

ORIGINAL ARTICLE

The state of cervical cancer screening in Vanuatu: A retrospective analysis (2015–2020)

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Abstract

Aims: Vanuatu is a lower- and middle-income country in the Pacific with a cervical cancer incidence of 100 per 100,000 women. An opportunistic screening program has existed since 2008, with continuous data collection related to this since 2015.

Methods: We analysed all cervical cancer screening data for Vanuatu over 6 years, and conducted a descriptive analysis of number of women screened, the results of screening, the treatment rates of human papillomavirus (HPV) positivity or cytological abnormalities detected through screening, and the incidence of cervical cancer. The challenges encountered during the implementation of the screening program are also described.

Results: Data were available from 01/01/2015 to 31/12/2020. Based on census data, 70,081 women were eligible for screening, and 15,696 (22.4%) women underwent screening at least once. Screening coverage included 13.2% of individuals under 30 years, 33.2% of individuals in the 30–50 age group, and 15.8% of people over 50 years. A total of 8910 HPV tests were conducted, of which 876 (9.8%) were positive. Among the HPV-positive cases, 316 received large loop excision of the transformation zone (LLETZ) treatment, 156 (49.4%) of which were high grade and 2 (0.6%) of which were cancer. A total of 13,396 Pap smear tests were conducted, with 315 (2.4%) showing high-grade results and 226 (1.7%) indicating possible high-grade results. Overall, 119 cancers were diagnosed from 15,696 women screened (0.8%), including 6/3297 (0.2%) of < 30 years, 75/10,089 (0.7%) of 30–50 years, 38/2310 (1.6%) of > 50 years.

Conclusion: One in five eligible Ni-Vanuatu women have undergone cervical cancer screening since 2015, with 7.6 per 1000 women having malignant results and 40.4 per 1000 women having high-grade or possible high-grade results.

KEYWORDS

cervical cancer, HPV, screening, Vanuatu, Western Pacific

INTRODUCTION

Vanuatu is a lower- and middle-income country (LMIC), and a Pacific Island nation, with a population of 300,000 [1]. The incidence of cervical cancer is estimated at 100

per 100,000 women [2], with an average age at diagnosis of 44 years and an average age of death from the disease of 45 years [3].

The World Health Organization (WHO) has outlined that by 2030, countries need to meet the “90-

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70-90” targets to achieve cervical cancer elimination; that is, 90% of girls complete human papillomavirus (HPV) vaccination at the age of 15 years, 70% of women are screened at ages of 35 and 45 years, and 90% of patients with precancerous lesions are treated [4]. Vanuatu has had an opportunistic cervical cancer screening program since 2008, supported by the Ministry of Health and run by local nurses and doctors, with volunteer support from Australian pathologists. Coverage of cervical cancer screening (both cytology and HPV based) has been steadily increasing. Since 2015, there has been continuous data collection of screening rates, as well as the outcomes and the results of subsequent treatment. Further to this, the Vanuatu Ministry of Health has recently released the first guidelines for cervical cancer prevention and control. Briefly, the guidelines outline that women aged 25 years or older will be offered HPV DNA testing, Pap smear testing, or both depending on their age, and a flow chart of follow-up and treatment thereafter is detailed in the guidelines. It is important to note that the guidelines state that “no woman requesting a Pap smear will be denied the service, no matter what age” [5].

To meet the WHO targets, countries like Vanuatu must have adequate data collection, as well as the capacity to interrogate that data and identify programmatic gaps. We undertook an analysis of 6 years of continuous screening data to provide insight into the coverage of the secondary prevention of cervical cancer. In addition, our analysis gives a critical baseline before the introduction of the Ministry of Health screening guidelines and identifies gaps in service delivery that may need to be targeted.

MATERIALS AND METHODS

Participation in the screening program was through voluntary attendance at organized clinic days and outreach programs. Information about the screening program was disseminated through advertisements at health clinics, health programs on local radio stations and local television channels, as well as opportunistic promotion by primary healthcare providers.

Women who were aged 25 years or older, were sexually active, had not been screened in the past 2–3 years, and were asymptomatic were eligible to participate. Women received counseling and provided consent to participate. Screening involved a collection of cervical samples for cytology (Pap smear) and/or testing for HPV DNA. If a woman was aged under 30 years or over 50 years, she was offered a Pap smear. From 2015 to 2017, women aged 30–50 years were initially screened with HPV, and Pap smear testing was done only in HPV-positive cases. Since 2017, HPV and Pap smear testing in this age group have been done concurrently. The use of resources in this

Key points

Cervical cancer remains a challenge in Vanuatu, however, one in five Ni-Vanuatu women have undergone screening. Overall, 119 cancers were diagnosed from 15,696 women screened, and 13,396 Pap smear tests were done; 315 (2.4%) returned high-grade results and 226 (1.7%) returned possible high-grade results.

way has been developed as a part of the Ministry of Health guidelines in consultation with multiple stakeholders and is considered the most appropriate system for cervical cancer screening in Vanuatu, allowing for resource constraints. However, it should be noted that testing was done in some cases outside the guidelines (e.g., HPV screening in women under 30 years).

HPV tests were sent to a laboratory in Vanuatu and analyzed in batches within 30 days. Pap smears were fixed on glass slides and sent to Santo Northern Provincial Hospital to be assessed by the sole locally trained pathologist, or sent off-site to Australia for testing under a long-standing agreement. Given the limited domestic resources, most Pap smears were sent off-site. For example, in 2020, 99% of Pap smears were sent to QML Pathology (Brisbane, Australia) and ACT Pathology (Canberra, Australia). Pap smear results were reported using the Bethesda system. Histopathology services were provided by Sullivan Nicolaides Laboratories in Australia.

Screen-detected anomalies were addressed in two ways. Although all women with HPV-positive results were planned for treatment, the results of the Pap smear allowed for triaging. Specifically, HPV-positive cases with cytologically abnormal results (any result other than normal or low-grade abnormality) were prioritized for treatment. HPV-positive cases with cytologically normal or low-grade abnormal results were treated when possible. This decision was based on the limited availability of human and physical resources that must be judiciously used to provide treatment. Women who only had Pap smear screening were contacted by the clinic with the results, which took an average of 60 days. Women with low-grade abnormalities were advised to have a repeat test one year later, and women with normal results were advised to have a repeat test in 2 years if they were over 30 years or in 3 years if they were younger than 30 years. In both pathways of screening, the results were communicated to the clinic staff, who contacted the women and arranged a plan for treatment if indicated. To optimize resources, considering the limitations of domestic histopathology services, and to ensure the maximum follow-up of women after screening, HPV and Pap

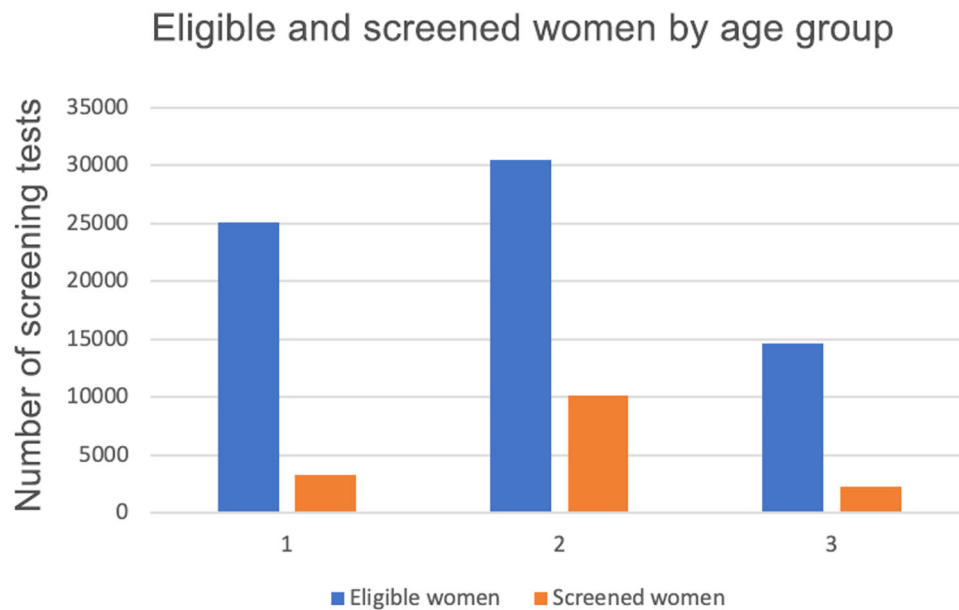


FIGURE 1 Rates of screening by age group. Group 1: age < 30 years; Group 2: age 30–50 years; Group 3: age > 50 years.

smear abnormalities were generally managed with definitive treatment, rather than first performing colposcopy and targeted biopsy (which resulted in significant delays in treatment). The treatment employed was large loop excision of the transformation zone (LLETZ) under colposcopic guidance, which was available at Vila Central Hospital and the Northern Provincial Hospital, as well as through outreach services on the islands. To access any of these services, women may need to travel from one village or one island to another.

The number of women eligible for screening was estimated based on 2016 mini-census data [6]. All clinical services that provide cervical cancer screening contribute summary data to a database supported by the Ministry of Health. This process has been continuous since 2015. The total number of cervical cancer screening investigations performed and the results of these tests and any subsequent treatments were captured at the laboratory level and entered into a registry, which also provided follow-up. Data were deidentified and aggregated for analysis. Barriers to executing the cervical cancer screening program were documented through discussions with the health staff running the program, as well as personal observations of the authors.

Cervical cancer screening data was extracted for the period from 01/01/2015 to 31/12/2020. A descriptive analysis was undertaken, incorporating for all women undergoing cytological screening and/or HPV screening, including: the results of both screening tests, the correlation between cytological screening and HPV testing when both were

performed, the treatment rates of abnormalities, and the incidence of cervical cancer. Data were presented as summary statistics with descriptive data being presented for each variable. Data were entered and analysed in the Unified/Gupta Corporation VISION ACCELL IDS relational database. Feedback on the challenges or barriers faced during the screening program was described. This was collated from the staff.

RESULTS

Data were available from 01/01/2015 to 31/12/2020. A total of 70,081 women were eligible for screening, and a total of 15,696 (22.4%) women underwent screening at least once, ranging from 2365 to 3536 women per year. A total of 2031 (12.9%) women participated in the screening program more than once. Data presented below are the representative of each screening occurrence. Totally, 17,727 total screening tests were performed, with Pap smear, HPV tests, or both. Rates of screening by age group can be seen in Figure 1, with 13.2% of less than 30 years, 33.2% of 30–50 years, and 15.8% of over 50 years being screened.

Totally, 8910 HPV tests were performed, and 876 (9.8%) were positive. The positivity rate of HPV varied by age group: 165/1011 (16.3%) under the age of 30 years, 682/7298 (9.3%) aged 30–50 years, and 28/601 (4.7%) over the age of 50 years. Histological assessment of LLETZ was performed in 316 HPV-positive cases. The results for 8 (2.5%) cases were

TABLE 1 Results of screening with Pap smear tests.

Result	n (%)
Negative	10983 (81.9)
Possible low-grade	377 (2.8)
Low-grade	259 (1.9)
Possible high-grade	226 (1.7)
High-grade	311 (2.3)
Cancer	37 (0.3)
Unsatisfactory	1203 (8.9)

missing, 116 cases (36.7%) were benign, 34 cases (10.8%) were low-grade, 156 cases (49.4%) were high-grade, and 2 cases (0.6%) were cancer.

Totally, 13,396 Pap smears were done, with 311 (2.3%) returning high-grade results. All Pap smear results are outlined in Table 1. Nearly one in ten cases were returned as unsatisfactory. Among the 311 high-grade Pap smear results, 133 cases (42.8%) were from women who had HPV tests, 101 cases (75.9%) of which were positive. The majority (118 cases) of the HPV tests among cases with high-grade Pap smear results were performed in women aged 30–50 years, 91 cases (77.1%) of whom were positive.

During the analyzed period, a total of 645 LLETZ procedures and 106 hysterectomies were performed. For the 645 LLETZ procedures, the final pathology showed cancer in 26 cases (4.03%), high-grade dysplasia in 279 cases (43.3%), low-grade dysplasia in 81 cases (12.6%), no residual diseases in 236 cases (36.6%), and no results available for 23 cases (3.6%). For the 106 hysterectomies, the final pathology results showed cancer in 32 cases (30.2%), high-grade dysplasia in 13 cases (12.3%), low-grade dysplasia in 1 case (0.9%), no residual diseases in 52 cases (49.1%), and no results available for 8 cases (7.5%). There were 205 cases of Pap smear treatments where no HPV testing was performed; this included 18 hysterectomies and 187 LLETZ procedures. Among these 205 cases, the final results were unavailable for 5 cases (2.4%), benign in 64 cases (31.2%), low-grade intraepithelial neoplasia in 22 cases (10.7%), high-grade intraepithelial neoplasia in 104 cases (50.7%), and malignant in 10 cases (4.9%).

The treatment rates of high-grade Pap smears have increased over time and are shown in Table 2. However, it should be noted that cases from 2019–2021 may still be awaiting treatment, so the data presented here are likely to change. Overall, out of the 15,696 women screened, 119 cases (0.8%) with cancer were diagnosed, including 6 cases

TABLE 2 Treatment rate of high-grade Pap smear results by year.

Year	High-grade results on Pap smear (n)	Number (percentage) of individuals treated
2015	42	17 (40.5%)
2016	38	16 (42.1%)
2017	40	24 (60.0%)
2018	64	40 (62.5%)
2019	71	45 (63.4%)
2020	56	37 (66.1%)

(0.2%) diagnosed among women of less than 30 years (out of 3297), 75 cases (0.7%) among women aged 30–50 years (out of 10,089), and 38 cases (1.6%) among women over 50 years (out of 2310). Among the 896 HPV-positive results, 14 cases (1.6%) were diagnosed with cancer.

The screening coverage varied across the six provinces, ranging from 8.9% to 31.9% of eligible women. Screening coverage varied on individual islands, ranged from 0.2% (2 out of 904 eligible women on Maewo) to 71.9% (792 out of 1102 eligible women on Malo).

Barriers and facilitators

Feedback was collated, and the identified issues can be categorized into community education, communication of results, preventing loss to follow-up, stakeholder engagement, and data management.

Community education

The screening program initially adopted the Australian cervical cancer screening slogan, “Screening saves lives”. It was later found that this slogan needed to be modified to “Screening and treatment save lives”, as the literal interpretation of the initial slogan suggested that there was a perceived safety in screening alone and women did not return for treatment.

Education is needed for both men and women to understand the ubiquitous nature of HPV infection among sexually active individuals. It was also critical to educate men in the community, who are culturally often the decision-makers in health care and who in some cases may prevent women from accessing treatment due to misconceptions about HPV or Pap smear results (e.g., believing that they are caused by immoral behavior). Local leaders have been and continue to be engaged to address these issues, with measures including arranging meetings between medical superintendents and the chiefs of villages to discuss the program.

Communication of results

The initial consultation during screening became pivotal to the program, as many Ni-Vanuatu women had perceptions about the diagnosis of cancer. Women must be reassured that a positive screening test does not equate to a diagnosis of cancer, but rather serves as a signal that they need to return for treatment to prevent cancer.

Preventing loss to follow-up

Loss to follow-up after screening remained a weak point in the program. Ideally, women who underwent HPV screening should have their triage Pap smear testing taken at the same time to prevent loss to further follow-up. Women who were screened to be positive for HPV needed to be provided with comprehensive counselling and information at the initial screening, so that they can be brought in for treatment as well as be prepared to undergo that treatment. For the front-line workers in the program, screening should not be conducted unless there was a treatment plan in place, including adequate coordination between screening and hospital services, to ensure that women who were screened to be positive can and do access treatment. Another challenge was the need for a dedicated LLETZ clinic, so that cases can be managed as planned when women attend for treatment.

Stakeholder engagement

The front-line doctors and nurses of the program needed to be involved and consulted in all decision-making to ensure that the program protocols were both agreed on and complied with. Continuous and adequate communication between doctors, nurses, program coordinators, and the Ministry of Health was necessary, to ensure the ongoing operation of the program and the timely identification of any issues.

Data

Data have been continuously collected since 2015, which is considered key to the success of the program. Managing comprehensive statistics using a relational database is deemed essential for having queryable, understandable data, with findings that are both explainable and robust, suitable for policy decision-making and funding allocations.

DISCUSSION

We present a review of contemporary cervical cancer screening in Vanuatu. Since 2015, one-fifth of eligible Ni-Vanuatu women have undergone screening. Among

them, 4.9% of the women had possible high-grade, high-grade, or malignant lesions. The treatment rate for abnormalities detected by the screening was as high as 66.1%. Among women who participated in the screening, the incidence of confirmed cervical malignancy was 7.6 cases per 1000 individuals.

While 20% of eligible women have been screened, this proportion increases to 30% when only women aged 30–50 years are considered. Although this figure is far below the WHO target of 70% [4], it is a remarkable achievement when considering that there were no measures at all to prevent cervical cancer in Vanuatu before the pilot studies in 2006 [2]. The engagement of stakeholders is crucial for the success of the project, which was reflected in the development of the new guidelines for cervical cancer prevention released by the Ministry of Health [5].

Cytological screening (screening based on cytology) is becoming less common, and the challenges inherent in cytological screening have led the WHO to recommend alternative screening strategies in LMICs, such as HPV-based screening or visual inspection with acetic acid (VIA) [7]. Vanuatu is in a unique position, as evidenced by the data presented here. Given the small size of the country and the relatively small number of women to be screened, coupled with the extensive support provided by laboratory staff from Australia alongside the domestic dedicated cytology, cytological screening is maintainable in Vanuatu. Although some Pacific Island countries also use Pap smear screening, many either have no formal screening program or rely on VIA-based screening. Therefore, the establishment and maintenance of a cytology-based screening service in Vanuatu is a significant achievement [8, 9]. The cytological capacity in Vanuatu needs to be bolstered by strengthening the system to reduce the loss to follow-up that comes from the inherent delay between testing and recall for treatment.

It should be noted in this data that the rate of unsatisfactory Pap smear results was nearly 10% over the included period. This is higher than what has been reported in the literature, with rates of unsatisfactory results in large trials ranging from 1% to 3% [10, 11]. In the early stages of the program, it became clear that a significant contributing factor to these unsatisfactory results was the large size of the cervixes in many women presenting for screening (presumed related to the high parity). Since 2015, increased training has been provided for healthcare providers, including nurses conducting the screening, and the rate of unsatisfactory results has decreased from 15.3% to 5.4% in 2020.

This dataset, in terms of its size and scope, provides a comprehensive insight into a screening program in an LMIC. The data has been continuously compiled since 2015 and has been maintained by a single individual who has in-depth knowledge of the health services and the capacity to tract missing data. That is to say, the conclusions drawn from this data are limited by the fact that only

approximately one-fifth of eligible women participated in screening over the five years. As a result, the actual incidence rates of pre-invasive and malignant cervical diseases may vary across the entire population. Additionally, this study did not include any information on patient barriers to accessing cervical screening, which would be valuable for future research.

Vanuatu has the capacity to conduct HPV-based testing, and nearly 9000 tests were performed in the analysis. From a resource perspective, this was made possible due to a significant donation of HPV test kits from the Frazer Family Foundation. Amongst these Ni-Vanuatu women, one in ten returned HPV-positive results, with more than 16% of women under the age of 30 years being positive. If only HPV testing was considered, approximately half of those treatments would have been potentially unnecessary (benign or low-grade) based on this data. However, given the WHO goal of screening 70% of women twice in their lifetime and considering the mortality rate in LMICs once cervical cancer is diagnosed, the risk of overtreatment needs to be balanced with the significant benefits of early treatment. Similarly, the risk of under-treatment must be taken into account. In our data, 69 women with high-grade or possible high-grade cytological abnormalities had negative results on HPV testing.

Given that the average time from diagnosis to death from cervical cancer in Vanuatu is 1 year [3], most women are diagnosed at an advanced stage, for which there are limited treatment options [12]. It must be recognized that screening is ineffective without access to safe treatment. In this study, treatment could be delayed up to 12 months following a positive screening test. In their cohort study assessing the prevalence of HPV infection among women in Vanuatu, Aruhuri and colleagues found that nearly half of the women who were tested to be positive in screening were not followed up due to the challenges of tracing [13], and some of the barriers identified by stakeholders here in ensuring treatment coverage need to be addressed.

In the initial assessment in Vanuatu, McAdam and colleagues found that the point prevalence of malignancy was 10 per 1000 [2], which is higher than 7.6 per 1000 in this data. Compared to those pilot stages, our data reflect the latter 5 years of over a decade of screening. Although only one-fifth of eligible women participated in the incidence estimate, cervical cancer screening has been shown to reduce the incidence of cervical cancer [14]. Therefore, we hope that the ongoing screening program, combined with the promotion of the HPV vaccination, will further reduce the occurrence of malignancies.

CONCLUSION

Formalized cervical cancer screening in Vanuatu has been in place since 2008, and in the 5 years preceding this analysis, one in five eligible women participated in

the program, with around 5% of women having high-grade pre-malignant or malignant cervical diseases. The implementation of a comprehensive cervical cancer screening program in Vanuatu still faces many challenges, which need to be addressed.

AUTHOR CONTRIBUTIONS

Emma R. Allanson, Vera Velanova, Boniface Damutalau, Harriet Obed, Geetha Warriar, Ian H. Frazer, and Margaret McAdam devised the concept and contributed to the protocol. Boniface Damutalau, Harriet Obed, Geetha Warriar, Margaret McAdam, and Vera Velanova undertook data collection. Emma R. Allanson and Vera Velanova analyzed the data. Emma R. Allanson, Vera Velanova, Boniface Damutalau, Harriet Obed, Geetha Warriar, Ian H. Frazer, and Margaret McAdam contributed to all drafts and final versions of the manuscript.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

Ethics approval was obtained for this study by the Ministry of Health, Vanuatu on July 6th, 2021.

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