Original article

Cancer Care in sub-Saharan Africa – Urgent Need for Population–based Cancer Registries

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Abstract

Background: The incidence of malignant diseases is increasing globally, particularly in the developing countries as shown by recent cancer statistics from the World Health Organization Reports. It is anticipated that with increase in life expectancy consequent upon improved standard of living and increasing industrialization, the burden of cancer in sub-Saharan Africa is likely to increase in the new millennium.

Objective: This article is designed to review the existing literature on cancer statistics in sub-Saharan Africa and assess the need for population-based cancer registries to enhance cancer care and prevention within the region.

Design: Relevant literature on cancer statistics in sub-Saharan Africa and the developed Western countries were obtained from the Internet and local libraries. Information obtained from this search formed the basis of this review.

Results: There are few cancer registries in sub-Saharan Africa and most of them are hospital-based. Data from these registries indicate some consistency in the pattern of malignant diseases in most countries within the region with slight local variation. Carcinoma of the prostate, liver, Non-Hodgkin's lymphoma and colon and rectal tumors are the top four malignant diseases in the Ibadan cancer registry while Kaposi's sarcoma, liver and oesophageal cancers are the most common in some registries in East Africa.

Conclusion: Cancer statistics from the developing countries are inadequate due to lack of functional population-based cancer registries. It is recommended that functional population-based cancer registries be established in various countries within the region to facilitate the formulation of appropriate policies for improved cancer care and prevention. [*Ethiop.J.Health Dev.* 2003;17(2):89-98]

Introduction

The rising global incidence of malignant diseases as documented in recent reports of the World Health Organization (WHO) is an issue of serious concern, particularly in the developing countries where the increase is occurring at a faster rate. In 1985, there were an estimated 7.62 million new cancer cases, with 3.66 million (48 percent) in the developed countries and 3.96 million (52 percent) in the developing countries (1). The figure rose to 8.1 million new cases in 1990, an increase of 6.3 percent (2). In the mid twentieth century, frantic efforts were made to establish cancer registries in various countries in sub-Saharan Africa; from which emerged the Ibadan cancer registry in Nigeria, Harare cancer registry in Zimbabwe, Kampala cancer registry in Uganda, Bamako cancer registry in Mali, Conarkry cancer registry in Guinea and Gambia cancer registry. Most of these registries started with enthusiasm but the economic depression of the last two decades of the twentieth century caused tremendous decline in the economic fortunes of most of sub-Saharan Africa and consequently gross under-funding and shortage of relevant manpower and resources to service most of the registries. This review highlights the trends and increasing burden of cancer

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based on emerging statistics in the developing countries of sub-Saharan Africa. It is hoped that this will act as a stimulus to health care providers and health policy makers within the region to intensify efforts towards establishing functional population-based cancer registries for proper documentation of cancer statistics in the region. This will form the basis for the formulation of appropriate policies towards effective cancer care and control in sub-Saharan Africa.

Cancer in sub-Saharan Africa as compared with Western Countries

The incidence of all cancers is increasing all over the world and the increase is occurring more rapidly in regions that had hitherto enjoyed low incidence. According to World Health Organization Reports, there were an estimated 7.62 new cancer cases worldwide in 1985[1] but this rose to a total of 8.1 million new cases in 1990, divided almost exactly between the developed and developing countries (2). In the same year 1990, it was estimated that 5.2 million cancer deaths occurred, with about 55 percent occurring in the developing countries (2). With increasing industrialization and westernization of dietary and other socio-behavioral attitudes in most developing countries it is estimated that the burden of cancer in these countries will increase to epidemic proportions in the 21st century.

In most developing countries, priority for cancer care is rated low, as more emphasis is placed on the control of communicable diseases and improving environmental sanitation. At first sight, it may seem that cancer registration is a luxury that ought to occupy a lowly place in the demands upon usually slender financial resources. Yet this would be a mistaken belief, firstly because cancer is already a significant health problem in developing countries of the world, and one that is likely to increase in the future, and secondly because the presence of an adequate information system is an essential part of any cancer control strategy (2). There is evidence that, with improvements in the control of communicable diseases and the concomitant increase in life expectancy, the proportion of deaths attributable to cancer, which has been increasing, will continue to do so in the future. Developing countries are liable to be exposed to further risks of cancer with increasing industrialization, urbanization and intensification of agriculture in the course of development. It is therefore important that they pay attention to their cancer problems and prepare to meet the challenges of the future through setting up appropriate cancer control programmes and purposeful research that might produce useful and meaningful information in respect of the etiology of various malignant conditions.

Most cancer registries in sub-Saharan Africa were established in the middle of the last century, most were University Hospital-based, as these were the only centers possessing the infrastructure and resources required to run cancer registries. Data emerging from some of these registries indicate that the burden of cancer is increasing rapidly with some similarity in pattern of tumors in various centers in sub-Saharan Africa (3) as shown in Table 1.

Although the overall incidence of cancer in all sites appear to be higher in U.S. Blacks (3) compared with reports from most cancer registries in sub-Saharan Africa, it should be noted that there is a gross underestimation of the incidence of cancers in this part of the world due to failure of many cancer patients to report to hospital, lack of adequate health care facilities in most of these countries, absence of population-based cancer registries and lack of compulsory registration of births and deaths. There are some discernable differences in the cancer pattern in sub-Saharan Africa compared with African Americans. Prostate, lung, colon and rectum are the top three cancer sites in African American men while liver, prostate and oesophageal cancers top the list in most registries in sub-Saharan Africa (4). However a more detailed review of cancer in men reveal some consistency in the pattern of cancer with

Table 1: **Age-standardized (World Standard) Incidence Rates of the Principal Cancers in African Cancer Registries and the United States.**

	Conarkry, 1992-1995	Bamako, Mali 1987-1989	Gambia 1987-1989	Kampala, Uganda 1989-1991	Harare, Zimbabwe 1990-1992	U.S. (SEER) 1988-1992
Male						
Oesophagus	0.6	1.3	0.9	13.0	30.4	13.8
Stomach	6.1	19.4	3.9	1.5	13.5	14.5
Colon and rectum	2.3	5.4	1.4	6.2	10.4	46.4
Liver	32.8	47.9	30.6	7.5	34.6	6.5
Lung	4.9	4.8	1.0	1.5	24.6	99.1
Melanoma	1.3	0.9	0.0	0.8	1.8	0.7
Other skin	2.2	3.1	2.8	1.8	4.0	0.7
Prostate	8.1	6.3	1.2	12.3	29.2	137.0
Bladder	3.8	12.4	1.8	1.7	13.2	11.1
NHL	2.3	1.4	2.4	3.2	4.7	12.3
Leukaemia	0.3	0.6	0.5	0.4	5.8	9.1
Kaposi Sarcoma	0.1	-	-	30.1	24.6	7.0
All sites	83.0	121.9	59.1	98.0	238.5	455.3
Female						
Oesophagus	0.8	0.8	0.6	7.2	8.0	3.9
Stomach	5.7	10.3	1.5	2.0	18.4	3.9
Colon and rectum	1.7	3.0	0.6	3.4	5.6	35.3
Liver	12.5	21.4	12.1	3.2	19.2	2.0
Lung	0.9	2.6	0.0	0.0	7.3	38.5
Melanoma	1.1	0.9	0.0	0.5	3.8	0.5
Other skin	2.5	3.5	0.2	0.8	4.3	1.0
Breast	10.9	10.2	3.4	16.4	20.4	79.3
Cervix	46.0	23.4	10.5	43.6	67.0	12.0
Corpus uteri	1.1	0.8	1.2	6.1	3.7	11.4
Ovary	1.8	1.0	1.4	4.2	8.0	8.1
Bladder	0.9	3.5	0.7	0.7	12.5	4.3
Thyroid	0.6	1.7	0.1	0.8	5.3	3.3
NHL	1.3	0.4	1.3	2.6	4.0	7.0
Leukaemia	0.5	2.5	0.9	0.7	4.7	0.8
Kaposi Sarcoma	0.1	-	-	11.0	7.9	0.2
All sites	110.5	102.9	39.6	118.4	236.2	272.6

some regional variations in various parts of sub-Saharan Africa.

Table 2 shows the comparative data on the top 10 cancers in men in this region. Prostate, liver, non-Hodgkin's lymphoma and colorectal cancers top the list in the Ibadan Cancer Registry in Nigeria while Kaposi's sarcoma, liver and oesophageal cancers are the most common cancers in East Africa (4).

Changing pattern of cancer in sub-Saharan Africa during the last three decades

A closer examination of the available data reveals some changing pattern of various cancers in sub-Saharan Africa in the past three decades. For example, in the Ibadan Cancer Registry in Nigeria, prostate cancer was the 8th most common cancer in the 1960s but it has topped the list in the 1990s while liver cancer has moved down to the second position as

Table 2: **Comparative data of top 10 cancers in African men and African American men**

Rank	Ibadan, Nigeria 1980-1988	Ibadan, Nigeria 1989-1996	US (SEER) Black 1988-1992	Mali	Zimbabwe, African	Zimbabwe, European	Uganda
1	Liver	Prostate	Prostate	Liver	Kaposi's	Skin	Kaposi's Sarcoma
2	Prostate	Liver	Lung	Stomach	Liver	Postate	Prostate
3	Bone	Non-Hodgkin's Lymphoma	Colon rectum	Bladder	Oesophagus	Colon and rectum	Oesophagus
4	Colon Rectum	Colon and Rectum	Stomach	Colon and rectum	Lung and bronchus	Lung and bronchus	Liver
5	Bladder	Skin	Oesophagus	Lung and bronchus	Prostate	Bladder	Non- Hodgkin's lymphoma
6	Non-Hodgkin's Lymphoma	Laryinx	Non-Hodgkin's lymphoma	Skin	Bladder, Stomach	Melanoma	Colon and rectum
7	Stomach	Nasal Cavity	Bladder	Postate	Colon and rectum	Liver	Eye
8	Skin	Nasopharynx	Leukaemia	Non-Hodgkin's lymphoma	Non-Hodgkin's lymphoma	Brain	Stomach
9	Hodgkin's Lymphoma	Stomach, Bone	Kaposi's sarcoma	Kidney, Hodgkin's Kaposi's	Myeloid Leukaemia	Stomach	Lung and bronchus
10	Lung bronchus	Bladder	Gallbladder	Pancreas	Pancreas	Connective tissue	Skin

shown in Table 3. There has been a gradual increase in the number of cancer cases per decade but a much more rapid increase in the number of prostate cancer compared with liver cancer. Over the past three decades, the relative frequency of prostate cancer has gone from 4.45% of male cancers to 10.7% (4). Colorectal cancer ranks fourth on the list in Ibadan and Mali series but occupy the sixth and seventh positions in the list in East Africa, followed by carcinoma of the lung and bronchus. Other less common cancers include non-melanoma skin and laryngeal cancer and cancer of the nasal cavities and stomach.

Cancer in men

Table 3 shows the time trends in common cancers in men from the Ibadan cancer registry in Nigeria. Four decades ago (1960-1969), the top five cancers in men were liver, non-Hodgkin's lymphoma, Burkitt's lymphoma, connective tissue and stomach cancer. But within the next two decades, prostate cancer moved up to the second position and in the last decade, it became the most common cancer in Nigerian men (4). Carcinoma of the Colon and rectum moved from the tenth to the fourth position while Burkitt's lymphoma and connective tissue malignancies declined markedly in incidence.

Prostate adenocarcinoma

Reports from the Ibadan cancer registry indicate that carcinoma of the prostate has emerged as the most common cancer in Nigerian men. Available records suggest that the disease is increasing in prevalence in sub-Saharan Africa. Known risk factors for prostate cancer include age, race, positive family history, and dietary fat intake. Prostate cancer increased with age faster than any other malignancy and is poised to become a major public health problem in sub-Saharan Africa as life expectancy continues to increase. The mean age of patients is 71.4 years with over 77% of cases over the age of 60 years (4).

Table 3: **Most common cancers in men (Ibadan Cancer Registry)**

Site	Position	1970-1979	1980-1989	1990-1995
Liver	1	1	1	2
Non- Hodgkin's lymphoma	2	5	3	3
Burkitt's lymphoma	3	3	5	NR
Connective tissue	4	5	6	10
Stomach	5	4	NR	NR
Skin	6	7		5
Hodgkin's lymphoma	7	5	9	NR
Prostate	8	2	7	1
Bone and adamantinoma	9	8	2	NR
Colon and rectum	10	6	8	4
Nasal cavities	NR	9	4	8
Bladder	NR	10	NR	R
Lung and bronchus	NR	NR	NR	NR
Larynx	NR	NR	10	6
Brain	NR	NR	NR	7
Eye	NR	NR	NR	9

A recent report from Lagos, another major city in Southern Nigeria revealed a mean age of 68.3+/- 9.4 years (5). Nkposong and Lawani (6) reported a mean age of 60 years about three decades age. This age distribution is similar to that found in other African countries (Mali, Uganda, Zimbabwe), with the majority of cases occurring in men between the ages of 60 and 80 years (4).

Reports from populations of African descent in the diaspora seem to suggest that the black race share a disproportionately high burden from prostate cancer. Reports on cancer statistics in the U.S. indicates that prostate cancer is the second most common cause of cancer death in African American men. African American men have a 47 percent higher incidence and a 128 percent higher mortality from prostate cancer than white men in the U.S. There is evidence to suggest that a small percentage of cases of prostate cancer, particularly early onset prostate cancer may have strong familial susceptibility. This is supported by increased risk of prostate cancer among first-degree relatives of patients and an increased number of affected individuals within families (7,8). Environmental factors appear to play an important role in susceptibility to the disease. Increased fat and body mass index (BMI) appear to be important predictors of risk. The prevalence of obesity is higher among African American men compared with other racial groups. Reports from the Center for Disease Control and Prevention (CDC) indicate that 28.4% of African American men are overweight and have high BMI compared with other racial groups (9).

Liver Cancer

Liver cancer is the second most common cancer in Nigerian men while it still remains the most common cancer in men in some series from various parts of sub-Saharan Africa (3). The male to female ratio in most series is about 2.5:1 and diagnosis is based on clinical suspicion, ultrasonography and biopsy from operated cases. The most common factor underlying the high incidence of liver cancer in sub-Saharan Africa is the high prevalence of chronic carriers of Hepatitis B virus. West African immigrants in Europe (a group with presumably, the same HbsAg carriage rates as the indigenous populations in Africa) retain a high rate of liver cancer (10). This is in contrast to African American population, in whom the carrier rate is only 0.5% (3). In addition, exposure to aflatoxin, which is a known hepatocarcinogen interacting with Hepatitis B virus, is a contributory factor in the high incidence of the disease.

Cancer in women

The distribution of cancers in women in sub-Saharan Africa has also shown some changes in the past few decades as seen in the men. Available data indicate that from the 1960s, carcinoma of the cervix has been the most common cancer in Nigerian women. This

pattern is also reflected in the series of various pathological laboratories in the country. However, recent reports form the Ibadan cancer registry indicate that carcinoma of the breast has overtaken carcinoma of the cervix (11) as shown in Table 4. The other common malignant diseases in women within the region include ovarian cancer, liver cancer and connective tissue tumors as shown in Table 4.

Breast cancer

Although accurate cancer statistics are lacking in most countries in sub-Saharan Africa, reports from some cancer registries within the region provide some useful information on the incidence of some malignant diseases. The estimated incidence of carcinoma of the breast from the Ibadan cancer registry in 1976 was 15.3 per 100,000 women and this rose to 33.6 per 100,000 by 1993 (12). Despite this doubling in incidence, many clinicians believe that this is an underestimate of the true incidence of the disease due to low level of awareness, poverty, lack of access to medical services, sociocultural factors and the absence of a breast cancer-screening programme in Nigeria. Data from the Ibadan cancer registry indicates a mean age of 48 years with peak age incidence ranging from 36 to 45 years. Twelve percent of the patients are below the age of 30 years in contrast to 0.5% of Caucasian patients in this age range. Also postmenopausal patients account for only 20% of breast cancer patients in sub-Saharan Africa compared with over two-third of patients reported among Caucasians (12). Late presentation is a marked feature of the disease in Nigerian women with over 70% of cases reporting in hospital with advanced breast cancer (12,13). The main histological pattern is infiltrating ductal carcinoma with marked stromal reaction and infiltrating poorly differentiated anaplastic tumors account for a third of cases. The risk factors for breast cancer in women in sub-Saharan Africa are poorly understood. The few studies that have attempted to investigate the role of reproductive characteristics in breast cancer susceptibility in this population have reported conflicting results with few reporting a role for birth order, age at first full term pregnancy and age at first lactation while others fail to demonstrate any significant association between these factors and breast cancer risk.

Cervical cancer

Cervical cancer is the second most common cancer in women in the Ibadan cancer registry (11) although data from some African countries report cervical cancer as the most common malignant disease in females. Data from most series indicate that maximum incidence occurs around age 50 (3). The high incidence of this disease has been reported from various centers in sub-Saharan Africa. Presumably, this relates to the high prevalence of infection with oncogenic subtypes of human papilloma virus (HPV), now accepted as the major causative agent for cervical cancer (14). In Nigeria, there is very little information about the prevalence of HPV in the general population without cytological abnormalities. However, published studies do not, in general suggest that infection rates are higher than in various European countries. Prevalence of all HPV subtypes in Kenya range from 3.7% to 19.5% (15,16). In Senegal, 24.5% of women in an infectious disease service were HPV positive (17).

Table 4: **Common cancers in women (Ibadan cancer registry)**

Rank	Site of tumor	Percentage
1	Breast	29.7
2	Cervix	23.2
3	Ovary	3.6
4	Liver	2.3
5	Connective and soft tissue	2.2
6	Burkitt's lymphoma	2.1
7	Malignant neoplasm of Lymphoid tissue	2.1
8	Malignant neoplasm of skin	2.0
9	Malignant Neoplasm of Uterus	2.0

The relevance of cancer registries in Africa

Most of the available data on cancer incidence in sub-Saharan Africa has come from hospital based studies and the few cancer registries within the region. Most of these cancer registries are hospital based resulting in gross under-reporting of the incidence of various malignant diseases within the region. The recognized way to address problems of cancer in any population is the establishment of population-based cancer registries charged with the responsibility of accurate and detailed documentation of all cases of cancer within a specified population. The earlier cancer registries started in Europe and North America. Since then, efforts have been made to encourage the establishment of cancer registries in other parts of the world. The cancer registry is an essential part of any rational programme of cancer control (18). Its data can be used in a wide variety of areas of cancer control ranging from aetiological research, through primary and secondary prevention to health care planning and patient care, so benefiting both the individual and society. Although most cancer registries are not obliged to do more than provide the basis for such uses of data, cancer registries possess the potential for developing and supporting important research programmes using information which they collect.

The main objective of cancer registry is to collect and classify information on all cancer cases in order to produce statistics on the occurrence of cancer in a defined population and to provide a framework for assessing and controlling the impact of cancer on the community. The collection of information on cancer cases and the production of cancer statistics are only justified, however, if use is made of the data collected. Cancer registry information may be used in a multitude of areas, and the value of the data increases if comparability over time is maintained. Cancer epidemiologists use their knowledge of the distribution of cancer in human populations to search for determinants of disease. Evidently, the cancer registry provides a crucial basis for epidemiology since it holds information on the distribution of cancer, including non-fatal cases. However, in addition to the production of incidence figures, the collection of records of cancer patients from a defined population facilitates the in-depth study of cancer in individuals, while minimizing the selection bias found in clinical series. Basic descriptive statistics should be produced and presented for diagnostic entities mainly according to topography of the tumor. Comparison of cancer occurrence in various populations may provide clues to aetiology, and the demonstration of variation in incidence (and mortality) has made an important contribution to the recognition of environmental origin of many cancers, thus pointing to the possibilities for prevention (19,20).

The contribution of cancer registries to our knowledge of international variation in cancer incidence is an important but often overlooked purpose of registering cancer cases. The stimulation of aetilogical ideas from such geographical comparisons of cancer incidence can be enhanced by correlation with statistics on potential risk factors (21). The international pattern of cancer can also point to regions of the world where a research effort may be particularly rewarding. Monitoring of cancer trends is equally important for the evaluation of primary and secondary preventive measures as well as planning purposes in the health care system. The effects of primary prevention (reduced exposure to risk factors, such as tobacco smoking) are best interpreted by observing trends in incidence while the best measure for estimating the effects of secondary prevention (e.g., breast cancer screening) is mortality statistics.

Associations of a statistical nature from descriptive studies rarely imply causality, and hypotheses emerging from such observations must be subjected to in-depth studies in humans, and may be supplemented by studies in animals. Cancer registries form a valuable base for such analytical studies owing to the

availability of information on identified individuals. The ability to link cancer registry records with other data files is essential for the registry's role in analytical studies. This of course requires uniform identifying information in both the registry and the external data source. Cancer registry information has served as an end point in numerous cohort studies to evaluate risks associated with occupational exposures, drug taking, smoking, diet etc. The case-control study, where exposures are compared between cancer patients and disease-free controls, has become a widely used method for the investigation of risk factors. By nesting case-control studies within a cohort of women with cervical cancer and using patient information in cancer registries to gain access to medical records, it has been possible to determine radiation dose-response relationships for leukaemia (22) and for a large number of solid tumors (23).

In addition to use of cancer registry data for epidemiological and analytic studies, information from cancer registries form the basis for the formulation of policies on cancer control and prevention. This may be used for the planning and establishment of cancer treatment and care facilities directed towards various types of cancer. Geographical differences in cancer occurrence may be taken into account and so may time trends in the incidence of cancer. Knowledge of trends may then be used for the projection of incidence rates, caseloads and needs for treatment facilities (24).

The cancer registry plays a very important role in monitoring cancer survival in the population. Most cancer registries follow up each patient for death, and collect information on date and cause of death. Examination of asymtomatic persons to detect cancer at an early age is becoming increasingly important in the control of certain malignant diseases. Registries have played a crucial role in demonstrating the effect which cervical cancer screening programmes have in lowering incidence of cervical cancer by comparing trends in cervical cancer between areas where screening has been practiced with different intensity as has been done in Finland and Norway (2). While the effects of cervical cancer screening can be monitored by invasive cancer incidence trends, the effects of early detection and treatment of cancerous lesions in other organs may be evaluated by monitoring trends in mortality as in breast cancer screnning. In the early phases of such programmes, cancer registries may serve to monitor changes in stage distribution.

The cancer registry also plays important roles in other aspects of the health care delivery system in human populations. In addition to registering cases and using its data, the registry becomes an important source for hospital departments and research institutions to which cancer registry may provide lists of cancer patients for ad hoc statistics.

Conclusion

This review has attempted to examine the state of cancer statistics in the developing countries of sub-Saharan Africa. There is a general consensus that there is gross underestimation of the incidence of malignant diseases in this region due to the absence of population-based cancer registries in most countries and lack of reliable census figures and incomplete reporting of births and deaths. However, data emerging from the few registries within the region indicate similarity in the pattern of cancers reported from various countries with slight local variations. With the anticipated increase in the proportion of the aged in the populations in most developing countries in the next decades, it is plausible to speculate that the burden of cancer will increase in this millennium. It is recommended that population-based cancer registries be established in various countries to generate relevant cancer statistics necessary for the formulation of appropriate health policies for effective cancer care and prevention in sub-Saharan Africa.

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