

# Cervical cancer screening in the Pacific Island countries: an overview of current management for therapy

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## ABSTRACT

Cervical cancer is a common form of cancer in women worldwide including the Pacific Island Countries and Territories (PICT's). Mortality rates with cervical cancer are high in the PICTs and can be related to a number of factors including lack of available resources and cultural acceptance of screening, which contribute to this high rate. Cervical cancer screening methods have evolved from cell morphology observations to the more specialized techniques of molecular testing. High-risk Human Papilloma Virus (HPV) genotyping and liquid-based cytology are the most common methods and have been “gold standard” tools used in cervical screening for some time now. However, in the Pacific Island Countries and Territories (PICTs), there is great disparity in the use of such methods. These disparities in testing have seen an increase in cervical cancer morbidity and mortality rates.

Here, we consider the factors necessary to develop a low-cost effective and acceptable cervical cancer screening programme made accessible to all women in the Pacific Islands and thereby decrease the mortality rates and improving outcomes for women in the PICTS.

**Keywords:** Cervical cancer, Pacific Islands, Human papilloma virus (HPV).

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## INTRODUCTION

Cervical cancer is one of the leading causes of death among women in the developing countries (2). According to a report from Global Cancer Observatory (GLOBOCAN), in 2018, 311,000 women died from the disease with a global incidence of 570,000 cases. However, more than 80% of the total deaths were seen mainly in low-resource countries with a lack of organised cervical screening programs (3). Cervical malignancies have been strongly linked to persistent infection with high-risk human papillomavirus (HPV). However, certain cofactors, are essential in the progression of the disease, for example smoking, high parity, long-term usage of hormonal contraceptive and immunosuppressants (4, 5).

The incidence and mortality from cervical cancer in the Pacific Island Countries (PICTs) are equally alarming. The PICTs is regarded as a developing country, that is populated by a combination of Micronesians, Melanesians and Polynesians (Figure 1.) (6).

Melanesia is one of the regions with the highest cervical cancer incidence and mortality in the world (Figure 2), with an age-standardised incidence rate of 27.7 cases per 100,000 and a mortality rate of 19 per 100,000 population (7). According to the International Agency for Research on Cancer (IARC), the highest rates of cervical cancer incidence and mortality in PICTs (per 100,000 population) are seen in Papua New (29.1 and 19.8), Fiji (25.1 and 19.7), Solomon Islands (22.6 and 16.0) and Vanuatu (17 and 10.6) respectively. Similarly, Micronesia and Polynesia, except for New Zealand, demonstrate an alarming representation of this disease (Figure 2.) (3).

Whilst HPV vaccination has been used as a primary prevention strategy in the control of cervical cancer, screening programmes associated with cervical cancer, strategies such as cytology based screening, visual inspection with acetic acid (VIA) and HPV deoxyribose nucleic acid (DNA) testing also play a crucial role in reducing cervical cancer incidence and mortality (8). Unfortunately, screening in most of the Pacific countries is not routinely available. Where available, the screening strategy differ due to various contextual factors such as the availability of experienced health personnel, equipment, health facilities and sociocultural issues (9).

It is essential to identify the loopholes in screening efforts and formulate strategies in the fight against cervical cancer in a resource-constrained country such as the PICs. This article will focus on some areas that need evaluation such as effectiveness of the current cervical screening program, barriers and facilitators of the cervical screening program and the current survival rate of women diagnosed with cervical cancer.



Figure 1. Map of ocean based on Geoscheme M49 coding (Retrieved from United Nations Statistics Division)

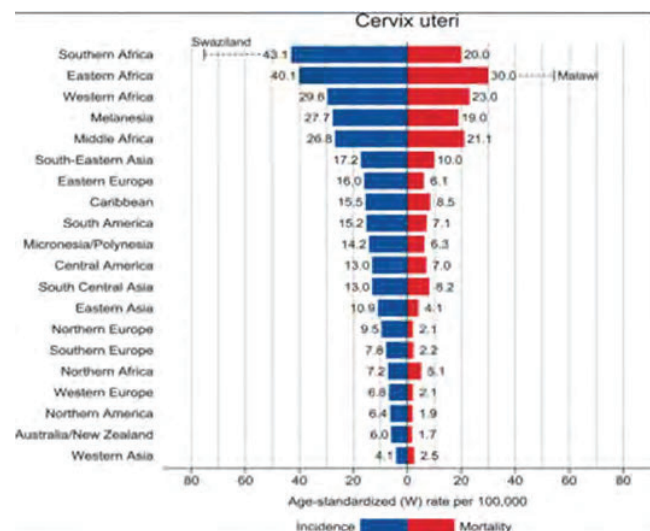


Figure 2. Estimate of incidence and mortality of cervical cancer in 2018 (Retrieved from GLOBOCAN cancer statistics)

## MATERIALS AND METHODS

This is an overview of current management and therapy of cervical cancer in the Pacific Island countries. No materials or personal interviews formed part of this overview. For the purpose of this work the authors surveyed the current regimes relating to the management of cervical cancer in the Pacific Island countries based on current HPV screening programmes and the literature. The results of the survey are presented in the form of an overview with some suggested recommendations relating to improving outcomes for screening women for HPV in the Pacific.

## DISCUSSION

### Current Cervical Screening Programme in Pacific Island Countries

Cervical cancer screening, as a secondary prevention tool, helps to identify the pre-cancerous stage of cervical malignancies. Therefore, a well organised cervical cancer screening programme helps to reduce cervical cancer burden. For instance, the National Cervical Screening Program in Australia has halved its cervical cancer mortality, and incidence since its establishment in 1991 (10). Similar results were seen in New Zealand after implementing the population-based screening programs in the 1990s. The population-based screening identifies woman 25 to 70 years who have been sexually active and encourage them to attend screening through invitation (11). However, disparities in access to screening services among different ethnic groups still exist in New Zealand. Nevertheless, the New Zealand Ministry of Health has developed a cancer action strategic plan to reduce equity gaps by introducing self-sampling and HPV DNA testing as a primary screening tool which commenced in the year 2021 (12).

In contrast, other PICT's such as Fiji, Papua New Guinea (PNG), Nauru Federated States of Micronesia (FSM), Kiribati, Marshall, Palau, and Cook Island has an opportunistic cervical screening program based on individuals' decision to be screened which affects the pap smear coverage and cervical cancer incidence (7). This is demonstrated with opportunistic screening in Malaysia (although not in PICT) where the Pap smear coverage dropped from 74.5% in 1996 to 59.7% in 2006, and the mortality rate increased from 0.29% to 0.41% respectively (13).

Similar results were seen in Palau following the implementation of screening services in 1997, where the overall cytology-based Pap smear tests decreased from 1647 in 2004 to 527 in 2013 (14). These results indicates the need for screening strategies in the PICTs to be revised. Additionally, countries with no effective screening programs, such as Solomon Islands, Vanuatu, Tonga, and Samoa, require a collaborative regional approach to address the issue (3). Similarly, with the exception of New Zealand and Australia, none of the PICTs have a well-structured quality assurance program to supervise or monitor the cervical screening process (4).

### Primary Screening Methods Used in the PICTs

There are different types of cervical screening methods used in PICTs, such as: cytology-based screening, visual inspection with acetic acid (VIA) and HPV DNA testing (4). The most common form of the primary screening in the PICTs is cytology-based Pap smear screening. However, VIA is also introduced as a co-test to cytology-based screening in countries such as Fiji, FSM, Kiribati, and Marshall, whereas HPV DNA testing is anticipated as an adjunct to cytology in Palau (4, 15).

The Pap smear test involves collecting exfoliated cells from the squamocolumnar junction of the cervix, which are transferred onto the slides, stained, and examined under a microscope for cell changes. However, these techniques require technical expertise for the reporting of the results (16). The Pap smear technique has been very successful in countries such as Australia, New Zealand, and other developed countries. However, due to a limited number of cytologists in the PICTs, the samples are sent elsewhere for reporting,

causing delays in the turnaround time (17). For example, in Palau, the samples are sent to Philippines for reporting, which takes several weeks for results to be finalised.

In contrast, VIA technique is a cost-effective and efficient method, also referred to as "see and treat" approach which involves applying acetic acid on the cervix to identify the presence of abnormal lesions (15). The World Health Organisation (WHO) has recommended the use of VIA to prevent cervical cancer in a low resource setting. A study conducted by Fong et al. (2014) in Fiji, demonstrated that VIA and cryotherapy have been effective and acceptable among the Fijian population. However, VIA method has high false-negative results, whereby high-grade lesions can be easily missed (18). A study conducted in PNG compared the VIA with HPV DNA testing demonstrated that only 47% of high-grade diseases were detected using VIA in comparison to 92% by HPV DNA test (19). Whilst VIA technique has higher sensitivity, it is less specific in the detection of low and high-grade lesions when compared with Pap smear technique. Vahedpoor et al. (2019) reported that using VIA along with Pap smear increases the sensitivity up to 97.3% in detecting low- and high-grade lesions. Therefore, countries such as Kiribati, Marshall Islands and FSM have incorporated VIA in conjunction with cytology as the tools for detection(4).

The HPV DNA method detects the presence or absence of the human papilloma virus in the vaginal or cervical smears. While some studies indicate that HPV testing is costly and adds an extra processing step when used as a triage test to cervical cytology, other cost-effective analyses support the implementation of HPV as a primary screening tool. A study conducted in Thailand demonstrated a higher detection rate of CIN 2 lesion (1520 women per 100,000) using the HPV test in comparison to Liquid-based Pap test (1013 women per 100,000).

Another study in Papua New Guinea proved that the HPV DNA testing was cost-effective and demonstrated sufficient accuracy with self-sampling (21). Similar recommendations were made from a study conducted amongst Samoan population and the emphasis on self-sampling technique in this study could potentially remove the cultural barriers associated with pelvic examination currently faced by Pacific women (21). In addition, a clinical control trial in Mexico demonstrated higher acceptability of self-collected testing (98%) in comparison to Pap screening (89%) (22). Therefore, small island nations where cytological tests are not available, or VIA had poor results, HPV DNA testing could be a promising approach with the support from outside donor agencies.

### Screening Age and Screening Interval

The screening age and the screening interval vary across different countries in the Pacific region. For example, at the Fiji School of Medicine, the screening age for women who have been sexually active is between 25 to 49 years while in Fiji, women of 25-60 years are screened for cervical cancer. In contrast, Marshall Islands, Palau and Kiribati, perform cervical screening for sexually active female which begins as early as 21 years of age. However, there are no evidence that screening from age 20-24 reduce cervical cancer, thus screening women who are under the age of 25 years, can lead to over diagnosis, mistreatment, and increased risk of infertility (23).

The American Cancer Society has similar recommendation on screening intervals as the PICTs. For example, a primary HPV test is done every five years, whereas the Pap test alone is done every three years (24). When low grade or high-grade abnormality is detected, the tests to be repeated at shorter intervals. For example, in New Zealand, when low-grade abnormality is detected at cytology screening, the women will undergo a reflex (cytology and HPV DNA) testing, and if HPV DNA is negative, the cytology test is repeated in 12 months (11). A similar approach is seen in Fiji, Palau, and FSM, whereby patients with abnormal pap smear must repeat screening in 12 months for effective management (15).

The primary concern for Pacific women is the follow-up rate upon the detection of abnormal results. A study conducted by

Foliaki et al. (2014) in Fiji showed that only two out of 13 women with abnormal Pap smear test, attended follow up health clinics. Again, women in the PICTs face specific challenges to access health care facilities which can be a significant factor contributing to the low follow-up rate. Pacific women also face specific barriers that need to be addressed to improve the engagement of women in the cervical screening process.

### **Barriers of Cervical Cancer Screening**

While barriers to cervical cancer screening are multifaceted, some of the common themes highlighted in the literature include:

#### **Cultural Beliefs and Attitudes**

The culture across all PICTs is very similar in terms of how body parts are treated. In general, it is considered that the lower part of the body particularly the genitalia area is a sacred part of the body. Discussions surrounding sex and sex related topics are "taboo". As a result of this, the majority of the Pacific women feel uncomfortable discussing their reproductive health with the health care providers, especially if the health care worker is a male (26). In addition, women undergoing cervical screening in PICTs are viewed as being associated with promiscuous behaviour, and to prevent themselves from discrimination and stigma, these women do not engage in the screening process (9, 27). Similarly, some Pacific women have competing priorities and responsibilities to their families and may not see the need for screening being asymptomatic (26). However, culturally appropriate and an effective cervical screening program should overcome the cultural barriers and attitudes of the Pacific women towards cervical cancer.

#### **Knowledge and Education**

Most women in the PICTs have limited knowledge relating to HPV and cervical cancer in general because of lack of awareness and education. Naidu et al. (2015) reported that 72% of Fijian women in three rural settlements did not know about cervical cancer, while 80% had no idea of the risk factors. However, comprehensive research in the different provinces of the PICTs should be conducted to access the level of knowledge of these women on the topic of cervical cancer. A similar study by DiStefano et al. (2012) revealed that Chamorro and Tongan communities in California had minimal knowledge of HPV. Thus, to increase the knowledge among people in the Pacific community, a culturally tailored and language-specific programs will engage more women in cervical screening.

#### **Fear and Health Care Experience**

Some women reveal a fear of possible cancer diagnosis as a barrier to screening, and others complain about the fear of pain and discomfort regarding the procedure (27). Similarly, women with previous bad experiences with health care services are negatively influenced to participate in cervical cancer screening. These experiences include long waiting hours, language barrier and inadequate information communicated to the patients (30). Fitzgerald (2018) further elaborated that the slow turnaround time of results in the PICTs adds to the disinterest for a "follow-up". It is therefore essential to identify the reasons for the low turnout in the Pacific women and to determine whether it is due to a lack of knowledge, negligence or because of poor health care service. Georgina et al. (2019) argued that effective communication is the strong factor in the PICTs that may drive women to take part in screening programs continuously.

#### **Practical Issues**

Several studies have discussed a range of "accessible to service" issues such as: transportation cost, taking time off from work, childcare and socioeconomic status, which prevent women from accessing screening services (9, 15, 28). Clarke (2019) suggested that to overcome these problems, services such as: after hour appointments should be made free in both general practitioner surgeries and health clinics, cover transportation costs. Hence, reaching out to communities to provide these services will increase the likelihood of participation. Additionally, women staying on the outer islands in the Pacific must travel long distance with the only mode of

transport as a boat, horseback, or walking, which prevent them from attending clinics (15, 18). To overcome these barriers, population-based outreach programs will increase the participation of cervical screening.

### **Facilitators**

Some of the factors that may remove the barriers to screening among Pacific women, addressed in this review include:

#### **Awareness Through Education**

Creating awareness of the disease will enhance knowledge among people. Both males and females should be informed of the importance of screening practices. According to Wong and Kawamoto (2010), when the husband has a better understanding of the disease, he will offer better support to his wife. While most of the families in the PICTs carry traditional and strong cultural values strongly, a tailored education supported by church and community leaders can be very beneficial.

In contrast, in communities with strong cultural taboos, culturally tailored programs may not be as effective. As stated by Mishra et al. (2009), Samoan women with culture-specific beliefs showed no increase in self-reported cervical screening. Therefore, this raises the question of whether creating awareness in a church setting is the appropriate place. Nevertheless, other means of creating awareness, such as radio, television and social media advertising could be an essential facilitator of engagement. A 12% increase in the screening coverage among Pacific women living in New Zealand was noted following 12 months of a culturally appropriate media campaign (33).

#### **Health Service Delivery**

Anaman-Torgbor et al. (2017) highlighted that if women are given the option to decide on the gender of the service provider, they will ultimately improve their participation. According to Wong and Kawamoto (2010), the likelihood of Pacific women attending the screening was greater when in the presence of a female provider. However, due to limited number of qualified health personnel in PICTs, it would be necessary to train nurses and other health care personnel to enhance the screening activities (15). Other than accessible health care services such as mobile clinics, outreach programs and extended hours on weekends are important facilitators that can be initiated in the PICTs. Nevertheless, encouragement from health care personnel is an essential factor that will assist in the facilitation of screening practices.

#### **Effective Communications**

By providing standardised information on tests, women will be better informed. The health care providers communication style carries a significant role in how women engage for the screening programme. A study by Foliaki and Matheson (2015) concluded that the Pacific women who have had positive experience with health care services were more likely to return for screening. Additionally, a reminder system similar to the one used in New Zealand which is lacking in the PICTs will help with engagement for screening (11).

### **The Survival Rate of Cervical Cancer Patients in the PICTs**

The survival rates of cervical cancer patients are dependent on factors such as the stage of the disease, age of the patient, access to treatment facilities, availability of treatment modalities, and socioeconomic status. The clinical stage at presentation is a significant predictor of survival rate. For example, if diagnosed with stage 1 cervical cancer, the chances of a 5-year survival rate are more than 90%, while stages 3 and 4 have less than 20% survival rate (35). Although this may be true, survival rates are just estimates, and may vary in a particular person's situation due to certain factors such as diet and individuals' immunity to combat cancers.

In addition, the survival rate of patients differs across different countries (Table 1.). Some reasons for survival differences may include factors such as socioeconomic status, the viability of health facilities, and failure to follow up (Jayant et al., 2016).

The five-year survival rates in regions such as Korea (77.3%), Japan (71.4%) and China (67.6%) reported the highest, while India (59%), Malaysia (57.1%) and Thailand (53.9%) reported a lower 5-year survival rate (Huang et al (2022)). These results reflect the differences in the effectiveness of screening programs and accessibility to high-quality service.

**Table 1.** Data on cervical cancer survival demonstrated in different studies conducted in developed and developing countries.

Country	Author/Year	Number (n)	Outcome	Value
New Zealand	Patricia, Lynn (36)	Māori 138 Non-122	2-year survival rate (Age 40-59)	M -68% Non-M (88%)
Saudi Arabia	Nisreen and Khalid (37)	190	5-year survival	53.2%
India	Jayant, Thorat (35)	558	5-year survival	35-60%
Ethiopia	Wassie, Argaw (38)	634	5-year survival	38.62%

In a study conducted in Ethiopia, which has no effective screening programme, the five-year survival rate was as low as 38%. However, the authors in this study did not look at the specific cause of death, which overestimated the cervical cancer-related mortality (38). Similarly, a study in India revealed that the survival rate for five years varies between 35% to 60% in the different rural regions in India. The primary reasons emphasised by the authors in both the studies were lack of access to health clinics, late diagnosis, and lack of treatment facilities.

A similar trend is seen among Pacific women where they present to the hospital with an advanced stage of the disease which impacts their survival rate (28). A retrospective study in Palau demonstrated that the survival rate of women diagnosed with cervical, or breast cancer decreased from 58% to 39% between the years (2004-2008) and (2009-2013) respectively (14). The result of these studies suggests that an ineffective screening program with the delayed intervention has a major impact on the survival rate of women with breast or cervical cancer.

Furthermore, the lack of current information on cervical cancer survival rate in the Pacific context makes it difficult to compare the finding with other studies. However, the results from various literature provide an insight on the survival rate in the PICTs, based on the similar challenges of limited treatments options, lack of access to health services and socioeconomic barriers faced by the Pacific women. Ethnicity and socioeconomic survival disparities has been discussed in several studies. Patricia et al. (2010) reported that the 2-year survival rate in the non-Māori population (88%) was significantly higher in comparison to the Māori population (68%). Also, Brewer et al. (2012) stated that the 5-year survival rate between Māori and Pacific people is as twice as lower than the non-Māori and non-Pacific people in New Zealand. Similarly, in the United States, the relative survival rates in white and black women are 71% and 58%, respectively (7). The inequalities in the survival rates of women were due to late-stage diagnosis. Therefore, equity issues in the Pacific women should be evaluated if the data on survival rate is made available.

The lack of available data in the Pacific context raises a question on the availability of cancer registries and management of patient's information. Therefore, updated cancer registries and future studies are necessary to investigate the survival rate in cervical cancer patients in PICT's. The local information will determine the effectiveness of cancer management while reflecting on the degree of awareness on screening, so that early diagnosis and treatment can be provided.

### Primary Prevention Strategies of Cervical Cancer in the Pacific Island Countries

Because virtually all cases of cervical malignancies are attributable to HPV, vaccinating young females against the HPV could substantially reduce the cervical cancer burden in resource-limited countries. The WHO recommended vaccinating girls aged 9-13 years against HPV and screening women aged 30-49 years as a part of their "Best Buys" intervention in developing countries (40). However, the impact of vaccination depends on several factors that vary across different populations in the Pacific such as; vaccination type, age of vaccination, vaccination coverage, and the prevalence of age-specific HPV infection (41).

There are three types of vaccines available varying on the number of HPV types they target. The bivalent vaccines contain and target types 16, and 18 HPV whereas quadrivalent vaccines provides additional protection against types 6 and 11 that causes 90% of genital warts. The second-generation 9-valent vaccines target similar HPV types as quadrivalent vaccines as well as types 31,33,45,52 and 58 responsible for over 90% of cervical cancer (42). However, the choice of vaccines used in the Pacific region entirely depends on the cost, availability, and support from international organisation such as Global Alliance for Vaccine (GAVI), United Nations Children's Fund (UNICEF), and Centres for Disease Control (CDC). The current cost of full vaccination ranges from US\$10 to more than US\$100; but additional operational and delivery costs need careful analysis in the decision-making process. While procuring vaccines on their own is highly costly for individual countries, but through the regional approach of collective bargaining, and bulk procurement will ensure some cost reduction similar to what has been achieved in the Caribbean Island territories (43). Therefore, affordability and sustainability of vaccines in the Pacific region call for regionalisation and collaboration between national governments, global partners, and donors (44).

Moreover, the choice of vaccine delivery strategy plays a vital role in the effectiveness, affordability and equitability of the primary prevention of cervical cancer (44). The efficacy trials have demonstrated that vaccine is most cost-effective in the adolescent females between the ages of 9-14 who mount a more robust immune response in comparison to 16-23 years old individuals (45). While school enrolment in the 9-14 age group is high in the PICTs, school-based vaccination programs could be most suitable to increase coverage. However, other approaches such as community outreach vaccination programmes are needed for those girls not in school (e.g., migrants, street children, school dropouts). A National school-based campaign in Fiji initiated by the Global Alliances for Vaccine and Immunisation (GAVI) was successful with regards to community acceptance and vaccine uptake (8). However, the integration of sex education in the school curriculum is required in the Pacific region to raise awareness on other risk factors, such as high parity, smoking, and use of hormonal contraceptives responsible for cervical cancer progression (46).

Subsequently, many clinical trials have been conducted to determine the suitable number of doses of HPV vaccination. In developing countries, three doses of HPV vaccination are a logistical and economic barrier. However, the efficacy and high immunogenicity of vaccines suggest that even if administered less than three doses, the vaccines will retain long-term effectiveness (42). A trial in Costa Rica demonstrated that antibodies to HPV 16 and 18 were stable for a four-year trial period after receiving only one or two doses of the vaccine (47). The surprising nature of this finding suggests that total costs will be reduced if only one dose of the vaccine is administered to girls in the resource-constrained setting (48). National HPV vaccination programs have started in several PICTs (Fiji, Solomon Islands, New Caledonia, Cook Islands, Guam, Federated States of Micronesia, Marshall Islands, Kiribati, Wallis and Futuna Northern Mariana Islands and Palau) through significant donor agency support (49). However, HPV vaccination coverage in the majority of the PICTs is unknown or low with weak monitoring mechanisms and requires a robust system of continuous monitoring and evaluation of vaccine coverage to monitor the effectiveness of the HPV vaccination program (50).

## RECOMMENDATIONS

Given that most of the screening is performed opportunistically in the PICTs may explain for the low participation rate of women, it is therefore recommended that population-based screening is implemented in the PICTs to increase coverage and cervical screening participation. Similarly, VIA screening should be introduced in a resource-constrained setting, with a recommendation that PICTs can implement VIA and cytology co-testing to increase sensitivity in detecting low- and high-grade lesions. Above all, HPV testing may revolutionise cervical screening in the developing countries. Local authorities such as the Ministry of Health, cancer societies and other non-government organisations (NGOs) should consider implementing HPV testing in the cervical cancer program at the earliest.

Moreover, policies and standard operating procedures will ensure quality results delivered to the patients in a timely manner. Additionally, training health care providers will enable the cervical screening process to be conducted efficiently and effectively. Similarly, health seminars on cervical cancer should be encouraged through increased publicity. Health practitioners should be encouraged to educate women on cervical health and the advantages for screening. Comparatively, health promotion activities should be culturally appropriate and delivered in collaboration with Pacific communities.

The screening age in the PICTs should be reviewed and standardised to 25 years as recommended by the National Cervical Screening Program Australia. The data on the survival rate of the patients could be a potential indicator of the effectiveness of current cervical cancer prevention strategies; therefore, policies on reporting cervical cancer surveillance data should be made compulsories for all PICTs.

Most importantly, an improved cancer surveillance system is recommended with an ongoing registration of records that include every woman's vaccination history, clinical records, appointments scheduled, and treatment administered. Leaders in the PICTs must continue to seek capacity building through regional partnership and prioritise their local cancer control agenda in line with the global elimination strategy of vaccinating 90% of girls by age 15, 70% screening coverage by the ages 35 to 45, treating 90% of precancerous lesions and managing 90% of invasive cervical cancer (51, 52).

## CONCLUSION

The increasing burden of cervical cancer in the PICTs warrant a regional initiative in collaboration with local health authorities. This collaboration will assist for capacity building among local health care providers to improve the outcome of women in the PICTs with the disease. Additionally, there is a need for strengthening research capabilities in the Pacific region so that comprehensive data on cervical cancer epidemiology can be attained for developing effective strategies to improve the outcome of cervical cancer in women in the Pacific region.

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