



In addition to the records unit, the department of Pathology also keeps archives of histology and cytology reports, slides and paraffin blocks of patients' biopsies not only from MUST University hospital but also other hospitals in south western Uganda. On these histology and cytology reports are found demographic data of the patient and information indicating the hospital where a biopsy was performed, clinical summary, nature of specimen and diagnosis. These reports are stored serially on a yearly basis. Autopsy reports containing similar information as those of histology reports are also obtainable from the department of Pathology.

Records of cases diagnosed as having cancer and residing in a region currently comprising of Mbarara and Ntungamo districts (former Mbarara district) for the years 1995 - 1999 were retrieved from MUST University hospital records and department of Pathology for analysis.

*Population at risk:* The population at risk was calculated from the 1991 population census allowing for an annual natural growth increase of 75% as provided by statistics Department of the Ministry of Finance and Economic Planning. This population which is mainly made up of Nkole ethnic group (70%) is 95% rural and 47% is below 15 years.

**RESULTS**

For the five year period (1995 - 1999) considered, a total of 585 (245 males and 340 females) cancer cases was diagnosed in the risk population 1,066,300 (526,900 males and 539,400 females) giving a crude rate of 11/100,000 (9.3 and 12.6 for males and females respectively).

Tables 1 and 2 list five common cancers diagnosed at MUST University hospital among males and females respectively and their percentage to the total number of cases and site specific crude rates. The most frequent

**Table 1**

*Frequency of major cancers among males: Mbarara district*

Site	No. of cases	%	Crude rate	Standard error
KS	40	16	1.7	0.0001
Stomach	30	12	1.3	0.0001
Non Hodgkin	30	12	1.3	0.0001
Prostate	27	11	1.2	0.0001
Penis	21	9	0.9	0.0001
Others	99	38	4.1	0.0001
Total	247	100	10.5	0.0006

**Table 2**

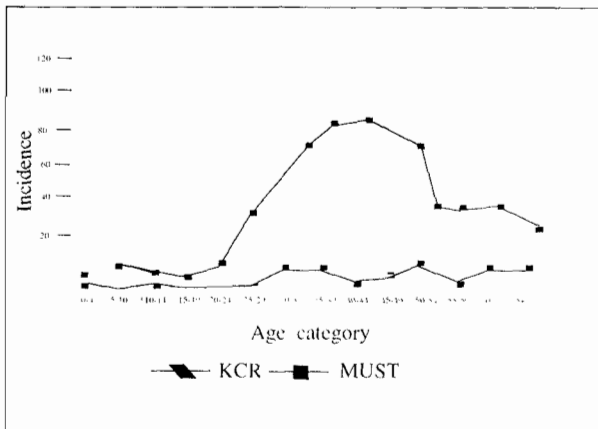
*Frequency of major cancers among females: Mbarara district*

Site	No. of cases	%	Crude rate	Standard error
Cervix	140	41	5.1	0.02
Breast	45	13	1.7	0.01
NHL	25	7	0.9	0.001
Stomach	20	6	0.7	0.001
KS	16	5	0.6	0.001
Others	94	28	1.0	0.001
Total	340	100	11.5	0.033

cancer in males was KS while in females KS was the fifth commonest. Figures 2 and 3 show the age specific incidence rates for KS in males and females respectively and in comparison with those of Kyadondo county. Apart from the lower rates in the latter, the pattern appears to be similar suggesting that probably same aetiological factors are involved.

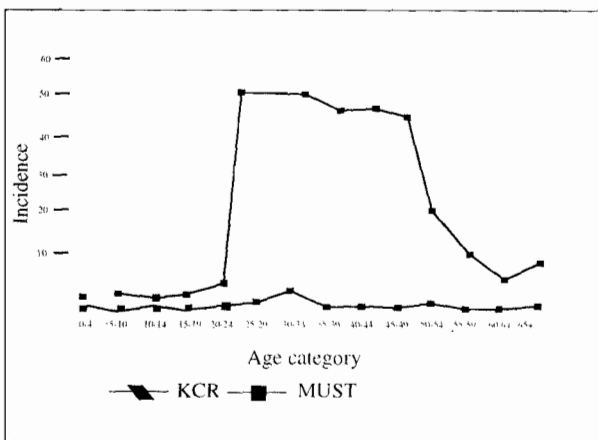
**Figure 2**

*Age specific incidence rate of Kaposi Sarcoma in KCR and MUST males*



**Figure 3**

*Age specific incidence rate of Kaposi Sarcoma in KCR and MUST females*



Stomach cancer was second commonest cancer in males accounting for 12% of all malignant tumours while in female stomach cancer accounted for six per cent. The probable reason is that Mbarara is part of the so called "high stomach cancer region" which extends from Kivu in the eastern part of Democratic Republic of Congo (former Zaire) to northern Tanzania and includes Rwanda and Burundi. Non Hodgkin lymphoma was another tumour found common among males and females. It was difficult to classify NHL in this population as most of the cases were reported on only cytology and very few had histological diagnosis. However, thirty two of the 55 cases

of NHL had their age known and 66% of these were below fifteen years of age suggesting that most of these were probably Burkitt's lymphoma.

Prostate cancer was among five commonest tumours occurring mainly in old persons and also being a frequent tumour in the sub-Saharan region suggests that perhaps the data being analysed reflects the true burden of cancer in this community. Another tumour found very frequent among males of Mbarara was cancer of the penis. In Kyadondo county, cancer of the penis is becoming less common probably due to the fact that the population of Kyadondo is more urbanised with general improvement of personal hygiene a major factor in prevention of cancer of the penis.

In females just like in other developing countries, cancer of the cervix emerges as the most frequent cancer in Mbarara. Cervical cancer is associated with early sexual activity and multiple partners which are more likely factors to be found in low socio-economic class and these factors could be operating in Mbarara. Breast cancer was the second commonest female cancer in Mbarara and being a superficial tumour, it is possible that patients tend to readily seek health services. An outstanding cancer which appeared to be rare in Mbarara but quite common in Kyadondo county is the oesophageal cancer. It accounted for three per cent among males and females in this study while in Kyadondo county oesophageal cancer appear to be on the increase.

## DISCUSSION

The author feels that the number of cancer cases diagnosed at MUST University hospital is quite low despite the assumption of increased medical facilities in the region. This is most likely due to underdiagnosis as a result of patients failing to attend these health units. As shown in Figure 1, the health facilities of this region are still sparse as compared to those of Kyadondo county, and this must greatly affect attendance by very ill patients to these facilities. Another possible explanation of low number of cases in this study is the introduction of user fee in the hospitals. Currently the stringent conditions attached to the donor-sponsored Economic Structural Adjustment Programmes underway in some African countries have resulted in the introduction of user fee charges in government hospitals. At the MUST university hospital for instance, a patient pays an equivalent of three US dollars as user fee for only a biopsy examination and with Uganda GDP per capita of US dollars 1700 certainly many people will not afford most sophisticated investigations like biopsy examination. The low biopsy rate would also affect the quality of data which must be taken into consideration while interpreting this data. Another factor to be considered concerning the quality of data in this study is incompleteness of the demographic data. The major demographic data which could not be regularly ascertained in Mbarara district was age. In most cases age was not recorded and therefore age specific incidence

rates could not be calculated in all cases and where attempts have been made this factor should be considered. Inconsistence of demographic data is typical of an area without a cancer registry and would be minimised if trained personnel are recruited to specifically search for this information.

However, none of the above mentioned basis could explain the impressive percentage of some cancers occurring in Mbarara district. The most frequent cancer among males was KS and this is perhaps not surprising considering that Uganda is one of the most severely affected countries with HIV infection. The seropositivity for HIV in Uganda is reported to be seven to twelve per cent in the rural population and the recorded incidence of AIDS was 45.8 per 100,000 per year in 1990(6,7). KS is now designated as AIDS associated tumour with a significantly increased risk among HIV seropositive individuals(6). It is therefore possible that the observed high frequency of KS is partly due to AIDS and in support of this is the similar peak age specific incidence rate of 35-40 for males and 30-35 for females as that reported of AIDS patients with KS in Kampala(8). The sex ratio of 2.5:1 is another supporting evidence for the role of AIDS in the increase of KS in Mbarara district. The AIDS associated KS affects both sexes almost equally unlike the endemic type which predominantly is a disease of elderly males with a male to female ratio of up to 10:1(9). However the extremely low age specific rate of KS in Mbarara compared to that reported by Parkin *et al*(10) in Kyadondo county is most likely due to underdiagnosis in Mbarara although it may also be possible that patients with AIDS in the rural setting do not live long enough to develop KS. It was found by Berley *et al*(11) that KS patients with AIDS were much older than incident cases of AIDS. A recent study by Ziegler *et al*(8) on the risk factors for KS in HIV positive subjects in Uganda showed a statistically significant high risk of developing KS for affluent AIDS patients as opposed to rural peasants and it is possible that this could also partly explain the low rates in Mbarara district which is 90% rural. It is interesting to note that unlike in Kyadondo county where the age specific incidence rate falls with advancing age after a peak, in Mbarara male population with KS there are several peaks of age specific incidence rates up to old age while in females the age specific incidence rates decrease after a peak corresponding to the AIDS infection (Figures 1 and 2). This pattern is similar to that reported by Wabinga *et al*(12) and clearly suggests that there is a substantial number of endemic KS cases in Mbarara district. Endemic type of KS occurs more in the elderly and has been found to be more frequent in the western part of Uganda with the incidence decreasing eastward and this would probably explain the trend observed in this study(13). There is no known explanation to the variation of prevalence of endemic KS in various parts of Uganda although it appears the prevalence of Human Herpes Virus 8(HHV-8), the virus believed to be the cause of KS, is quite prevalent in Uganda population(14,15). The absence of childhood KS

in this communication is probably due to under-reporting but is also possible that like in adults, children in rural setting could be dying quite early and therefore not allowing for development of KS. Reports from Kampala Cancer Registry indicate an enormous increase in the incidence of childhood KS and HHV-8 infection has also been reported common in Ugandan children(16,17).

The most striking observation in this study was the high frequency of stomach cancer which accounted for 12% of all cancers in males and six per cent in females. It is unfortunate that age specific incidence rates could not be calculated due to lack of information on age in most patients but the crude rates were three times higher than those reported in males by Wabinga *et al*(18) in Kyadondo county indicating that stomach cancer is probably the commonest cancer in males of Mbarara district. In females the crude rate of 0.7/100,000 for cancer of stomach was slightly higher than that reported in Kyadondo county of 0.5/100,000(18). Earlier attempts to determine the pattern of gastric cancer in Ugandan ethnic groups have constantly shown higher frequency rates among the people of western Uganda. Hutt and colleagues(19) had reported an incidence of stomach cancer among the Nkole about three times that of the Ganda in Kyadondo county while Bijlsma (20) also found high prevalence of stomach cancer for tribes of south western Uganda when a survey of 370 centrally registered cases for a ten year period was analysed. The high prevalence of stomach cancer in this ethnic group has never been investigated but this trend continues to Kivu province of the Democratic Republic of Congo, Rwanda, Burundi and northern Tanzania(21,22). Apparently this so called "high stomach cancer region" is inhibited by a similar ethnic group and it is tempting to suggest a genetically determined predisposing factor. Earlier researchers had however associated the high prevalence of stomach cancer in this region to lack of trace elements in volcanic soil which is characteristic of the region. Other volcanic regions such as around Mountain Elgon, Mountain Kenya and Mountain Kilimanjaro have also been found to have increased prevalence of this cancer(23-25). However, recently Bayo(26) found Bamako in Mali, a non volcanic area, with one of the highest incidence of stomach cancer in the world and Capetown in South Africa another non volcanic area also reports a high prevalence of this cancer(26,27). Currently researchers throughout the world are focussing on the role of *Helicobacter pylori* (*H. pylori*), a Gram negative spiral bacterium which causes gastritis, in the pathogenesis of gastric cancer. Many epidemiological studies have shown significant positive association of *H. pylori* infection and gastric cancer with odd ratio varying from 0.5 to 4 in case control studies (28). However, in Africa the role of *H. pylori* in the aetiology of gastric carcinoma is unclear with the prevalence of *H. pylori* infection being found high in some population of Africa which have low incidence of gastric cancer(29). The author is under taking a comparative study on the pathology of *H. pylori* in the Nkole and Ganda ethnic groups and preliminary results so far show that gastric

atrophy, a premalignant lesion, is more frequent in the Ankole than Ganda whereas the rates of infection is similar suggesting that probably *H. pylori* causes more atrophy in Nkole than Ganda ethnic group.

Cancer of the cervix and breast were the commonest cancers among the females in Mbarara. Oncogenic human papillomavirus (HPV) has been established as a possible cause of cancer of the cervix and has been found to be present in 53% of cancer of cervix cases in Uganda(30). It is possible that this high prevalence of HPV is responsible for the observed high prevalence of cancer of cervix in Uganda. Certainly no screening programmes exist in Mbarara just like in the entire country and perhaps this contributes to the high prevalence of this cancer. In countries where screening programmes are established, the incidence of cancer of the cervix is very low. Despite the high frequency of breast cancer in Mbarara region, the low crude incidence rate strongly suggest that the tumour is not all that common compared to the western world.

Prostate cancer was also observed high in the male population of Mbarara and this is not peculiar as currently it is reported to be on the increase in almost all sub-Saharan countries. The probable cause of increased incidence is thought to be the elderly population with increased awareness compounded with introduction of western lifestyle although hereditary factors can not be ruled out.

Cancer of the penis was also quite frequent among the population of Mbarara district whereas the trends in Kyadondo county show a decline of this tumour(12). Schmauz(32) had earlier shown that penile cancer in Uganda varied in frequency in different tribes being highest in Nyoro and lowest among the Gishu. This variation was associated with hygienic cultural practices particularly circumcision which is practised among the Gishu, Konjo and Sabiny. Similar reports emanating from other African countries also related uncircumcision to penile cancer. Mbarara which is inhabited by Nkole group do not culturally practise circumcision and being 95% rural probably indicate a rather lack of information on genital hygiene. It is worth noting that penile cancer is generally a slow growing cancer which is easily diagnosed and probably the high frequency in this region.

Another major striking observation in this study was the markedly low frequency of cancer of the oesophagus in Mbarara. There is concern in Kyadondo county over the increasing incidence of cancer of oesophagus which is currently the third commonest cancer among males and also quite frequent in females(12). Cancer of oesophagus has been associated with diet/alcohol in its aetiology and Kisumu with the high prevalence of this cancer, extensive use of maize has been associated with its aetiology. It is believed that aflatoxin which is elaborated by fungi which infest maize during storage may be responsible for the high prevalence of cancer of oesophagus in Kisumu. Maize appear not to be a major staple food for people of Mbarara who depend mainly on steamed banana and millet. However, low income earners of Kampala seem to be increasingly more dependant on maize as a staple food

and also ingest locally brewed alcohol made of maize. Other cancers observed in western world such as lung cancer and cancer of the colon appear to be rare in Mbarara just like in most of sub-Saharan Africa.

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