>. For a country like Nepal, where cancer awareness in the community and public level is very low and cervical screening is not mandatory, ladies do not visit doctors for this sole purpose. Without a cervical cancer screening program conducted by the government or organisations, several cases remain below the tip of the iceberg in the community, and later the cases are presented in locally advanced stages in the outpatient departments <sup>[8]</sup>. Untimely diagnosis and underutilization of screening facilities have led to cervical cancer being the second most common cancer in Nepal.

Cervical cancer screening methods are underutilised not only in rural areas but also in urban areas. Lack of awareness of cervical cancer and unawareness of the accessibility of the tools of screening might be the reason for underutilization of screening. Due to a lack of self-screening initiatives, community screening has been frequently carried out at the government, institutional, and private or non-governmental organisation levels. These community-level free screening programs have led to a larger number of participants utilising the service. During community-level screening, the VIA test is typically used to obtain early results. If suspected, a pap smear with liquid-based cytology or colposcopy is performed in the hospital on an outpatient basis, and sometimes at the community level when pap smear sample collection tools are available, and then reviewed by pathologists <sup>[13]</sup>.

Several studies have been done previously regarding cervical cancer screening. In a survey by Khatuja *et al.* on the knowledge and practices of cervical cancer screening among the general population and medical personnel, the knowledge and awareness of cervical cancer and screening were found to be 32.5% among women in the general population and 100% among medical professionals <sup>[8]</sup>. In the same study, the utilisation of screening by the general population was 25%, whereas, despite being aware, utilisation of screening by medical professionals was 17.5% due to a lack of time, embarrassment, and hesitation. In our study, 67.4% of those who were educated and had an occupation had utilised the cervical screening modality previously on

their own before this community project, whereas 64.5% of women who were not educated and had no particular occupation had not been previously screened. The utilisation and underutilisation of screening in the Nepalese community highlighted how education and working women were aware of their health and motivated for screening, unlike the results of Khatuja *et al.*, which showed underutilisation of screening by medical professionals themselves <sup>[8]</sup>.

In the study conducted by Sankaranarayanan *et al.* the rate of aceto-white lesions seen in VIA was 8-15% <sup>[9]</sup>. Similarly, community-based studies conducted in other low-resource-based settings, such as Thailand, the rate of acetowhite seen in the VIA test was 3% (Gaffikin *et al.* <sup>[10]</sup>), Mozambique, 9% (Moon *et al.* <sup>[11]</sup>), and Laos, 7% (Phongsavan *et al.*) <sup>[12]</sup>.

In a study conducted by Fong *et al.*, the rate of aceto white lesion seen in the VIA test was 9.8%.

Our study revealed a rate of aceto white lesions of 18.9%, which is quite similar to the rates reported in previous studies, where the VIA test resulted in a positive outcome in 8-15% of cases <sup>[13,14]</sup>.

In the study conducted by PL Sachan, Pap smear test results showed no malignancy in 48.8% and infection/inflammation in 42.6%. Similarly, another study by Sharif <sup>[15]</sup> showed that Pap smear results revealed no pathology in 36%, 19% ASCUS (Atypical Squamous cells of undetermined significance), inflammation in 32%, and 5.5% HSIL (High-grade Squamous intraepithelial lesion). Similarly, a study conducted by A. Tiwari regarding the correlation between Pap smear and biopsy showed that 32.81% of patients had normal cytology in Pap smear, 25% had ASC-US, and 4.68% had atypical cells. Our study showed that pap smears contained no atypical cells in 48.6%, no inflammatory cells in 50.8%, and 0.5% atypical or malignant cells. This highlights the importance of a pap smear in determining whether to conduct a colposcopy or prescribe antibiotics in cases of infection/inflammation.

In the study conducted by Sachan, the examination findings revealed a healthy cervix in 26.6%, per vaginal discharge in 29.6%, Erosion in 19.2%, Uterovaginal prolapse in 3.35% and bleeding on touch in 4.84% <sup>[15]</sup>. Our study revealed that 37.9% of the examinations showed erosion as the highest finding, followed by prolapse (9.49%), discharge (3.9%), Rectocele (2.7%),



Cystocele (6.7%), Normal (22.9%), and Others (16.2%)<sup>[15]</sup>.

Our study highlighted the importance of Pap smears and further testing, as 55.8% of VIA-positive cases showed inflammation or infectious smears, underscoring the value of VIA in community testing to guide subsequent tests<sup>[16]</sup>.

One of the primary limitations of this study is the lack of generalizability due to the use of convenience sampling. Since participants are selected based on their availability and willingness to participate, the sample may not be fully representative of the broader population of women in the region. Potentially overrepresenting certain socio-economic or demographic groups while underrepresenting others<sup>[10]</sup>. Co-testing for HPV was not analyzed in this study, which may have resulted in better outcomes. Pap smear, along with the use of HPV co-testing, shall be studied to make the screening more effective. Every lady, after being sexually active or at least after 30 years of age, should undergo mandatory screening with a pap smear, if not available, at least with VIA. The government should implement a policy for cervical cancer awareness in every rural and urban region, and provide screening in these areas to alleviate the financial burden<sup>[13]</sup>.

## CONCLUSIONS

Cervical cancer is the leading cause of cancer in the female population. Timely diagnosis leads to better prevention and treatment. The Pap smear has been a standard procedure with better specificity, low cost, and ease of performance. In the community settings, VIA is a rapid, immediate test result and hints for future testing. Although not all VIA-positive cases have atypical cells in a pap smear, it raises awareness for further testing. In the lower middle-income countries like Nepal, having VIA in the community testing and further pap smear in the health post is always better than not doing any tests till the symptoms appear. Before undergoing this screening, it is essential to understand why it is being conducted, to inform the community and raise awareness about the test and its frequency.

## CONTRIBUTION OF AUTHORS

**Research concept**– Asmita Rayamajhi, Vivek Ghosh

**Research design**– Asmita Rayamajhi, Vivek Ghosh

**Supervision**– Sajjad Ahmed Khan, Asmita Rayamajhi,

Vivek Ghosh

**Materials**– Dikshya Nepal, Asmita Rayamajhi, Vivek Ghosh

**Data collection**– Asmita Rayamajhi, Dikshya Nepal

**Data analysis and interpretation**– Vivek Ghosh, Asmita Rayamajhi

**Literature search**– Dikshya Nepal

**Writing article**– Asmita Rayamajhi, Vivek Ghosh

**Critical review**– Sajjad Ahmed Khan, Asmita Rayamajhi, Vivek Ghosh

**Article editing**– Dikshya Nepal, Asmita Rayamajhi

**Final approval**– Asmita Rayamajhi, Vivek Ghosh

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