

*Full Length Research Paper*

# Distribution of cancers in Zambia: Evidence from the Zambia National Cancer Registry (1990–2009)

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**The Zambia National Cancer Registry (ZNCR) data of 1990 to 2009 was analyzed with the aim of determining the distribution of cancers in Zambia in the 1990/2000 decades. A total number of 12891 cases of cancers were notified to ZNCR of which 4586 (36.6%) were for males. Most cases of cancers that were notified were for patients in the 25 years or older age group (21.9% among males in the 64 years or older age group, and 25.6% among females in the 35 to 44 years age group). Most reported cancers in females were cervical cancer (48.5%) and breast cancer (11.4%). The predominant cancers in males were Kaposi's sarcoma (22.2%) and prostate cancer (16.2%). Prevention, treatment and control interventions should be focused on cervical and breast cancers, in females and prostate cancer and Kaposi's sarcoma in males.**

**Key words:** Cancers, cervical cancer, breast cancer, Kaposi's sarcoma, prostate cancer, National Cancer registry, Zambia

## INTRODUCTION

Cancers are one of the leading causes of death worldwide (Sener and Grey, 2005; Ferlay et al., 2010; Thun et al., 2010). Despite some remarkable advances in early cancer detection, treatment and prevention, the incidence and mortality rates of all cancers have increased worldwide (Kachroo and Etzel, 2009). Cancers accounted for 13% of all deaths in 2008 (Ferlay et al., 2010).

The incidence of all cancers is increasing in developing countries (Vorobiof and Abratt, 2007; Narayan et al., 2010). Developing countries accounted for approximately 51% of all cancers worldwide in 1975, and this proportion has since increased to 55% in 2007, and it is now projected that by 2050, developing countries will account for 61% of all cancers (Bray and Møller, 2006). The increasing incidence of all cancers in developing countries is largely

due to changes in the risk factors and the lifestyle trends that are associated with economic development (Pisani et al., 1997; Ngoma, 2006; Reeler and Mellstedt, 2006; Fontham, 2009). The risk factors and lifestyle modifications, which include poor diets, decreased activity, increased crowded living conditions and increased tobacco use have accounted for the increase in cancer incidence (Ngoma, 2006).

The cancers attributable to infection are almost three times higher (26%) in developing countries than the developed countries (8%) (Parkin, 2006) and the oncogenic infections that have been linked to the cancers are Human Papilloma Virus (HPV) (IARC Working Group, 1997), Hepatitis B Virus (HBV) (Kirk et al., 2004), *Helicobacter pylori* (*H. pylori*) (Blankfield, 2002), Human Herpes Virus (HHV8) (Chang et al., 1994), and Epstein Barr Virus (EBV) (Knowles, 2003). The Human Immuno-Deficiency Virus predisposes people especially those of the Sub-Saharan countries to AIDS-related malignancies

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Figure 1. Map of Zambia showing the locations of the provinces.

such as cervical cancer, Kaposi sarcoma and lymphomas (Parkin, 2006; Sasco et al., 2010; Brower, 2011).

The current HIV prevalence rates among males and females aged 15 to 49 years in Zambia are 12.3 and 16.1%, respectively (Central Statistical Office et al., 2009). The high rate of HIV infection has resulted in an increase in AIDS-defined malignancies. Cervical cancer (Parham et al., 2006; Sahasrabuddhe et al., 2007), Kaposi sarcoma and other adult malignancies (Patil et al., 1995; He et al., 1998; Bowa et al., 2009) and in children malignancies (Chintu et al., 1995) have increased in the last decade. It is interesting to note that all these studies ascertained the increase in the cancers by review of the histo-pathological records over a period of time from the University Teaching Hospital (UTH) laboratory or hospital/clinic based research. The limitation to these studies is that they analyzed referral cases at the UTH in Lusaka only. Despite the UTH being the main hospital in the capital city that examines most of the pathological specimen, it cannot be nationally representative as not all cases of cancers are diagnosed from UTH and not all cancers are seen in Lusaka. This study uses the national cancer registry data that is collected from most hospitals in the country, including UTH. There is no published study that has used the Zambia National Cancer Registry data. Therefore, the objective of the study was to determine the distribution of cancers by sex in Zambia in the 1990/2000 decades.

## MATERIALS AND METHODS

### Data source

The Zambia National Cancer Registry was established in 1982. It is currently located in the Paediatric Centre of Excellence (previously located in the Department of Community Medicine) on the UTH grounds in Lusaka. UTH provides specialized care for the entire country, as it is the referral hospital for all the provincial hospitals. Zambia has 9 provinces (Figure 1), and each province has a central/general hospital that is a second-level specialized hospital (CBoH, 2002). Most cases of cancers are detected in these hospitals and are referred to the UTH for specialized treatment. Until 2005, most cancers requiring further specialized treatment were treated in either Zimbabwe or South Africa. Since then, after the Cancer Disease Hospital (CDH) was built on the UTH grounds, most cases of cancer requiring specialized treatment are treated in Lusaka. Hence, UTH and CDH are primary sources of cancer notifications, and the other two being Ndola and Kitwe Central Hospitals.

Every district hospital is provided with cancer notification forms to notify the cancer registry of any case of cancer. These forms are sent to the cancer registry on a monthly basis. Due to logistical challenges such as postal services faced by hospitals in notifying the registry, members of staff in the registry occasionally travel to some provinces to collect the completed forms. Other hospitals are not visited due to unavailability of transport. Hence, the registration of cancers in Zambia is primarily passive. Parkin (2012) reported that 96% of the cases registered in Zambia had a histology report suggesting that cases without a biopsy were not reported.

The information collected included name, date of birth, age, sex, marital status, residence, ethnicity, tribe, referral hospital, diagnosis, basis of diagnosis, tumour site and histology, stage of the disease

Excel files. Since 2006, data have been entered using CANREG 4.

### Measurement and statistical considerations

Data analysis was conducted using Statistical Analysis Software (SAS for Windows version 9.2). It included cancers detected between January 1990 and December 2009, except for years 2003 and 2006 when data were not available. Observations that had more than 3 missing variables were deleted. Although diagnosis was classified using the International Disease Classification 10, the anatomical site of the cancer was used. Cancers of the lips, tongue, mouth, salivary glands, tonsils, oropharynx, nasopharynx, hypopharynx, pharynx-unspecific and larynx were summed and coded as head and neck cancers. Cancers of the small intestine, large intestine, colon, and rectum were coded as colon and rectal cancers. Melanoma of the skin, basal cell carcinoma, and other skin cancers were coded as cancers of the skin. Age was coded as <15, 15 to 24, 25 to 34, 35 to 44, 45 to 54, 55 to 64 and 64+ years. Frequencies produced were stratified by sex.

## RESULTS

Over the period of 1990 to 2009, a total number of 12,891 cases of cancer, consisting 4586 (36.6%) cases of males were notified to the cancer registry in Zambia. Age was not recorded in 270 (5.9%) of the total notifications among males, and in 505 (6.1%) of all cancer notifications among females. Most cases of cancer that were notified for males were in the 64 years or older age group (21.9%). Meanwhile, most reported cases of cancer for females were in the 35 to 44 years age group (25.6%). Apart from Lusaka province, which reported most cases (70.0% of males and 70.9% of females), Eastern (11.5% of males and 9.8% of females) and Southern (6.9% of males and 9.0% of females) provinces reported the second and third highest proportions of cases of cancers. These results are shown in Table 1.

Table 2 shows the distributions of cancers stratified by sex. The predominant (as percent of all notified cancers) were Kaposi's sarcoma (22.2%), followed by prostate cancer (16.2%), eye malignancies (9.0%), and head and neck cancer (8.0%) among males. Among females, the most notified cancers were cervical cancer (48.5%), followed by breast cancer (11.4%), Kaposi's sarcoma (7.5%), and eye malignancies (6.3%).

## DISCUSSION

Cancer registries in most countries in the Sub-Saharan Africa have been constrained in collecting all the cases of cancers in a country, and accurately estimating incidence rates due to lack of resources. Most of the public health resources have been directed towards communicable diseases, including antiretroviral therapy and acquired immunodeficiency syndrome-related services. The pathological and diagnostic services that are vital for the accurate diagnosis of cancers have been inadequately funded. Despite these challenges, some of the cancer

**Table 1.** The characteristics of the 12891 cancer notifications-Cancer Registry (1990-2009), Zambia.

Factor	Male (total = 4586)		Female (total = 8305)	
	n	%	n	%
<b>Age</b>				
0-14	340	7.9	251	3.2
15-24	332	7.7	633	8.1
25-34	654	15.2	1658	21.3
35-44	778	18.0	1999	25.6
45-54	599	13.9	1496	19.2
55-64	669	15.5	987	12.7
64+	944	21.9	776	9.9
<b>Province</b>				
Eastern	528	11.5	812	9.8
N/western	85	1.9	108	1.3
Central	125	2.7	260	3.1
Copper belt	107	2.3	158	1.9
Luapula	63	1.4	78	0.9
Lusaka	3212	70.0	5890	70.9
Northern	66	1.4	116	1.4
Southern	315	6.9	751	9.0
Western	85	1.9	132	1.6

registries in Sub-Saharan African countries have made substantial progress in reporting cancers. The best examples are countries such as Zimbabwe, Uganda, Kenya and Tanzania. Since the inception of the cancer registry in 1982, Zambia has made steady improvement in its cancer registry, moving from storing cancer data manually to storing it electronically using CANREG 4. However, it is important that the Zambia Registry start using CANREG 5. The establishment of the CDH within reach of the cancer registry office has enabled early collection of notification forms. The CDH now has new diagnostic equipment which has improved the accuracy of diagnosing cancers cases. However, there is still much that needs to be done to improve the existing pathological and diagnostic services in the country.

Cervical cancer was the most common cancer in women in Zambia. Studies conducted at the UTH revealed that cervical cancer was the most common cancer among women (Bowa et al., 2009). This is in agreement with the data of most cancer registries in the same region in Africa, which reported cervical cancer to be among the most prevalent cancers in women, especially with the onset of HIV/AIDS (Chokunonga et al., 1999; Banda et al., 2001).

Breast cancer was the second most common cancer in women in Zambia although previous studies indicated that breast cancer was the third most common cancer in women (Bowa et al., 2009). The incidence and mortality of breast cancer have decreased in developed countries due to the early detection of the cancer through screening

**Table 2.** Proportions of cancers out of total notifications stratified by sex (1990-2009), Zambia.

Site (CD10)	Males (total = 4801)		Female (total = 7501)	
	n	%	n	%
Head and neck	324	8.0	209	2.8
Oesophagus	167	4.1	115	1.5
Stomach	143	3.5	112	1.5
Colon rectum	179	4.4	115	1.5
Anal	17	0.4	24	0.3
Liver	163	4.0	80	1.1
Pancreas	43	1.1	18	0.2
Bronchus, lung	63	1.6	15	0.2
Bone	57	1.4	42	0.6
Connective tissue	114	2.8	170	2.3
Kaposi's sarcoma	900	22.2	566	7.5
Skin	223	5.5	208	2.8
Breast	39	1.0	855	11.4
Uterus	-	-	205	2.7
Cervix uteri	-	-	3636	48.5
Placenta	-	-	15	0.2
Ovary	-	-	150	2.0
Vulva	-	-	35	0.5
Vaginal	-	-	38	0.5
Bladder	195	4.8	119	1.6
Kidney, renal	34	0.8	43	0.6
Prostate	656	16.2	-	-
Penis	53	1.3	-	-
Testis	18	0.4	-	-
Eye	363	9.0	473	6.3
Brain, nervous system	18	0.4	12	0.2
Thyroid	22	0.5	49	0.7
Burkitt's lymphoma	61	1.5	39	0.5
Hodgkin's lymphoma	30	0.7	25	0.3
Non-Hodgkin's lymphoma	135	3.3	113	1.5
Multiple myeloma	6	0.1	5	0.1
Leukaemia	25	0.6	15	0.2

programs.

The incidence of breast cancer in Sub-Saharan Africa including Zambia has been high due to the lack of screening programs. Women should receive mammograms annually beginning at the age of 35, but many women are unable to comply with these guidelines because of challenges regarding accessibility to these facilities, especially among underprivileged women in rural areas who are unable to afford the cost of mammograms. There have been efforts to promote the importance of screening programs, but the extent to which these efforts influence communities, especially rural areas, is not yet established. There is a need to strengthen the cervical cancer screening programs and scale it-up to other parts of the country.

The incidence of Kaposi's sarcoma is higher in Sub-Saharan Africa than in developed countries. The endemic African form of Kaposi's sarcoma was reported in the 1960s (Cook-Mozaffari et al., 1998), but with the emergence of HIV/AIDS, an atypical aggressive type has been reported in most African countries (Wabinga et al., 1993; Bassett et al., 1995). The incidence of Kaposi's sarcoma has increased concomitantly with the increased prevalence of HIV, as demonstrated in Zambia (Chintu et al., 1995; Patil et al., 1995; He et al., 1998). Consequently, Kaposi's sarcoma was the most prevalent cancer in men in the current study; this is in agreement with studies in the same region (Bassett et al., 1995; Parkin et al., 1999; Wabinga et al., 2000) and in particular in Zambia (Bowa et al., 2009). However, Kaposi's sarcoma

has been reported to be the second most common cancer in women after cervical cancer (Bassett et al., 1995; Parkin et al., 1999; Wabinga et al., 2000) in Sub-Saharan Africa. Although Bowa et al. (2009) identified Kaposi's sarcoma as the fourth most common cancer in women this contradicts the data from the cancer registry, which indicated that Kaposi's sarcoma is the third most prevalent cancer in women.

Prostate cancer was the second most common cancer in men in our study, in contrast to Bowa et al. (2009) who reported it to be the fourth most common cancer in men, partly due to different sources of data. Factors that contribute to the development of prostate cancer in Zambia have not yet been established. In other countries, prostate cancer screening using PSA testing has reduced the incidence and mortality of this cancer. In Zambia, the incidence of prostate cancer was reported to have increased by 55% in the last 20 years, and this increase was attributed to better health education and improved urological services such as PSA testing and prostatic biopsy (Bowa et al., 2008). Despite these findings, there is a need to further promote the importance of prostate cancer screening.

## LIMITATIONS

Although our sample size was the largest among studies of cancer conducted in Zambia, our results might be biased towards the distribution of cancers in Lusaka province from where 7 in 10 of the cancers were reported from. Missing and incomplete data were excluded from the analysis, and our results may be biased to the extent that these cases with missing information differed from the cases with full information. The 2003 and 2006 data were missing at the time of analysis, and this might have affected the distribution of cancers. However, we have no reason to believe that the distributions of cancers in these years could have been any different from the other years. Data on the size of the population-at-risk were not collected, and we were not able to estimate the incidence rates, let alone for Lusaka province. Parkin (2012) reported that 96% of the cases registered in Zambia had a histology report suggesting that cases without a biopsy were not reported; and our findings may be biased against those cancers that were diagnosed without a biopsy.

## Conclusions

There is great potential for the Zambia national cancer registry to accurately report the incidences of cancers. Despite the challenges of the cancer registry and the inadequate pathological services, the percentages of cancers reported in the current study are similar to the findings of previous studies in Zambia and other results reported in the region. The predominant cancers in

Zambia among males are Kaposi's sarcoma and prostate cancer; while in females they are cervical and breast cancers.

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