

# Cervical Cancer in Sub Sahara Africa

Atara Ntekim

*Department of Radiation Oncology,  
College of Medicine, University of Ibadan  
Nigeria*

## 1. Introduction

“Cervical cancer is fully preventable and curable, at low cost and at low risk, when screening to facilitate the timely detection of early precursor lesions in asymptomatic women is available together with appropriate diagnosis, treatment and follow-up” (Lewis, M. Pan American Health Organization, 2004).

The burden of cervical cancer is quite low in the developed countries of the world. The situation is quite the reverse in developing countries where it constitutes a major health problem. While the incidence is decreasing in the former, it is on the increase in the later. This is a source of great concern considering the fact that cervical cancer is preventable and curable at low cost with currently available methods. Sub Sahara Africa is the region with the highest incidence of cervical cancer in the world with concomitant high mortality affecting women at their prime. There are no screening programs for early detection of precancerous lesions within the countries of Sub Sahara Africa. Most screening activities are done as pilot or research projects which are discontinued on completion. South Africa is the only country in the region with a national cytology based screening program since 2001 but then coverage remains poor and the impact on invasive cervical cancer is unknown (Louie et al.2009). The onset of HIV/AIDS epidemic that is highest in the sub region has elevated the problem of cervical cancer to a serious level. To compound the problem is the widespread lack of resources associated with the region. The countries of Sub Sahara Africa are shown in figure 1.

## 2. Aim

The aim of this work is to appraise the incidence, mortality, state of prevention and treatment of cervical cancer in sub-Sahara Africa. This highlight is necessary so that health professionals, philanthropists, policy makers, advocates and other stake holders can appreciate and understand the state of the disease and respond through the development of treatment, preventive and control programs that will lessen the burden and mortality from this disease in the sub region. It is also aimed at highlighting the need to see that cervical cancer should be considered a public health problem in the region.

## 3. Methods

The method used was through the synthesis of data and information derived from available current published scientific works from peer reviewed journals, workshop proceedings,



Fig. 1. Map showing the countries of Sub Sahara Africa (Map Source: [www.worldmap.org](http://www.worldmap.org)) (NB Southern Sudan became independent July 2011)

hospital and regional based cancer registry figures, reports from specific centres, conference proceedings and a review of work done on cervical cancer in the authors institution The University College Hospital Ibadan Nigeria.

#### 4. Findings and discussions

Cervical cancer occurs worldwide but the highest incidence and mortality rates of cervical cancer are in Eastern, Western, and Southern Africa, as well as South-Central Asia and South America. Rates are lowest in Western Asia, Australia/New Zealand as shown in table 1.

In sub-Saharan Africa cervical cancer accounts for 22.2% of all cancers in women and it is also the most common cause of cancer death among women (Parkin et al., 2003). Cervical

World Area	Incidence per 100,000	Mortality per 100,000
<b>Eastern Africa</b>	<b>34.5</b>	<b>25.3</b>
<b>Western Africa</b>	<b>33.7</b>	<b>24.0</b>
<b>Southern Africa</b>	<b>26.8</b>	<b>14.8</b>
South - Central Asia	24.6	14.1
South America	24.1	10.8
Melanesia	23.7	16.6
<b>Middle Africa</b>	<b>23.0</b>	<b>17.0</b>
Central America	22.2	11.1
Caribbean	20.8	9.4
South - Eastern Asia	15.8	8.3
Central and Eastern Europe	14.5	6.3
Micronesia/ Polynesia	13.4	4.9
Eastern Asia	9.6	3.9
Northern Europe	8.3	2.4
Southern Europe	8.0	2.6
Western Europe	6.9	2.0
Northern Africa	6.6	4.0
Northern America	5.7	1.7
Australia/ New Zealand	5.0	1.0
Western Asia	4.5	2.1

Table 1. Age Standardized Cervical Cancer Incidence and Mortality Rates by World Area (Extracted from GLOBOCAN 2008 by Jemal et al., 2011).

cancer is however the second common cancer among women after cancer of the breast in some areas like Ibadan in Nigeria (Adebamowo et al. 1999). About 60-75% of women in sub-Saharan Africa who develop cervical cancer live in rural areas. Many of these women go untreated, mostly due to lack of access (financial and geographical) to health care. Women in sub-Saharan Africa lose more years to cervical cancer than to any other type of cancer. Unfortunately, it affects them at a time of life when they are critical to the social and economic stability of their families (Parkin et al., 2002).

The true incidence of cervical cancer in many African countries is unknown as there is gross under-reporting. Only very few countries have functional cancer registries and record-keeping is minimal or non-existent in many countries. Some of the figures quoted in the literature are hospital-based, which represents a small fraction of women dying from cervical cancer, as most women cannot access hospital care and die at home. A mortality rate of 35 per 100,000 is reported in Eastern Africa. The reported mortality rates in developed countries with successful screening programs seldom exceed 5 per 100,000 women (Chokunonga et al., 2002).

## **4.1 Factors responsible for the high prevalence**

### **4.1.1 Socio-cultural factors**

Human papilloma virus (HPV) has been isolated in most cases of cervical cancer in all parts of the world. Epidemiologic studies have shown that the association of genital human papilloma virus (HPV) with cervical cancer is strong, independent of other risk factors, and consistent in several countries. The International Biological Study on Cervical Cancer (IBSCC) Study Group led by Bosch, F. in 1995 reported that HPV DNA was detected in 93% of the tumors, with no significant variation in HPV positivity among countries. HPV 16 was present in 50% of the specimens, HPV 18 in 14%, HPV 45 in 8%, and HPV 31 in 5%. HPV 16 was the predominant type in all countries except Indonesia, where HPV 18 was more common. There was significant geographic variation in the prevalence of some less common virus types. A clustering of HPV 45 was apparent in western Africa, while HPV 39 and HPV 59 were almost entirely confined to Central and South America. In squamous cell tumors, HPV 16 predominated (51% of such specimens), but HPV 18 predominated in adenocarcinomas (56% of such tumors) and adenosquamous tumors (39% of such tumors). The report concluded that the results confirm the role of genital HPVs, which are transmitted sexually, as the central etiologic factor in cervical cancer worldwide (Bosch F et al., 1995). Epidemiological studies employing a variety of HPV typing protocols have been collated in meta-analyses. HPV-16/18 is estimated to account for 70% of all cervical cancers worldwide, although the estimated HPV-16/18 fraction is slightly higher in more developed (72-77%) than in less developed (65-72%) regions. About 41-67% of high-grade squamous intraepithelial lesion (HSIL), 16-32% of low-grade squamous intraepithelial lesion (LSIL) and 6-27% of atypical squamous cells of undetermined significance (ASCUS) are also estimated to be HPV-16/18-positive, thus highlighting the increasing relative frequency of HPV-16/18 with increasing lesion severity. After HPV-16/18, the six most common HPV types are the same in all world regions, namely 31, 33, 35, 45, 52 and 58; these account for an additional 20% of cervical cancers worldwide. (Clifford et al., 2006)

Human papillomavirus (HPV), the necessary cause of cervical cancer, is endemic in Africa. In a study to investigate the prevalence of and the risk factors for cervical infection with human papillomavirus (HPV) in an inner-city area of Ibadan, Nigeria, Thomas et al., (2004) interviewed and obtained a sample of cervical cells from 932 sexually active women aged 15 years or older. A total of 32 different HPV types were identified with an HPV prevalence of 26.3% overall and 24.8% among women without cervical lesions; or age-standardised to the world standard population of 28.3 and 27.3%, respectively. High-risk HPV types predominated, most notably HPV 16, 31, 35 and 58. In all, 33.5% of infections involved more than one HPV type. Unlike most populations studied so far,

HPV prevalence was high not only among young women, but also in middle and old age. Single women (odds ratio, OR=2.1; 95% confidence interval, CI=1.1–3.9) and illiterate women (OR=1.7; 95% CI=1.1–2.5) showed increased HPV positivity.. High prevalence of HPV in all age groups may be a distinctive feature of populations where HPV transmission continues into middle age and cervical cancer incidence is very high. Many of the factors that increase both HPV acquisition and promote the oncogenic effect of the virus are also very widespread in Africa (Schmauz et al 1989). These include: early marriage, polygamous marriages and high parity. Polygamy is reported to increase the risk of cervical cancer two-fold and the risk increases with increasing number of wives (Bayo et al., 2002). This is part of the male factor in addition to prostitution that lead to the high prevalence of HPV in Sub Sahara Africa.

High parity, which is the norm in some cultures in Africa, is also a recognised, HPV-related co-factor for the development of cervical cancer (Brinton et al 1989).

The prevalence of HPV has been shown to be higher in uncircumcised men than in circumcised men. In a study to investigate the association between male circumcision (MC) and high risk human papilloma virus (HR-HPV) prevalence, Auvert and colleagues (2009) using urethral swabs collected during a period of 262 consecutive days among participants from the intervention (circumcised) and control (uncircumcised) groups who were reporting for a scheduled follow-up visit reported that HR-HPV prevalences among intervention and control groups were 14.8% (94/637) and 22.3% (140/627). Confounder factors (ethnic group, age, education, sexual behaviour including condom use, marital status, and HIV status) had no effect on the results. Multiple HR-HPV prevalence was 7.0% (89/1267) It was significantly lower among men of the intervention group compared with men of the control group (4.2% vs. 9.9%) .The prevalence of HR-HPV infections in their study was even thought to be underestimated since detection in the urethra is significantly lower than detection in the glans, corona sulcus or the penis shaft. As a corollary, some randomized controlled trials have shown a partial protective effect of male circumcision (MC) on the acquisition of HIV by males in Africa. The effect of MC on HR-HPV reinforces the WHO-UNAIDS recommendation for the implementation of MC programs in countries with a high HIV prevalence, a low MC prevalence and a high MC acceptability (Auvert et al., 2009). In Sub Sahara Africa these countries are mainly in Southern and Eastern Africa. Drain et al., in 2006, published an analysis of classification of developing countries according to prevalence of male circumcision. The categories were low, 20%, intermediate 20-80% and high > 80%. The classification for developing countries in Africa is presented in table 2.

This report noted that male circumcision, which is routinely practiced in the Middle East, Northern and Western Africa, and Western Asia, was associated with lower rates of certain STIs, HIV and cervical cancer (a proxy for HPV), but not with infections transmitted by non-sexual routes. In general, more male circumcision was strongly associated with lower cervical cancer rates and fewer HIV cases, independent of religion. Furthermore, male circumcision was independently associated with HIV among countries with primarily heterosexual HIV transmission, and not among countries with primarily homosexual or injection drug use HIV transmission. These findings all suggest that male circumcision is a true protective factor that reduces the sexual transmission of HIV and possibly HPV, independent of Muslim and Christian religions.

Male circumcision prevalence			
Low (<20%)	Intermediate (20-80%)	High (>80%)	
Botswana	Central African Republic	Algeria	Guinea-Bissau
Burundi	Cote d'ivoire	Angola	Kenya
Cape Verde	Ethiopia	Benin	Liberia
Malawi	Lesotho	Burkina Faso	Libya
Namibia	Mozambique	Cameroon	Madagascar
Rwanda	South Africa	Chad	Mali
Swaziland	Sudan	Congo (Brazzaville)	Mauritania
Zambia	Tanzania	Dem Rep of Congo	Mauritius
Zimbabwe	Uganda	Djibouti	Morocco
		Egypt	Niger
		Equatorial Guinea	Nigeria
		Eritrea	Senegal
		Gabon	Sierra Leone
		Gambia	Somalia
		Ghana	Togo
		Guinea	Tunisia

Table 2. Category of male circumcision prevalence for developing countries in Africa (Adapted from Drain et al., 2006)

#### 4.1.2 Socio-economic factors

Worldwide women of low socio-economic status have a greater risk of having cervical cancer. Cervical cancer is often referred to as a disease of poverty and of poor women. A recent study in Mali in West Africa showed that within a population widely infected with HPV, poor social conditions, high parity and poor hygienic conditions were the main co-factors for cervical cancer (Palacio-Mejia et al., 2003). Sub Sahara Africa also has widespread conditions that encourage sub standard living conditions. These include wars, political chaos, internal conflicts, natural disasters, famine and drought. These often lead to large populations being displaced externally and internally for long periods of time. Under this refugee- like conditions, social vices like rapes, prostitution and multiple marriages and

cohabitation prevail encouraging the transmission of HPV. War is associated with male sexual promiscuity, which in turn contributes to the development of cervical cancer among sexually monogamous women. In 1996, a case-control study sponsored by Stanford University documented that the Vietnam War had contributed substantially to the problem of cervical cancer in contemporary Vietnam, and the Vietnam/American Cervical Cancer Prevention Project was established as an all-volunteer non profit organization. Publication of data linking war to disease was delayed for 8 years in an attempt to ease the process of reconciliation by offering what most would acknowledge to be a remedy in advance of what some will perceive to be an accusation. (Suba et al., 2006)

High rates of invasive cervical cancer was noted in coastal areas of Coasta Rica and this was attributed to difficulties in having access to treatment. Most countries of Sub Sahara Africa are located within the Tropical Rain Forest with difficult terrain as there are lots of swampy areas and thick and mountainous forests. This makes access to screening, health education and treatment difficult.

#### **4.1.3 Biological factors**

Poor nutritional status and infections, e.g. malaria, HIV and TB, are ravaging sub-Saharan Africa and have made many people immuno-compromised. Several studies have demonstrated the association of HIV with HPV. The prevalence of CIN has been estimated to be as high as 20–40% in HIV-positive women (Wright et al 1994). HIV-positive women are more likely to have persistent HPV infections than HIV-negative women. In a study of 2,198 women who attended gynaecological clinics in Abidjan, Côte d'Ivoire, HIV-positive women had a significantly higher prevalence of squamous intraepithelial lesion (SIL) (La Ruche et al., 1998). Temmerman et al (1999) reported a five-fold increased risk of high-grade SIL among 513 HIV-positive women in a family planning clinic in Kenya. Other reports from the region show that women with HIV develop cervical cancer at an earlier age than women who are HIV-negative (Moodley 2001). Gichangi et al (2003) in Kenya found that young women under the age of 35 who had invasive cervical cancer were 2.6 times more likely to be HIV positive than controls of similar age (35% vs. 17%, OR 2.6,  $p=0.043$ ). A recently published study from Tanzania showed that the prevalence of HIV-1 was much higher among the cervical cancer patients (21.0%) than among the controls (11.6%). HIV-1 was a significant risk factor for cancer of the cervix (OR=2.9, 95% CI=1.4–5.9). (Moodley et al., 2006) Sub-Saharan Africa harbours 67% of the world's population of people living with HIV and AIDS (Bugu G 1998).

#### **4.1.4 Lack of awareness and knowledge of cervical cancer in Africa**

Cervical cancer is yet to be recognised as an important public health problem in sub-Saharan Africa. In Sub Sahara Africa, priority is given to infectious diseases such as malaria, tuberculosis, leprosy, diarrheal diseases, acute respiratory infections and HIV/AIDS all of which have preventive and management strategies. Several studies have shown poor knowledge of cervical cancer in Africa, which cuts across different literacy levels. Among 500 attendees of a maternal and child health clinic in Lagos-Nigeria only 4.3% were found to be aware of cervical cancer. (Anorlu et al., 2004) In 2004, also in Lagos-Nigeria, 81.7% of 139 patients with advanced cervical cancer had never heard of cervical cancer before, and 20%, 30% and 10% respectively thought the symptoms they had were due to resumption of

menses, lower genital infection and irregular menses. Almost all the women (98%) believed that their advanced disease was curable, 12% thought it was not a serious disease and only 9% understood that it was cancer and therefore serious (Ajayi et al., 1998). Similar studies in Kenya and Tanzania also reported very poor knowledge of the disease in patients. (Gichangi et al., 2003 & Kidanto et al., 2002). Poor knowledge is not limited to patients alone, however; health care workers who are supposed to be better informed do not have good knowledge of the disease either. In Lagos Nigeria, delay by primary health care providers in referring cases of cervical cancer was found to be an important cause of women presenting with late-stage disease. It took a mean of  $9.35 \pm 12.9$  months for primary health care providers to diagnose and refer women with cervical cancer to a tertiary hospital for management. (Anorlu et al., 2004).

Education improves knowledge and acceptability of preventive measures against cervical cancer. In a study on cervical cancer awareness and HPV vaccine acceptance among 375 female university students in Northern Nigeria, a total of 133 participants knew of HPV (35.5%), 202 (53.9%) had heard of cervical carcinoma and 277 (74.0%) were willing to accept HPV vaccination. (Ilyasu et al., 2010). Apochie and colleague (2009) conducted a cross sectional survey among college students aged 18 years and above, attending a large university in Accra, Ghana. A sample of 157 students was selected to study knowledge and beliefs about cervical cancer screening. In general, respondents seemed to understand that cervical cancer screening had benefits. Over 64 percent believed that the test could find cervical changes before they became cancerous while 78.5% thought those changes could be easily cured. Among the perceived barriers to screening, the most prevalent perceived barrier was that only half of respondents believed that the purpose of cervical cancer was to diagnose cancer, the second commonest reported barrier (40.6%) was the belief that their partner would not allow them to obtain cervical cancer screening. The following barriers were also important; cost (23.2%), not knowing where to go (24.3%), and belief that everyone would think they were sexually active (24.6%). Encouragingly, few believed that a pap test would be painful (9.4%). While more than 68% perceived that young women were susceptible to cervical cancer, a lower percentage (52.5%) believed that they themselves were at risk for cervical cancer. About three quarters of respondents (73%) believed that cervical cancer was a serious disease that would make a woman's life difficult and about 62% of students also believed that there were effective cures for cervical cancer. In general, a low percentage received screening cues from their social environment by way of knowing peers who had screened or from a healthcare worker's recommendation. Six of the fifteen respondents who had received at least one recommendation from a healthcare worker to get cervical screening, scheduled and obtained one. The subset reporting having received a health care worker recommendation but that reported not having the test, indicated the following reasons; they could not afford it, they did not know where to get screening, they had no time to schedule and obtain screening and they felt it was embarrassing to expose themselves for screening. About a third reported ever having heard a mass media discussion on cervical cancer while a fifth have at least once listened to a discussion on cervical cancer at a church or other social gathering. About half also stated that they would be willing to obtain the cheaper alternative cervical cancer screening using visual inspection and mild acetic acid, if a doctor recommended it. Overall there was good awareness of the issues related to screening, although there were specific gaps in knowledge about risk factors and screening intervals. For instance, it was found that although the relationship



between sex and cervical cancer was known, less was known about other risk factors like their partner's prior sexual experiences and very little was known about the link between HPV and cervical cancer.

#### 4.1.5 Poor cervical cancer screening

Very few women in sub-Saharan Africa are ever screened for cervical cancer. None of the 500 women attending a maternal and child health clinic in a poor area of Lagos in 1999 had ever had a Pap smear. Only 9% of health care workers in two health institutions in Nigeria had ever had a Pap smear. In a study among medical workers in a Ugandan hospital (doctors, nurses and medical students) Only 19% of the female medical workers had ever had a cervical cancer screening test done. The reasons for not having been screened included: not feeling at risk, lack of symptoms, carelessness, fear of vaginal examination, lack of interest, test being unpleasant and not yet being of risky age. Moreover, 25% of the female respondents said that they would only accept a vaginal examination by a female health worker. (Mutya et al., 2006) In a similar study among nurses in a Tanzanian hospital concerning nurses' own cervical cancer screening practices most (116/137) of the respondents had never had a Pap smear the most common reason (54.7%) was not knowing where to go for the test, followed by seeing no reason for the test (13.1%), being afraid of the procedure (9.5%) and being afraid of bad results (7.3%). (Urasa & Darj 2009)

Some of the few women who do have access to screening do not get themselves screened because they have wrong beliefs about cervical cancer. (Anorlu et al., 2007). Less than 1% of women in four West African countries had ever been screened (Gichangi et al., 2003). Moreover, there are very few cervical screening services in Africa and many of them are based in secondary and tertiary health care facilities located in urban areas. Only 5% of 504 general practitioners in Lagos Nigeria in 2004 screened their patients (Denny et al 2006). Women who use these services are generally young, and smears are thus being taken from a relatively low-risk group.

Screening in most developing countries like the countries within the sub region is mainly opportunistic, characterized by an estimated low coverage, coexisting with over-screening of women with access to health services, and an absence of quality control procedures. Policies for cervical cancer screening in most countries vary and, most often nonexistent. Formulation and ensuring compliance with national program guidelines is an essential step toward significantly reducing the burden of cervical cancer (Arrosi et al. 2010). This type of service does not reach women most at risk, i.e. older women aged 35–60 years, especially those who live in rural areas. Cytology-based screening, which is used in developed countries, is resource intensive, and difficult to realise in very many countries in sub-Saharan Africa because of poor health care infrastructure and lack of resources. There are very few cytopathologists, cytoscreeners and cytotechnicians; some have inadequate training. Quality control is inadequate. Histopathological services are extremely limited in many countries. Malawi, a country with a cervical cancer incidence rate of 47 per 100,000 women, had one pathologist, one colposcope, no cyto-technicians and no facilities for cervical cancer screening or treatment as at 2001. The situation is not much different presently. The default rate among those with cytological abnormalities reaches 60–80% due to the absence of effective mechanisms for recall of women with abnormal smears.

The effectiveness of direct visual inspection [visual inspection with acetic acid (VIA) and visual inspection with Lugol's iodine (VILI)] as a form of population-based screening has been studied across the continent, mainly sponsored by international agencies (Chirenje et al., 2001) VIA is similar to colposcopy in that 4% acetic acid is applied to the cervix and any acetowhite lesion is visualized, although with VIA there is no magnification. It is a simple procedure and in most centres has been carried out by trained nurses. Candidates with suspicious lesions are selected for treatment. Studies have shown the sensitivity of VIA to be the same as that of Pap smear while its specificity is lower than 85% (Urasa & Darj 2011). The specificity is also noted to be even lower among HIV positive patients possibly due to high rates of coinfections in the lower genital tract (Denny et al., 2002). Visual inspection method is however a subjective method and prone to different interpretations by different observers depending on experience and competence. Other screening methods include HPV DNA assay (which has been shown to be even superior to PAP smear test) and colposcopy.

#### **4.1.6 Treatment of cervical cancer in sub-Saharan Africa**

Treatment of cervical cancer is dependent on the stage of the disease, age and medical state of the patient, tumor characteristics, patients' preferences and resources within the health sector of each country. Options can be monotherapy or combined; they range from conisation of the cervix, simple hysterectomy with or without lymphadenectomy, radical hysterectomy with pelvic lymphadenectomy, pelvic exenteration, chemotherapy, radiotherapy, to palliative chemotherapy. Treatment at an early stage has the best prognosis with the highest cure rates (Urasa & Darj 2011)

##### **4.1.6.1 Treatment of pre-invasive cervical cancer**

It may not be too wrong to say that there are apparently more cases of invasive cancer than pre-invasive cancer; this is mainly because there are very few facilities for screening and very poor access to the screening services. Because so few women are ever screened, not many cases of pre-cancerous lesions are diagnosed or detected. Colposcopy is available only in very few centres. Hysterectomy and cone biopsy are the usual treatment modalities for pre-cancerous lesions, as the equipment and expertise for large loop excision of the transformation zone (LLETZ), also known as loop electrosurgical excision (LEEP), are scarce.

##### **4.1.6.2 Treatment of invasive cervical cancer**

The treatment of invasive cervical cancer continues to be a major challenge in many sub-Saharan African countries, due to the lack of surgical facilities, skilled providers and radiotherapy services. Management of women with invasive cervical cancer requires a multidisciplinary approach, including: gynaecologists, radiation oncologists, medical oncologists, pathologists, medical physicists, technicians, nurses and counsellors. These specialists are lacking in many places across the continent, and where they exist they tend to work in isolation rather than in teams.

There are few cases that present in the operable stage of the disease. In Lagos Nigeria, less than 10% of cases are operable at the time of presentation. Some of the few who do present early may not have surgery as there are very few certified gynaecologists who perform radical gynaecological cancer surgery. Follow-up after surgery is often very poor as some

patients who believe they have been cured never come back. Others just cannot afford the cost of transportation back to urban centres for follow-up (Ashraf, H. 2003). For patients who present late, radiotherapy becomes the preferred treatment. Unfortunately, only a few receive this treatment due to the paucity of resources and very advanced disease at presentation. Chirenje et al. (2001) found in Harare, Zimbabwe that in 70% of patients, radiotherapy was the most commonly used treatment modality, as many of the cases presented with stage 2B and above.

Radiotherapy is not available in many places in Sub Sahara Africa. In 1997, radiotherapy was not available in 32 African countries. (Levin et al.,1997). In 2003, 15 countries in Africa did not have a single radiotherapy machine. Nigeria, the most populous country in Africa, had only five radiotherapy centres as at 2009: four government-owned and one privately owned. WHO recommends 0.4 radiotherapy machines per million of population. Nigeria's five machines to 140 million people translates to ~0.04 per million, well below WHO's recommendation. In contrast, in the United States, there are 12 machines per million people. (Sepulveda et al., 2003). Besides few machines, those that exist frequently do not function most of the time because the resources for their proper maintenance and repair do not exist. In addition, there is a shortage of trained staff such as radiotherapists and medical physicists, as well as essential materials.

#### **4.1.7 Supportive care**

Pain is the most common presenting symptom in many cancer patients in Africa because of late presentation. In a survey of terminally ill patients in five countries in Africa – Uganda, Ethiopia, Tanzania, Zimbabwe and Botswana – the greatest need expressed by the patients was pain relief. (Harding et al., 2005) In another study comparing the concerns of terminally ill patients in a developed country (Scotland) and an African country (Kenya), it was found that the main concern of the Scottish patients was the emotional pain of facing death, while for their counterparts in Kenya it was physical pain and financial worries. Unfortunately, there is inadequate availability of pain-relieving medications, especially opioids. Only 11 out of 47 African countries use morphine for chronic pain and of these 11, the amount consumed is small. (Murray et al 2003) .

Oral morphine is not available to very many cancer patients in sub-Saharan Africa. Insufficient funds due to low priority accorded to palliative care by governments, regulatory and pricing obstacles, ignorance, and false beliefs are responsible. In some instances, where drugs are available to patients, sustainability of pain relief is hampered by poverty, as many cannot afford the cost of the drugs. Poverty, poor infrastructure, lack of health care workers adequately trained in palliative care and poor priority accorded to palliative care by African governments are all obstacles to effective palliative care in sub-Saharan Africa. There are very few hospices to take care of terminally ill patients. However, countries like South Africa, Uganda, Kenya, Tanzania, Nigeria and Zimbabwe have made some progress in palliative care. Uganda is the first African country to follow the WHO guidelines on palliative care. It has made oral morphine freely available to districts that have specialist palliative care nurses or clinical officers, and has promoted morphine use down to the villages. Laws have also been passed to allow trained nurses, especially those in the rural areas, where there are very few or no doctors, to prescribe morphine. Cancer is believed in certain cultures to be a punishment from the gods, and terminally ill patients often seek help

from traditional healers and spiritual leaders. A good model for palliative care in Africa should therefore integrate the culture, beliefs and traditions of the people. Some countries are making efforts in this direction by incorporating traditional healers into mainstream medicine. However, a feasible, accessible, and effective palliative care is yet to be developed in sub-Saharan Africa. (Merriman & Kaur 2005).

#### **4.2 Improvements in outlook**

There is need to improve the outlook of this condition in Sub Sahara Africa. There should be improvement in attitude towards education needs of the populace so as to create and improve awareness and knowledge about the disease. Disease prevention requires social change, which in turn requires the participation of those for whom the change is intended, including demographic groups at high risk for disease, appropriate governmental authorities, and essential medical personnel. Both locally and globally, socio-political problems associated with sustaining working coalitions from groups with shared interests but competing incentives constitute critically important real-world obstacles to successful cervical cancer prevention and will remain so irrespective of the screening method(s) eventually used. In settings where health systems cannot afford to ignore such incentives, laboratory data constitute an essential yet sometimes overlooked fulcrum against which to leverage the social change required to preserve life (Suba et al., 2006)

There is need for sensitisation of health workers about cervical cancer and importance of screening. Based on studies carried out in countries where organized screening is available, it is known that screening uptake can be influenced by cultural beliefs, the social position of women, characteristics of the health care system, the physician's attitudes towards screening and women's comprehension of the screening process. Embarrassments about undergoing a gynecological examination, fear of the procedure or belief that little can be done to prevent cancer are other factors that might decrease screening participation. Lower socio-economic background, lack of health insurance and low literacy also compromise participation in screening. Attending cervical cancer screening may have a negative connotation or stigma when it is combined with a gynecological examination and treatment for reproductive tract infections. The gender of health care professionals and limited time that they allocate to patient education may negatively influence screening participation as well. Other influences that may influence participation in screening in particular in low resource countries are gender imbalances and whether illness is perceived as traditional or modern. Adequate knowledge about cervical cancer influences early detection and treatment seeking pattern (Mutya et al., 2007). In Botswana a national cervical cytology screening committee was formed in 1996 with a role in planning and advising the government. Just six years later a national guidance document for the national cervical cytology programme was drawn up and implemented. In this short space of time public awareness has been successfully raised resulting in an increased uptake of Pap smears from 5000 per year before the start of the programme to an impressive 32,000 per year in 2009. Despite considerable success, progress is hampered by inadequate resources, the high prevalence of HIV in the country and the long waiting list for treatment.

There is now a need to build upon the scope of cervical cancer prevention. This problem is not limited to Botswana as many African countries have similarly inadequate resources to treat patients even when abnormal cervical cytology is detected (sSACCCWG 2010). Training

curricula of nurses and medical students need to be revised to include more practical cervical cancer screening skills. There is need to change attitudes that screening is only for gynaecologists. For opportunistic screening to work, health workers in other departments need to be sensitised on the gravity of cervical cancer and to remember to refer all eligible women who come into their care for screening (Mutya 2006). Nurses in high income countries play a role in cancer prevention and participate in cervical cancer screening by carrying out Pap smear tests. Due to the lack of logistics and scarcity of gynecologists and pathologists in Sub Sahara Africa, nurses could be used effectively in the prevention of cervical cancer, by being enabled to collect Pap smear tests specimen and using the visual inspection by acetic acid technique which is less costly and does not require high expertise (Urasa & Darj 2011).

Facilitation of screening activities through the provision of more PAP smear facilities while the evaluation and adoption of non cytological based screening methods such as use of VIA and Lugols iodine and HPV DNA testing and ensuring wider coverage of screening activities is desirable. In developed area with low mortality rates from cervical cancer, it has long been established that organized screening programs has great impact on the reduction of cervical cancer mortality. Time trends in mortality from cervical cancer in Denmark, Finland, Iceland, Norway, and Sweden since the early 1950s were investigated in relation to the extent and intensity of organised screening programmes in these countries. In all five countries the cumulative mortality rates (0-74 years) fell between 1965 and 1982. In Iceland, where the nationwide programme has the widest target age range, the fall in mortality was greatest (80%). Finland and Sweden have nationwide programmes also; the mortality fell by 50% and 34%, respectively. In Denmark, where about 40% of the population are covered by organised programmes, the overall mortality fell by 25%, but in Norway, with only 5% of the population covered by organised screening, the mortality fell by only 10%. The results support the conclusion that organised screening programmes have had a major impact on the reduction in mortality from cervical cancer in the Nordic countries. (Laara E et al., 1987)

It has been established that cytologic screening programs that detect and treat precancerous lesions decrease mortality from cervical cancer in countries that have been able to achieve broad screening coverage at frequent intervals. However, in the majority of low-income countries like Sub Sahara Africa, cytologic screening has proven difficult to sustain, in large part because of its reliance on highly trained cytotechnologists, high-quality laboratories, and an infrastructure to support up to 3 visits for screening, colposcopic evaluation of abnormalities, and treatment.

Several factors have led to an expansion of the options for cervical cancer control. First, the availability of reliable HPV DNA assays has led to numerous studies documenting its higher sensitivity for detecting precancerous lesions compared with a single cytology test. Second, recent studies suggest that alternate screening strategies that use HPV DNA testing or simple visual screening methods may be more practical in some areas of the world like Sub Sahara Africa. Third, regardless of initial screening test (e.g., cervical cytology, HPV DNA testing, simple visual screening), strategies that enhance the linkage between screening and treatment, and seek to minimize loss to follow-up, have the best chance of measurable success. Additionally, economic evaluations of these alternatives have concluded that they are promising (Goldhaber-Fierbat & Goldie 2006). It has been suggested that the most efficient and cost-effective screening techniques in low-resource countries include visual

inspection using either acetic acid or Lugol's iodine and DNA testing for human papillomavirus (HPV) DNA in cervical cell samples (Sankaranarayanan et al., 2009 cited in Jemal A. et al., 2011) A recent clinical trial in rural India, a low-resource area, found that a single round of HPV DNA testing was associated with about a 50% reduction in the risk of developing advanced cervical cancer and associated deaths. The limitations of HPV DNA testing include the cost (i.e. US\$20-30 per test), infrastructure, and time needed to obtain a result . However CareHPV (Qiagen Gaithersburg Inc., MD, USA) has been developed as a simple, rapid and operational HPV test for low-resource settings that can produce results within 3 h. The compact, portable and battery-operated technology has stable conditions, and the test can be conducted by workers with minimal training. Data from China showed that, compared to VIA, CareHPV has a higher sensitivity (90% vs. 41%) and a reasonably comparable specificity (84% vs. 94%) to detect high-grade lesions. Moreover, a modelling analysis found that CareHPV has the potential to reduce the incidence of cervical cancer by 56% in China if given just three times over a woman's lifetime and effective treatment is available, suggesting its potential impact in reducing the burden of invasive cervical cancer in comparable settings. Regulatory approval is anticipated in developing countries in the near future, and CareHPV test if provided at a low cost, represents a promising alternative screening test, however, its performance and diagnostic value to detect pre-cancerous lesions need to be evaluated in African settings (Louie et al., 2009).

Widespread adoption of HPV vaccination to the recommended target population will reduce the disease incidence in the future. The vaccine is however seen to demobilize efforts towards setting up and improving screening services in places with poor screening coverage. The high cost of the vaccines is a constraint on low resource countries that have high incidence of the disease. It has been submitted that the vaccines if given to girls before onset of sexual activity, have the potential to dramatically reduce the incidence of HPV infection and therefore cervical cancer. McIntyre, P. ( 2011) however also reported that one problem is that it is unlikely that the benefits will start to be felt in 15-20 years, and the full population impact will take 50 years or more to be felt. He is of the view that implementing an HPV Vaccination program is no substitute for organizing an effective screening system. The vaccine is of little value to the population of women who have already become sexually active as it cannot eradicate the virus if already present or retard the growth of incipient cancer. The report also noted that despite impressive results in clinical trials, they have not yet proven themselves in country programs. An example was the program in Romania where free vaccine was provided to girls 11 years old and a school - based campaign program of vaccination was started. It was reported that the take up rate was as low as 4%. Some parents prevented their daughters from getting vaccinated raising public health aspect issues towards high coverage and acceptance. The vaccine is therefore seen by some as a possible distraction from the main challenge as "the vaccine is not an alternative to cytology. We cannot fight cancer without regular cytology examination and that must be clearly stated" ( Chil, A., quoted in McIntyre 2011) . The expectations that vaccines which primarily protect against the most common strains of HPV infections (HPV types 16 and 18), which cause about 70% of cervical cancers, may prevent cervical cancer worldwide are at present high. The vaccines have shown high safety, efficacy and immunogenicity for both the quadrivalent HPV 16/18/6/11 vaccine (Gardasil\_, Merck & Co., Inc.) and the bivalent HPV 16/18 vaccine (Cervarix\_, GlaxoSmithKline Biologicals) (Schiller et al. 2008 cited in Louie Et al., 2009). A number of countries in sub-Saharan Africa have licensed the HPV vaccines

(Table 3). However, implementation plans are lagging and will depend largely on the affordability of the vaccines, and a clear cost benefit ratio. However, affordable pricing is the most critical factor to facilitate the introduction of HPV vaccines in low- and medium-resource countries like Sub Sahara Africa in the short term. It is also extremely important that women continue to receive screening services because the current vaccines are being given to adolescent girls only, and even vaccinated girls should begin screening when they

Quadrivalent HPV 6/11/16/18 Vaccine (Gardasil® Merck, SA)	Bivalent HPV 16/18 Vaccine (Cervarix®, GSK)
Botswana	Congo
Burkina Faso	Cote d'Ivoire
Cameroon	Gabon
Central African Republic	Ghana
Chad	Kenya
Congo	Namibia
Cote d'Ivoire	Nigeria
Democratic Republic of Congo	Senegal
Equatorial Guinea	South Africa
Ethiopia	Uganda
Gabon	
Kenya	
Malawi	
Mauritania	
Mauritius	
South Africa	
Togo	
Uganda	

Table 3. HPV Vaccines licensure in Sub Sahara Africa as of March 2009 ( Source: HPV Information centre, 2009 cited in Louie et al., 2009)

HPV Prevalence				
HPV type	Any histology	squamous cell carcinoma	Adenocarcinoma	unspecified
6	0.4	0.2	0.0	1.4
11	0.5	0.3	0.0	1.1
16	51.6	53.4	36.5	49.4
18	18.1	15.1	29.4	24.8
31	2.5	2.8	0.0	2.3
33	6.2	6.4	5.3	5.9
35	4.1	2.5	1.5	8.4
39	1.1	1.5	0.0	0.3
45	9.1	8.3	8.2	11.3
51	3.1	1.4	1.5	8.5
52	3.4	1.9	0.0	8.7
56	0.7	0.8	0.0	0.5
58	1.3	1.1	0.0	2.4
59	0.7	0.6	1.5	0.7
66	0.6	0.6	0.0	0.8
68	1.1	1.1	0.0	1.4
70	0.1	0.0	0.0	0.0
73	0.7	0.8	0.0	0.0
82	0.0	0.0	0.0	0.0

Table 4. Type - specific HPV prevalence among invasive cervical cancer cases in Africa by histology.( Source: WHO/IDC HPV information centre).

reach the recommended screening age since the vaccines do not provide protection for the 30% of chronic infections by HPV types other than HPV 16, 18, 6 and 11 that cause cervical cancer as shown in table 4 and that even in the recommended strains, protection is not 100% (Sankaranarayanan , 2009a, 2009b).



Prevention and early diagnosis through vaccination and screening requires effective mobilization of the target groups and this has been a problem in developing countries like the countries of Sub Sahara Africa. An approach to improve this has been formulated by Alliance for Cervical Cancer Prevention (ACCP) as follows. Since cultural and emotional barriers and practical needs are among the main reasons why women choose not to be screened, addressing these barriers and needs will help increase women's awareness and willingness to seek services. Screening, treatment, and follow-up services need to address women's cultural, emotional, and practical needs and concerns.

Community involvement is essential for: Using a community-based education approach as a way of building a discourse with women and promoting women's participation will help reduce fear and misunderstanding about cervical cancer screening and treatment and strengthen prevention knowledge and practices. Making women's experiences with services more positive ensures greater follow-up rates and increases the likelihood that women will share information about their good experience with peers. Reducing their fear of screening and treatment Strengthening women's understanding of prevention. Efforts in creating effective messages to improve women's awareness is needed. Messages should be targeted to reach women at highest risk of cervical cancer (generally aged 30 -50 years). Women should be involved in creating prevention messages and programs. Recognized barriers to women's participation in screening include: little understanding of cervical cancer, limited understanding of female reproductive organs and associated diseases , lack of access to services, shame and fear of a vaginal exam, fear of death from cancer, lack of trust in health care system, lack of community and family support. Common misconceptions about cervical cancer include the fact that people often do not know that it is preventable and the belief that screening involves Sexually Transmitted Infections (STI)/HIV screening including the belief that a positive/abnormal Pap smear result means a woman will die. In South Africa and Kenya, women often think a positive screening test means they have HIV infection While in Mexico, women fear that treatment will leave them sexually disabled.

Direct personal contact can facilitate screening exercises. This can be done through community meetings, posters, pamphlet newspaper advertisements or articles and radio or television messages. Key sources of information include peers who have received messages or been screened, leaders or members of women's groups, midwives and traditional healers ,community health promoters, community leaders ,nurses, nurse practitioners, or doctors. The target groups have to be located. Places to reach women are local women's groups community centres, women's workplaces, places of worship ,health facilities, women's homes, schools (parent's groups) and markets and key cervical cancer prevention messages should include the facts that good health practices can help prevent cancer, cervical cancer develops slowly and is preventable, screening can detect treatable, precancerous lesions before they progress to cancer, women aged 30 and older are more likely to develop cervical cancer than younger women, women in their 30s and 40s should be screened and that the screening procedure is relatively simple, quick, and is not painful. A small number of women who need treatment after screening can receive a simple procedure to remove the lesion. Screening test that is positive is not a death sentence but it provides the opportunity to eliminate abnormal cells before they become cancerous

Helping women discuss cervical cancer can bring the message home. This can be done through community health or outreach workers who can facilitate communication at the

community level. Counselling by health care providers can both inform women and help them talk to their families. Women who receive treatment for precancerous lesions and who must abstain from sexual intercourse for several weeks especially need good counselling

To ensure women's positive experiences with screening, there is need to build and maintain positive provider-client relationships. This is needed because women are more likely to participate when they are treated well, health care providers are sensitive, responsive and respectful. Health care providers should develop a respectful rapport with clients. Women with positive experiences will become advocates when talking to other women.

Important counselling tips include listening and encouraging women to express their concerns being sensitive to cultural and religious considerations expressing support through non-verbal communication, such as nodding, keeping messages simple and answering questions directly, calmly, and in a reassuring manner and providing adequate information to remind them of the instructions. Services should be made accessible and appropriate through review of internal policies and procedures to ensure that programs are accessible and friendly to women. Having female health care providers in settings where women are uncomfortable with male health care providers, if possible can help. Ensuring affordability of the services and having settings that will ensure confidentiality and privacy including easy access to the women are essential. Local languages should be incorporated into the counselling medium. This can be done through involving women helps who can also assist in developing, implementing and evaluating programs and messages. Advisory team of women and other key community leaders can be consulted in order to deliver a package that will meet women's cultural, emotional and practical needs. This is aimed at increasing women's awareness of and willingness to seek services and improve women's experience with cervical cancer prevention services in addition to increasing program participation among women at risk.

High parity is associated with increased incidence of HPV infection leading to increased cases of cervical cancer. Most women in the region have high number of children resulting in worsening poverty and predisposition to the disease. Education on the need for reduced family size through the adoption of effective family planning methods can help in improving the general living condition of the people. This will eventually lead to sizeable population that can be easily reached with cervical cancer control programs.

Onset of sexual activities among teenage girls in the sub region from the age of 15years is high. This predisposes such girls to high risk of cervical cancer. The promotion of use of condom early through sex education programs in early school days can also help in reducing the transmission of HPV in the sub region. Closely linked to this is the issue of circumcision which should be encouraged among those with low level of practice.

Adoption of radiotherapy facilities based on less sophisticated technology like the Cobalt 60 based teletherapy and brachytherapy equipments that give acceptable good treatment outcome can help in the treatment of those already diagnosed with the disease. At The University College Hospital, Ibadan Nigeria, cobalt 60 brachytherapy source is used for high dose brachytherapy services with satisfactory outcome. This has served the purpose and is quite economical as the source is changed every 5 years instead of every 4 months as the case with the more popular iridium 190 source.

The HIV epidemic in the sub region has further increased the problem of cervical cancer as those so infected have rapid progression of the disease and usually have poorer outcome. Efforts to improve the control of the infection will also lead to the reduction in the mortality of cervical cancer.

#### **4.2.1 Pre-requisites for cervical screening: Infrastructure, funding, training**

The following were the submissions of Oxford University's Africa - Oxford Cancer Consortium (AFROX) meeting towards prevention of cervical cancer in Africa at St Catherin's College Oxford in March 2009. The meeting was chaired by Professor David Kerr of Oxford University and Professor Fiander Alison of The University of Cardiff. The following were the suggested prerequisite towards setting up effective screening programs in the sub region.

To set up a cervical screening programme, it is vital to address the associated infrastructure, funding and training needs. The delegates at this workshop recommended that it would be important for:

- Screening to be free at point of service and ideally as close to the people as possible.
- The health systems for African countries differ, and so a unique approach would be required for each country. However, each African Government should be lobbied to set aside a certain amount of money per year to carry out cervical screening. It would be important to have this recognised by a separate sub-section of the national budget. Finding sustainable funding for screening programmes is important - one way to achieve this could be for donors to insist that they would only fund a cervical cancer screening programme if the government agreed to provide funding support for the programme to continue after set-up funding ended.
- Building up political will and support for national funding support towards cervical cancer screening would be required. The First Ladies of Africa could have an important role in leading this. In Nigeria, the Governors' wives have been keen supporters of cervical cancer screening. Community advocates and the media would also need to be mobilised. These groups would also have a key role in raising public awareness about the causes of cervical cancer and why treatment would be important.
- Records and documentation of those being screened should be kept so we can tell how often or if they go for screening. This would also help to monitor whether it was simply the same people getting screened, or if the programme was succeeding in reaching new women.
- If possible, screening should be integrated into existing programmes, such as programmes for breast cancer screening, sexual health programmes, etc
- Training of health professionals to take smear tests and/or HPV tests would be necessary. Training of pathologists to read smear tests would also be critical.

#### **4.2.2 Evaluation & cost effectiveness of cervical screening**

The participants of this workshop discussed how to evaluate and measure the cost effectiveness and success of cervical screening programmes. They identified the following areas as being critical for consideration:

## 1. Training

- Are programs easy to staff?
- Should pap smears be abandoned for developing countries due to lack of people to read them?
- Work must be done by another health care level other than doctor – but problems arise when empowerment of lower personnel is met by resistance from doctors
- Brain drain an issue – we must address the retention of health care personnel

## 2. Cost

- Need more interaction with health economists
- Sustainability?
- We must look into different financial flows, the idea of marketing campaigns and alternate financing schemes to raise substantial sums

## 3. Coverage

- Feasibility of “mother-daughter” screening and vaccination project?
- Feasibility of self-screening?

## 4. Political will

- Need to sell a product to the policy makers? It is problematic to make a set of recommendations for African countries. The right screening depends on where you are. This is a highly heterogeneous environment and we can't settle on a one-size-fits-all approach
- Dogmatic decisions to be replaced by research-based decisions...lobbying is good if it is on the basis of data.
- Screening must be made part of a country's health policy
- Demonstration projects are a good way to show political leaders the efficacy of screening programs
- Millennium Development Goals (MDG) goals 4 and 5 (reduction in child mortality and improvement in maternal health) are a useful platform to use – argue that HPV is part of maternal health.

### 4.2.3 Creating a climate for informed decision-making in screening and vaccination

The delegates at this workshop suggested the following steps should be taken, to create a climate of informed decision-making about screening and vaccination programmes:

- Informed consent has to be tailored appropriately to population. Informed consent means different things in different situations and with different people, so it has to be appropriate to population.
- Screening should become part of routine care.
- Policy makers are not yet aware of the cost/toll of cervical cancer in their countries. Consequently, the development of cancer registries is important.
- Scientific evidence is important but a consensus statement can also be useful, for example from the world health organisation.
- Need to show politicians that the impact of screening would be seen now.

- Survivors' stories and the family stories of the women who have died of cervical cancer need to be told. Doctors and nurses should also tell stories about cervical cancer. We should not be afraid to tell individual stories; these are the ones that touch people.

## 5. Conclusion

Cervical cancer is still a problem in sub Sahara Africa. Concerted and focussed effort towards the reduction in the burden of the disease is urgently needed. The intensification of preventive, screening and therapeutic measures including education of the populace on these aspects can bring the disease under control as it is in the developed countries. Each country of Sub Sahara Africa should develop and implement sustainable preventive and screening programs using any of the available methods suitable and appropriate for their own setting instead of the present opportunistic screening activities prevalent in the region. Functional cancer registries are needed to analyze the pattern of the disease so as to help in planning control programs. There is also the need to address some of the conditions that predispose to practices that favor the development and spread of the disease. These conditions include poverty, illiteracy, political instability and widespread underdevelopment.

## 6. References

- Abotchie, P. & Shokar, N (2009). Cervical Cancer Screening Among College Students in Ghana: Knowledge and Health Beliefs *Int J Gynecol* ; Vol 19 No.3 ( April 2009):pp. 412-416.
- Adebamowo CA and Adekunle O O(1999). Case control study of epidemiologic risk factors for breast cancer in Nigeria. *Br J Surg*. No. 86: (1999) pp. 771-775
- AFROX Towards Prevention of Cervical Cancer in Africa 2009 [www.afrox.org](http://www.afrox.org) accessed on 20th July 2011
- Ajayi IO, Adewole IF (1998). Knowledge and attitude of out patients' attendants in Nigeria to cervical cancer. *Central African Journal of Medicine* ;44(2):41-44.
- Anorlu RI, Banjo AAF, Odoemhum C, et al. (2000) Cervical cancer and cervical cancer screening: level of awareness in women attending a primary health care facility in Lagos. *Nigeria Postgraduate Medical Journal* 2000;70:25-28.
- Anorlu RI, Orakwue CO, Oyenyin L, et al. Late presentation of cervical cancer in Lagos: what is responsible? *European Journal of Gynaecological Oncology* 2004; 25(6):729-32.
- Anorlu RI, Rabi KA, Abudu OO, et al. Cervical cancer screening practices among general practitioners in Lagos, Nigeria. *Journal of Obstetrics and Gynaecology* 2007;27(2):181-84
- Arrossi S, Paolino M, Sankaranarayanan R (2010) Challenges faced by cervical cancer prevention programs in developing countries: a situational analysis of program organization in Argentina. *Pan American Journal of Public Health*. 2010 Oct;28(4):249-57
- Ashraf H. Poor nations need more help to slow growing cancer burden. *Lancet* 2003; 361:2209.
- Auvert B., Sobngwi-Tambekou, J. Cutler, E., Nieuwoudt, M Lissouba, P, Puren, A & Taljaard D. Effect of male circumcision on the prevalence of high-risk human

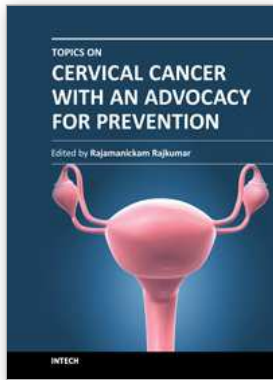
- papillomavirus in young men: results of a randomized controlled trial conducted in Orange Farm, South Africa. *Journal of Infectious Diseases* Jan Vol.199 No.1(2009) pp. 14-19
- Bayo S, Bosch FX, de Sanjose S, et al. Risk factors of invasive cervical cancer in Mali. *International Journal of Epidemiology* 2002;31:202-09.
- Bosch F, Manos M, Munoz N., Sherman M, Jansen A et al. Prevalence of Human Papillomavirus in Cervical Cancer: a Worldwide Perspective. *Journal of The national cancer Institute* Vol. 87 No 11(1995) pp 796- 8Brinton LA, Reeves WC, Brenes MM, et al. Parity as a risk factor for cervical cancer. *American Journal of Epidemiology* 1989; 130:486-96.
- Buga GA. Cervical cancer awareness and risk factors among female university students. *East African Medical Journal* 1998;75(7):411-16.
- Chirenje ZM, Rusakaniko S, Kirumbi L, et al. Situation analysis for cervical cancer diagnosis and treatment in east, central and southern African countries. *Bulletin of WHO* 2001;79:127-32.
- Chokunonga E, Levy LM, Bassett MT, et al. Zimbabwe cancer registry. In: Parkin DM, Whelan SL, Ferlay J, et al, editors. *Cancer Incidence in Five Continents*. Vol. VIII. Lyon: IARC Press, 2002. pp.104-05.
- Clifford G, Franceschi S., Diaz M et.al HPV type- distribution in women with or without cervical neoplastic disease *Vaccine* Volume 24, Supplement 3, 21 August 2006, Pages S26-S34
- Denny I., Kuhn L, Pollack A & Wright T. (2002) Direct visual inspection for cervical cancer for cervical cancer screening: an analysis of factors influencing test performance. *Cancer* No. 94 2002 pp 1699-1707.
- Denny L, Quinn M, Sankaranarayanan R. Screening for cervical cancer in developing countries. *Vaccine* 2006; 24(Suppl 3):S3/71-S3/77 Male circumcision, religion, and infectious diseases: an ecologic analysis of 118 developing countries
- Drain, P. Halperin, D Hughes, J Klausner, J & Bailey R *Infect Dis*. 2006; 6: 172
- Gichangi P, Estamble B, Bwayo J, et al. Knowledge and practice about cervical cancer and Pap smear testing among patients at Kenyatta National Hospital, Nairobi, Kenya. *International Journal of Gynecological Cancer* 2003;13:827-33.
- Goldhaber-Fiebert J & Goldie S. Estimating the cost of cervical cancer screening in five developing countries *Cost Eff Resour Alloc*. 2006; 4: 13.s 1186
- Harding R, Profrene J, Higginson PJ. Palliative care in sub-Saharan Africa. *Lancet* 2005;365:1971-77.
- Jemal,A.; Freddie Bray, Melissa M. Center, Jacques Ferlay,; Elizabeth Ward, David Forman. *Global Cancer Statistics A Cancer J Clin* 2011;61:69-90 volume 61 No 2 March/April 2011 pp 79
- Iliyasu Z, Abubakar IS, Aliyu MH, Galadanci HS Cervical cancer risk perception and predictors of human papilloma virus vaccine acceptance among female university students in northern Nigeria *J Obstet Gynaecol*. 2010;30(8):857-62
- Kidanto HL, Kilewo CD, Moshiro C. Cancer of the cervix: knowledge and attitudes of female patients admitted at Muhimbili National Hospital, Dar es Salaam. *East African Medical Journal* 2002;79:467-69.

- Laara, E. Day, N. & Hakama M.(1987) Trends in mortality from cervical cancer in the Nordic countries: association with organized screening programs. *The Lancet* Vol.329 No. 8544 (May 1987) pp 1247-1249
- La Ruche G, You B, Mensah-Ado I, et al. Human papillomavirus and human immunodeficiency virus infections: relation with cervical dysplasia-neoplasia in African women. *International Journal of Cancer* 1998;76: 482-86.
- Levin V, el Gueddari B, Meghzifene A. Radiation therapy in Africa: distribution and equipment. *Radiotherapy and Oncology* 1997;52:79-83.
- Louie K, Sanjose S & Mayaud P (2009)., Epidemiology and prevention of human papilloma virus and cervical cancer in sub-Saharan Africa: a comprehensive review. *Tropical Medicine and International Health* Vol. 14 NO. 10 (October 2009) pp 1287-1302
- McIntyre, P. ( 2011) Cutting unnecessary deaths from cervical cancer. *Cancer World* No 42 June 2011 pp 58-62
- Merriman A, Kaur M. Palliative care in Africa: an appraisal. *Lancet* 2005;365:1909-11
- Moodley M, Moodley J, Kleinschmidt I. Invasive cervical cancer and human immunodeficiency virus (HIV) infection: a South African perspective. *International Journal of Gynecological Cancer* 2001;11(3):194-97.
- Moodley JR, Hoffman M, Carrara H, et al. HIV and pre-neoplastic and neoplastic lesions of the cervix in South Africa: a case-control study. *BMC Cancer* 2006;6:135.
- Murray SA, Grant E, Grant A, et al. Dying from cancer in developed and developing countries: lessons from two qualitative interview studies of patients and their caretakers. *British Medical Journal* 2003; 326:368-72
- Mutyaba Twaha Mutyaba, Elisabeth Faxelid, Florence Mirembe, & Elisabete Weiderpass I . Influences on uptake of reproductive health services in Nsangi community of Uganda and their implications for cervical cancer screening *Reprod Health*. 2007; 4: 4. 1186
- Mutyaba T, Mmiro F & Weiderpass. Knowledge, attitudes and practices on cervical cancer screening among the medical workers of Mulago Hospital, Uganda *BMC Med Educ*. 2006; 6: 13. Pp.1186
- Palacio-Mejía LS, Range-Gomez G, Hernandez Avila M, et al. Cervical cancer, a disease of poverty: mortality difference between urban and rural areas in Mexico. *Salud Pública de México* 2003;45(Suppl 3): S315-25
- Parkin DM, Ferlay J, Hamdi-Cherif M, et al. *Cancer in Africa: Epidemiology and Prevention*. IARC Scientific Publications. No.153. Lyon: IARC Press, 2003.
- Parkin DM, Whelan SL, Ferlay J, et al, editors. *Cancer Incidence in Five Continents, Vol VIII*. IARC Scientific Publication No.155. Lyon: IARC, 2002.
- Sankaranarayanan R, Nene BM, Shastri SS, et al. HPV screening for cervical cancer in rural India. *N Engl J Med*. 2009;360: 1385-1394.
- Sankaranarayanan R. HPV vaccination: the promise & problems. *Indian J Med Res*. 2009;130:322-326.
- Schmauz R, Okong P, de Villiers EM, et al. Multiple infections in cases of cervical cancer from a high incidence area in tropical Africa. *International Journal of Cancer* 1989;43:805-09
- Sepulveda C, Habiyambere V, Amandua J, et al. Quality care at end of life in Africa. *British Medical Journal* 2003;327:209-13.

- Suba, E, Murphy, S, Donnelly, A, Furia, L, Huynh, M & Raab, S. Systems Analysis of Real-World Obstacles to Successful Cervical Cancer Prevention in Developing Countries *American Journal of Public Health* Vol. 96, No. 3 (March 2006) pp 480-487
- sSACCCWG (sub Sahara Africa Cervical Cancer Working Group) Scientific Communiqué number 3. November 2010
- Temmerman M, Tyndall MW, Kidula N, et al. Risk factors for human papillomavirus and cervical precancerous lesions: the role of concurrent HIV-1 infection. *International Journal Gynecology and Obstetrics* 1999;65:171-78.
- Thomas J, Herrero R, Omigbodun A, Ojemakinde K, Ajayi !, Fawole A, Oladepo O, Smith J et al. Prevalence of papillomavirus infection in women in Ibadan, Nigeria: a population-based study. *British Journal of Cancer* No 90 (Feb 2004) pp.638-645
- The Alliance for Cervical Cancer Prevention (ACCP) Developing Cervical cancer screening programs that meet women's needs. [www.alliance-cxca.org](http://www.alliance-cxca.org) Accessed 19<sup>th</sup> July 2011
- Urasa M & Dar E. Knowledge of cervical cancer and screening practices of nurses at a regional hospital in Tanzania *African Health Sci* Vol 11 No. 1 March 2011 pp 48-57
- Wright TC Jr, Ellerbrock TV, Chiasson MA, et al. Cervical intraepithelial neoplasia in women infected with human immunodeficiency virus: prevalence, risk factors, and validity of Papanicolaou smears. *Obstetrics and Gynecology* 1994;84(4):591-97.

INTECH





## **Topics on Cervical Cancer With an Advocacy for Prevention**

Edited by Dr. R. Rajamanickam

ISBN 978-953-51-0183-3

Hard cover, 284 pages

**Publisher** InTech

**Published online** 02, March, 2012

**Published in print edition** March, 2012

Cervical Cancer is one of the leading cancers among women, especially in developing countries. Prevention and control are the most important public health strategies. Empowerment of women, education, "earlier" screening by affordable technologies like visual inspection, and treatment of precancers by cryotherapy/ LEEP are the most promising interventions to reduce the burden of cervical cancer. Dr Rajamanickam Rajkumar had the privilege of establishing a rural population based cancer registry in South India in 1996, as well as planning and implementing a large scale screening program for cervical cancer in 2000. The program was able to show a reduction in the incidence rate of cervical cancer by 25%, and reduction in mortality rate by 35%. This was the greatest inspiration for him to work on cervical cancer prevention, and he edited this book to inspire others to initiate such programs in developing countries. InTech - Open Access Publisher plays a major role in this crusade against cancer, and the authors have contributed to it very well.

### **How to reference**

In order to correctly reference this scholarly work, feel free to copy and paste the following:

Atara Ntekim (2012). Cervical Cancer in Sub Sahara Africa, Topics on Cervical Cancer With an Advocacy for Prevention, Dr. R. Rajamanickam (Ed.), ISBN: 978-953-51-0183-3, InTech, Available from: <http://www.intechopen.com/books/topics-on-cervical-cancer-with-an-advocacy-for-prevention/cervical-cancer-in-sub-sahara-africa>

**INTECH**  
open science | open minds

### **InTech Europe**

University Campus STeP Ri  
Slavka Krautzeka 83/A  
51000 Rijeka, Croatia  
Phone: +385 (51) 770 447  
Fax: +385 (51) 686 166  
[www.intechopen.com](http://www.intechopen.com)

### **InTech China**

Unit 405, Office Block, Hotel Equatorial Shanghai  
No.65, Yan An Road (West), Shanghai, 200040, China  
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元  
Phone: +86-21-62489820  
Fax: +86-21-62489821