Recent Advances in Cervical Cancer

Avid Science
Chapter 3

Awareness and Perspectives on Cervical Cancer and Practices Related to it: How far it has Promoted?

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Abstract

Cervical cancer is a leading cause of cancer mortality among women worldwide and a major public health threat in a resource constraint countries. Different cross-sectional research studies have been developed in recent years to explore the perceptions of cervical cancer and its issues in different communities. In the light of the resultant of the recent surveys, the overall status of knowledge was assessed to be low and lethargic attitude towards safe practices especially in low and middle income countries. Due to lack of awareness related to cervical cancer, screening, human papillomavirus (HPV) infection and availability of vaccine, the incidence and prevalence of cervical cancer is high in low and middle income countries. Improvement in literacy level and health seeking behavior of women for reducing the burden of cervical cancer is highly needed. A serious dearth of screening facilities and HPV vaccination in low-resource countries highlighted the need of prudent measures to be carried out to educate women about the primary and secondary preventive measures. High level of perceived severity of cervical cancer in the communities are attributed to the high fatality rate of the disease in low and middle income countries. Socio-demographic risk quantification is warranted to acquire a better understanding of the determinants of cervical cancer in developing countries. Strong approach is needed that empowered women with knowledge of cervical cancer and to improve their economic status in society as low social economic factors inhibit women from utilizing cervical cancer prevention services. There are tremen-
dous challenges in low and middle income countries to implement best comprehensive national cancer programs because of resource constraints. Training priority or educational interventions save lives by risk reduction and scale up screening in lower-resource settings.

**Introduction**

Cervical cancer caused by oncogenic Human papillomavirus is a major public health problem that continues to be one of the leading female genital cancers worldwide. About 80% of cases occur in developing countries and about 87% cervical cancer deaths occur in less developed regions [1,2]. It is the fourth most common cancer among women worldwide with an estimated 528,000 new cases and 266,000 deaths in 2012 [2].

Epidemiologic evidence clearly indicates that high risk HPV is the principal cause of invasive cervical cancer and cervical intraepithelial neoplasia (CIN). Invasive cervical cancer is attributed to HPV infection. Seventy percent of the cancers are known to be caused by HPV 16 or 18 [1,3]. Symptoms remain elusive until the cancer progresses to advanced stages. Thus, seemingly healthy women need to be screened to detect asymptomatic pre-cancerous lesions [4]. These lesions are 100% treatable and their resolution can prevent cervical cancer from developing [5]. Cervical cancer can be effectively controlled through primary and secondary prevention such as cervical screening and prophylactic HPV vaccination. Early stages of the disease can be detected through the use of Papanicolaou smear (Pap smear), which has a sensitivity rate of 40-70%. Despite having a 12-25% negative rate [6], this test is important for detecting dysplastic cervical cells [7].

Routine tests with Pap smears can greatly minimize the risks of dying from cervical cancer. Pap smear tests have decreased annual worldwide mortality rates associated with cervical cancer by approximately 2% each year since its introduction in 1941. It is known to have reduced the overall mortality rate by 74%. The test is considered the most effective cancer-screening technique ever discovered [8]. Visual inspection with acetic acid (VIA) or Lugol’s iodine (VILI) and HPV DNA-based testing are also utilized for screening purposes in developing [9-11] and developed countries [12].

The knowledge of the condition and early screening might decrease the mortality associated with it, with most women report to the hospital with an advanced form of the disease due to lack of awareness and community level interventions to encourage screening [13]. Appropriate level of knowledge, attitude and beliefs are key elements for adopting a healthy lifestyle, influencing human behaviors and accepting newly introduced preventive measures. Concerning cervical cancer, the gap of knowledge of clinical presentation, risk factors, primary and secondary prevention has been documented in several studies both in developed and developing countries [14-17].
Cervical health outcomes are poor in lower-resource settings where practices on screening and quality treatment are either unavailable or unaffordable. Multiple factors contribute to inefficient screening of cervical cancer in low-income countries, such as the inadequacy or non-existence of a national screening system, poorly developed health services, the low access of the impoverished population to health care, the lack of technical and laboratory expertise, and, in general, the lack of public awareness. All these factors contribute to inefficient testing, late diagnosis and late treatment [18].

Either due to unavailability or sparse distribution of screening centers in lower-resource countries, the screening programs have been ineffective in risk reduction or to overcome the burden of the deadly disease. The key to reducing cancer morbidity and mortality is still the early detection and treatment of pre-cancerous lesions. With the lack of knowledge about the disease and familiarity with the concept of prevention, there is no way to mention early detection of cervical cancer and use of HPV vaccination [1].

Assessment measures have to be taken to investigate how far the awareness related to cervical cancer have been promoted, in order to envision the need or importance of its knowledge and possibly how to present our opinion to explore the awareness and perceptions about cervical cancer and its issues.

Exploration of Perceptions and Responsiveness Level Related to Cervical Cancer Among Women in Different Countries

Various cross-sectional studies have been developed in recent years to explore perceptions of cervical cancer and related issues among women in different communities that have drawn attention to a significant level.

The uptake and success of cervical cancer screening is determined by women's knowledge and awareness of cervical cancer. In Gabon, a country in middle Africa, cervical cancer is considered a major public health problem and is the most commonly occurring cancer among Gabonese women [19]. Recently a very first study to explore the level of knowledge and awareness of cervical cancer, Pap smear testing and HPV in Gabonese women was conducted [20]. Information on age, marital status, occupation, number of children, level of education and monthly income was collected. Knowledge of cervical cancer, Pap smear testing and HPV was related to the socio-demographic characteristics of the participants. Findings from the study suggested that Gabonese women predominantly associate cervical cancer with sexual behavior. High parity, early age of first pregnancy, heredity, excessive sex and alcohol/drug were less frequently cited by the women [20]. The women
generally demonstrated a poor level of knowledge. Older participants, those who had ever been married and those with medium to high monthly incomes were more likely to have a good knowledge [20].

Every year in India, 122,844 women are diagnosed with cervical cancer and 67,477 die from the disease [21]. India also has the highest age standardized incidence of cervical cancer in South Asia at 22, compared to 19.2 in Bangladesh, 13 in Sri Lanka, and 2.8 in Iran [21]. The peak age of occurrence of cervical cancer in India in between 55 and 59 years, and the highest age-adjusted rates are in Aizawl in the north eastern part of India at 24.3 per 100,000 women [22]. A cross-variables such as age, educational status, occupation, family income, residence, religion and marital status etc., were considered as independent variables [23]. Significantly greater proportions of adequate knowledge, attitude and practice were identified among women in higher age group, better educational status, better family income, women belonging to urban slum areas, working women and nulliparous or women with more than equal to three children. In addition, increased proportion of adequate knowledge and attitude were seen among menopausal women although adequate practice was found to be evidently higher among those with abnormal uterine bleeding [23].

China accounts for 29.0% of the 51,000,000 new cases of cervical cancer each year [24]. Xinjiang province has the highest incidence (590/100,000) and mortality rate of cervical cancer in China, especially the south of Xinjiang. The incidence of cervical cancer among the Uyghur women is four times higher than the mean incidence of China (138/100,000) [1,25,26]. The prevalence of cervical cancer in Uyghur women has been higher than the ethnic groups living in Xinjiang, and the mortality rate was more than the other ethnic minorities in China [1]. Recently, a cross-sectional questionnaire based study was conducted by Abida A and Sumeyya A et al, among the Uyghur women in Xinjiang province of China, the largest survey among Uyghur women till date that determined their knowledge about cervical cancer, HPV and HPV vaccine [1]. The study included 5000 Uyghur women participants, the resultant of the survey was that less than a quarter of the respondents were not at all or very less aware of cervical cancer, HPV and HPV vaccine. Because of the limitations of the prophylactic vaccination especially in developing countries, cervical screening test is still a very effective and useful method for reducing high incidence and mortality of cervical cancer in Xinjiang [1]. In order to control or reduce high incidence of cervical cancer, elevation of knowledge level about cervical cancer is more important than prophylactic vaccination in Xinjiang [1].

Cervical cancer is the leading cause of cancer mortality among women in Sub-Saharan Africa (SSA) [27,28]. Eastern Africa has the highest burden of cervical cancer
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in the world, with an age-standardized incidence ratio of 34.5 against an average of a per 100,000 in the developed world. A cross-sectional, mixed methods study in central division of Kitui County, Kenya was conducted, the only study done in Kenya that accessed the teacher's knowledge on HPV vaccine [29]. Assessing and securing teacher's support will be essential to successful vaccine implementation in Kenya. The study highlighted the gap in knowledge on HPV vaccine that shows that insufficient knowledge on HPV vaccine may reduce the willingness of teacher's to allow their daughters to be vaccinated or recommend the vaccine to others [29].

Cervical cancer is the second most common cancer in women aged 15-44 years in Nigeria [30]. Less than 7.1% of Nigerian women have reportedly had cervical cancer screening done and only 8% of women who attended the clinic between 2010 and 2011 had HPV vaccination [31]. A questionnaire-based cross-sectional survey was carried out in Oyo and Osun states both in southwestern Nigeria. A standardized questionnaire assessing knowledge of HPV, cervical cancer, Pap smear test, vaccine acceptability, and willingness to participate in HPV vaccination as well as demographic characteristics related to HPV and cervical cancer [31]. The survey revealed that the level of awareness of the HPV vaccine is low (27.1%) among the general population of women in southwest Nigeria; however after they were enlightened, 77.2% were willing to take the vaccine. The study showed that socio-demo-

graphic characteristics of individuals such as age, marital status, occupation, level of education and religion have significant effects on their willingness to partake in research studies [31].

According to the 2009 World Health Organization (WHO) report, the age-adjusted incidence rate of cervical cancer in Ethiopia is 35.9 per 100,000 patients with 7619 annual number of new cases and 6081 deaths every year [32]. Despite this fact very few women receive screening services in Ethiopia [33]. Low level of awareness, lack of effective screening programs and insufficient attention to women's health care are the possible factors for the observed higher incidence rate of cervical cancer in the country [34]. A community based cross-sectional survey was carried out among women of age 15 and above in Gondar town (Ethiopia) [35]. A structured questionnaire prepared in Amharic was used for the study. It was adopted from a survey tool developed by the American Cancer Society through some modification. Questions regarding knowledge of risk factors, symptoms, treatment options and prevention and early detection measures for cervical cancer were score and pulled together and the mean score was computed to determine the overall knowledge of respondents. Respondents scored average and above were considered at knowledgeable otherwise not. Only 31% of the study participants were able to identify at least one risk factor for cervical cancer like sexually transmitted infections (STIs), onset of sexual activity, multiple sexual
partners and smoking. Knowing the causative risk factors, symptoms and preventive measures of a particular can make all the differences, without this prevention, is far more difficult [35]. Studies conducted worldwide have shown that there is poor knowledge of cervical cancer among women [36].

A recent survey developed in Uganda to explore lay perceptions, beliefs and knowledge about cervical cancer local names, causes, symptoms, course, treatment and prognosis so as to inform interventions to promote early biomedical help-seeking for symptoms suggestive of cervical cancer [37]. The data was collected from two villages; a village in the rural (Aswa) and a village in Municipality (urban). This was to ensure capture of any variation that may be due to geographical and socio-economic contexts of the respondents. A qualitative approach was adopted, Focus Group Discussions (FGD) and Key informant interviews (KIIs) were used to collect data. In about half of both rural and urban FGDs and nine KIIs respondents reported that cervical cancer may be caused by a virus or bacteria that is either sexually transmitted or which enters the body through other sources including poorly cooked foods. In a few of the FGDs, respondents thought that a virus which is present in every woman right from birth is responsible for the causation of cervical cancer in some women who develop other problems or who feed on poorly balanced diets [37]. Lay people’s understanding of cervical cancer overlaps with biomedical knowledge of cervical cancer particularly with respect to cervical cancer symptoms, causes and treatment. The perceptions that lubricants on condoms and use of family planning injections and pills cause cervical cancer may undermine the use of these birth control methods resulting two unplanned pregnancies, abortions and maternal morbidity and mortality [37].

According to WHO Information Centre o HPV and cervical cancer, the age standardized annual incidence of cervical cancer in Nepal is 19.0 per 100,000, making Nepal a country with one of the highest cervical cancer rates in South Asia [38]. The first and the only study conducted among the general population of Nepali women assessed the knowledge and awareness of HPV, cervical cancer and HPV vaccine among Nepali women from two ethnically diverse sub-populations in urban and rural Nepal [39]. Approximately half of women who participated in this study were aware of cervical cancer, while less than 15% had knowledge or were aware of HPV or the HPV vaccine [39]. Overall, women from both communities were found to have a low knowledge and awareness of cervical cancer, HPV and HPV vaccine. Acceptance of a freely available HPV vaccine for children was high indicating potentially high uptake rates in these communities provided adequate information sharing about cervical cancer and HPV is present.

There are more than 100,000 females above 14 years of age who are at risk of developing cervical cancer in Maldives [40]. A questionnaire-based survey was carried
out among the population of the atolls (administrative units of the Republic) selected to represent three different regions (north, central and south) of Maldives [41]. The study was first of its kind in Maldives, the study subjects were representative of different age groups, literacy level and economic conditions. The women participating in the study were already exposed to many of the risk factors of cervical cancer. Only 38% of the study participants were aware of the cervical cancer. Even among this small number of women only half knew about some of the early symptoms of cervical cancer. The knowledge of the common early symptoms of cancer was generally poor with only 34.6% of women knowing at least one of the symptoms. Majority of them only knew that a growing lump or a non-healing ulcer could be cancer. But the knowledge of the other common symptoms like abnormal bleeding from any site of the body or persistent change in bowel habits etc. was very low. This implies that such symptoms are often ignored, which leads to delayed diagnosis [41]. Very few women knew of a vaccine to prevent cervical cancer that was quite expected since the HPV vaccines are not available in the country. Less than one fifth of the women had heard of Pap test or any test for early detection of cervical cancer. Even among the small number of women who had heard of the Pap test, very few actually had the test ever. The exposure of the women of Maldives to risk factors of cervical cancer and the methods of prevention is very limited [41].

Cervical cancer which is a global health problem is the cause of 5.31% all malignancies affecting Turkish women [42]. According to the data of Izmir cancer Registry, the annual incidence rate of cervical cancer in Izmir is 5.4 out of 100,000 [43]. A recent survey was conducted to determine risk factors for cervical cancer for women in Izmir, a descriptive field research undertaken for the purpose of determining cervical cancer risk factors [44]. In the study used a questionnaire form which was a four-part questionnaire which included the information about socio-demographic, obstetric (delivery method, number of pregnancies and deliveries), genital hygiene and the use of contraceptive methods, age of starting to have sexual intercourse and number of partners of the participants. The cervical cancer related risk born by the women between 15 and 49 years of age and living in the Kizilay neighborhood in Izmir and their states of having Pap smear test conducted were determined [44]. The fact that most of the participating women did not have smear tests done within the last three years, although it is cheap and has substantial importance in terms of early diagnosis, indicates that the women lack awareness on the importance of early diagnosis of cervical cancer. In this respect, a great majority (82.4%) of the women that participated in the study were considered to be under risk. It was determined that the participating women bear cervical cancer risk due to vaginal delivery, vaginal lavage, three or more pregnancy, three or more childbirth histories and that because they are not aware of these risk factors, the rate of Pap smear
application is low [44]. In a similar study conducted in Izmir it was reported that 44.1% of women did not have any Pap smear test at all in their lives and only 23% have Pap smear test made every year [43].

Like most of the countries, in UAE cervical cancer is the second commonest cancer in females. The health Authority Abu Dhabi (HAAD) reports around 50-55 cases annually in the Emirate Abu Dhabi with an incidence of 7 per 100,000 women; half of these cases occurring in relatively young women aged 35-55 years [45]. According to a recent cross-sectional study of 640 women aged 18-50 years conducted in Al-Ain district in UAE, the knowledge of HPV infection and vaccine is low in the UAE [45]. Few women recognized HPV as STI. Only one third of women were aware of the fact that cervical cancer is preventable disease.

Incidence and mortality rates of cervical cancer in Democratic Republic of Korea, according to the International Agency for Research on Cancer (IARC), were 6.6 and 3.3 per 100,000 in 2008 [46]. A cross-sectional survey of 200 women using structured interviews was conducted in Korea [46]. The survey suggested that despite the high level of education among both rural and urban respondents, there are a number of knowledge deficiencies regarding cervical cancer, its symptoms, cause and preventability. The study indicated that there was a little difference between rural and urban women in relation to their knowledge, attitude and practice (KAP) concerning cervical cancer and screening. The findings suggested that even with a reasonable level of knowledge of cervical cancer among interviewees, there are important gaps regarding the awareness of cervical cancer’s preventability and subsequent translation into actual uptake of cervical cytology services [46]. Primary prevention using the HPV vaccine is not yet feasible in most low-resource countries, including due to its high cost. Study clearly indicated that women’s uptake of these screening services remains low.

Immunosuppression, especially due to human immunodeficiency virus (HIV) infection, is a predisposing factor for persistent infection with high-risk oncogenic human papillomavirus (HR-HPV) [47] and the development of squamous intraepithelial lesions (SIL) [48]. High HIV viral loads and low CD4 counts are associated with a higher risk of HR-HPV infection and cervical abnormalities [49]. The risk of recurrence or progression of cervical lesions is 4-5 times higher in women living with HIV [50]. The prevalence of HIV infection in Lao PDR is relatively low compared to neighboring countries, around 0.2% among adult aged 15-49 in the general population [51]. Recently the first survey among Lao women aged 25 to 65 on knowledge, awareness and attitude about cervical cancer has been conducted in three different regions of the country and involved a representative sample of the female population living with HIV and a matched control groups [52]. The general level of knowledge of the women interviewed was very poor, most being unable to mention
any STI, never having heard of HPV and knowing no way to prevent cervical cancer. Almost half of women have heard of cervical cancer and consider it as a serious and common disease. The other interesting aspect highlighted by the survey was that HIV infected women had a significantly higher level of knowledge than their controls, although their average level of education was lower. Women living with HIV were more likely to consult a gynecologist than controls. Knowledge about risk factors for cervical cancer screening methods and means of prevention were similarly poor in both groups. Few women considered themselves at risk of developing cervical cancer. Although this awareness was four times higher among HIV infected women (35.9%) than among controls (8.4%), not leading to a greater practice of screening. Indeed, only 5.6% of HIV infected women had undergone a Pap test. Absence of symptoms was the reason given by one third of women and 46% of women infected with HIV for not performing testing. The screening capacities in the Lao Health System do not yet allow responding to systematic demand for all women at risk. The main result of the survey was the highlight of a wide ignorance on cervical cancer and its prevention amongst Lao women [52].

The HIV and acquired immunodeficiency syndrome (AIDS) epidemic in Sub-Saharan Africa contributes to the high prevalence of HPV infection [53]. Cervical cancer screening in Botswana is limited and currently unable to reduce the disease burden. Recently, a study investigated prior receipt of a Pap smear among women seeking health care in Gaborone, Botswana in clinics with access to Pap screening services [54]. The study also examined women’s beliefs about causes of cervical cancer and reasons for undergoing a Pap smear. It has been hypothesized that HIV-positive women would be more likely to have had a Pap smear than HIV-negative women, because they are more involved in health care services. Women with higher incomes would be more likely to have had a Pap smear due to greater resources to seek and obtain the health care services that they need [54]. Only around half of the respondents linked Pap smears to cervical health. Around three quarters of women had heard of cervical cancer. Many Botswana women did not understand the link between HIV and HPV infection and cervical cancer. Less than half of the participants had heard of HPV, However, half of women listed causes of cervical cancer that correctly identified sexual behaviors that increase the risk of HPV infection and thus cervical cancer. As prevention capacity increases, local agencies can use this information to design interventions to increase cervical cancer screening in women not likely to have received Pap smears in the past [54].

Perceptions of Health Care Professionals About Cervical Cancer

Health care practitioners need to be sensitized first for undergoing cervical cancer screening because of their essential role in the implementation of any future screening
programs and in their educative role with patients [55].

In the formation of a health society, it’s important that especially the family health personnel to adopt the knowledge, attitudes and behaviors concerning methods for early diagnosis of cancer. In this way, the awareness for early diagnosis of cancer in a normal population may be increased and the implementation of early diagnosis methods can be achieved. The successful implementation of a struggle with cancer can only be achieved by a serious, planned and organized study [56].

The age-adjusted incidence of cervical cancer in Ethiopia is 26.4 per 100,000 women, which is second only to breast cancer [57]. Recently, self-administered, anonymous, multiple-choice surveys were distributed to health care providers who self-identified as providing care to female patients of reproductive age in Ethiopia [58]. The purpose of the study was to access baseline knowledge and awareness of cervical cancer and cervical cancer screening practices among health care providers in Ethiopia involved in women’s primary care. The survey found significant deficit in the understanding of cervical cancer etiology, pathophysiology and risk factors among nurses and midwives. This deficiency could have implications for future screening programs since these providers would likely play a principal role in patient education and implementation of a cervical cancer screening program in Ethiopia. Fortunately, responses indicated recognition by those providers of the need for more education about cervical cancer [58]. Importantly, a clear understanding of the link between HPV infection and cervical cancer, as well as an awareness of the availability of HPV testing and vaccine against HPV were low among non-physician providers. As HPV vaccination became available in Ethiopia, uptake will likely be strongly influenced by information received from non-physician health care provider. Therefore, increasing such awareness among the group of providers will be critical to the success of any public health initiatives [58].

Cervical cancer burden is high in low-income countries as the health infrastructure is limited. It is essential that our health care professionals are aware of the cancer advances and especially of these interventions which can be utilized in lower-resource countries [55]. A questionnaire based survey undertaken at tertiary care hospital in Bangalore, India; study population included female Doctors and Nurses above the age of 30 years; a pre-tested, pre-designed semi-structured self-administered questionnaire was used [55]. The questionnaire included information on socio-demographic characteristics (age, marital status, occupation and work experience), knowledge about cervical cancer, Pap test and vaccination (risk factors, eligibility for screening and vaccination), attitude of the respondents was determined through questions regarding opinion on issues such as willingness to get Pap test, HPV vaccination, patient education on risk factors for cervical cancer and self-practice of Pap test and vac-
cination for carcinoma cervix and barriers in the acceptance of Pap test [55]. Study was conducted with an objective to find out practice of Pap test among the health care professionals themselves, a majority of participants’ knowledge about cervical cancer was good and they considered its prevention and control to be important. The study identified a number of critical gaps with regard to health care practitioners’ awareness of cervical cancer and practice of Pap smear [55]. The absence of symptoms was reported which was the most common reason reported by the respondents for not undergoing screening test, which illustrates how cervical screening is conceptualized and understood health care professionals.

The female health care workers plays important role as a health educator and a promoter. Therefore, unsatisfactory knowledge and low compliance with screening recommendations may lead to negative impact on community in undergoing a Pap smear [59]. The importance of the issue by organizing in-service trainings for female primary health care workers and the importance of having diagnostic tests should be re-highlighted [60].

Health care providers especially nurses in developing countries play a crucial role in taking smear, giving an information and advising for their patients on HPV infection, HPV related condition, HPV testing and vaccination [61]. Various international studies have demonstrated that health care professionals had a basic knowledge about cervical cancer HPV and related disease, HPV tests and HPV vaccine; but lack detailed knowledge [62-65]. Recent study conducted in Turkey to determine the level of knowledge on the HPV infection and vaccination, and attitude towards HPV vaccination in Pediatricians, Obstetricians and Gynecologists (OBG), and the physicians majoring in the fields of pediatrics, obstetrics and gynecology [66] showed that the measures directed towards all health care professionals but primarily the pediatricians and the obstetricians, who work on the front line in relation to HPV vaccination and infections, which would increase the level of knowledge and awareness on HPV need to be taken.

Verbal, written and visual communication tools should be used intensively in order to include topics on cervical cancer, early diagnosis and prevention in bachelor and master programs for nurses, to inform society about cervical cancer and HPV vaccine for public health and to teach precautions for its prevention [67]. Since HPV vaccine should be applied during childhood and adolescent period, especially children nurses should have knowledge about this subject and inform families of the children at this period about this subject [68].

Continuous care of primary health care workers, extending the screening programs, regarding health policies and system and changing people’s behavior and attitudes may positively affect the public health. Because of their role in the preventive health services, we should determine the knowledge levels of health care personnel through epi-
Assessment of Status of Knowledge of Students Related to Cervical Cancer

Level of knowledge and awareness has been suggested as an elementary step to develop positive approach towards the disease, its consequences and prevention [69]. A study in India was designed to ascertain the knowledge about HPV, cervical cancer and Pap test with female dental students as target population [69]. This cohort of female dental students can be the best medium to spread recognition about the disease amidst the wider group [69]. Only 18% of the study population had high level of total correct knowledge, but majority of them around 63% have average level of correct total knowledge. The finding may be the reason of concern as even in such erudite population the information regarding HPV, cervical cancer and Pap smear was low [69]. Similar finding was noted in another study among Indian Medical Students [70] wherein they reported that the level of awareness about HPV and HPV vaccine was very low. On the other hand, finding of the study [71] among another cohort of medical students revealed that most of the students were well-aware about preventable nature of cervical cancer and its viral etiology. Also, comparison with other population clusters brought to light the varying levels of knowledge like poor knowledge was reported among 18-25 year old vocational school students of Berlin [72] and among adult and adolescent of Mali [73] and average awareness among educated youth in India (66%), Sri Lanka (57.7%) and Nepal (58.8%) [74].

Cervical cancer is the leading cancer site in Bhutan with an estimated age standardized incidence rate of 12.8 per 100,000 [75]. The age standardized mortality rate for cervical cancer in Bhutan is estimated to be 7.1 per 100,000 which is slightly more than twice that of the United States of America (USA) (2.7/100,000) and Japan (2.8/100,000) [75]. A study in Bhutan [76] revealed poor cervical cancer knowledge of risk factors and detection method among female university graduates of Bhutan. Similar studies conducted in Malaysia [75], South Africa [77], Kolkata (India) [78] and in the USA [79,80] reported comparable results [76].

According to WHO, every year 152 women are diagnosed with cervical cancer and 55 die from the disease and it ranks as the eighth most frequent cancer among women between 15 and 44 years of age in the Kingdom of Saudi Arabia (KSA) [81]. A study conducted among the students at a medical school in Al-Ahia, KSA [81] explained that health professionals are the best and reliable medium that can help raise the awareness of the public about dreadful but preventable cancer. Medical students are the future health professionals and it is important to assess their knowledge in order to develop education and awareness policy to increase their knowledge that can then be disseminated into the society to reduce morbidity and
mortality due to cervical cancer [81]. Inadequate knowledge regarding cervical cancer signs and symptoms, risk factors and lack of awareness regarding availability of vaccine was observed in the study. Medical students surveyed are the future doctors and they are good source to increase the awareness in the society regarding the preventable nature of the cervical cancer. To increase their knowledge and awareness, medical students should receive comprehensive information at undergraduate level [81].

Cervical cancer is currently the primary cancer amongst the women in South Africa, with annual new cases of 6742 in African women and 3681 deaths [82]. HIV-positive women are 3 to 5 times more likely to develop cervical lesions that could become cancerous [83]. This makes a high risk environment for the acquisition of cervical cancer in South Africa because about 13.3% of the female are living with HIV/AIDS [84]. University students have higher risk of acquiring STIs than the general population because of the high-risk sexual behavior in which they engaged. Many university students underestimate their risk of contracting various STIs, and HPV has become a common STI in college campuses. Risky sexual behavior, a lack of knowledge and preventive care, such as regular Pap test have lead to a high incidence of HPV infection in university students. These lead to cervical cancer [85]. A descriptive cross-sectional study was carried out among the full time final year undergraduate female medical students in Durban, South Africa [85]. It was found that level of awareness regarding cervical cancer, the risk factors and detection method was low among these female students. About two-thirds of the students were currently involved in a sexual relationship and among them 14.4% reported they were having multiple sexual partners in the past year. About half of the participants heard about cervical cancer and its detection method. This result is less than the Nigerian and American study [86,87]. In Nigerian study, it was found that 71% of the female undergraduate students were aware of cervical cancer [86] whereas the American study reported 70% [87]. The study [85] also found that 60% knew about HPV as risk factor for cervical cancer and a third knew about multiple sexual partners as risk factors. Also more than half mentioned that they do not know if cervical cancer can be prevented. Among those who were sexually active and know about Pap smear test, majority did not do the test mainly because of personal factors such as fear of the procedure, or were not ill. These indicated that the female students in this institution are having less knowledge regarding cervical cancer which is very important as to protect them from getting this preventable disease. This low level of knowledge may have translated to action as not to do the screening test as they might not know the benefit of the Pap smear test [85]. Provisions should also be made available for female students when attending the university health clinics for any condition. Health care workers at the clinic can educate health care users, targeting the risk population on risk factors for cervical cancer and motivate them to have
a Pap smear performed. This can improve the university community’s knowledge of cervical cancer and practices on the Pap smear test when they seek medical care [85].

According to the report of the National Cancer Registry in 2006, cervical cancer is the third most common cancer, contributing 9.1% of all cancers in Peninsular Malaysian women [88]. A cross-sectional study [88] was conducted to assess the knowledge level of female students towards cervical cancer and its prevention in Sarawak, Malaysia. The majority of the students exhibited poor knowledge level for both cervical cancer and prevention regardless of their demographic characteristic, cervical cancer awareness and HPV vaccination acceptance [88]. Among the races, Malay students answered more questions correctly in the cervical cancer knowledge part and Chinese students answered more questions correctly in the cervical cancer prevention part. These two races exhibited higher knowledge of cervical cancer and its prevention than the sarawakian indigenous respondents. Malay students in the study had higher socio-economic status. This might be a factor for their higher cervical cancer knowledge because the study also revealed that the socio-economic status was associated with prevention knowledge [88]. Overall the students showed poor knowledge level regarding cervical cancer and its prevention and low HPV vaccination acceptance. Thus, it is important to educate the public including secondary school students and their parents about cervical cancer and effective methods to prevent it. This can be achieved through educational and awareness programs at schools and community centers as well as using popular mass media [88]. These measures are especially important in the state of Sarawak as well as other rural states in Malaysia and can lead to a reduction in the prevalence of cervical cancer in the future.

Students are expected to both protect and improve their own health and to provide effective service to the public health in the future. Students should be made aware of acquiring such responsibilities during their education [89].

Health Behavior

Knowledge plays an important role in a person’s decision to engage in health preventive behaviors. A study in Maldives [41] revealed that one fifth of the women had initiation of sexual activities at an early age of below 18 years. Age at marriage is also early with 37.3% women getting married at or below the age of 18 years. Nearly one third of the women had multiple marriages and the husbands of at least one third of the women have multiple marriages. Significant number of women who knew that sex at early age or having multiple sexual partners as risk factors had sex at young age or had multiple marriages or both. More than one third of women who knew that multiple pregnancies could be a risk factor had more than two children themselves [41]. Though the prevalence of smoking among the women was low, many of them were
exposed to second-hand smoke because of the rampant practice of smoking among their male partners. Creation of a global awareness against smoking and tobacco used is much needed in the country [41].

A largest survey among Uyghur women in Xinjiang, China reported that only 1.34% participants knew about the link between smoking and cervical cancer [1] which is remarkably lower than the studies reported from Bhutan (25%) [76], Sri Lanka (20.8%) [74]. Some studies reported even lower, Nepal (0.2%) [74] and Ghana (1.0%) [74].

A study conducted among the women living in the Wielkopolska region, Poland showed that sexual initiation under the age of 18 years was more common among women living in the urban environments, while over the age of 18 years was more common among residents of rural areas. One factor that may contribute to the occurrence of cervical cancer is smoking (according to 45% of all respondents) and a large number of births (61%) [90]. The use of contraceptive pills was not included in the risk factors by 63% of the respondents. Regarding the number of partners and early sexual initiation as risk factors for cervical cancer, opinions were divided. Among women who have given birth less than three times or not at all [91,92]. Taking combined oral contraceptive pills for 10 years is associated with a two-fold increased risk of cervical cancer, and over 10 years may can result in a four-fold risk [91,92]. Improvement in health education is one of the main factors influencing the development of cervical cancer and to reduce the mortality and morbidity related to cervical cancer.

### Barriers and Practices to Demystify Them

As one of the key strategies in preventing cervical cancer in developed countries, providing HPV vaccines in low and middle income countries is a critical pillar for meeting the global action plan for closing the cancer divide. However, outstanding barriers to achieving this goal in low and middle income countries include high cost of vaccine and vaccine delivery, low cervical cancer screening levels, poor health system capabilities, inaccessibility to medical care, low awareness and knowledge of HPV and cervical cancer, and failure of cervical cancer to be reorganized as a major health concern [93]. Barriers could impact the health seeking behaviors of women at the community level.

A study was conducted in which the operational level health care professionals in the Obstetrics and Gynecology departments and the medical directors of the two study hospitals pointed out a number of patient and community related challenges, individual health professional inadequacies, health system related barriers, and health policy related barriers to help-seeking for cervical cancer in northern Uganda [94]. Discomfort attributed to the exposure of women’s genitals, the position in which the women lie when health professionals do pelvic examina-
tions and take samples during screening and diagnosis of cervical cancer and the perceived pain from the speculum inserted during pelvic exams were reported as challenges to cervical screening and help-seeking for cervical cancer symptoms [94]. Lack of financial and emotional support from men and denial of permission for women to go to hospital for early help-seeking for symptomatic cervical cancer featured frequently in the study. It is thought that men might not support the women because of men’s ignorance of the benefit of cervical screening and early help-seeking for symptomatic cancer. Therefore, deliberate policy to involve men in women’s health matters might improve the health of women in Uganda and other low and middle income countries where domestic power balance is skewed towards the men [94]. A critical barrier to care is the abandonment of cervical cancer patients by their relatives in the hospitals because of the bad smell of vaginal discharges from the patients, difficulty in keeping good hygiene for the patients themselves are debilitated and helpless, and fatigue due to prolong hospital stay with associated depletion of resources [94].

Another study conducted among Malaysian women revealed that most respondents have perceived barriers to cervical cancer screening. The main barrier identified in the study was lack of convenient clinic times and lack of information [95]. Perceived barriers to cervical screening in the context of an organized program have been found to include dislike of the test, not wishing to know the result and the belief that screening is unnecessary in the absence of symptoms [96]. Another important barrier mentioned by the participants was lack of information about screening sites. This barrier can be easily addressed by providing women with information on where to go for Pap smear tests [95]. Other barriers reported by the participants were embarrassment, pain and discomfort associated with a Pap smear test [95]. In the study there was a significant correlation between race and perception. This may be due to different traditions, beliefs and lifestyle practices of different races [95].

Cervical cancer screenings in Ghana are not common and are restricted as the test is done in few public health facilities in the country and is patronized by referrals and a few who know about Pap smear [13]. A recent study carried out in Elmina, Southern Ghana revealed the barriers towards cervical cancer screening [13], the main barriers identified by respondents for not seeking Pap smear test were institutional and personal. These were lack of screening sites, screening sites being too far away, limited information on cervical cancer, and absence of health education programs. The personal factors were lack of knowledge about the Pap smear test and the facilities where it can be carried out. Further barriers revealed were fatalistic misconception and financial barriers. The fatalistic misconception barriers comprised of items like “I am scared of a cancer diagnosis and treatment” and “Past vaginal examination tests have been uncomfortable”. The
financial barriers identified included an inability to afford the cost of the test since it is not covered by the National Health Insurance Scheme [13].

According to the recent study conducted among Gabonese women [20], the major barrier cited by the women in use for cervical cancer screening was negligence; fear of discovering a serious disease was also cited by the interviewed women [20]. Negligence may suggest the need for an aggressive information campaign about the disease. However, fear reflects a poor understanding of the national history of cervical cancer and of the principle behind cervical cancer screening. Moreover, that suggested that the acceptability of cervical screening could be high if women were simply informed [20].

A very recent study from Kenya investigated that poor accessibility of the region (16%), pupil absenteeism (4%) and fear of side effects (8%) were among the prominent barrier reported by the respondents [29]. The participants reported that accessibility was a major issue due to poor road network and vastness of the country. Some cited cultural and religious beliefs that were against vaccination and fear of side effects and barriers too. Poor transport system and absenteeism calls for continued efforts towards innovative delivery strategies and vaccination [29]. School-based delivery is the most preferred method for reaching girls with the HPV vaccine and has been used in Rwanda, South Africa, Tanzania and Uganda with high levels of uptake [93,97].

A London based study explored barriers towards cervical screening among ethnic minority and white women living in London [96]. Some women did not feel concerned about cervical cancer and as a result had delayed screening attendance in the past. Some women felt screening offers a unique opportunity to see if anything is wrong. Conversely, the fact that screening involves looking for disease in the absence of symptoms was seen as a reason not to be screened by other women. Although emotional responses to the procedure (fear, embarrassment, pain) were raised by many women, the potential for these emotions to be barriers seemed more prominent among Asian women [96]. Some of the ethnic minority women also raised the potential for feelings of shame, if diagnosed if cervical cancer, a barrier to screening for others in their community. If perceptions of stigma and shame are barriers to screening, it will be important to address this. Misunderstandings about the causes of cervical cancer should be addressed and appropriate terminology should be used. Educational interventions should focus on emphasizing the efficacy of screening and addressing concerns about embarrassment and shame [96].

A consensus is lacking on the most important barriers to cervical cancer screening utilization among HIV-infected women [98]. A study was developed to qualitatively assess barriers and facilitators related to cervical cancer screening among low-income, HIV-infected women from an integrated HIV clinic [98]. Pain and discomfort associ-
ated with receiving Pap smear were described by the majority of women as significant barriers to utilizing cervical cancer screening services. Anxiety related to undergoing follow-up procedures such as colposcopies, biopsies and loop electrosurgical excision (LEEP) was also reported [98]. Most participants were aware that HIV-infected women are at higher risk for developing cervical cancer, in general, they did not believe that mechanisms linking cervical cancer to HIV status, they were generally unaware of and unable to identify individual risk factors such as tobacco use, HPV infection, and multiple sexual partners associated with cervical cancer [98]. Transportation was one of the most pervasive barriers to attending cervical cancer screening appointments, especially for women with longer commutes to the clinic [98]. Because lack of transportation contributes to poor utilization of health care services and ultimately leads to poor health outcomes, addressing the impact of transportation and vulnerability with HIV-infected populations is most critical.

Acceptance and Uptake of HPV Vaccine

HPV vaccines are safe and effective, and have achieved 90% of efficacy in preventing cervical pre-cancers in young women naïve to the targeted HPV types. The WHO recommends routine HPV vaccination for girls aged 9-13 years when feasible and sustainable, and where prevention of cervical cancer on other HPV-related diseases constitutes a public health priority [99]. The GAVI Alliance is supporting an HPV vaccine demonstration project in Kenya in 2013-2014 [100]. A study carried out in Kenya that sought to explore socio-cultural factors associated with HPV vaccine acceptability among opinion leaders and both male and female caregivers in a western province of Kenya [99]. Although cancer was a widely known and feared disease, cervical cancer was not commonly recognized. It was feared and seen as shameful; something that is not openly discussed. Overall acceptability of a vaccine that prevents cervical cancer was high, if endorsed by trusted government agencies and of communities are properly sensitized [99]. In Kenya, an effective strategy should not only address cervical cancer awareness, stigma and the need for vaccination, but issues of vaccine safety, efficacy and delivery, including potential concerns regarding its effect on fertility and intent of the program [99]. A combination of school-based and health facility-based delivery methods may therefore offer the greatest promise for effectively reaching girls with HPV. The main reason for not vaccinating was a lack of invitation (i.e. not knowing where and when they were expected). Other reasons for non-uptake include time constraints and forgetting or simply not considering the option of vaccinating. Thus, the participants indicated that cervical cancer vaccination was not considered a priority, which reaffirms the need for HPV vaccine promotion [99]. A remarkable result from the study was that, besides refusal, participants with vaccinated daughters also feared side effects. Women who grew
up in rural areas were less likely to have their daughters vaccinated. While this may result from less knowledge regarding cervical cancer. In addition, the weight of the partner’s decision is observed through the strong correlation with baseline acceptance; foreseeing a partner’s objection significantly lowered acceptance. Perceiving the daughter as too young was negatively, but the daughter’s actual age did not influence acceptance or uptake [99].

The effectiveness of a vaccine delivery program depends largely upon the awareness of the health care providers about the vaccine and their attitude in terms of acceptability of the vaccine [102]. These factors influence the willingness or readiness of the health care providers to recommend the vaccine to others [102]. A questionnaire-based cross-sectional survey of female health care workers was carried out in Enugu, Southeastern Nigeria [103]. Acceptability of HPV vaccine was defined as the willingness of the health care worker to recommend the vaccine to her adolescent daughters, other adolescents, and other sexually unexposed young women, whereas acceptability of screening for cervical cancer was defined as the willingness of the health care workers to do the Pap smear herself and to recommend it to other women singly or during health care talk among female folk [103]. The study demonstrated a significantly higher level of acceptability of the HPV vaccine as a method of preventing cervical cancer despite the significantly lower level of awareness of the vaccine compared to that of the Pap smear, implies that the health care workers were much more willing to vaccinate their adolescent daughters or recommend the vaccine to adolescent daughters of other women than doing the Pap smear test themselves or recommending it to other women [103]. The uptake of HPV vaccine among the adolescent daughters of respondents in the study was fairly high. It is known that public enlightenment campaigns often have the potential of creating awareness and improving acceptability and uptake of most health care programs and health care workers in doubt are key partners in achieving this success. Despite the high level of awareness and acceptability of the Pap smear in the study, the uptake by the respondents was very low [103]. This may be due to poor health-seeking behavior and attitude to seeking routine preventive medical procedures among people in developing countries.

In Turkey studies have examined about barriers on HPV vaccine; 80.5% of the medical students stated that possibility to suggest the vaccine might increase in case the vaccine would be free. High price of vaccine and beliefs about the vaccine would increase unprotected sexual intercourse were found the most important drawback points of the students in suggesting vaccine to girls’ parents [104].

In 2008, the Health Authority-Abu Dhabi introduced HPV vaccine free of charges for all school girls entering grade 11 in Abu Dhabi State whether they are national or
not. Abu Dhabi became the first state in the Middle East to introduce HPV vaccine. The Abu Dhabi HPV vaccination program is a school-based program. The uptake of the vaccine has increased significantly over the last three years. The most recent data showed that the uptake of vaccine is more than 95% [45]. The knowledge of HPV infection and vaccine is low in the UAE. Women age and husband’s level of education are associated with better knowledge of HPV infection after adjusting for women’s level of education [45].

A study conducted in Vietnam investigated knowledge levels of daughters and their mothers who were exposed to HPV vaccine messaging as part of the communication strategy of a vaccination program, exploring the relationship between knowledge of mothers and their respective daughters [105]. The findings suggested that knowledge about certain topics may have improved after the education and communication campaigns. The message about the purpose of the vaccine was clearly disseminated and understood by mothers and daughters, and specifies about the HPV vaccine were understood by the recipients of the vaccine. The knowledge of daughters and their mothers alone may not be the deciding factor for HPV vaccination, since vaccination uptake was high even with low overall knowledge. Even if comprehensive information on cervical cancer, HPV vaccines, and the program is provided to the communities, mothers and daughters may also remember different aspects of an HPV vaccine education campaign [105].

A recent study conducted among the underserved population in New York revealed a marginal willingness of teenagers to accept the HPV vaccine [106]. The lack of awareness about cervical cancer screening and underestimated risk of HPV infection likely contributes to the limited willingness of the adolescents surveyed to accept the HPV vaccine for themselves. Health care providers are an important source of information for parents and children, and studies show that they generally have a positive attitude towards recommending an HPV vaccination [106].

Study revealed that knowledge of cervical cancer and Pap screening is associated with having had the HPV vaccination, however interestingly not with willingness to accept the vaccine among those not yet vaccinated. Based on factors affecting vaccine acceptability, HPV vaccine programs in the United States should emphasize high vaccine effectiveness, the high likelihood of HPV infection, physician recommendations, and address barriers to vaccination [106].

A study was designed to assess the level of knowledge and beliefs regarding cervical cancer, and acceptance of the HPV vaccine among Saudi university students [14]. Students’ knowledge of the link between HPV and the primary prevention of cervical cancer by HPV vaccine was reported to be poor. The study sample represented the top academic level of university students, in addition, a
good percentage of them belong to high socio-economic standards. The two factors are expected to impose a positive influence on the level of knowledge both directly and indirectly with good opportunities for better education of family members, which is usually associated with passion to acquire knowledge, in addition to better chances of a high standard of health care facilities where healthcare providers have more time to raise the awareness of their customers. Vaccine side effects and fear of injections were perceived barriers for HPV vaccine among a considerable proportion of students enrolled in the study [14].

Economic incentive is needed in order to reduce the price of HPV vaccine to a more reasonable range [107]. A study showed that level of knowledge on HPV and national immunization program had significant association with the acceptance of HPV vaccine among the respondents [108]. Prior to initiating an HPV vaccination program assessing the levels of knowledge and awareness in a community has been suggested as means to develop appropriate educational materials for vaccine recipients and decision makers [69].

Effective immunization strategy will be integral to the success of implementation of the baseline disease knowledge and preventive measures, because most adolescents will used to the informed about vaccines and diseases before they consider vaccination. Of the most important barrier to vaccination, which is lack of information would be addressed; it would greatly impact the decision making and vaccine acceptance of adolescents and young women [109]. Even if the HPV is accepted, the uptake is largely determined by obtaining appropriate information, including practical information about HPV vaccination opportunities. Given the weight of social influences on decision-making, vaccination messages should target broadly and emphasize the vaccine's safety at all times [110]. Finally, outreach strategies, such as school-based vaccination, might diminish organizational challenges for those willing to vaccinate.

Cervical Health Disparities

A recent study among Ethiopian health care workers [58] showed that the disparity in cervical cancer diagnosis and subsequent mortality between high and low resource countries is due largely to the low rate of screening for pre-invasive cervical disease and limited treatment options in lower-resource settings. Cervical cancer's long latency and recognizable pre-cancerous lesions make screening a particularly effective way of prevention as pre-cancerous lesions, once identified, can be expectantly managed or treated safely and inexpensively in an outpatient setting.

Hmong women experience significant cancer health disparities [111]. They are diagnosed at a later stage of cancer than other women in the U.S and have cancer mortality rates 2.8 times higher than other Asian American women and 4.2 times higher than non-Hispanic white
women [112,113]. Lack of attention to cultural appropriateness and literacy level of cancer screening materials may contribute to the disparity in screening rates after Hmong women. A better understanding within the Hmong community of the screening process and benefits to be gained might reduce these disparities. Cancer prevention education interventions that are consistent with Hmong culture and language may be helpful in promoting early cervical cancer screening [111].

To address disparities in cervical cancer screening among low-income HIV-infected women, programs should capitalize on the identified facilitators and alleviate modifiable barriers using multi-level strategies [98].

**Implications for Cancer Educational Intervention and Implementation Science Research**

The knowledge improved significantly with improvement in the level of education. Health education through different teaching strategies is an effective way of imparting knowledge [1]. To date, the largest study conducted among Uyghur women in Xinjiang, China [1] clearly assess the women's status of knowledge and highlighted why and how to take measures to elevate the knowledge level of cervical cancer among Uyghur women. Further explained that, awareness was lower in women with lower educational level. With increase of educational level, awareness has increased [1]. Recently, a study in China sought to assess the short-term effectiveness of a hospital-based, local health care providers oriented educational intervention or rural women's knowledge and attitude towards the prevention of cervical cancer and HPV infection immediately following the group education as an intervention [114], if this education approves to be effective in raising the awareness of HPV and cervical cancer prevention among women, an increased attendance to cervical cancer screening might be achieved when such education is widely disseminated especially through the existed educational system led by China CDC (Centre for Disease Prevention and Control) [114]. Another study carried out among medical students in Southwest China [115] explained that the medical students are future health care providers and sources of medical knowledge, their knowledge and attitudes will directly impact the decisions concerning HPV vaccination and cervical cancer screening among patients.

Promotion of cervical health education is needed to prevent incidence of cervical cancer. Health education must take into account the ability to understand and cultural characteristics of women. It is necessary to improve the communication skills to effectively convey prevention messages to less educated women [116]. Education on cervical screening through the mass media and health talks in delivering health care are imperative to informing women about cervical cancer and the facilities available
Video as a medium of health education have proved to be invaluable visual aids with high levels of effectiveness when used as health education tools in many different settings [117-119]. The search for the optimum mode of communication for specific audiences is a major area of research in health education [119].

Women living with HIV (WLH) bear a disproportionate burden of cervical cancer and may face challenges understanding health information. WLH could benefit from increased health literacy efforts. Specifically, these efforts should focus on improving utilization of cervical cancer screening and interesting knowledge of cervical cancer with HPV [120]. Educational interventions offered through social settings, such as community and church groups, may be a good way to encourage discussion about screening among older ethnic minority women. These interventions should focus on emphasizing the efficacy of screening and addressing concerns about embarrassment and shame [96].

There is need to address vaccine safety concerns and educate the community that HPV is a STI that affects both men and women. As the country prepares to launch a nation-wide HPV vaccination for adolescent girls, one of the key investments should be in dissemination of information on HPV, HPV vaccine and cervical cancer. Effective ways of educating teachers, parents and girls are therefore needed. Because schools are likely to be the chosen vehicles/venues for delivering the first step should be recruitment and training of teachers to act as vaccine champions so as to educate their colleague, parents and targeted girls [29].

Targeted health education on the effectiveness of biomedical modalities for treatment of cervical cancer is needed particularly in the rural communities in order to encourage early biomedical help-seeking and cautiously discourage resource to traditional treatments for symptoms of cervical cancer [37].

The use of implementation science (IS) to facilitate the uptake and sustained adoption of evidence-based health promotion strategies is gaining global recognition [121]. In the Unites States, where cancer is the second most common cause of death, adoption of evidence-based interventions (EBIs) for cancer prevention and control has led to some reductions in morbidity and mortality [123]. However, widespread use of EBIs remain a challenge even in higher income countries like the U.S due to a range of factors including the quantum of evidence available (e.g., the number of efficacy studies), availability, training and experience of service providers, congruence between research and field experience, availability of resources for service delivery, and community acceptance [122,123]. Research (including process, outcome and impact evaluations) can identify feasible, effective and affordable approaches to
cancer screening and diagnosis. Such evidence should not be only communicated through the scientific literature, but also disseminated among policy makers and program planners [124]. Cancer prevention efforts should not only strengthen public service delivery, but also identify ways in which to link, partner and coordinate with the large and expanding private sector, while taking into account the strengths and weaknesses of each sector. For example, the public health system has far greater reach into rural areas than the private sector although the private sector may be better positioned to provide tertiary level care. Non-governmental organizations are a third source of cancer prevention services. They can increase the uptake of screening services through community engagement and promote accountability and quality of public and private care through independent monitoring and evaluation of programs. Although equitable and sustainable access to cancer prevention and treatment services will require public sector leadership, success is likely to be contingent on effective multi-stakeholder partnership [124].

**Cervical Cancer Prevention Services and National Immunization Schemes**

Cervical cancer is highly amenable to screening, although early detection of dysplasia has failed women in developing countries, as indicated by the large number of people who report in late stages [22]. Availability of screening tests, age, education, marital status, income, number of children, use of contraception, lack of knowledge about cervical cancer screening and its prevention, personal and lifestyle factors, attitudes, limited family support, ease of access, and lack of patient-friendly health services are factors affecting screening [125]. The objective of cervical cancer screening/secondary prevention is to prevent invasive cervical cancer from developing by detecting and treating women with CIN2/3 lesions, and the effectiveness is determined by reduction in incidence and mortality. The critical components of a screening program are an acceptable good-quality screening test, prompt diagnostic investigations, appropriate treatment, and post-treatment follow up [126]. There is strong support for non-experimental studies [127] in developed countries such as, Denmark and Finland that incidence and mortality of cervical cancer can be reduced by screening [128].

The Cancer council of the Pacific Islands (CCPI), the indigenous body that advises the Pacific Regional Comprehensive Cancer Control Program and other cancer-related initiatives in the U.S. Affiliated Pacific Islands Jurisdictions (USAPIJ), has had a long-term goal of working with the ministries and departments of health in the USAPIJ to develop minimum regional guidelines for cervical cancer screening and prevention [129,130]. A comprehensive description of the current cervical cancer screening practices in the USAPIJ was needed to inform health departments and local partners on way to improve existing
cervical cancer prevention strategies and to develop new ones. In 2009, the Pacific island Health Officers Association, an organization that represents the collective health interests of the USAPIJ, stated its support for a project to assess cervical cancer screening practices in the USAPIJ [131]. The point-of-care HPV test may be delivered as a self- or provider-administered test, with results available in several hours using laboratory equipment that does not require electricity and highly experienced technicians, making it suitable for lower-resource settings [132,133]. This may be particularly relevant for the USAPIJ, with remote inhabited islands where women may be invited by outreach workers for screening.

Several recent developments have emphasized HPV vaccine as an important prevention strategy. The 2009 WHO position paper on HPV vaccines recommended they be included in routine national immunization programs as a public health priority [134]. Furthermore, one of the goals of the 2006 Global Immunization Vision and Strategy (GIVS) is to introduce new vaccines to all eligible populations within five years of introduction in national programs [135]. Additionally, major milestones during 2007-2011 have brought access to HPV vaccines within reach for many adolescents in low-income countries [135].

Cytological screening based on Pap smear plays a major role in reducing both the incidence and mortality of invasive cervical cancer. In the USA and Canada, the reduction in the incidence of cervical cancer and the subsequent reduction of female mortality rate were attributed to the widespread introduction of the Pap smear screening program as secondary preventive measure for early detection of cases [136-138]. In countries lacking national cervical screening programs, the prevalence of cervical cancer is up to 75% higher, with higher associated mortality rates, compared with countries that do have nation screening programs [139]. Studies exploring perceptions of cervical cancer screening among Muslim women have drawn attention to various factors that are significant. Religion and culture, along with awareness of the signs and symptoms of cervical cancer, were found to be strongly associated with the uptake of screening [140].

It has been hypothesized that HIV-positive women would be more likely to have had Pap smear than HIV-negative women, because they are more involved in health care services. Also the women with higher incomes would be more likely to have had a Pap smear due to greater resources to seek and obtain the health care services that may need [54]. The implementation of routine screening for cervical cancer in HIV treatment centers would be a significant first step toward a national prevention program aiming at the elimination of a deadly, but preventable cancer [52].

The biggest barrier to the adoption of HPV vaccines into national immunization programs has been the high costs of the vaccine [141]. Primary prevention of cervical
cancer using HPV vaccines would be the best approach to alleviate the burden of the deadly disease in low-income countries. In terms of recommendations, there is a need for a large scale health promotion campaign to educate women and communities about cervical cancer and preventability by effective screening of all well women. Mobile outreach clinics with integrated screening services offering visual inspection with acetic acid staining of the cervix (VIA) followed by immediate treatment of abnormal findings (using widely available compressed CO₂), in a screen-and-treat approach, could form a strategy to address the issues of access hindered by long distance and travel time [142], and also the limited infrastructure available for a screening program based on cervical cytology (Pap testing).

If an individual is not aware that a vaccine can prevent a certain disease, the likelihood of immunizing against the disease is low.

**Discussion**

Cervical cancer is a major cause of cancer mortality among women worldwide due to its tendency for increased incidence. The global burden of cervical cancer is disproportionately high among the developing countries where 85% of the estimated 493,000 new cases and 273,000 deaths occur worldwide [143]. The recognition that HPV infection is associated with a high risk of cervical cancer has resulted in a paradigmatic shift in the focus of cervical cancer prevention from female adults to youth with the introduction of a prophylactic vaccination against HPV [144].

It is important to create awareness among communities through educational programs on cancer prevention, preventable risk factors, benefits of early diagnosis, and availability of screening facilities. It is known that precancerous lesions are detectable for a few years or more before cancer develops. If people have related knowledge and health conception about cervical cancer and its screening, then this is a long enough golden period and good opportunity to screen and prevent this disease. In developed countries, cervical screening programs have reduced the incidence of invasive cervical cancer up to 80% although this decline has now reaches a plateau with current causes occurring in patients who have filed to attend for screening or where the sensitivity of the tests have proven inadequate [1].

India accounted for a quarter of both the world’s estimated cervical cancer burden of 529,000 cases and 275,000 deaths in 2008 [27]. There is a high incidence belt for cervical cancer in the north eastern districts of Tamil Nadu, India with puducherry, an union territory having higher age adjusted incidence (39.2/100,000 population) compared to nearby districts Villupuram (31.1/100,000 population) and Cuddalore (29.9/100,000 population). The prevalence and burden of cervical cancer is much
higher among women of low socio-economic status (SES), as well as among rural women in India [146,147]. Though cervical cancer is the leading cancer among women in puducherry, a study has shown that they are ignorant about the completely preventable disease [148]. Extensive health education to the public is needed to improve their knowledge with an emphasis on the fact that both vaccination and screening are the new standards for prevention of cervical cancer. The peak age of occurrence of cervical cancer in India is between 55 and 59 years, and the highest age adjusted rates are in Aizawl in the north eastern part of India at 24.3 per 100,000 women [22]. There is evidence that cervical cancer incidence is greater among women of lower classes, those less educated and those with a larger number of children, in order to increase this, it is necessary to carry out specific health education sessions for men and women to facilitate care seeking [22].

Attainment of high HPV vaccination, screening coverage rates and treatment of all women with precursor lesions in target groups is essential for any cervical cancer prevention program success, and is an immense challenge [149]. Most health systems in low and middle income countries have found are very challenging to come up with comprehensive cervical cancer prevention programs that can attain high average of cervical cancer HPV vaccination, screening and treatment. Many low and middle income countries have had established cervical cancer prevention programs in operation for decades. Despite the existence of the programs, cervical cancer screening coverage is very low [150]. For instance in Malawi, despite having the cervical cancer prevention program offering free services in all public health facilities for more than two decades, the screening coverage is less than 5% and is concentrated in urban and semi-urban areas [151], literature suggests that some women and girls in low and middle income countries do not utilize cervical cancer prevention services due to individual, community and health systems related factors. One of the key factors is lack of awareness about cervical cancer and how it can be promoted. Poor knowledge about the disease might be caused by the women's low levels of education that may also arise from the failure of the health system to provide women with adequate information about cervical cancer. Women who are more educated and also those with more incomes are likely to utilize cervical cancer prevention service than those with little education and income. Those with more income are in a better position to purchase the costly preventive services than those with less or no income. With low level of education and little knowledge attach stigma to cervical cancer or relate cervical cancer to HIV/AIDS [151].

Among Africa women, the awareness about cervical cancer, and especially its prevention and treatment is very limited. Of note, several socio-demographic parameters (place of residence, level of education, occupation, mar-
tal status and religion) were found to affect the women’s knowledge, attitude and/or practice [18]. A very recent study in Ethiopia found that there was a strong interplay between the knowledge and attitudes of cervical cancer and the resultant health seeking behaviors [152]. The community’s awareness of cervical cancer was low, but when the symptoms were explained, the participants recognized that the condition was common, with most participants being aware of the women affected by this condition. Despite this, there were substantial psycho-social, socio-cultural, and health system barriers to effective health-seeking behavior for women with cervical cancer. There was high level of perceived severity of cervical cancer in the community which could be attributed to both the high fatality rate of the disease, and the noticeable symptoms of late stage disease. As the disease is thought to be caused by breaching social taboos or undertaking unacceptable behaviors, modern treatments are thought to be ineffective in such cases [152]. The identified barriers were related to the insidious nature of the disease, individual level factors, community level factors, and institutional factors [152].

In Kenya, health professionals, from regional and national referral hospitals reported inadequacies in training or management of patients with cervical cancer [153]. Health professionals’ lack of clinical skills and associated late stage cervical cancer was reported in South Africa [154]. Other studies highlighting the awareness level, skills of health care professionals and their major role in health education and prevention reported the same results and focused on increased the skills and knowledge of health care professionals [55,58,60,61,66,67,103,155,156]. A study to assess the attitude and quantify the magnitude of such non-gynecologists in performing vaginal and speculum examinations may shine light onto the root causes for non-performance of the examinations [94]. Perhaps, retraining and reorienting qualified health care professionals through continuous professional development might update their knowledge and skills in cervical cancer care [94].

One study conducted in a western country confirmed that the provision of focused, timely and ongoing education in the school setting increased HPV vaccination rates and decreased HPV related morbidity [154]. In addition, the early inclusion of HPV prevention in the health education curriculum at the elementary school level has been validated [157]. It has been shown in a study that while most Korean health teachers were aware of the necessity to provide HPV education to their students, there was no formal HPV education program for them to follow [157]. The necessity for the involvement of men is strongly recommended to improve the perception and interaction to prevent HPV [158-163].

Beliefs about the importance of early detection can be influenced by discussing cancer openly, which does
not happen in some cultures and perceived racism and language barriers can contribute to negative attitudes towards the General practitioner. Encouraging open discussion about cancer among minority communities could help raise awareness about the importance of early detection and thus promote help-seeking [164].

Continued support and advertisement of cervical cancer screening programs along with innovative recruitment strategies will increase usage density and decrease unnecessary deaths from cervical cancer. The public must be educated and informed regarding the danger and burden imposed by cervical cancer not only to the individual, but also to their family, community and country [95]. Medical personnel, pharmaceutical companies, NGOs and the private sector have to work together to reduce the cervical cancer burden.

**Conclusion**

Due to limited awareness of cervical cancer, its relationship to HPV, and concerns about safe practices, the ideal strategies for vaccination, screening and increasing awareness are required that help us to identify important steps for awareness, implementation and availability of HPV vaccination. Educational interventions are needed to improve uptake of cervical screening with time and to increase self-efficacy and perceived locus of control about cervical cancer. Widespread ignorance about cervical cancer and vaccine, cultural beliefs as potential challenges to vaccination, diffidence, access challenges or competing priorities served as major barriers for vaccination that highlighted the need for sustainable HPV vaccine delivery strategies in lower-resource settings. Findings from the surveys have important implications designing and implementing cervical cancer prevention strategies in low and middle income countries including screening and HPV vaccination programs. Improvements in health literacy are strongly associated with health interventions at the primary health level. To detect cancer at early stages and to conduct screening programs in order to decrease the incidence of invasive cancer and mortality, it is essential for health providers to recognize the importance of cancer screening programs to protect their own and individual health. Regulating health policies and systems, increasing literacy levels, changing women’s attitude may positively effect the public health and further promotion of cervical health.
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