

Outcomes of a National HPV-DNA based Cervical Screening Pilot: Results from a Collaborative Model in Dolakha and Dhulikhel Hospital, Nepal

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Abstract

Introduction: Cervical cancer is the most common Gynaecological malignancy in Nepal. The screening coverage remains only around 8% despite national targets of 70%. HPV DNA testing offers a sensitive method suitable for low-resource settings. In 2022–2023, Nepal launched HPV-based pilot screenings in seven districts, including Dolakha district. This study was done with the aim to describe the screening and management of HPV positive women identified in the National cervical cancer screening program through collaborative approach.

Methods: A retrospective study was conducted using secondary data from the government-led National HPV DNA cervical cancer screening program implemented in Bhimeshwar Municipality, Dolakha in collaboration with Dhulikhel Hospital. Data from 2,235 women aged 30 years and above with complete screening records were analyzed. Variables included age, ward, HPV and Visual Inspection with Acetic acid results, biopsy findings, treatment received, and follow-up status. Microsoft Excel (Version 2508) was used to summarize and analyze the data.

Results: Out of 9,640 eligible women, 2,235 were screened, achieving a 23.18% coverage. A total of 210 women (9.4%) tested positive for HPV DNA. Among HPV-positive cases, 210 (99%) received follow-up for VIA screening and among them all positive cases received appropriate treatment based on tissue biopsy report.

Conclusion: Despite limited resources, the collaborative approach helped the program achieve full follow-up and treatment for HPV-positive women. This study highlights the need for collaboration of local stakeholders at planning level to improve the screening coverage.

Keywords: Cervical cancer, Community-based screening, HPV DNA testing, Nepal

Introduction

Cervical cancer is a major public health challenge in Low and Middle Income Countries (LMICs), leading to high rates of morbidity and mortality among women.^{1,2} Despite the National guidelines of Nepal recommending screening coverage of at least 70% of women aged 30 years and above, actual screening coverage remains only around 8%.^{3,4} The screening efforts are limited by poor infrastructure, inadequate health budgets and lack of access to advanced diagnostics.⁵

Human papillomavirus (HPV), the primary cause of cervical cancer, can be detected through HPV Deoxyribonucleic acid (DNA) testing, which is more sensitive than conventional cytology based methods like Pap smear.^{6–8} Its high sensitivity and self-sampling potential makes it suitable for low resource setting.^{9–12} It enables early detection of precancerous changes.⁵ A step survey conducted in 2019 in Nepal reported

that in the age group 30-49 years, only 8.2% of the women ever screened for cervical cancer.¹³

Recognizing this need Nepal endorsed an HPV-DNA based pilot screening in 7 districts (Dolakha, Mahottari, Rautahat, Sarlahi, Lalitpur, Palpa, Sindhupalchowk and Sunsari) in 2022-2023.³ However, evidence on cervical cancer screening coverage and management of screen positive women remains limited. There is no published data on HPV-based integrated, community-led collaborative screening approaches in Nepal including follow up, referral and treatment. To address these gaps, this study aims to assess the collaborative experience between the government-led HPV screening program in Bhimeshwor Municipality, Dolakha, and Dhulikhel Hospital in managing women identified at risk for cervical cancer.

Methods

A retrospective study was conducted at Bhimeshwor Municipality of Dolakha District, Nepal. It was selected as the site for study as it is one of the eight districts where the government conducted a pilot HPV-DNA based cervical cancer screening. In addition, the presence of an outreach clinic of Dhulikhel Hospital made collaboration for clinical management of positive cases feasible. Ethical clearance for the study was obtained from Kathmandu University School of Medical Sciences Institutional Review Board (Approval no: 262/25).

The study was based on secondary data collected during the National HPV-based cervical cancer screening program, which was conducted in Bhimeshwor Municipality from 5 May 2024 to 15 May 2024. A total of 2,235 women had participated in the program. Women included in the analysis were married women aged 30 years and above residing in different wards of the Municipality who had complete screening records, while those outside the eligible age or incomplete records were excluded.

Screening was conducted using HPV-DNA testing as the primary screening method, and women who tested positive were referred to Dolakha Hospital-Dhulikhel Hospital or Dhulikhel Hospital itself for further evaluation and management. Additional procedure included Visual Inspection with Acetic Acid (VIA) followed by tissue biopsy and treatment using Loop Electrosurgical Excision Procedure (LEEP) or thermocoagulation as required. All these data were collected from the records including follow-up status.

Descriptive analysis was performed to summarize key variables, including participant's age, ward-level residency, HPV and VIA results (Negative, Positive), biopsy findings (CIN I, CIN II, CIN III, Carcinoma, negative), treatment received (LEEP, thermocoagulation) and follow up status (completed, lost to follow up).

Secondary data was collected from records provided by Bhimeshwor Municipality for the National Cervical Cancer Screening Program, which follows standardized national guidelines and protocols developed by the Ministry of Health and Population. Only complete and verified records were included in the study to maintain content validity. To maintain reliability in this study, data extraction was performed using a

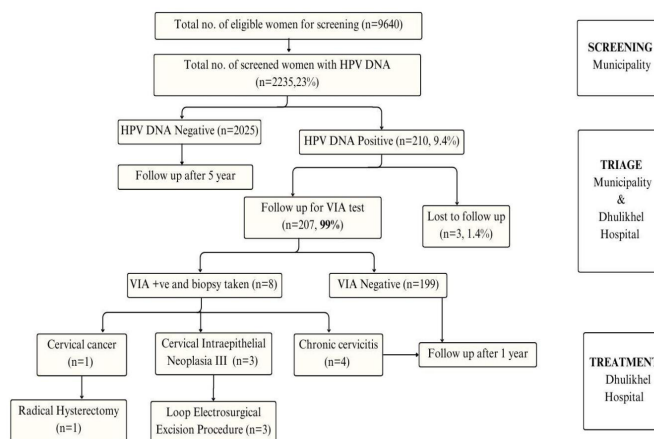
pre-designed data extraction checklist, and consistency of data entry was cross-checked to minimize errors.

Following the identification of HPV DNA-positive cases, government officials from Bhimeshwor Municipality approached Dhulikhel Hospital to establish a collaborative partnership for the clinical management of women with HPV-DNA test positive. The financial constraints within the municipality posed significant challenges for timely treatment and care. In response, Dhulikhel Hospital took full responsibility for the follow-up and clinical management of all HPV-positive cases. This collaboration has remained in place till date, ensuring continuity of care and access to necessary treatment for the women testing positive.

Microsoft Excel (Version 2508) was used to summarize the descriptive statistics, including frequencies and percentages, to present ward-wise participation, screening uptake, HPV positivity rates, and their treatment. Ward-level comparisons are presented in tabular form to assess variations in coverage and positivity across the municipality.

Results

A total of 9,640 women aged 30 years and above were screened through HPV DNA based cervical cancer screening in Bhimeshwor Municipality. Of these, 2,235 underwent sample collection, resulting in an overall screening coverage of 23.18% (Figure 1).



Among those screened, 210 women (9.4%) tested positive for HPV DNA. Screening uptake varied significantly across the ward. Ward 1 had a relatively high coverage of 44% with 382 women screened out of 868 eligible women, identifying 27 positive cases. Similarly, Ward 3 had a notable screening rate of 38% (n=552) and detected the highest number of positive cases (n=69). Ward 9 also showed a high screening uptake at 35%, with 320 women screened and 34 positive cases. In contrast, Wards 2, 4, 6, and 8 showed low screening coverage, ranging from 10% to 14%, with comparatively fewer samples collected and positive cases detected. Although Ward 6 had the largest eligible population of 1,815 women, only 193 women were screened, with a low coverage of just 10.6% (Table 1).

Table 1: HPV DNA Screening Coverage and Positivity rate among Women Aged 30 Years and above in Bhimeshwor Municipality

Ward no	Total female population of 30 years and above * -A	Total number of females with HPV screening-B	Total HPV Positive cases	Total coverage proportion by government (B/A*100)
1	868	382	27	44%
2	1102	114	2	10%
3	1451	552	69	38%
4	583	61	7	10.5%
5	1215	255	18	21%
6	1815	193	21	10.60%
7	944	257	27	27%
8	744	101	5	14%
9	918	320	34	35%
Total	9640	2235	210 (9.4%)	23.2%

*Source HMIS target population data 2080/2081 B.S. provided by the municipality for age 30-49 yrs and 50 plus age.

Following the initial HPV DNA testing, 207 HPV-positive women underwent further evaluation through VIA. Tested positive were 8 out of 207 cases and all 8 cases underwent tissue biopsy followed by appropriate treatment. Biopsy results revealed one case of endocervical adenocarcinoma, which was referred to Bhaktapur Cancer Hospital for further management. Additionally, three cases of CIN-III were identified and were treated with Loop Electrosurgical Excision Procedure (Figure 1).

Three HPV-positive women (1.4%) were lost to follow-up. Among them, 2 were lost to follow up due to inability to contact and one refused for pelvic examination by VIA test (Figure 1).

Discussion

This study demonstrated the outcomes of implementation of a large-scale, National HPV DNA based screening initiative in Bhimeshwor Municipality, Nepal in collaboration with Dhulikhel Hospital. The key finding showed a substantial number, 210 (99%) of HPV DNA screen positive were evaluated by VIA test. All VIA positive (8 in number) underwent biopsy and based on the histopathology report, received appropriate treatment. This intersectoral collaboration depicted the strength in the approach followed by this study.

With a screening coverage of 23.18%, this initiative successfully identified 210 HPV-positive cases (9.4%). The screening coverage rate has increased as compared to the screening coverage of 8.2% as reported by STEPS survey, Nepal.¹³ However, this initiative was not able to reach the target of the National guidelines recommending screening coverage of at least 70% of women aged 30–60 years.³ This suggests that earlier collaboration with Dhulikhel Hospital during the planning and implementation phases of HPV screening, rather than engaging later primarily for the management of HPV positive cases, might have increased the likelihood of achieving higher screening coverage. Dhulikhel Hospital already has experience in implementing community-based HPV screening programs, whereas this was first time, such initiative was conducted by the

Municipality. Early involvement could have allowed us to share our experience and provide technical guidance, which might have contributed to improving screening coverage.

The variation in screening coverage across wards also suggests disparities in screening participation, highlighting the need for more targeted approaches. These include enhanced behavior change communication, sustained community engagement, and collaboration with local health workers and multisectoral partners. Similar disparities have been reported in other low- and middle-income country contexts, where factors such as geographic location, time constraints, health-seeking behavior, cost, local leadership, and community mobilization affect screening uptake.^{9–11,14}

One of the key strengths of this initiative was its collaboration with Dhulikhel Hospital for management of women with HPV positive results. While maximizing screening coverage is crucial, it must be well complemented by timely and appropriate clinical management. This collaborative approach bridged the gap between screening and treatment, ensuring continuity of care for women who tested positive and diagnosis of precancerous lesions and invasive cancer. The hospital's commitment to managing HPV-positive cases mitigated the municipality's limitations in funding and highlighted the importance of multisectoral collaboration for successful program implementation. Various other studies have also shown that, particularly in resource-constrained settings, such collaborations are effective in strengthening primary care, enhancing preventive services, and reducing health inequities especially where local budgets are insufficient to support treatment services.^{15–17}

Although the loss to follow-up rate in this study was relatively low (n=3, 1.4%), it remains a persistent challenge, especially in geographically remote or socioeconomically disadvantaged areas. Contributing factors include migration, limited contact information, fear, stigma, and family responsibilities. Delays in follow-up for precancerous lesions can lead to missed opportunities for early intervention, thereby increasing the risk of advanced cancer and mortality.¹⁸

Conclusion

This study highlights that community-based HPV DNA screening, supported by strong intersectoral collaboration between local government and healthcare providers, is a feasible and effective strategy for cervical cancer prevention in low-resource settings. The program achieved high follow-up and ensured 99% treatment for HPV-positive women, highlighting the scalability of this approach. To further strengthen such initiatives, future efforts should focus on improving community engagement, reducing diagnostic delays, and incorporating inclusive strategies such as self-sampling.

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