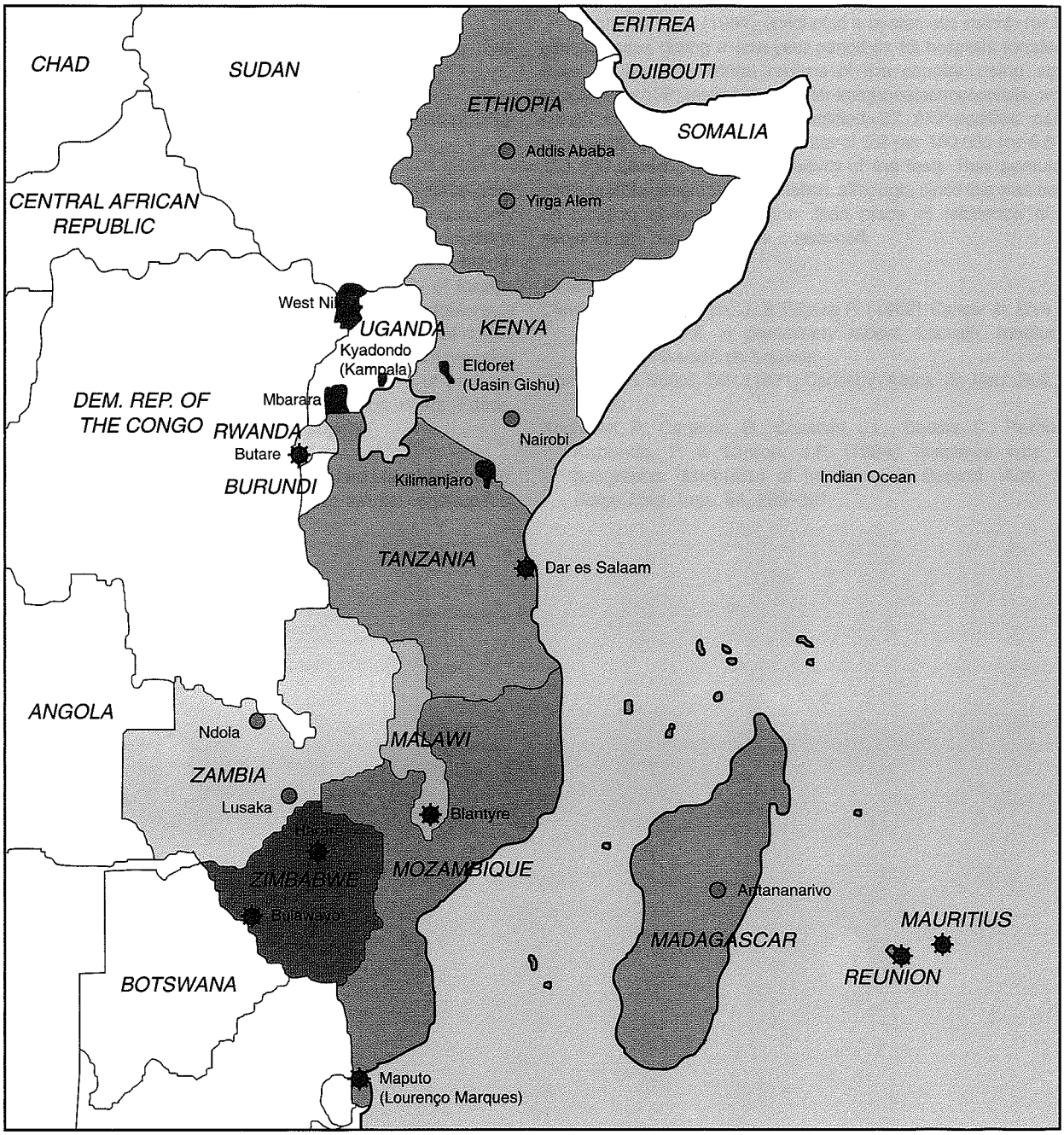
3.4 East Africa



3.4.1 Burundi

Background

Climate: Equatorial; high plateau with considerable altitude variation (772 m to 2760 m); average annual temperature varies with altitude from 23 to 17 degrees centigrade, but is generally moderate as the average altitude is about 1700 m; average annual rainfall is about 150 cm; wet seasons from February to May and September to November, and dry seasons from June to August and December to January

Terrain: Hilly and mountainous, dropping to a plateau in east, some plains

Ethnic groups: Hutu (Bantu) 85%, Tutsi (Hamitic) 14%, Twa (Pygmy) 1%, Europeans 3000, South Asians 2000

Religions: Christian 67% (Roman Catholic 62%, Protestant 5%), indigenous beliefs 32%, Muslim 1%

Economy—overview: Burundi is a landlocked, resource-poor country in an early stage of economic development. The economy is predominantly agricultural, with roughly 90% of the population dependent on subsistence agriculture. Its economic health depends on the coffee crop, which accounts for 80% of foreign exchange earnings. The ability to pay for imports therefore rests largely on the vagaries of the climate and the international coffee market. Since October 1993, the nation has suffered from massive ethnic-based violence that has resulted in the death of perhaps 100 000 persons and the displacement of a million others. Foods, medicines and electricity remain in short supply.

Industries: Light consumer goods such as blankets, shoes, soap; assembly of imported components; public works construction; food processing

Agriculture—products: Coffee, cotton, tea, corn, sorghum, sweet potatoes, bananas, cassava (tapioca); meat, milk, hides

Cancer registration

There has been no systematic cancer registration in Burundi.

Review of data

Early reports of cancer include an analysis of 900 cases seen in seven hospitals in the region during 1956–60 (Clemmesen *et al.*, 1962) and a summary of 120 cases from four hospitals in Rwanda-Burundi in 1968–69 (Cook & Burkitt, 1971).

Kocheleff *et al.* (1984) conducted a systematic search for liver cancer cases during a one-year period in 19 hospitals located in three of the four natural regions of the country. Using alpha-fetoprotein (AFP) testing by counter-immunoelectrophoresis, with a cut-off of 200 ng/ml, they identified 87 AFP-positive cases, equivalent to a crude incidence rate of 5.2 per 100 000 (or 8.8 per 100 000 allowing for 60% sensitivity of the test). They postulated considerable geographical variation, although, since this was based on location of hospital, rather than place of residence of the subjects, the results may be questioned.

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3.4.2 Comoros

Background

Climate: Tropical marine; rainy season (November to May)

Terrain: Volcanic islands, interiors vary from steep mountains to low hills

Ethnic groups: Antalote, Cafre, Makoa, Amalsala, Sakalawa

Religions: Sunni Muslims 86%, Roman Catholic 14%

Economy—overview: Comoros is made up of three islands that have inadequate transportation links, a young and rapidly increasing population, and few natural resources. The low educational level of the labour force contributes to a subsistence level of economic activity, high unemployment and heavy dependence on foreign grants and technical assistance. Agriculture, including fishing, hunting and forestry, is the leading sector of the economy. It contributes 40% to GDP, employs 80% of the labour force, and provides most of the exports. The country is not self-sufficient in food production; rice, the main staple, accounts for the bulk of imports. The government is struggling to upgrade education and technical training, to privatize commercial and industrial enterprises, to improve health services, to diversify exports, to promote tourism, and to reduce the high population growth rate.

Industries: Tourism, perfume distillation, textiles, furniture, jewellery, construction materials, soft drinks

Agriculture—products: Vanilla, cloves, perfume essences, copra, coconuts, bananas, cassava (tapioca)

Cancer registration

There is no reported cancer registration in the whole of Comoros.

3.4.3 Djibouti

Background

Climate: Desert, torrid dry.

Terrain: Coastal plain and plateau separated by central mountains.

Ethnic groups: Somali 60%, Afar 35%, French, Arab, Ethiopian and Italian 5%.

Religion: Muslim 94%, Christian 6%.

Economy—Overview: The economy is based on service activities connected with the country's strategic location and status as a free trade zone in north-east Africa. Two thirds of the inhabitants live in the capital city, the remainder being mostly nomadic herders. Scanty rainfall limits crop production to fruits and vegetables, and most food must be imported. Djibouti provides services as both a transit port for the region and an international transshipment and refuelling centre. It has few natural resources and little industry. The nation is, therefore, heavily dependent on foreign assistance to support its balance of payments and to finance development projects. The unemployment rate is 40–50% and per capita consumption dropped an estimated 35% over the last seven years because of recession, civil war and a high population growth rate (including immigrants and refugees).

Industries: Limited to a few small-scale enterprises, such as dairy products and mineral-water bottling

Agriculture—products: Fruits, vegetables; goats, sheep, camels

Cancer registration

There has been no documented cancer registration in Djibouti.

3.4.4 Eritrea

Background

Climate: Hot, dry desert strip along Red Sea coast; cooler and wetter in the central highlands (up to 61 cm of rainfall annually); semi-arid in western hills and lowlands; rainfall heaviest during June–September except on coastal desert

Terrain: Dominated by extension of Ethiopian north–south trending highlands, descending on the east to a coastal desert plain, on the northwest to hilly terrain and on the southwest to flat-to-rolling plains

Ethnic groups: Ethnic Tigrinya 50%, Tigre and Kunama 40%, Afar 4%, Saho (Red Sea coast dwellers) 3%

Religions: Muslim, Coptic Christian, Roman Catholic, Protestant

Economy—overview: With independence from Ethiopia in 1993, Eritrea faced the economic problems of a small, desperately poor African country. The economy is largely based on subsistence agriculture, with over 70% of the population involved in farming and herding. The small industrial sector consists mainly of light industries with outmoded technology. Domestic output (GDP) is substantially augmented by worker remittances from abroad. Government revenues come from custom duties and taxes on income and sales. Road construction is a top domestic priority. Eritrea has inherited the entire coastline of Ethiopia and has long-term prospects for revenues from the development of offshore oil-fields, offshore fishing and tourism.

Industries: Food processing, beverages, clothing and textiles

Agriculture—products: Sorghum, lentils, vegetables, maize, cotton, tobacco, coffee, sisal (for making rope); livestock (including goats); fish

Cancer registration

There is no information on any form of cancer registration in Eriteria.

3.4.5 Ethiopia

Background

Climate: Tropical monsoon with wide topographic-induced variation

Terrain: High plateau with central mountain range divided by Great Rift Valley

Ethnic groups: Oromo 40%, Amhara and Tigrean 32%, Sidamo 9%, Shankella 6%, Somali 6%, Afar 4%, Gurage 2%, other 1%

Religions: Muslim 45–50%, Ethiopian Orthodox 35–40%, animist 12%, other 3–8%

Economy—overview: The economy is based on agriculture, which accounts for more than half of GDP, 90% of exports, and 80% of total employment; coffee generates 60% of export earnings. The agricultural sector suffers from frequent periods of drought and poor cultivation practices, as well as poor internal security conditions. The manufacturing sector is heavily dependent on inputs from the agricultural sector.

Industries: Food processing, beverages, textiles, chemicals, metal processing, cement

Agriculture—products: Cereals, pulses, coffee, oilseed, sugar-cane, potatoes, other vegetables; hides, cattle, sheep, goats

Cancer registration

There has been no population-based cancer registration in Ethiopia.

Review of data

There is no information on cancer incidence in Ethiopia. The only data on the cancer profile derive from published series, principally from pathology departments (Table 1).

Lindtjorn (1987) reported on 1154 patients with histologically diagnosed cancer at three hospitals in the Sidamo and Gamu Gofa regions of southern Ethiopia, for periods between the mid-1960s and mid-1980s. Among men, the commonest malignancies were hepatocellular carcinoma (especially notable in a histology-based series), lymphomas and superficial malignancies (skin cancers including melanomas and superficial soft-tissue sarcomas), while among women cervical, breast and ovarian cancers predominated. There were 12 Kaposi sarcoma cases diagnosed (1% of the total); the sex distribution was not given. In childhood, Hodgkin disease and Burkitt lymphoma were the most common cancers.

Loutfi and Pickering (1992) analysed the cases diagnosed in two laboratories in Addis Ababa in 1979–88 and 1986–88. There were 4067 cases, an annual average of 219 in men and 396 in women. In men, the commonest cancers were lymphoma (19%), soft-tissue sarcoma (13%) and head and neck cancer (11%); the other sites are shown in Table 1. In women, cervix cancer and breast cancer accounted for over half of the cases.

Ashine and Lemma (1999) reported on 841 cases of cancer (8.1% in children) diagnosed histologically (at the Norwegian Radium Hospital, Oslo) at Yirga Alem Hospital, Sidama Zone, southern Ethiopia, in 1986–95. The most common sites recorded were, in men, non-Hodgkin lymphoma (13.9%), soft-tissue sarcoma (12.7%) and non-melanoma skin cancer (12.2%), and in women cervix cancer (25.8%) and breast cancer (12.5%) (Table 1). The authors commented on the low frequency of liver cancer in their biopsy series (diagnosis was mainly by ultrasound).

Patterns of malignant tumours in Ethiopian Jews migrating to Israel in 1984 were analysed by the Israel Cancer Registry (Iscovich *et al.*, 1993). This cohort of 8272 Ethiopian immigrants (4253 males and 4019 females, with 27 966 and 26 848 person-years observed for males and females respectively) had significantly lower overall cancer incidence than Jews born in Israel. The standardized incidence ratios (SIR) for cancers at all sites were 39% (95% CI 22–64) and 63% (95% CI 41–92) for males and females respectively. Male primary liver cancer and female thyroid cancer had high SIRs. All other sites had either average or low SIRs. There were no reported cases of respiratory system neoplasms. Digestive system neoplasms (other than primary liver cancer) were more common in females than males.

From these data, it seems fairly sure that liver cancer is relatively common in Ethiopia. Some clinical series have commented upon this (Pavlica & Samuel, 1970; Tsega, 1977), and prevalence of hepatitis B surface antigen (HBsAg) in the general adult population has been variously estimated as between 6 (Tsega *et al.*, 1986) and 11% (Tsega *et al.*, 1987; Kefene *et al.*, 1988). The relatively high frequency of oesophageal cancer in Sidamo Regional Hospital (Table 1) was further investigated by Madebo *et al.* (1994). They found that, among patients attending this hospital for gastrointestinal symptoms, a significantly higher proportion of those from the Bale highlands had oesophageal or gastric cancer, compared with patients from elsewhere.

Two series of childhood cancer cases have been described. Ahmed (1984) reported on 122 cases of childhood cancer, diagnosed by pathology or haematology, in the main teaching hospital of Addis Ababa, between 1974 and 1981, and Teka (1992) a series of 71 cases, similarly diagnosed, in the Gonder College of Medical Sciences (north-west Ethiopia) between 1981 and 1990 (Table 2). Both show that lymphomas are the most commonly diagnosed childhood cancer, with one third of cases Burkitt lymphoma. Neuroblastomas do not appear to be rare.

Daniel (1990) described 39 cases of Burkitt lymphoma admitted to an Addis Ababa hospital and noted that the majority came from areas of high altitude (> 1500 m) without endemic malaria.

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Table 1. Ethiopia: case series

Site	Three hospitals in S. Ethiopia, (Lindtjorn, 1987)					Two laboratories in Addis Ababa, (Loutfi & Pickering, 1992)					Yirga Alem Hospital, Sidama, Ethiopia, 1986–95 (Ashine & Lemma, 1999)				
	Male		Female		%HV	Male		Female		%HV	Male		Female		%HV
	No.	%	No.	%		No.[2]	%	No.[2]	%		No.	%	No.	%	
Oral cavity	24	3.9%	22	4.1%	100						21	5.1%	17	3.9%	100
Other pharynx[1]	7	1.1%	2	0.4%	100						1	0.2%	0	0.0%	100
Oesophagus						6	2.7%		0.0%		42	10.2%	13	3.0%	100
Stomach	23	3.7%	13	2.4%	100	16	7.3%	13	3.3%	100	24	5.9%	14	3.2%	100
Colon/rectum	24	3.9%	10	1.9%	100	21	9.6%	14	3.5%	100	20	4.9%	13	3.0%	100
Liver	60	9.8%	7	1.3%	100	20	9.1%	11	2.8%	100	10	2.4%	1	0.2%	100
Pancreas	3	0.5%	2	0.4%	100						2	0.5%	1	0.2%	100
Lung	11	1.8%	6	1.1%	100						2	0.5%	2	0.5%	100
Melanoma	40	6.5%	29	5.4%	100	9	4.1%	5	1.3%	100	26	6.3%	21	4.9%	100
Other skin	85	13.8%	33	6.1%	100	26	11.9%	19	4.8%	100	50	12.2%	38	8.8%	100
Kaposi sarcoma											15	3.7%	2	0.5%	100
Breast	11	1.8%	77	14.3%	100			91	23.0%	100	9	2.2%	54	12.5%	100
Cervix uteri			118	21.9%	100			126	31.8%	100			111	25.8%	100
Corpus uteri			8	1.5%	100			15	3.8%	100			12	2.8%	100
Ovary etc.			54	10.0%	100			28	7.1%	100			38	8.8%	100
Prostate	7	1.1%			100	9	4.1%				3	0.7%			100
Penis	26	4.2%			100						5	1.2%			100
Bladder	6	1.0%	2	0.4%	100	9	4.1%			100	1	0.2%	0	0.0%	100
Kidney etc.	9	1.5%	6	1.1%	100						5	1.2%	5	1.2%	100
Eye	33	5.4%	20	3.7%	100						18	4.4%	12	2.8%	
Brain,nervous system															
Thyroid	12	2.0%	7	1.3%	100						6	1.5%	6	1.4%	100
Non-Hodgkin lymphoma	58	9.4%	20	3.7%	100	30	13.7%	14	3.5%	100	57	13.9%	15	3.5%	100
Hodgkin disease	26	4.2%	5	0.9%	100	12	5.5%	3	0.8%	100	6	1.5%	0	0.0%	100
Myeloma															
Leukaemia	7	1.1%	2	0.4%	100										
ALL SITES	614	100.0%	540	100.0%	100	219	100.0%	396	100.0%	100	410	100.0%	431	100.0%	100

[1] Includes nasopharynx

[2] Average annual number

Table 2. Ethiopia: childhood case series

Cancer	Ahmed, 1984		Teka, 1992	
	No.	%	No.	%
Leukaemia	29	23.8%	8	11.3%
Acute lymphocytic leukaemia			7	9.9%
Lymphoma	34	27.9%	18	25.4%
Burkitt lymphoma	11	9.0%	6	8.5%
Hodgkin disease	6	4.9%		
Brain and spinal neoplasms	0	0.0%		
Neuroblastoma	9	7.4%	6	8.5%
Retinoblastoma	3	2.5%	11	15.5%
Wilms tumour	15	12.3%	5	7.0%
Bone tumours	4	3.3%	14	19.7%
Soft-tissue sarcomas	13	10.7%		
Kaposi sarcoma	0	0.0%		
Other	15	12.3%	9	12.7%
Total	122	100.0%	71	100.0%

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3.4.6 Kenya

Background

Climate: Varies from tropical along coast to arid in interior

Terrain: Low plains rise to central highlands bisected by Great Rift Valley; fertile plateau in west

Ethnic groups: Kikuyu 22%, Luhya 14%, Luo 13%, Kalenjin 12%, Kamba 11%, Kisii 6%, Meru 6%, other African 15%, non-African (Asian, European, and Arab) 1%

Religions: Protestant (including Anglican) 38%, Roman Catholic 28%, indigenous beliefs 26%, Muslim 6%, other 2%

Economy—overview: Economic liberalization and reform were introduced in 1993 and this included removal of import licensing and price controls, and removal of foreign exchange controls.

Industries: Small-scale consumer goods (plastic, furniture, batteries, textiles, soap, cigarettes, flour), processing agricultural products; oil refining, cement; tourism

Agriculture—products: Coffee, tea, corn, wheat, sugar-cane, fruit, vegetables; dairy products, beef, pork, poultry, eggs

Cancer registration

Until very recently, there was no population-based cancer registration in Kenya, but a pathology-based registry existed since 1962, based in the pathology department of the main government teaching hospital (Kenyatta National Hospital) in Nairobi.

The Eldoret Cancer Registry, established in 1999, is located in the Faculty of Medical Sciences of Moi University. The registry records details of all cancer patients diagnosed and treated in hospitals of Eldoret town and aims to be population-based for the district of Uasin Gishu, in the Rift Valley Region of Kenya (population in 1999: 623 000). As well as the Director, the registry has two full-time staff: a registrar and secretary, plus three part-time staff for data collection and data entry. Case-finding is active, using hospital records departments, pathology and death certificates. There are five hospital sources. The most important is Moi Teaching Hospital, which also acts as the District General Hospital. Cases are identified from the disease index (completed by records staff in ICD-10) and details of cases abstracted from case records. This method is supplemented by ward visits by medical students, which serve to identify cases not found through the medical records department. The registrar visits four private hospitals and the Eldoret Hospice regularly to identify cancer cases. There is only one pathology laboratory serving the District (in Moi University Faculty of Medical Sciences). Haematological malignancies are all diagnosed by the registry director (Department of Haematology).

Death registration is virtually universal, although deaths at home are certified by the village chief, and are of questionable accuracy.

Cases are coded in the registry, and data entry and management is by CANREG-3.

Review of data

The results from Eldoret for the three-year period 1998–2000 (Table 1) show that, in this highland area, cancer of the oesophagus is the most common cancer of men, with the moderately high ASR of 24.5 per 100 000, while it is fourth in frequency in women, with an incidence rate around half that in men. This implies that the area of high incidence of this cancer in Kenya is rather more extensive than was proposed based on earlier studies. For example, Ahmed and Cook (1969), on the basis of an analysis of records from Kisumu hospital, suggested that the area of high incidence was localized in Central Nyanza district, close to Lake Victoria. Gatei *et al.* (1978), using data from the histopathology register at Kenyatta National Hospital, noted that a relatively high proportion of cases occurred among individuals from the Luo and Luhya tribes, who originate from western Kenya (around Lake Victoria), while < 1% of oesophageal cancers in their register were from the Kalenjin, the majority people around Eldoret. Linsell (1967a, b), examining data from the same source, earlier noted rather low frequencies of both oesophageal and gastric cancers among the Kalenjin tribe. Stomach cancer incidence is, in fact, moderate in Eldoret (ASR 10.4 per 100 000 in men and 7.8 per 100 000 in women. Incidence of liver cancer in this registry is moderately high; the rates (ASR 10.0 in men and 7.3 in women) are based on cases diagnosed by all methods, not just histology, so that the relative importance of liver cancer is greater than in earlier data from Kenya, which were based on pathology reports (see below). Currently, the incidence of Kaposi sarcoma is moderately high; these are presumably related to AIDS, since Kaposi sarcoma was not particularly common in Kenya before the epidemic. Nasopharyngeal cancer also appears to be relatively common (ASR 3.9 in males and 2.9 in females). A relatively high incidence has been reported previously from the highland area of central Kenya (Clifford, 1965).

Linsell (1967a) reported histologically diagnosed cancers among Africans, from the Medical Research laboratory in Nairobi, for the years 1957–63 (Table 2).

Cook and Burkitt (1971) reported on the records of three hospitals in western Kenya (Central Nyanza, 1965–66; Maseno, 1950–65; Kaimosi, 1966–69) with respect to the frequency of 12 common cancers in Africa: oesophagus, stomach, colon, liver, lung, penis, cervix, breast, bladder, skin, Kaposi sarcoma and Burkitt lymphoma. A total of 371 cases in men and 206 in women were included. The commonest cancer in men was cancer of the oesophagus, and in women cancer of the cervix in all the three hospitals. Kaposi sarcoma was relatively uncommon at that time (4% of cancers in men).

The results from the National Cancer Registry (based on the records of the pathology department in Kenyatta National Hospital, Nairobi) for the years 1968–78 were published by Kungu (1986) (Table 2). Excluding non-melanoma skin cancer, the most commonly recorded cancer was cervix cancer (22.4% of cases in women), followed by the lymphomas. Cancers of liver, oesophagus and nasopharynx were relatively common.

Chopra *et al.* (1975) compared the frequencies and types of cancer among Asians (from the Indian subcontinent) resident in Kenya with those in indigenous Africans. Higher risks of lung, breast and colon cancer were found in the Asians (Table 2).

Cameron and Warwick (1977) earlier investigated primary cancer of the liver in Kenyan children. In a nine-year period they reported 34 examples of primary liver cancer diagnosed in the first two decades of life and 29 of these were hepatocellular carcinoma; those diagnosed in the second decade were associated with liver cirrhosis. Peers and Linsell (1973) had reported a statistically significant association between estimated levels of aflatoxin ingestion and liver cancer in some parts of Kenya. Pettigrew *et al.* (1977) reported that 77% of a series of Kenyan patients with chronic persistent hepatitis or chronic active hepatitis or liver cirrhosis had hepatitis B surface antigen compared with 15% of a control group, and deduced that HBV was probably responsible for the high prevalence of hepatocellular carcinoma.

Table 1. Kenya, Eldoret (1998-2000)

NUMBER OF CASES BY AGE GROUP AND SUMMARY RATES OF INCIDENCE - MALE

SITE	ALL AGES	AGE UNK	MV (%)	0-	15-	25-	35-	45-	55-	65+	CRUDE RATE	%	CR 64	ASR (W)	*ICD (10th)*
Mouth	16	0	100	1	-	2	2	6	3	2	1.7	2.3	0.31	**3.7**	*C00-06*
Salivary gland	3	0	67	-	-	1	1	1	-	-	0.3	0.4	0.03	**0.4**	*C07-08*
Nasopharynx	20	0	90	1	1	4	4	6	2	2	2.1	2.9	0.32	**3.9**	*C11*
Other pharynx	5	0	100	-	-	2	1	1	-	1	0.5	0.7	0.05	**0.9**	*C09-10,C12-14*
Oesophagus	89	0	40	-	1	1	11	20	25	31	9.5	12.8	1.66	**24.5**	*C15*
Stomach	36	0	33	-	-	-	2	9	8	17	3.8	5.2	0.58	**10.4**	*C16*
Colon, rectum and anus	24	0	54	-	-	1	6	5	5	7	2.6	3.4	0.45	**6.3**	*C18-21*
Liver	44	0	45	-	1	6	8	14	7	8	4.7	6.3	0.75	**10.0**	*C22*
Gallbladder etc.	1	0	0	-	-	-	-	-	1	-	0.1	0.1	0.04	**0.3**	*C23-24*
Pancreas	16	0	25	-	-	-	1	-	8	7	1.7	2.3	0.40	**5.4**	*C25*
Larynx	14	0	71	-	-	1	1	3	5	4	1.5	2.0	0.33	**4.1**	*C32*
Trachea, bronchus and lung	15	0	53	-	-	1	2	2	5	5	1.6	2.2	0.28	**4.0**	*C33-34*
Bone	22	0	41	2	11	1	2	2	-	4	2.3	3.2	0.15	**3.2**	*C40-41*
Melanoma of skin	2	0	100	-	1	-	-	-	-	1	0.2	0.3	0.00	**0.4**	*C43*
Other skin	19	0	79	-	-	2	2	2	6	7	2.0		0.36	**5.3**	*C44*
Mesothelioma	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C45*
Kaposi sarcoma	35	0	83	3	-	9	13	5	4	1	3.7	5.0	0.51	**5.8**	*C46*
Peripheral nerves	1	0	100	-	-	-	-	-	1	-	0.1	0.1	0.04	**0.3**	*C47*
Connective and soft tissue	11	0	91	2	-	1	2	3	1	2	1.2	1.6	0.15	**2.2**	*C49*
Breast	3	0	67	-	-	-	1	-	-	2	0.3	0.4	0.01	**0.8**	*C50*
Penis	2	0	50	-	-	-	-	-	1	1	0.2	0.3	0.05	**0.7**	*C60*
Prostate	54	0	30	-	-	-	-	7	13	34	5.8	7.7	0.77	**16.8**	*C61*
Testis	3	0	0	-	-	1	-	1	1	-	0.3	0.4	0.08	**0.7**	*C62*
Kidney	14	0	71	9	1	-	-	-	2	2	1.5	2.0	0.14	**2.2**	*C64*
Renal pelvis, ureter and other urinary	1	0	100	-	-	-	-	-	1	-	0.1	0.1	0.05	**0.4**	*C65-66,C68*
Bladder	10	0	30	-	-	-	2	1	3	4	1.1	1.4	0.19	**2.9**	*C67*
Eye	9	0	100	2	2	1	4	-	-	-	1.0	1.3	0.07	**0.9**	*C69*
Brain, nervous system	34	0	6	6	2	4	5	9	7	1	3.6	4.9	0.65	**6.7**	*C70-72*
Thyroid	2	0	100	-	-	-	-	1	1	-	0.2	0.3	0.07	**0.6**	*C73*
Hodgkin disease	15	0	100	3	4	-	3	4	-	1	1.6	2.2	0.17	**2.4**	*C81*
Non-Hodgkin lymphoma	55	0	84	16	7	9	7	6	2	8	5.9	7.9	0.46	**8.2**	*C82-85,C96*
Multiple myeloma	8	0	75	-	-	-	1	3	2	2	0.9	1.1	0.17	**2.2**	*C90*
Lymphoid leukaemia	21	0	90	6	2	2	-	3	3	5	2.2	3.0	0.24	**4.1**	*C91*
Myeloid leukaemia	16	0	94	3	3	6	1	1	2	-	1.7	2.3	0.19	**2.2**	*C92-94*
Leukaemia, unspecified	4	0	75	2	-	1	-	1	-	-	0.4	0.6	0.03	**0.5**	*C95*
Other and unspecified	92	0	16	2	3	11	10	18	16	32	9.8	13.2	1.30	**22.3**	*O&U*
All sites	716	0	52	58	39	67	92	134	135	191	76.2		11.07	**165.6**	*ALL*
All sites but C44	697	0	52	58	39	65	90	132	129	184	74.2	100.0	10.70	**160.3**	*ALLbC44*
Average annual population				136931	68617	48245	28045	15529	7889	7764					

Table 1. Kenya, Eldoret (1998-2000)

NUMBER OF CASES BY AGE GROUP AND SUMMARY RATES OF INCIDENCE - FEMALE

SITE	ALL AGES	AGE UNK	MV (%)	0-	15-	25-	35-	45-	55-	65+	CRUDE RATE	%	CR 64	ASR (W)	*ICD (10th)*
Mouth	5	0	80	-	-	-	1	2	1	1	0.5	0.8	0.11	**1.4**	*C00-06*
Salivary gland	3	0	67	-	-	1	-	1	-	1	0.3	0.5	0.04	**0.7**	*C07-08*
Nasopharynx	13	0	85	1	3	1	1	1	4	2	1.4	2.0	0.24	**2.9**	*C11*
Other pharynx	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C09-10,C12-14*
Oesophagus	51	0	35	-	-	1	10	12	17	11	5.6	7.8	1.36	**15.5**	*C15*
Stomach	26	0	35	-	-	-	3	8	7	8	2.8	4.0	0.59	**7.8**	*C16*
Colon, rectum and anus	10	0	80	-	-	-	4	2	-	4	1.1	1.5	0.09	**2.2**	*C18-21*
Liver	29	0	24	-	-	4	7	7	6	5	3.2	4.4	0.60	**7.3**	*C22*
Gallbladder etc.	5	0	60	-	-	-	3	1	-	1	0.5	0.8	0.07	**1.1**	*C23-24*
Pancreas	12	0	25	-	-	1	2	5	1	3	1.3	1.8	0.20	**3.0**	*C25*
Larynx	2	0	100	-	1	-	-	-	1	-	0.2	0.3	0.04	**0.4**	*C32*
Trachea, bronchus and lung	10	0	60	-	-	1	-	4	2	3	1.1	1.5	0.24	**3.0**	*C33-34*
Bone	9	0	33	1	3	1	2	2	-	-	1.0	1.4	0.11	**1.3**	*C40-41*
Melanoma of skin	14	0	93	1	1	1	1	6	-	4	1.5	2.1	0.18	**3.2**	*C43*
Other skin	8	0	75	-	-	3	2	1	1	1	0.9		0.13	**1.6**	*C44*
Mesothelioma	1	0	100	-	-	-	1	-	-	-	0.1	0.2	0.02	**0.2**	*C45*
Kaposi sarcoma	15	0	87	-	3	5	5	1	1	-	1.6	2.3	0.21	**2.4**	*C46*
Peripheral nerves	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C47*
Connective and soft tissue	20	0	95	2	3	5	6	1	1	2	2.2	3.1	0.22	**3.2**	*C49*
Breast	59	0	93	-	3	10	14	14	13	5	6.5	9.0	1.30	**14.3**	*C50*
Vulva	1	0	100	-	-	-	-	-	1	-	0.1	0.2	0.04	**0.3**	*C51*
Vagina	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C52*
Cervix uteri	93	0	71	-	-	9	17	21	28	18	10.2	14.2	2.22	**25.9**	*C53*
Uterus	29	0	72	-	1	3	7	7	4	7	3.2	4.4	0.50	**7.1**	*C54-55*
Ovary	39	0	74	-	5	7	7	3	7	10	4.3	6.0	0.59	**8.7**	*C56*
Placenta	8	0	63	-	4	1	3	-	-	-	0.9	1.2	0.08	**1.1**	*C58*
Kidney	10	0	40	6	1	2	1	-	-	-	1.1	1.5	0.06	**1.0**	*C64*
Renal pelvis, ureter and other urinary	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C65-66,C68*
Bladder	5	0	80	-	-	-	-	-	1	4	0.5	0.8	0.04	**1.4**	*C67*
Eye	5	0	100	2	1	-	2	-	-	-	0.5	0.8	0.04	**0.6**	*C69*
Brain, nervous system	26	0	4	5	3	7	5	1	3	2	2.8	4.0	0.32	**4.2**	*C70-72*
Thyroid	7	0	43	1	-	-	3	-	-	3	0.8	1.1	0.05	**1.5**	*C73*
Hodgkin disease	8	0	88	1	1	2	2	2	-	-	0.9	1.2	0.12	**1.4**	*C81*
Non-Hodgkin lymphoma	34	0	76	14	3	5	4	3	3	2	3.7	5.2	0.41	**5.3**	*C82-85,C96*
Multiple myeloma	3	0	100	-	1	-	-	-	-	2	0.3	0.5	0.00	**0.6**	*C90*
Lymphoid leukaemia	5	0	100	1	1	-	-	2	1	-	0.5	0.8	0.12	**1.2**	*C91*
Myeloid leukaemia	19	0	84	4	1	4	2	3	4	1	2.1	2.9	0.35	**3.9**	*C92-94*
Leukaemia, unspecified	2	0	0	1	1	-	-	-	-	-	0.2	0.3	0.01	**0.2**	*C95*
Other and unspecified	76	0	8	2	3	11	10	10	15	25	8.3	11.6	1.21	**18.7**	*O&U*
All sites	662	0	58	42	43	85	125	120	122	125	72.5		11.89	**154.4**	*ALL*
All sites but C44	654	0	58	42	43	82	123	119	121	124	71.6	100.0	11.76	**152.7**	*ALLbC44*
Average annual population				135433	72081	44362	24030	13064	7333	8214					

Table 2. Kenya: case series

Site	Medical Research Laboratory Nairobi, 1957–63 (Linsell, 1967)					National Cancer Registry, 1968–78 (Kungu, 1986)					3 Nairobi hospitals: Asians, 1967–71 (Chopra, 1975)				
	Male		Female		%HV	Male		Female		%HV	Male		Female		%HV
	No.	%	No.	%		No.	%	No.	%		No.	%	No.	%	
Oral cavity[1]	85	3.7%	112	5.9%	100	383	4.3%	390	4.4%	100	13	7.6%	4	2.4%	100
Nasopharynx	97	4.2%	26	1.4%	100	487	5.5%	225	2.5%	100	2	1.2%	2	1.2%	100
Other pharynx	3	0.1%	1	0.1%	100	11	0.1%	5	0.1%	100	3	1.8%	2	1.2%	100
Oesophagus	175	7.6%	10	0.5%	100	803	9.1%	112	1.3%	100	3	1.8%	4	2.4%	100
Stomach	57	2.5%	43	2.3%	100	381	4.3%	212	2.4%	100	4	2.3%	6	3.6%	100
Colon/rectum	69	3.0%	37	1.9%	100	217	2.5%	126	1.4%	100	26	15.2%	10	6.0%	100
Liver	160	6.9%	58	3.1%	100	806	9.2%	335	3.8%	100	7	4.1%	5	3.0%	100
Pancreas	12	0.5%	6	0.3%	100	78	0.9%	40	0.5%	100	2	1.2%	1	0.6%	100
Lung	24	1.0%	7	0.4%	100	69	0.8%	33	0.4%	100	21	12.3%	1	0.6%	100
Melanoma	94	4.1%	100	5.3%	100	337	3.8%	378	4.3%	100	1	0.6%	0	0.0%	100
Other skin	279	12.1%	319	16.8%	100	855	9.7%	1010	11.4%	100	2	1.2%	1	0.6%	100
Kaposi sarcoma	92	4.0%	15	0.8%	100	390	4.4%	55	0.6%	100					
Breast	23	1.0%	174	9.2%	100	110	1.2%	829	9.4%	100	1	0.6%	58	34.9%	100
Cervix uteri			270	14.2%	100			1985	22.4%	100			16	9.6%	100
Corpus uteri			23	1.2%	100			161	1.8%	100			10	6.0%	100
Ovary etc.			51	2.7%	100			341	3.9%	100			7	4.2%	100
Prostate	44	1.9%			100	387	4.4%			100	8	4.7%			100
Penis	42	1.8%			100	0	0.0%		0.0%	100	3	1.8%			100
Bladder	30	1.3%	14	0.7%	100	118	1.3%	55	0.6%	100	4	2.3%			100
Kidney etc.	20	0.9%	26	1.4%	100	126	1.4%	124	1.4%	100	4	2.3%	0	0.0%	100
Eye	54	2.3%	36	1.9%	100	162	1.8%	123	1.4%	100	0	0.0%	0	0.0%	100
Brain, nervous system	15	0.7%	9	0.5%	100	187	2.1%	113	1.3%	100	7	4.1%	4	2.4%	100
Thyroid	22	1.0%	22	1.2%	100	61	0.7%	200	2.3%	100	0	0.0%	3	1.8%	100
Non-Hodgkin lymphoma	349	15.1%	152	8.0%	100	957	10.9%	552	6.2%	100	5	2.9%	3	1.8%	100
Hodgkin disease	85	3.7%	23	1.2%	100	337	3.8%	94	1.1%	100	4	2.3%	3	1.8%	100
Myeloma	15	0.7%	3	0.2%	100	34	0.4%	21	0.2%	100	3	1.8%	0	0.0%	100
Leukaemia	10	0.4%	5	0.3%	100	154	1.7%	129	1.5%	100	14	8.2%	8	4.8%	100
ALL SITES	2305	100.0%	1901	100.0%	100	8808	100.0%	8846	100.0%	100	171	100.0%	166	100.0%	100

[1] Includes salivary gland tumours

Table 3. Kenya: childhood case series

Cancer	Kungu, 1984		Makata *et al.*, 1996	
	No.	%	No.	%
Leukaemia		0.0%		0.0%
Acute lymphocytic leukaemia		0.0%		0.0%
Lymphoma	751	49.3%	356	59.3%
Burkitt lymphoma	367	24.1%	201	33.5%
Hodgkin disease	136	8.9%	25	4.2%
Brain and spinal neoplasms	56	3.7%	0	0.0%
Neuroblastoma	2	0.1%	3	0.5%
Retinoblastoma	119	7.8%	69	11.5%
Wilms tumour	134	8.8%	27	4.5%
Bone tumours	81	5.3%	18	3.0%
Soft-tissue sarcomas	154	10.1%	84	14.0%
Kaposi sarcoma	28	1.8%	37	6.2%
Other	225	14.8%	43	7.2%
Total	1522	100.0%	600	100.0%

In a recent retrospective survey of the records of eight hospitals serving the population of the four districts of Greater Meru in Eastern province, McFarlane *et al.* (2001) identified 200 cases of gastric carcinoma diagnosed in 1991–93. Most had been diagnosed by laparotomy (52%) or endoscopy (24%), but histology was available for only 18 cases (9%). The estimated age-standardized incidence rates were 14.3 per 100 000 in men and 7.1 per 100 000 in women.

Childhood cancer

Kungu (1984) provided data on 1522 histologically confirmed cases of childhood cancer in Kenya between 1968 and 1980 (Table 3). No haematological malignancies are included in the series. Childhood cancers accounted for 10% of the total number of all cancers registered in that registry and lymphoma accounted for 49.3% of all childhood cancers. Burkitt lymphoma was the most frequent type of lymphoma (48.9%), occurring mainly in the age range 3–8 years, with a male:female ratio of 1.7:1. 45% of cases involved the face, maxilla or mandible. The Luo tribe, from a lowland area near Lake Victoria, seemed to be the most affected, accounting for 30% of cases of Burkitt lymphoma. Hodgkin disease was much more frequent in boys (ratio 4.6:1).

Makata *et al.* (1996) identified 676 surgical histological specimens in three hospitals of western Kenya (in Nakuru, Kisumu and Eldoret), diagnosed in the sixteen-year period 1979–94. The distribution of the 600 cases for which information was considered adequate is shown in Table 3. Burkitt lymphoma was the most commonly identified solid tumour. The frequency was rather different in the three hospitals, however, being 51.6% of biopsies in Kisumu, in the humid tropical zone around Lake Victoria, but only 23.4% in the cooler, highland Rift Valley province (Eldoret).

Neither of these two series included leukaemia cases. In two small case series of childhood cancer, leukaemias were found to comprise 21% of cases in Kenyatta Hospital (Macharia, 1996) and 12.8% in data from eight hospitals (including Kenyatta) in 1997 (Mwanda, 1999).

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3.4.7 Madagascar

Background

Climate: Tropical along coast, temperate inland, arid in south

Terrain: Narrow coastal plain, high plateau and mountains in centre

Ethnic groups: Malayo-Indonesian (Merina and related Betsileo), Cotiers (mixed African, Malayo-Indonesian, and Arab ancestry—Betsimisaraka, Tsimihety, Antaisaka, Sakalava), French, Indian, Creole, Comoran

Religions: Indigenous beliefs 52%, Christian 41%, Muslim 7%

Economy—overview: Madagascar suffers from chronic malnutrition, under-funded health and education facilities, a roughly 3% annual population growth rate, and severe loss of forest cover, accompanied by erosion. Agriculture, including fishing and forestry, is the mainstay of the economy, accounting for 33% of GDP and contributing more than 70% to export earnings.

Industries: Meat processing, soap, breweries, tanneries, sugar, textiles, glassware, cement, automobile assembly plant, paper, petroleum, tourism

Agriculture—products: Coffee, vanilla, sugarcane, cloves, cocoa, rice, cassava (tapioca), beans, bananas, peanuts; livestock products

Cancer registration

There has been no cancer registration in Madagascar.

Review of data

A description of 11 151 malignant tumours diagnosed in the anatomo-pathology service of the Institut Pasteur of Madagascar in 1954–78 was reported by Coulanges *et al.* (1979); this showed a high frequency of skin cancer (17%), lymphoma (9.8%) and melanoma of skin (8.2%) among males, while in females cevical cancer (31.5%) and breast cancer (12.3%) were the most frequent. A further report, for the years 1979–81 was published in 1986 (Table 1). Raharisolo Vololonantenaina *et al.* (1998) described a further case series, from the same pathology laboratory, for the period 1992–96. Cancer of the cervix remained the most common cancer of women (38%), followed by breast cancer (17%). In men, the most common cancers appear to have been colon-rectum (11.3%) and stomach cancer (10.3%) – a situation very different from that reported ten years earlier (Table 1).

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Table 1. Madagascar: case series

Site	Institut Pasteur, pathology data, 1979–81 (Coulanges, 1986)				
	Male		Female		%HV
	No.	%	No.	%	
Oral cavity[1]	28	7.4%	15	2.5%	100
Nasopharynx	0	0.0%	2	0.3%	100
Other pharynx	1	0.3%	0	0.0%	100
Oesophagus	0	0.0%	0	0.0%	
Stomach	5	1.3%	3	0.5%	100
Colon/rectum	25	6.6%	17	2.8%	100
Liver	5	1.3%	2	0.3%	100
Pancreas	0	0.0%	1	0.2%	100
Lung	8	2.1%	2	0.3%	100
Melanoma	31	8.2%	13	2.2%	100
Other skin	64	17.0%	29	4.8%	100
Kaposi sarcoma	20	5.3%	1	0.2%	100
Breast	2	0.5%	74	12.3%	100
Cervix uteri			190	31.5%	100
Corpus uteri			7	1.2%	100
Ovary etc.			50	8.3%	100
Prostate	16	4.2%			100
Penis etc.	14	3.7%			
Bladder	6	1.6%	4	0.7%	100
Kidney etc.	3	0.8%	9	1.5%	100
Eye	16	4.2%	12	2.0%	100
Brain, nervous system	1	0.3%	1	0.2%	100
Thyroid	5	1.3%	20	3.3%	100
Non-Hodgkin lymphoma	37	9.8%	39	6.5%	100
Hodgkin disease	8	2.1%	7	1.2%	100
Myeloma	0	0.0%	0	0.0%	
Leukaemia	1	0.3%	0	0.0%	100
ALL SITES	377	100.0%	604	100.0%	100

[1] Includes salivary gland

3.4.8 Malawi

Background

Climate: Tropical; rainy season (November to May); dry season (May to November)

Terrain: Narrow elongated plateau with rolling plains, rounded hills, some mountains

Ethnic groups: Chewa, Nyanja, Tumbuko, Yao, Lomwe, Sena, Tonga, Ngoni, Ngonde, Asian, European

Religions: Protestant 55%, Roman Catholic 20%, Muslim 20%, traditional indigenous beliefs

Economy—overview: The economy is predominantly agricultural, with about 90% of the population living in rural areas. Agriculture accounts for 45% of GDP and 90% of export revenues. The economy depends on substantial inflows of economic assistance from the International Monetary Fund, the World Bank, and individual donor nations. The government faces strong challenges to spur exports, to improve educational and health facilities and to deal with environmental problems of deforestation and erosion.

Industries: Tea, tobacco, sugar, sawmill products, cement, consumer goods

Agriculture—products: Tobacco, sugarcane, cotton, tea, corn, potatoes, cassava (tapioca), sorghum, pulses; cattle, goats

Cancer registration

The Malawi National Cancer registry was established in 1989. Initially it was a histopathology-based registry, recording data on cancer cases diagnosed in the pathology laboratory in Queen Elizabeth's Hospital (QEH), Blantyre, which received specimens from hospitals throughout the country. In 1993, the registry began to record cases from all hospitals and clinics serving the population of Blantyre District (Urban and Rural), however diagnosed. This was achieved by a programme of regular visits by a cancer registrar and registry clerk to hospital records departments and clinical services where cases might have been diagnosed or treated. The majority of cases (76%) were from QEH – the main government hospital – with smaller numbers from other hospitals run by religious orders or privately. There is no comprehensive death registration in Malawi, so that death certificates cannot be used as a source of information on cancer cases. The number of cases recorded among residents of the Districts remained more or less constant in the five-year period 1994–98 at 400–500 per year.

In 1999, a new registry director was appointed and extra staff were employed. This allowed more frequent visits to hospitals for case-finding and visits to hospitals in neighbouring districts were scheduled. In addition, medical record staff in local hospitals were asked to record details of any cancer cases seen in out-patient departments. This resulted in a marked increase in cases from Blantyre district recorded by the registry, to an average of 735 per year in 1999–2001.

Review of data

Results are presented for a recent two-year period (2000–2001), corresponding to the years in which the enhanced case-finding described above were employed (Table 1). The incidence rates are rather higher than in the data from the first five years of registration (1994–98) published by Banda *et al.* (2001). In this earlier data-set, the age-standardized incidence for all sites was 92.0 per 100 000 in men and 88.8 per 100 000 in women. The authors commented that there was probably underascertainment of cases during these years; the results are therefore summarized as relative frequencies of different cancers in Table 2.

The overall incidence rates for the period 2000–2001 were 128.2 per 100 000 in men and 151.3 per 100 000 in women (Table 1). Only a minority of cases were registered on the basis of microscopic evidence; this largely reflects the very high incidence of Kaposi sarcoma: 53.5% of all cancers in men (ASR, 49.9) and 32.3% in women (ASR, 31.7) and relatively few of these cases were diagnosed on the basis of histology. Following Kaposi sarcoma, the most common cancers of men are oesophageal cancer (10%, ASR 17.4), prostate cancer (4.2%, ASR 10.7), non-Hodgkin lymphomas (5.8%, ASR 6.0) and bladder cancer (2.2%, ASR 3.4). In women, the most common cancers (after Kaposi sarcoma) are cervix cancer, (30.7%, ASR 53.1), breast cancer (6.6%, ASR 12.0) and oesophageal cancer (5.2%, ASR 10.7).

The pattern is very similar to that in the earlier data (Table 2), although, as noted, the incidence rates are higher.

The only comprehensive analysis of the cancer profile in Malawi previously published was a histopathology series from 1976–80; in this period, there was no local histopathology service in Malawi, and biopsies from all over the country were sent to St Thomas's Hospital, London, UK (Hutt, 1986). The most frequent cancers (other than skin) in males were oesophagus (12.8%), bladder (7.4%) non-Hodgkin lymphomas (7.1%) and Kaposi sarcoma (6.6%) (Table 2). In women, the most common cancers were cervix (36.6%), bladder (6.8%) and breast (6.7%). Burkitt lymphomas comprised 22.2% of childhood cancers.

The frequency of bladder cancer in Malawi, and the fact that it is predominantly squamous cell in type, which is related to schistosomiasis (endemic in Malawi) was noted by Lucas (1982). Bladder cancer appears to be proportionately less common in the 1994–98 data (3.1% in males and females). This may be partly due to increases in numbers of other cancers (especially Kaposi sarcoma) or to restriction to subjects resident in Blantyre; however, it is possible that the prevalence of schistosomiasis has also declined over time. In the older series, the high sex ratio (8.5:1) and age distribution of the Kaposi sarcoma cases suggest that few were HIV-related at this time, and the overall frequency was much as it had been (4.2%) in the early 1970s (O'Connell *et al.*, 1977). The large increase in frequency of Kaposi sarcoma in the most recent registry data almost certainly reflects the effects of the epidemic of AIDS; Malawi is one of the most affected countries on the continent, with an estimated adult prevalence of HIV infection at the end of 1997 of 14.9%.

Childhood cancer

The numbers of cases of childhood cancer registered have varied little from year to year, probably because the majority of cancers in this age group have been diagnosed histologically. Table 3 shows the cases recorded among residents of Blantyre district in the period 1991–2001. Burkitt lymphoma is by far the most common cancer of boys and girls (ASR 25.9 per million), followed by Kaposi sarcoma (11.8), retinoblastoma (6.8) and Wilms tumour (5.7). Only nine leukaemias and one brain cancer were recorded, and there was just one case of neuroblastoma.

Three reports have detailed the profile of childhood cancer cases diagnosed in the national pathology series, from 1967–76 (Molyneux, 1979), from 1985–93 (Mukiibi *et al.*, 1995), and from 1991–95 (Banda & Liomba 1999), as shown in Table 4. All demonstrate the overwhelming importance of Burkitt lymphoma in

Table 1. Malawi, Blantyre (2000-2001)

NUMBER OF CASES BY AGE GROUP AND SUMMARY RATES OF INCIDENCE - MALE

SITE	ALL AGES	AGE UNK	MV (%)	0-	15-	25-	35-	45-	55-	65+	CRUDE RATE	%	CR 64	ASR (W)	*ICD (10th)*
Mouth	4	2	75	-	-	-	1	1	-	-	0.4	0.6	0.08	**0.8**	*C00-06*
Salivary gland	2	1	100	-	-	-	-	-	1	-	0.2	0.3	0.11	**0.9**	*C07-08*
Nasopharynx	1	0	100	-	-	-	1	-	-	-	0.1	0.1	0.01	**0.1**	*C11*
Other pharynx	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C09-10,C12-14*
Oesophagus	72	7	26	-	-	6	19	13	14	13	8.0	10.0	1.28	**17.4**	*C15*
Stomach	9	0	67	-	-	2	1	2	1	3	1.0	1.3	0.12	**2.3**	*C16*
Colon, rectum and anus	11	0	82	-	-	2	2	2	1	4	1.2	1.5	0.12	**2.7**	*C18-21*
Liver	28	3	64	4	4	2	5	5	2	3	3.1	3.9	0.35	**5.1**	*C22*
Gallbladder etc.	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C23-24*
Pancreas	2	0	0	-	-	-	-	1	-	1	0.2	0.3	0.02	**0.6**	*C25*
Larynx	3	0	100	-	-	-	1	1	-	1	0.3	0.4	0.04	**0.8**	*C32*
Trachea, bronchus and lung	9	1	44	-	-	-	1	3	1	3	1.0	1.3	0.13	**2.5**	*C33-34*
Bone	9	1	89	-	2	2	-	2	2	-	1.0	1.3	0.18	**1.7**	*C40-41*
Melanoma of skin	3	1	100	-	-	-	-	2	-	-	0.3	0.4	0.05	**0.6**	*C43*
Other skin	16	2	94	-	1	1	-	5	3	4	1.8		0.29	**4.4**	*C44*
Mesothelioma	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C45*
Kaposi sarcoma	385	38	11	9	28	142	110	45	11	2	42.8	53.5	4.15	**49.9**	*C46*
Peripheral nerves	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C47*
Connective and soft tissue	7	0	100	-	1	2	1	-	2	1	0.8	1.0	0.12	**1.5**	*C49*
Breast	5	0	100	-	-	-	-	-	1	4	0.6	0.7	0.04	**1.7**	*C50*
Penis	4	1	25	-	2	1	-	-	-	-	0.4	0.6	0.02	**0.3**	*C60*
Prostate	30	8	47	-	-	-	-	3	7	12	3.3	4.2	0.57	**10.7**	*C61*
Testis	1	0	100	-	-	-	-	1	-	-	0.1	0.1	0.02	**0.2**	*C62*
Kidney	9	2	100	3	-	-	1	1	2	-	1.0	1.3	0.15	**1.6**	*C64*
Renal pelvis, ureter and other urinary	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C65-66,C68*
Bladder	16	3	31	-	-	2	4	2	3	2	1.8	2.2	0.26	**3.4**	*C67*
Eye	18	4	83	3	1	5	3	-	-	2	2.0	2.5	0.10	**2.5**	*C69*
Brain, nervous system	1	0	0	1	-	-	-	-	-	-	0.1	0.1	0.00	**0.1**	*C70-72*
Thyroid	1	0	0	-	-	-	-	1	-	-	0.1	0.1	0.02	**0.2**	*C73*
Hodgkin disease	5	0	60	3	-	1	-	-	1	-	0.6	0.7	0.06	**0.6**	*C81*
Non-Hodgkin lymphoma	42	3	81	12	2	9	5	9	1	1	4.7	5.8	0.45	**6.0**	*C82-85,C96*
Multiple myeloma	2	0	100	-	-	-	1	-	1	-	0.2	0.3	0.05	**0.4**	*C90*
Lymphoid leukaemia	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C91*
Myeloid leukaemia	2	0	50	-	2	-	-	-	-	-	0.2	0.3	0.01	**0.2**	*C92-94*
Leukaemia, unspecified	3	0	33	1	-	-	-	1	1	-	0.3	0.4	0.08	**0.8**	*C95*
Other and unspecified	35	1	43	1	1	6	4	8	9	5	3.9	4.9	0.76	**8.9**	*O&U*
All sites	735	78	34	37	44	183	160	108	64	61	81.8		9.60	**128.2**	*ALL*
All sites but C44	719	76	32	37	43	182	160	103	61	57	80.0	100.0	9.31	**123.9**	*ALLbC44*
Average annual population				172918	103703	83683	42468	25486	11401	9655					

Table 1. Malawi, Blantyre (2000-2001)

NUMBER OF CASES BY AGE GROUP AND SUMMARY RATES OF INCIDENCE - FEMALE

SITE	ALL AGES	AGE UNK	MV (%)	0-	15-	25-	35-	45-	55-	65+	CRUDE RATE	%	CR 64	ASR (W)	*ICD (10th)*
Mouth	7	0	86	-	2	1	2	1	1	-	0.8	1.0	0.13	**1.3**	*C00-06*
Salivary gland	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C07-08*
Nasopharynx	1	0	100	-	-	-	-	-	1	-	0.1	0.1	0.05	**0.4**	*C11*
Other pharynx	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C09-10,C12-14*
Oesophagus	38	7	13	-	1	2	6	11	4	7	4.4	5.2	0.79	**10.7**	*C15*
Stomach	3	0	100	-	-	1	-	1	1	-	0.3	0.4	0.10	**0.9**	*C16*
Colon, rectum and anus	13	0	69	-	2	2	4	1	-	4	1.5	1.8	0.12	**2.7**	*C18-21*
Liver	2	1	50	-	-	-	-	-	-	1	0.2	0.3	0.00	**0.6**	*C22*
Gallbladder etc.	1	1	100	-	-	-	-	-	-	-	0.1	0.1	0.00	**0.0**	*C23-24*
Pancreas	4	0	50	-	-	-	2	1	-	1	0.5	0.6	0.05	**0.9**	*C25*
Larynx	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C32*
Trachea, bronchus and lung	1	0	0	-	-	-	-	-	1	-	0.1	0.1	0.06	**0.5**	*C33-34*
Bone	6	1	50	1	1	1	2	-	-	-	0.7	0.8	0.05	**0.7**	*C40-41*
Melanoma of skin	4	0	100	-	-	1	-	-	2	1	0.5	0.6	0.13	**1.4**	*C43*
Other skin	17	2	100	-	3	1	-	7	3	1	2.0		0.46	**4.9**	*C44*
Mesothelioma	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C45*
Kaposi sarcoma	234	23	11	7	53	78	50	19	4	-	27.0	32.3	2.58	**31.7**	*C46*
Peripheral nerves	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C47*
Connective and soft tissue	8	0	75	-	2	1	2	2	1	-	0.9	1.1	0.16	**1.6**	*C49*
Breast	48	2	77	-	3	8	12	12	7	4	5.5	6.6	1.07	**12.0**	*C50*
Vulva	2	0	100	-	-	2	-	-	-	-	0.2	0.3	0.02	**0.2**	*C51*
Vagina	3	0	100	-	-	-	1	1	-	1	0.3	0.4	0.03	**0.7**	*C52*
Cervix uteri	222	19	48	-	2	41	68	47	26	19	25.6	30.7	4.47	**53.1**	*C53*
Uterus	7	1	71	-	-	1	-	1	3	1	0.8	1.0	0.24	**2.4**	*C54-55*
Ovary	10	1	80	1	2	1	1	3	-	1	1.2	1.4	0.12	**1.8**	*C56*
Placenta	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C58*
Kidney	2	0	50	2	-	-	-	-	-	-	0.2	0.3	0.01	**0.2**	*C64*
Renal pelvis, ureter and other urinary	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C65-66,C68*
Bladder	16	0	56	-	1	1	6	3	3	2	1.8	2.2	0.35	**4.1**	*C67*
Eye	25	2	84	2	1	8	8	1	2	1	2.9	3.5	0.34	**4.2**	*C69*
Brain, nervous system	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C70-72*
Thyroid	6	0	67	-	-	2	-	2	1	1	0.7	0.8	0.12	**1.5**	*C73*
Hodgkin disease	3	0	67	1	2	-	-	-	-	-	0.3	0.4	0.01	**0.2**	*C81*
Non-Hodgkin lymphoma	25	0	80	2	4	5	6	5	2	1	2.9	3.5	0.41	**4.9**	*C82-85,C96*
Multiple myeloma	1	0	100	-	-	-	-	-	1	-	0.1	0.1	0.06	**0.5**	*C90*
Lymphoid leukaemia	2	0	50	1	-	-	-	1	-	-	0.2	0.3	0.04	**0.4**	*C91*
Myeloid leukaemia	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C92-94*
Leukaemia, unspecified	3	0	33	2	1	-	-	-	-	-	0.3	0.4	0.01	**0.2**	*C95*
Other and unspecified	27	6	74	3	1	2	5	5	3	2	3.1	3.7	0.54	**6.3**	*O&U*
All sites	741	66	44	22	81	159	175	124	66	48	85.6		12.56	**151.3**	*ALL*
All sites but C44	724	64	43	22	78	158	175	117	63	47	83.6	100.0	12.11	**146.4**	*ALLbC44*
Average annual population				180541	112151	66987	33833	19556	9018	10790					

Table 2. Malawi: case series

Site	Pathology series: Malawi 1976–80 (Hutt, 1986)					Malawi Cancer Registry: Blantyre District, 1994–98 (Banda *et al.*, 2001)				
	Male		Female		%HV	Male		Female		%HV
	No.	%	No.	%		No.	%	No.	%	
Oral cavity[1]	90	5.0%	71	3.6%	100	14	1.1%	8	0.8%	86
Nasopharynx	9	0.5%	2	0.1%	100	2	0.2%	0	0.0%	50
Other pharynx	1	0.1%	1	0.1%	100	1	0.1%	0	0.0%	100
Oesophagus	232	12.8%	36	1.8%	100	154	12.4%	77	7.7%	20
Stomach	38	2.1%	7	0.4%	100	11	0.9%	3	0.3%	72
Colon/rectum	41	2.3%	26	1.3%	100	16	1.3%	10	1.0%	65
Liver	101	5.6%	32	1.6%	100	52	4.2%	20	2.0%	29
Pancreas	1	0.1%	2	0.1%	100	3	0.2%	3	0.3%	17
Lung	6	0.3%	3	0.2%	100	8	0.6%	0	0.0%	100
Melanoma	55	3.0%	63	3.2%	100	7	0.6%	14	1.4%	86
Other skin	226	12.5%	130	6.7%	100	24	1.9%	23	2.3%	79
Kaposi sarcoma	119	6.6%	14	0.7%	100	674	54.1%	274	27.3%	17
Breast	14	0.8%	108	5.5%	100	3	0.2%	74	7.4%	70
Cervix uteri			712	36.6%	100			251	25.0%	48
Corpus uteri			71	3.6%	100			14	1.4%	86
Ovary etc.			61	3.1%	100			11	1.1%	82
Prostate	64	3.5%			100	45	3.6%			33
Penis	46	2.5%			100	8	0.6%			38
Bladder	133	7.4%	132	6.8%	100	39	3.1%	31	3.1%	33
Kidney etc.	20	1.1%	21	1.1%	100	5	0.4%	7	0.7%	75
Eye	1	0.1%	0	0.0%	100	29	2.3%	31	3.1%	100
Brain, nervous system	41	2.3%	38	2.0%	100	3	0.2%	1	0.1%	19
Thyroid	17	0.9%	39	2.0%	100	7	0.6%	19	1.9%	92
Non-Hodgkin lymphoma	128	7.1%	87	4.5%	100	69	5.5%	58	5.8%	69
Hodgkin disease	17	0.9%	1	0.1%	100	7	0.6%	4	0.4%	91
Myeloma	10	0.6%	4	0.2%	100	0	0.0%	2	0.2%	100
Leukaemia	6	0.3%	3	0.2%	100	9	0.7%	11	1.1%	70
ALL SITES	1808	100.0%	1946	100.0%	100	1245	100.0%	1003	100.0%	39

[1] Includes salivary gland tumours

Table 3. Childhood cancer, Malawi, Blantyre (1991-2001)

	NUMBER OF CASES					REL. FREQ.(%)	RATES PER MILLION					
	0-4	5-9	10-14	All	*M/F*	Overall	0-4	5-9	10-14	Crude	**ASR**	%MV
Leukaemia	0	4	5	**9**	*0.5*	3.4	-	3.3	4.8	2.5	**2.5**	28.6
Acute lymphoid leukaemia	0	1	1	**2**	*1.0*	0.8	-	0.8	1.0	0.6	**0.5**	50.0
Lymphoma	20	75	34	**129**	*2.0*	49.0	15.4	61.1	32.8	36.2	**35.2**	79.2
Hodgkin disease	0	5	5	**10**	*9.0*	3.8	-	4.1	4.8	2.8	**2.7**	70.0
Burkitt lymphoma	16	61	18	**95**	*2.2*	36.1	12.4	49.7	17.4	26.7	**25.9**	67.4
Brain and spinal neoplasms	0	1	0	**1**	-	0.4	-	0.8	-	0.3	**0.3**	100.0
Neuroblastoma	0	1	0	**1**	-	0.4	-	0.8	-	0.3	**0.3**	-
Retinoblastoma	20	3	0	**23**	*0.8*	8.7	15.4	2.4	-	6.5	**6.8**	82.6
Wilms tumour	12	7	1	**20**	*1.5*	7.6	9.3	5.7	1.0	5.6	**5.7**	85.0
Bone tumours	2	0	4	**6**	*1.0*	2.3	1.5	-	3.9	1.7	**1.7**	16.7
Soft tissue sarcomas	16	12	18	**46**	*1.6*	17.5	12.4	9.8	17.4	12.9	**13.0**	100.0
Kaposi sarcoma	14	11	17	**42**	*1.6*	16.0	10.8	9.0	16.4	11.8	**11.8**	45.2
Germ cell tumours	1	0	2	**3**	-	1.1	0.8	-	1.9	0.8	**0.9**	100.0
Other	5	8	12	**25**	*0.9*	9.5	3.9	6.5	11.6	7.0	**7.0**	84.0
All	76	111	76	**263**	*1.4*	100.0	58.7	90.4	73.3	73.9	**73.2**	67.7

Table 4. Malawi: childhood case series

Cancer	Malawi 1967–76 (Molyneux, 1979)		Malawi 1985–93 (Mukiibi *et al.*, 1995)		Malawi 1991–95 (Banda & Liomba, 1999)	
	No.	%	No.	%	No.	%
Leukaemia	0	0.0%	18	2.3%	6	1.1%
Acute lymphocytic leukaemia		0.0%	10	1.3%	1	0.2%
Lymphoma	187	45.9%	472	59.7%	283	51.7%
Burkitt lymphoma	121	29.7%	368	46.5%	199	36.4%
Hodgkin disease	11	2.7%	38	4.8%	22	4.0%
Brain and spinal neoplasms	0	0.0%	6	0.8%	1	0.2%
Neuroblastoma	13	3.2%	0	0.0%	0	0.0%
Retinoblastoma	56	13.8%	89	11.3%	46	8.4%
Wilms tumour	27	6.6%	50	6.3%	27	4.9%
Bone tumours	14	3.4%	16	2.0%	16	2.9%
Soft-tissue sarcomas	48	11.8%	66	8.3%	120	21.9%
Kaposi sarcoma	18	4.4%	32	4.0%	88	16.1%
Other	62	15.2%	74	9.4%	48	8.8%
Total	407	100.0%	791	100.0%	547	100.0%

this age group, and the most recent data show the rise in importance of Kaposi sarcoma, in line with the evolution of the epidemic of AIDS.

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3.4.9 Mauritius

Background

Climate: Tropical, modified by southeast trade winds; warm, dry winter (May to November); hot, wet, humid summer (November to May)

Terrain: Small coastal plain rising to discontinuous mountains encircling central plateau

Ethnic groups: Indo-Mauritian 68%, Creole 27%, Sino-Mauritian 3%, Franco-Mauritian 2%

Religions: Hindu 52%, Christian 28.3% (Roman Catholic 26%, Protestant 2.3%), Muslim 16.6%, other 3.1%

Economy—overview: Since independence in 1968, Mauritius has developed from a low-income, agriculturally based economy to a middle-income diversified economy with growing industrial, financial services and tourist sectors. For most of the period, annual growth has been of the order of 5–6%. This remarkable achievement has been reflected in increased life expectancy, lowered infant mortality and a much improved infrastructure. Sugar-cane is grown on about 90% of the cultivated land area and accounts for 25% of export earnings. The government's development strategy centres on industrialization (with a view to modernization and to exports), agricultural diversification, and tourism.

Industries: Food processing (largely sugar milling), textiles, clothing; chemicals, metal products, transport equipment, non-electrical machinery; tourism

Agriculture—products: Sugar-cane, tea, corn, potatoes, bananas, pulses; cattle, goats; fish

Cancer registration

A cancer registry was established in Mauritius in 1986. Since 1989, information has been collected from the radiotherapy patient register, the Central Pathology Laboratory, hospital inpatient records, the Overseas Treatment unit and the civil status office. Notification from the private sector is voluntary. Responsibility for the registry was transferred to the Mauritius Institute of Health in 1996. Duplicate registrations are eliminated by manual search of the patient register.

The first results, for 1989–93 were published in 1998 (Manraj *et al.*, 1998). A more detailed report for the period 1989–96 was published in May 1999 as a locally prepared monograph: *Cancer Study in Mauritius* (1989–1996), by Manraj, S.S., Poorun, S. & Burhoo.

Review of data

Table 1 and Table 2 have been extracted from the 1999 report, which presents registrations for the years 1989–96. There was a progressive increase in the number of cases registered each year from 1989 (736 cases) to 1993 (1010 cases), but the number was more stable in the later four years. The mortality to incidence (M:I) ratios also suggest some underregistration (85% for males, 59% for females). 82% of cases were histologically verified.

Table 1 shows that in men lung cancer is the most common tumour, although the actual recorded incidence (ASR 11.8 per 100 000) and mortality:incidence (M:I) ratio (1.3) is modest. There are moderately elevated rates for cancers of the oral cavity, and stomach.

In women, cancer of the breast is the most commonly diagnosed cancer (ASR 26.4; M:I ratio 0.37), followed by cervix (ASR 22.4; M:I 0.58).

Childhood cancer

In children (Table 2), lymphomas appear to be relatively uncommon, compared with leukaemias, and there is a relatively high percentage of brain and nervous system neoplasms (18%).

Reference

Manraj, S.S., Mustun, H., Ghurburrun, P., Laniece, C. & Salamon, R. (1998) Incidence des cancers Maurice en 1989-1993. *Bull. Soc. Pathol. Exotique*, **91**, 9–12

Table 1. Mauritius:1989-1996: annual incidence per 100 000 by age group (years)

Site		Age group					All	%	Crude rate	ASR (world)
		0–14	15–44	45–54	55–64	65+				
Male										
Oral cavity and pharynx	C00–C14	0	32	50	93	114	298	9.6%	7	9.3
Oesophagus	C15	0	2	23	43	44	114	3.7%	2.7	3.7
Stomach	C16	0	21	28	82	134	266	8.6%	6.3	8.7
Colon/rectum	C18–21	0	45	35	76	100	258	8.3%	6.1	7.9
Liver	C22	1	11				51	1.6%	1.2	1.5
Pancreas	C25	0	8				45	1.5%	1.1	1.4
Larynx	C32						116	3.7%	2.7	3.8
Lung	C33–34	0	32	52	120	159	373	12.1%	8.8	11.8
Melanoma of skin	C43	2	21	13	25	62	14	0.5%	0.3	0.5
Other skin	C44						111	3.6%	2.6	3.5
Kaposi sarcoma	C46							0.0%		
Penis	C60						47	1.5%	1.1	1.3
Prostate	C61	0	2	7	33	153	200	6.5%	4.7	6.7
Testis	C62						36	1.2%	0.8	0.8
Bladder	C67	0	8	34	61	108	184	5.9%	4.3	6.1
Kidney etc.	C64–66	5	5				40	1.3%	0.9	1.3
Brain	C71–72	21					121	3.9%	2.9	2.7
Thyroid	C73						8	0.3%	0.2	0.2
Non-Hodgkin lymphoma	C82–85, C96	8	44	19	19	23	79	2.6%	2.2	3.1
Hodgkin disease	C81						37	1.2%	0.8	
Myeloma	C90	0	48	10	21	27	27	0.9%	0.6	4.6
Leukaemia	C91–95	62					156	5.0%	3.7	
Other sites	Other						514	16.6%	12.1	14.6
All sites	ALL	151	500	388	770	1199	3095	100.0%	73	93.5
Female										
Oral cavity and pharynx	C00–C14	0	28	16	27	48	125	2.9%	2.9	3.1
Oesophagus	C15	0	5	7	21	38	76	1.7%	1.7	1.9
Stomach	C16	0	22	19	39	70	151	3.5%	3.6	4
Colon/rectum	C18–21	0	48	52	63	95	261	6.0%	6.2	7
Liver	C22	0	9				42	1.0%	1	1.1
Pancreas	C25	0	4				40	0.9%	1	1.1
Larynx	C32						22	0.5%	0.5	0.6
Lung	C33–34	0	11	12	17	23	65	1.5%	1.5	1.7
Melanoma of skin	C43	1	19	19	23	56	14	0.3%	0.3	0.4
Other skin	C44						106	2.4%	2.5	2.7
Kaposi sarcoma	C46							0.0%		
Breast	C50	1	382	259	191	220	1085	25.0%	25.5	26.4
Cervix	C53	0	159	216	216	247	855	19.7%	20.1	22.4
Corpus	C54	0	14				113	2.6%	2.7	3
Ovary	C56	0	75	58	53	49	245	5.6%	5.8	6.2
Bladder	C67	1	3	13	25	44	69	1.6%	1.6	1.8
Kidney etc.	C64–66	4	5				26	0.6%	0.6	0.7
Brain	C71–72	26					124	2.9%	3	3.2
Thyroid	C73						48	1.1%	1.1	1.2
Non-Hodgkin lymphoma	C82–85, C96	10	33	12	13	22	68	1.6%	1.6	2.3
Hodgkin disease	C81						25	0.6%	0.8	
Myeloma	C90	0	38	16	21	24	33	0.8%	0.8	3.4
Leukaemia	C91–95	35					110	2.5%	2.6	
Other sites	Other						641	14.8%	15.1	16.2
All sites	ALL	117	1048	853	952	1272	4344	100.0%	102	110.4

Source: Cancer Study in Mauritius (1989–1996). Report of the National Cancer Registry, Ministry of Health and Quality of Life, Mauritius Institute of Health (May 1999)

Table 2. Mauritius, 1989–96: childhood case series

Cancer	No.	%
Leukaemia	97	36%
Acute lymphocytic leukaemia		
Lymphoma	18	7%
Burkitt lymphoma		
Hodgkin disease		
Brain and spinal neoplasms	47	18%
Neuroblastoma	22	8%
Retinoblastoma	15	6%
Wilms tumour	5	2%
Bone tumours	29	11%
Soft-tissue sarcomas		
Kaposi sarcoma		
Other	35	13%
Total	268	100%

3.4.10 Mozambique

Background

Climate: Tropical to subtropical

Terrain: Mostly coastal lowlands, uplands in centre, high plateaux in northwest, mountains in west

Ethnic groups: Indigenous tribal groups 99.66% (Shangaan, Chokwe, Manyika, Sena, Makua, and others), Europeans 0.06%, Euro-Africans 0.2%, Indians 0.08%

Religions: Indigenous beliefs 50%, Christian 30%, Muslim 20%

Economy—overview: Before the peace accord of October 1992, Mozambique was devastated by civil war and was one of the poorest countries in the world. Prospects subsequently improved, and Mozambique has begun to exploit its sizeable agricultural, hydropower and transportation resources. Foreign assistance programmes help supply the foreign exchange required to support the budget and pay for import of goods and services.

Industries: Food, beverages, chemicals (fertilizer, soap, paints), petroleum products, textiles, cement, glass, asbestos, tobacco

Agriculture—products: Cotton, cashew nuts, sugar-cane, tea, cassava (tapioca), corn, rice, tropical fruits; beef, poultry

Cancer registration

A 'cancer survey' for the population of Lourenço Marques (now Maputo) was organized from the Department of Pathology, Hospital Central Miguel Bombarda, between May 1956 and April 1961, supported financially by the Portuguese Government and the National Cancer Association of South Africa (Prates & Torres,1965). Cases were registered by medical staff from hospital inpatients and outpatients, radiotherapy departments, pathology departments, death certificates and doctors attending cases at home. Cases were also identified from autopsy records, the Department of Statistics, two mission hospitals, three private nursing homes, twelve state or municipal or company outpatient clinics, the Medical Officer of Health for Lourenço Marques and from the Port Health Authority. Registration was stated to be more than 90% complete.

The registry covered the area of the city of Lourenço Marques and a peri-urban area of 60 square kilometres. The population at risk was estimated from a sample survey as 99 030, and comprised 60% Thonga (Ronga) Shangana group, 30% Bitonga and Chope people, 10% other tribes including Chuabos and Macuas. 51% were Catholic, 23% Protestant, 4% Muslim and 22% had other religions (African) or no religion. The majority of the population (76%) were engaged in agriculture

Review of data

The results from the registry of Lourenço Marques (Maputo) for the period 1956–60 are shown in Table 1. Of the 600 cases registered, 87.3% were morphologically verified (90.7% in men, 81.7% in women). Liver cancer was by far the most common cancer of men (65.5% of cases, ASR 101.7 per 100 000), followed by cancers of the bladder (6% of cases, ASR 17.1) and non-Hodgkin lymphomas (4.5% of cases, ASR 5.2). In women, liver cancer was first in importance (31% of cases, ASR 31.4) followed by cancers of the cervix (21.3% of cases, ASR 29.1) and bladder (10.7% of cases, ASR 14.0). The almost equal incidence of bladder cancer in males and females and the observation (Prates & Torres, 1965) that the majority (56%) were squamous-cell cancers indicates that the majority were related to schistosomiasis. 18 of the 24 cases of non-Hodgkin lymphomas were Burkitt lymphoma, but only four cases (2 boys, 2 girls) were in the childhood age group. In contrast to neighbouring parts of South Africa and Malawi, cancer of the oesophagus was rare, as were respiratory and gastrointestinal cancers in general.

In a later report from the pathology department of the same hospital, based on cases diagnosed by histology, cytology or autopsy, Bijlsma (1981) noted that the relative frequency of liver cancer in men had declined from 51.8% of cases in 1956–61 to 35.3% in 1977; there was no change in the relative frequency in women.

Another source of information on cancer patterns and trends in Mozambique derives from the studies of cancer patterns among gold miners in South Africa. The first report, for the period 1964–71 (Harington *et al.*, 1975) confirmed the very high incidence of liver cancer in these men (crude incidence, considered equivalent to an age-specific rate for age group 25–34 years, was 80.4 per 100 000), and the low rates for cancers of the oesophagus and lung. Later reports (Bradshaw *et al.*, 1982; Harington *et al.*, 1983) showed quite marked declines in incidence of liver cancer, to 40.8 per 100 000 in 1972–79 and 29.9 per 100 000 in 1981. There was also a suggestion of a decline in the incidence of bladder cancer (Bradshaw *et al.*, 1982). Considerable variation was present in the incidence of liver cancer in miners from different regions of Mozambique, with the highest incidence in those from coastal districts, and low rates in men from inland areas to the west (Bradshaw *et al.*, 1982). A later study (van Rensburg *et al.*, 1985) included systematic registration of all liver cancers (histologically verified) from hospitals in the coastal province of Inhambane between 1968 and 1974. Incidence rates were calculated, based on the census of 1970. The overall (crude) incidence for the province was 25.5 per 100 000 in men and 13.0 per 100 000 in women (the corresponding ASRs are 23.2 and 7.9 per 100 000). The maximum recorded incidence was in age group 30–39 years, with a decline thereafter. There was considerable variation in the rates between different districts of the province (e.g., in men, from 9.3 per 100 000 in Massinga to 60.7 per 100 000 in Panda), which was correlated with aflatoxin intake (as estimated from food samples obtained from villages in the different districts).

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Table 1. Mozambique, Lourenco Marques (1956-1960)

NUMBER OF CASES BY AGE GROUP AND SUMMARY RATES OF INCIDENCE - MALE

SITE	ALL AGES	AGE UNK	0-	10-	20-	30-	40-	50-	60+	CRUDE RATE	%	ASR (W)	*ICD (10th)*
Mouth	6	0	-	1	1	-	-	3	1	*2.2*	1.5	*3.6*	*C00-C08*
Nasopharynx	3	0	-	-	-	1	-	1	1	*1.1*	0.7	*2.2*	*C11*
Other pharynx	0	0	-	-	-	-	-	-	-	*0.0*	0.0	*0.0*	*C09-C10,C12-C14*
Oesophagus	7	0	-	-	-	2	1	3	1	*2.6*	1.7	*4.4*	*C15*
Stomach	3	0	-	-	-	-	-	1	2	*1.1*	0.7	*3.0*	*C16*
Colon, rectum and anus	4	0	-	-	1	1	1	1	-	*1.5*	1.0	*1.8*	*C18-C21*
Liver	264	2	1	51	90	53	47	12	8	*98.2*	65.5	*101.7*	*C22*
Pancreas	2	0	-	-	1	-	-	-	1	*0.7*	0.5	*1.5*	*C25*
Larynx	2	0	-	-	-	-	1	1	-	*0.7*	0.5	*1.1*	*C32*
Trachea, bronchus and lung	6	0	-	1	-	-	2	1	2	*2.2*	1.5	*4.3*	*C33-C34*
Melanoma of skin	0	0	-	-	-	-	-	-	-	*0.0*	0.0	*0.0*	*C43*
Other skin	13	0	-	-	1	5	2	3	2	*4.8*		*7.6*	*C44*
Kaposi sarcoma													*C46*
Breast	0	0	-	-	-	-	-	-	-	*0.0*	0.0	*0.0*	*C50*
Penis	5	0	-	-	-	1	2	2	-	*1.9*	1.2	*2.6*	*C60*
Prostate	10	0	-	-	-	1	-	4	5	*3.7*	2.5	*9.0*	*C61*
Kidney etc.	2	0	-	-	-	-	-	-	2	*0.7*	0.5	*2.4*	*C64-C66,C68*
Bladder	24	0	-	-	2	3	5	7	7	*8.9*	6.0	*17.1*	*C67*
Eye	4	0	2	-	-	2	-	-	-	*1.5*	1.0	*1.5*	*C69*
Brain, nervous system	6	0	-	3	3	-	-	-	-	*2.2*	1.5	*1.6*	*C70-C72*
Thyroid	2	0	-	-	-	-	-	1	1	*0.7*	0.5	*1.8*	*C73*
Hodgkin disease	0	0	-	-	-	-	-	-	-	*0.0*	0.0	*0.0*	*C81*
Non-Hodgkin lymphoma	18	0	1	8	7	2	-	-	-	*6.7*	4.5	*5.2*	*C82-C85,C96*
Multiple myeloma	0	0	-	-	-	-	-	-	-	*0.0*	0.0	*0.0*	*C90*
Leukaemia	7	0	1	2	1	1	-	-	2	*2.6*	1.7	*3.9*	*C91-C95*
Other and unspecified	15	0	1	4	2	2	2	2	2	*5.6*	3.7	*7.4*	*O&U*
All sites	403	2	6	70	109	74	63	42	37	*149.9*	100.0	*184.0*	*ALL*
All sites but C44	390	2	6	70	108	69	61	39	35	*145.1*	96.8	*176.4*	*ALLbC44*
Average annual population			12600	14800	10800	6000	4900	2850	1820				

Source: Cancer Incidence in Five Continents volume 1

Table 1. Mozambique, Lourenco Marques (1956-1960)

NUMBER OF CASES BY AGE GROUP AND SUMMARY RATES OF INCIDENCE - FEMALE

SITE	ALL AGES	AGE UNK	0-	10-	20-	30-	40-	50-	60+	CRUDE RATE	%	ASR (W)	*ICD (10th)*
Mouth	10	0	-	2	2	-	1	3	2	*4.4*	5.1	*7.0*	*C00-C08*
Nasopharynx	0	0	-	-	-	-	-	-	-	*0.0*	0.0	*0.0*	*C11*
Other pharynx	0	0	-	-	-	-	-	-	-	*0.0*	0.0	*0.0*	*C09-C10,C12-C14*
Oesophagus	0	0	-	-	-	-	-	-	-	*0.0*	0.0	*0.0*	*C15*
Stomach	2	0	-	-	-	-	-	-	2	*0.9*	1.0	*2.4*	*C16*
Colon, rectum and anus	2	0	-	-	-	-	-	1	1	*0.9*	1.0	*2.0*	*C18-C21*
Liver	61	0	-	5	21	10	15	5	5	*27.0*	31.0	*31.4*	*C22*
Pancreas	2	0	-	-	-	-	-	1	1	*0.9*	1.0	*2.0*	*C25*
Larynx	2	0	-	-	-	-	2	-	-	*0.9*	1.0	*1.1*	*C32*
Trachea, bronchus and lung	2	0	-	-	-	1	-	-	1	*0.9*	1.0	*1.6*	*C33-C34*
Melanoma of skin	0	0	-	-	-	-	-	-	-	*0.0*	0.0	*0.0*	*C43*
Other skin	9	0	1	-	-	1	1	2	4	*4.0*		*7.6*	*C44*
Kaposi sarcoma													*C46*
Breast	5	0	-	-	-	-	2	3	-	*2.2*	2.5	*3.5*	*C50*
Cervix uteri	42	1	-	-	4	8	11	9	9	*18.6*	21.3	*29.1*	*C53*
Uterus	4	0	-	-	-	3	-	-	1	*1.8*	2.0	*2.3*	*C54-C55*
Ovary etc.	0	0	-	-	-	-	-	-	-	*0.0*	0.0	*0.0*	*C56-C57*
Kidney etc.	2	0	1	-	1	-	-	-	-	*0.9*	1.0	*0.6*	*C64-C66,C68*
Bladder	21	0	-	-	4	2	5	7	3	*9.3*	10.7	*14.0*	*C67*
Eye	6	0	2	-	1	1	1	1	-	*2.7*	3.0	*2.7*	*C69*
Brain, nervous system	4	0	1	1	2	-	-	-	-	*1.8*	2.0	*1.5*	*C70-C72*
Thyroid	3	0	-	-	1	-	-	1	1	*1.3*	1.5	*2.3*	*C73*
Hodgkin disease	0	0	-	-	-	-	-	-	-	*0.0*	0.0	*0.0*	*C81*
Non-Hodgkin lymphoma	6	0	2	1	-	2	-	1	-	*2.7*	3.0	*2.7*	*C82-C85,C96*
Multiple myeloma	0	0	-	-	-	-	-	-	-	*0.0*	0.0	*0.0*	*C90*
Leukaemia	4	0	-	-	1	2	-	-	1	*1.8*	2.0	*2.3*	*C91-C95*
Other and unspecified	10	0	-	2	2	2	1	1	2	*4.4*	5.1	*6.1*	*O&U*
All sites	197	1	7	11	39	32	39	35	33	*87.1*	100.0	*122.2*	*ALL*
All sites but C44	188	1	6	11	39	31	38	33	29	*83.1*	95.4	*114.6*	*ALLbC44*
Average annual population			13310	7090	10180	6340	4240	2250	1850				

Source: Cancer Incidence in Five Continents volume 1

3.4.11 Réunion

Background

Climate: Tropical, but temperature moderates with elevation; cool and dry from May to November, hot and rainy from November to April

Terrain: Mostly rugged and mountainous; fertile lowlands along coast

Ethnic groups: French, African, Malagasy, Chinese, Pakistani, Indian

Religions: Roman Catholic 94%, Hindu, Islam, Buddhist

Economy—overview: The economy has traditionally been based on agriculture. Sugarcane has been the primary crop for more than a century, and in some years it accounts for 85% of exports. The government has been pushing the development of a tourist industry to relieve high unemployment. The gap in Réunion between the well-off and the poor is large; the white and Indian communities are substantially better off than other segments of the population, often approaching European standards, whereas indigenous groups suffer the poverty and unemployment typical of the poorer nations of the African continent. The economic well-being of Réunion depends heavily on continued financial assistance from France.

Industries: Sugar, rum, cigarettes, handicraft items, flower oil extraction

Agriculture—products: Sugar-cane, vanilla, tobacco, tropical fruits, vegetables, corn

Cancer registration

Collection of data on cancer morbidity was initiated on the island of La Réunion in 1983. The population-based registry was established in 1988, with the aim of establishing the burden and patterns of cancer among residents of the island, whether diagnosed locally or elsewhere.

Registration is active. The first step involves collecting information from the principal sources, the public and private pathology and haematology laboratories. These data are then linked and supplemented with data from the treating physician. This step permits the removal of cases diagnosed in previous years, recurrences or metastases from a cancer already registered, as well as cases among non-residents. The data are coded using ICD-O-1 for topography and morphology; IARC/IACR rules are used for multiple tumours. Basal-cell carcinomas of the skin are registered but excluded from analysis of the data.

Review of data

A preliminary retrospective survey was performed in 1981, before the establishment of the population-based registry (Julvez & Vaillant, 1985). The results from the first five years of cancer regsistration (1988–92) were published in *Cancer Incidence in Five Continents*, volume VII (Parkin *et al.*, 1997) and by Grizeau *et al.* (1998).

The data published in this volume update this material with registrations from an additional two years (1993, 1994). The incidence rates, especially the age standardized rates, are rather higher for the period 1988–94 than in the previously published 1988–92 data. This results from both an increased number of registrations (an average of 843 per year in 1993–94, compared with 905 in 1988–92), a change in the estimate of the population (the more recent data take account of the census performed in 2000) and calculation of the ASR using 65+ as upper age category. The percentage of cases with morphological verification of diagnosis is relatively high (97% in both sexes); it was 98% in 1988–92 (Parkin *et al.*, 1997). The ratio between cases registered and deaths from cancer (M:I ratio) was 0.72 in males and 0.53 in females in 1988–92 (Grizeau *et al.*, 1998).

In males, the most common cancer registered is lung cancer, with an ASR of 34.4 per 100 000. This is one of the highest rates recorded in contemporary Africa, but lower than those observed in metropolitan France (Chapter 4.9, Table 1). The incidence in females is low (3.3 per 100 000), and equivalent to that recorded in populations of non-smokers. The incidence of cancer of prostate is moderately high, as are the rates of stomach cancer and oesophageal cancer. The sex ratio for cancers of the oesophagus is 10:1, suggesting that the high rates relate to tobacco and alcohol consumption; Grizeau *et al.* (1998) allude to the high consumption of locally produced rum. These habits may well account for the moderately high rates of cancers of the mouth and pharynx among men but not women.

In females, the main cancers are breast and cervix uteri, with the rates for the former being somewhat higher. Both are possibly underestimates, given the high percentage of cases with histological proof of diagnosis (99%).

Childhood cancer

122 childhood cancers were registered in the seven-year period. Leukaemias were the most common childhood cancers (ASR 30.1 per million), of which the majority (74%) were acute lymphocytic. Lymphomas comprised 16.4% of childhood cancers, with an ASR of 16.7 per million. CNS tumours were third in frequency (11.5%).

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Table 1. France, La Reunion (1988-1994)

NUMBER OF CASES BY AGE GROUP AND SUMMARY RATES OF INCIDENCE - MALE

SITE	ALL AGES	AGE UNK	MV (%)	0-	15-	25-	35-	45-	55-	65+	CRUDE RATE	%	CR 64	ASR (W)	*ICD (10th)*
Mouth	205	0	100	-	-	5	29	68	62	41	9.8	6.2	1.00	**12.5**	*C00-06*
Salivary gland	8	0	100	-	-	2	2	3	-	1	0.4	0.2	0.03	**0.4**	*C07-08*
Nasopharynx	11	0	100	1	1	-	3	2	3	1	0.5	0.3	0.05	**0.6**	*C11*
Other pharynx	228	0	99	-	-	3	27	82	75	41	10.9	6.9	1.16	**13.9**	*C09-10,C12-14*
Oesophagus	362	0	98	-	-	4	30	97	135	96	17.3	11.0	1.76	**22.8**	*C15*
Stomach	340	0	99	1	-	6	22	58	97	156	16.2	10.3	1.21	**21.8**	*C16*
Colon, rectum and anus	199	0	98	-	2	7	20	36	42	92	9.5	6.0	0.65	**12.6**	*C18-21*
Liver	47	0	79	-	-	2	6	11	12	16	2.2	1.4	0.19	**2.9**	*C22*
Gallbladder etc.	21	0	81	-	-	-	2	-	6	13	1.0	0.6	0.05	**1.4**	*C23-24*
Pancreas	49	0	71	-	-	-	3	8	20	18	2.3	1.5	0.22	**3.2**	*C25*
Larynx	115	0	100	-	-	3	7	33	33	39	5.5	3.5	0.49	**7.2**	*C32*
Trachea, bronchus and lung	522	0	96	-	1	4	17	87	151	262	24.9	15.8	1.80	**34.4**	*C33-34*
Bone	22	0	95	4	9	1	1	3	1	3	1.0	0.7	0.06	**1.1**	*C40-41*
Melanoma of skin	28	0	100	-	-	4	5	6	8	5	1.3	0.8	0.13	**1.6**	*C43*
Other skin	136	0	99	1	-	5	7	20	40	63	6.5		0.48	**8.8**	*C44*
Mesothelioma	8	0	100	-	-	-	1	2	1	4	0.4	0.2	0.02	**0.5**	*C45*
Kaposi sarcoma	9	0	44	-	-	6	1	1	1	-	0.4	0.3	0.03	**0.4**	*C46*
Peripheral nerves	1	0	100	-	1	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C47*
Connective and soft tissue	20	0	100	2	3	2	3	2	3	5	1.0	0.6	0.06	**1.1**	*C49*
Breast	10	0	90	-	-	-	-	-	6	4	0.5	0.3	0.05	**0.6**	*C50*
Penis	14	0	100	-	-	1	2	2	3	6	0.7	0.4	0.05	**0.9**	*C60*
Prostate	353	0	98	-	-	-	-	6	55	292	16.8	10.7	0.50	**24.5**	*C61*
Testis	23	0	100	1	3	14	4	-	1	-	1.1	0.7	0.07	**0.9**	*C62*
Kidney	35	0	97	3	-	1	4	8	9	10	1.7	1.1	0.14	**2.1**	*C64*
Renal pelvis, ureter and other urinary	7	0	100	-	-	1	1	2	1	2	0.3	0.2	0.03	**0.4**	*C65-66,C68*
Bladder	154	0	99	-	-	-	7	24	39	84	7.3	4.7	0.48	**10.2**	*C67*
Eye	7	0	100	2	-	1	-	-	-	4	0.3	0.2	0.01	**0.4**	*C69*
Brain, nervous system	40	0	93	8	-	6	6	8	8	4	1.9	1.2	0.17	**2.3**	*C70-72*
Thyroid	12	0	100	-	-	3	-	4	2	3	0.6	0.4	0.05	**0.7**	*C73*
Hodgkin disease	21	0	100	3	6	5	3	2	1	1	1.0	0.6	0.07	**1.0**	*C81*
Non-Hodgkin lymphoma	94	0	99	11	8	5	10	14	21	25	4.5	2.8	0.35	**5.5**	*C82-85,C96*
Multiple myeloma	52	0	94	-	-	-	2	7	17	26	2.5	1.6	0.18	**3.4**	*C90*
Lymphoid leukaemia	32	0	97	12	7	2	1	-	6	4	1.5	1.0	0.11	**1.8**	*C91*
Myeloid leukaemia	59	0	100	4	7	5	6	6	10	21	2.8	1.8	0.18	**3.4**	*C92-94*
Leukaemia, unspecified	7	0	100	1	1	-	-	-	1	4	0.3	0.2	0.01	**0.4**	*C95*
Other and unspecified	185	0	93	5	5	8	10	39	47	71	8.8	5.6	0.68	**11.6**	*O&U*
All sites	3436	0	97	59	54	106	242	641	917	1417	164.0		12.51	**217.3**	*ALL*
All sites but C44	3300	0	97	58	54	101	235	621	877	1354	157.5	100.0	12.03	**208.5**	*ALLbC44*
Average annual population				90022	60012	52262	38796	26334	17635	14325					

Table 1. France, La Reunion (1988-1994)

NUMBER OF CASES BY AGE GROUP AND SUMMARY RATES OF INCIDENCE - FEMALE

SITE	ALL AGES	AGE UNK	MV (%)	0-	15-	25-	35-	45-	55-	65+	CRUDE RATE	%	CR 64	ASR (W)	*ICD (10th)*
Mouth	17	0	100	-	-	1	1	5	4	6	0.8	0.7	0.06	**0.9**	*C00-06*
Salivary gland	5	0	100	-	-	1	2	-	2	-	0.2	0.2	0.03	**0.2**	*C07-08*
Nasopharynx	4	0	100	-	2	-	-	1	-	1	0.2	0.2	0.01	**0.2**	*C11*
Other pharynx	16	0	100	-	-	3	1	6	5	1	0.7	0.6	0.08	**0.8**	*C09-10,C12-14*
Oesophagus	36	0	100	-	-	-	1	6	10	19	1.7	1.5	0.11	**1.9**	*C15*
Stomach	158	0	98	1	-	5	11	15	30	96	7.3	6.4	0.36	**7.8**	*C16*
Colon, rectum and anus	199	0	97	1	5	9	19	37	35	93	9.2	8.1	0.58	**10.0**	*C18-21*
Liver	32	0	78	-	-	-	3	5	9	15	1.5	1.3	0.11	**1.6**	*C22*
Gallbladder etc.	53	0	92	-	-	-	3	6	9	35	2.4	2.2	0.11	**2.6**	*C23-24*
Pancreas	35	0	69	-	-	1	4	2	11	17	1.6	1.4	0.11	**1.8**	*C25*
Larynx	6	0	100	-	-	1	-	1	1	3	0.3	0.2	0.02	**0.3**	*C32*
Trachea, bronchus and lung	64	0	89	-	-	-	3	5	18	38	3.0	2.6	0.17	**3.3**	*C33-34*
Bone	15	0	100	2	2	2	4	-	2	3	0.7	0.6	0.04	**0.7**	*C40-41*
Melanoma of skin	40	0	100	2	2	11	8	2	6	9	1.8	1.6	0.12	**1.8**	*C43*
Other skin	127	0	100	-	-	1	10	17	21	78	5.9		0.29	**6.3**	*C44*
Mesothelioma	5	0	100	-	-	-	1	-	1	3	0.2	0.2	0.01	**0.2**	*C45*
Kaposi sarcoma	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C46*
Peripheral nerves	2	0	100	1	-	1	-	-	-	-	0.1	0.1	0.01	**0.1**	*C47*
Connective and soft tissue	16	0	100	2	1	3	2	3	2	3	0.7	0.6	0.05	**0.8**	*C49*
Breast	566	0	99	-	2	33	109	156	110	156	26.2	23.0	2.18	**29.2**	*C50*
Vulva	18	0	100	-	-	-	1	2	4	11	0.8	0.7	0.04	**0.9**	*C51*
Vagina	6	0	100	-	-	1	1	2	-	2	0.3	0.2	0.02	**0.3**	*C52*
Cervix uteri	447	0	99	-	3	55	101	108	85	95	20.7	18.2	1.74	**22.3**	*C53*
Uterus	104	0	99	-	-	5	9	17	18	55	4.8	4.2	0.27	**5.1**	*C54-55*
Ovary	101	0	99	1	5	9	10	20	22	34	4.7	4.1	0.35	**5.1**	*C56*
Placenta	3	0	100	-	-	1	2	-	-	-	0.1	0.1	0.01	**0.1**	*C58*
Kidney	25	0	92	9	1	3	3	2	4	3	1.2	1.0	0.09	**1.3**	*C64*
Renal pelvis, ureter and other urinary	5	0	100	-	-	-	1	-	2	2	0.2	0.2	0.02	**0.3**	*C65-66,C68*
Bladder	35	0	97	-	-	-	1	2	5	27	1.6	1.4	0.05	**1.7**	*C67*
Eye	7	0	86	5	-	-	-	-	2	-	0.3	0.3	0.03	**0.4**	*C69*
Brain, nervous system	41	0	93	7	7	7	2	4	6	8	1.9	1.7	0.13	**1.9**	*C70-72*
Thyroid	33	0	100	-	3	9	5	6	5	5	1.5	1.3	0.12	**1.6**	*C73*
Hodgkin disease	12	0	100	-	4	3	1	-	1	3	0.6	0.5	0.03	**0.5**	*C81*
Non-Hodgkin lymphoma	75	0	95	6	2	8	6	5	6	42	3.5	3.0	0.14	**3.5**	*C82-85,C96*
Multiple myeloma	64	0	97	-	-	-	4	1	13	46	3.0	2.6	0.12	**3.1**	*C90*
Lymphoid leukaemia	29	0	97	13	1	1	-	2	4	8	1.3	1.2	0.08	**1.5**	*C91*
Myeloid leukaemia	51	0	100	4	6	4	2	6	9	20	2.4	2.1	0.14	**2.5**	*C92-94*
Leukaemia, unspecified	3	0	67	-	-	1	-	-	-	2	0.1	0.1	0.00	**0.1**	*C95*
Other and unspecified	134	0	96	9	5	5	7	21	28	59	6.2	5.4	0.40	**6.9**	*O&U*
All sites	2589	0	97	63	51	184	338	465	490	998	119.6		8.21	**129.7**	*ALL*
All sites but C44	2462	0	97	63	51	183	328	448	469	920	113.8	100.0	7.92	**123.4**	*ALLbC44*
Average annual population				88123	60455	53653	39114	26687	19231	21855					

Table 2. Childhood cancer, France, La Réunion (1988-1994)

	NUMBER OF CASES					REL. FREQ.(%)	RATES PER MILLION					
	0-4	5-9	10-14	**All**	*M/F*	Overall	0-4	5-9	10-14	Crude	**ASR**	%MV
Leukaemia	18	11	5	**34**	*1.0*	27.9	48.3	24.9	11.6	27.3	**30.1**	100.0
Acute lymphoid leukaemia	13	8	4	**25**	*0.9*	20.5	34.9	18.1	9.3	20.0	**22.0**	96.0
Lymphoma	8	6	6	**20**	*2.3*	16.4	21.5	13.6	13.9	16.0	**16.7**	90.9
Hodgkin disease	2	0	1	**3**	-	2.5	5.4	-	2.3	2.4	**2.7**	100.0
Burkitt lymphoma	2	2	2	**6**	-	4.9	5.4	4.5	4.6	4.8	**4.9**	83.3
Brain and spinal neoplasms	7	2	5	**14**	*1.3*	11.5	18.8	4.5	11.6	11.2	**12.1**	100.0
Neuroblastoma	6	1	0	**7**	*0.4*	5.7	16.1	2.3	-	5.6	**7.0**	100.0
Retinoblastoma	5	0	0	**5**	*0.3*	4.1	13.4	-	-	4.0	**5.2**	80.0
Wilms tumour	9	3	0	**12**	*0.3*	9.8	24.1	6.8	-	9.6	**11.5**	100.0
Bone tumours	1	1	4	**6**	*2.0*	4.9	2.7	2.3	9.3	4.8	**4.5**	83.3
Soft tissue sarcomas	1	0	2	**3**	*0.5*	2.5	2.7	-	4.6	2.4	**2.4**	100.0
Kaposi sarcoma	0	0	0	**0**	-	-	-	-	-	-	**-**	-
Germ cell tumours	4	1	0	**5**	*1.5*	4.1	10.7	2.3	-	4.0	**4.9**	100.0
Other	6	5	5	**16**	*0.6*	13.1	16.1	11.3	11.6	12.8	**13.2**	93.8
All	65	30	27	**122**	*0.9*	100.0	174.4	67.8	62.5	97.8	**107.5**	95.1

3.4.12 Rwanda

Background

Climate: Temperate; two rainy seasons (February to April, November to January); mild in mountains with frost and snow possible

Terrain: Mostly grassy uplands and hills; relief is mountainous with altitude declining from west to east

Ethnic groups: Hutu 80%, Tutsi 19%, Twa (Pygmoid) 1%

Religions: Roman Catholic 65%, Protestant 9%, Muslim 1%, indigenous beliefs and other 25%

Economy—overview: Rwanda has suffered bitterly from ethnic-based civil war. The agricultural sector dominates the economy; coffee and tea normally make up 80–90% of exports. The amount of fertile land is limited, however, and deforestation and soil erosion continue to reduce the production potential. Manufacturing focuses mainly on the processing of agricultural products. A structural adjustment programme with the World Bank began in October 1990. Civil war in 1990 devastated wide areas, especially in the north, and displaced hundreds of thousands of people. A peace accord in mid-1993 temporarily ended most of the fighting, but resumption of large-scale violence and genocide in April 1994 in the capital city Kigali and elsewhere took 500 000 lives in that year alone and severely damaged already poor economic prospects. In 1994–96, peace was restored throughout much of the country. In 1996–97, most of the refugees who fled the war returned to Rwanda. Sketchy data suggest that GDP dropped 50% in 1994 and recovered partially, by 25%, in 1995. Plentiful rains helped agriculture in 1996, and outside aid continued to support this desperately poor economy.

Industries: Mining of cassiterite (tin ore) and wolframite (tungsten ore), tin, cement, processing of agricultural products, small-scale beverage production, soap, furniture, shoes, plastic goods, textiles, cigarettes

Agriculture—products: Coffee, tea, pyrethrum (insecticide made from chrysanthemums), bananas, beans, sorghum, potatoes; livestock

Cancer registration

A cancer registry was established in the Department of Pathology at the University Hospital, Butare, in 1991. This registry began active data collection, through regular visits by registry staff, to collect data on cancer cases diagnosed in all four hospitals in the prefecture of Butare (population 765 000) in May 1991. The Department of Pathology itself served as an important source of information. The registry continued to function until the Rwandan genocide of April 1994. Here we present the results for the first 32 months of operation, May 1991–December 1993. These have been published as part of a paper examining the distribution, and some determinants, of cancer in Rwanda (Newton *et al.*, 1996). The calculated incidence rates are very low (age standardized rates for all cancers combined of 27.4 per 100 000 in men and 28.1 in women). These are clearly underestimates, presumably the result of underascertainment of cases, and the percentage of cases with morphological verification of diagnosis seems rather high (83.4%). However, the relative frequencies of different cancers may be a more or less true reflection of reality (Table 1). They suggest that the main cancers of men are liver (20.5%), Kaposi sarcoma (9.4%) and stomach (8.8%), and in women cervix (22.1%), stomach (9.6%), liver (8.7%) and breast (7.7%).

Review of data

Early reports of cancer in Rwanda included an analysis of 900 cases seen in seven hospitals in the period 1956–60 (Clemmesen *et al.*, 1962) and a summary of 120 cases from four hospitals in Rwanda-Burundi in 1968–69 (Cook & Burkitt, 1971). More recently, Ngendahayo (1986) and Ngendahayo & Parkin (1986) reported on cancer cases diagnosed in the Department of Pathology at the University Hospital, Butare, in 1982–84 (Table 2).

A more detailed analysis of 119 Kaposi sarcoma cases diagnosed histologically in 1979–86 (Ngendahayo *et al.*, 1989) showed that, at that time, the sex ratio remained high (6.4:1) and that incidence appeared to show a progressive increase with age. Nevertheless, 28 cases were "generalized", either cutaneous or affecting lymph nodes, or gastrointestinal tract. All eight of the generalized cases tested for anti-HIV antibody were positive, while none of the 10 localized cutaneous cases were. By 1991–93, 61% of the 18 cases of Kaposi sarcoma tested for HIV antibody were positive (Newton *et al.*, 1995).

Ngendahayo & Schmauz (1992) provided more detail of the 115 lymphoma cases diagnosed in 1979–87. There were 19 cases of Hodgkin disease, five under age 20 years, and the majority (11 cases) of mixed cellularity type. 91/96 non-Hodgkin lymphoma cases were B-cell lymphomas, with about equal numbers of high and low grade, nodal and extra-nodal cases. There were 12 cases of Burkitt lymphoma (9 abdominal), all aged <20 years (46.2% of non-Hodgkin lymphoma cases in this age group).

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Table 1. Rwanda, Butare (1991-1993)

NUMBER OF CASES BY AGE GROUP - MALE

SITE	ALL AGES	AGE UNK	MV (%)	0-	15-	25-	35-	45-	55-	65+	%	*ICD (10th)*
Mouth	3	0	100	-	-	-	-	-	1	2	1.8	*C00-06*
Salivary gland	2	0	100	-	-	1	1	-	-	-	1.2	*C07-08*
Nasopharynx	0	0	-	-	-	-	-	-	-	-	0.0	*C11*
Other pharynx	3	0	100	-	-	1	1	-	1	-	1.8	*C09-10,C12-14*
Oesophagus	0	0	-	-	-	-	-	-	-	-	0.0	*C15*
Stomach	15	0	60	-	-	3	4	7	-	1	8.8	*C16*
Colon, rectum and anus	4	0	100	-	1	-	1	-	-	2	2.3	*C18-21*
Liver	35	0	51	-	6	2	4	5	13	5	20.5	*C22*
Gallbladder etc.	0	0	-	-	-	-	-	-	-	-	0.0	*C23-24*
Pancreas	3	0	67	-	-	-	1	1	1	-	1.8	*C25*
Larynx	1	0	100	-	-	-	-	-	-	1	0.6	*C32*
Trachea, bronchus and lung	2	0	0	-	-	-	1	-	-	1	1.2	*C33-34*
Bone	6	0	33	-	1	1	1	-	1	2	3.5	*C40-41*
Melanoma of skin	2	0	100	-	-	-	-	2	-	-	1.2	*C43*
Other skin	14	0	100	-	1	4	3	4	-	2		*C44*
Mesothelioma	0	0	-	-	-	-	-	-	-	-	0.0	*C45*
Kaposi sarcoma	16	0	100	-	1	6	6	-	-	3	9.4	*C46*
Peripheral nerves	0	0	-	-	-	-	-	-	-	-	0.0	*C47*
Connective and soft tissue	5	0	100	1	1	-	1	-	-	2	2.9	*C49*
Breast	1	0	100	-	-	-	-	1	-	-	0.6	*C50*
Penis	5	0	100	-	-	-	-	1	1	3	2.9	*C60*
Prostate	5	0	100	-	-	-	-	-	1	4	2.9	*C61*
Testis	0	0	-	-	-	-	-	-	-	-	0.0	*C62*
Kidney	3	0	67	1	-	-	2	-	-	-	1.8	*C64*
Renal pelvis, ureter and other urinary	0	0	-	-	-	-	-	-	-	-	0.0	*C65-66,C68*
Bladder	4	0	50	-	-	-	1	-	-	3	2.3	*C67*
Eye	4	0	100	2	-	1	1	-	-	-	2.3	*C69*
Brain, nervous system	1	0	100	-	1	-	-	-	-	-	0.6	*C70-72*
Thyroid	0	0	-	-	-	-	-	-	-	-	0.0	*C73*
Hodgkin disease	3	0	100	1	1	1	-	-	-	-	1.8	*C81*
Non-Hodgkin lymphoma	10	1	100	4	1	3	1	-	-	-	5.8	*C82-85,C96*
Multiple myeloma	1	0	100	-	-	-	-	-	-	1	0.6	*C90*
Lymphoid leukaemia	0	0	-	-	-	-	-	-	-	-	0.0	*C91*
Myeloid leukaemia	1	0	100	-	-	-	1	-	-	-	0.6	*C92-94*
Leukaemia, unspecified	1	0	100	1	-	-	-	-	-	-	0.6	*C95*
Other and unspecified	35	1	80	5	3	6	6	7	5	2	20.5	*O&U*
All sites	185	2	78	15	17	29	36	28	24	34		*ALL*
All sites but C44	171	2	77	15	16	25	33	24	24	32	100.0	*ALLbC44*

Table 1. Rwanda, Butare (1991-1993)

NUMBER OF CASES BY AGE GROUP - FEMALE

SITE	ALL AGES	AGE UNK	MV (%)	0-	15-	25-	35-	45-	55-	65+	%	*ICD (10th)*
Mouth	1	0	100	-	-	-	-	-	1	-	0.5	*C00-06*
Salivary gland	0	0	-	-	-	-	-	-	-	-	0.0	*C07-08*
Nasopharynx	0	0	-	-	-	-	-	-	-	-	0.0	*C11*
Other pharynx	2	0	100	-	-	1	-	-	1	-	1.0	*C09-10,C12-14*
Oesophagus	1	0	0	-	-	-	-	1	-	-	0.5	*C15*
Stomach	20	1	75	-	-	1	4	6	-	8	9.6	*C16*
Colon, rectum and anus	6	0	83	-	-	-	2	1	1	2	2.9	*C18-21*
Liver	18	0	78	-	1	2	4	4	6	1	8.7	*C22*
Gallbladder etc.	0	0	-	-	-	-	-	-	-	-	0.0	*C23-24*
Pancreas	3	0	0	-	2	-	-	1	-	-	1.4	*C25*
Larynx	1	0	0	-	1	-	-	-	-	-	0.5	*C32*
Trachea, bronchus and lung	0	0	-	-	-	-	-	-	-	-	0.0	*C33-34*
Bone	5	0	80	1	2	1	1	-	-	-	2.4	*C40-41*
Melanoma of skin	4	0	100	-	-	-	-	1	-	3	1.9	*C43*
Other skin	12	0	100	1	3	-	3	3	1	1		*C44*
Mesothelioma	0	0	-	-	-	-	-	-	-	-	0.0	*C45*
Kaposi sarcoma	3	0	100	-	-	1	2	-	-	-	1.4	*C46*
Peripheral nerves	0	0	-	-	-	-	-	-	-	-	0.0	*C47*
Connective and soft tissue	7	0	100	2	1	1	-	1	-	2	3.4	*C49*
Breast	16	0	94	-	1	4	6	3	-	2	7.7	*C50*
Vulva	1	0	100	-	-	-	-	1	-	-	0.5	*C51*
Vagina	1	0	100	-	1	-	-	-	-	-	0.5	*C52*
Cervix uteri	46	0	100	-	-	4	9	18	11	4	22.1	*C53*
Uterus	11	1	100	-	-	3	1	1	2	3	5.3	*C54-55*
Ovary	5	0	80	-	-	-	-	3	2	-	2.4	*C56*
Placenta	0	0	-	-	-	-	-	-	-	-	0.0	*C58*
Kidney	1	0	100	-	-	-	1	-	-	-	0.5	*C64*
Renal pelvis, ureter and other urinary	0	0	-	-	-	-	-	-	-	-	0.0	*C65-66,C68*
Bladder	3	0	100	-	-	-	-	-	1	2	1.4	*C67*
Eye	10	0	80	5	-	1	1	3	-	-	4.8	*C69*
Brain, nervous system	1	0	100	-	1	-	-	-	-	-	0.5	*C70-72*
Thyroid	3	0	67	-	-	1	-	1	1	-	1.4	*C73*
Hodgkin disease	2	0	100	1	-	-	1	-	-	-	1.0	*C81*
Non-Hodgkin lymphoma	5	0	80	2	-	2	-	-	1	-	2.4	*C82-85,C96*
Multiple myeloma	0	0	-	-	-	-	-	-	-	-	0.0	*C90*
Lymphoid leukaemia	1	0	100	-	-	-	1	-	-	-	0.5	*C91*
Myeloid leukaemia	3	0	100	-	-	-	1	-	1	1	1.4	*C92-94*
Leukaemia, unspecified	0	0	-	-	-	-	-	-	-	-	0.0	*C95*
Other and unspecified	28	0	82	2	3	4	3	9	4	3	13.5	*O&U*
All sites	220	2	88	14	16	26	40	57	33	32		*ALL*
All sites but C44	208	2	87	13	13	26	37	54	32	31	100.0	*ALLbC44*

Table 2. Rwanda: case series

Site	Department of Pathology, University Hospital, Butare (1982–84) (Ngendahayo & Parkin, 1986)				
	Male		Female		%HV
	No.	%	No.	%	
Oral cavity	38	9.7%	16	3.8%	100
Nasopharynx	3	0.8%	1	0.2%	100
Other pharynx	0	0.0%	0	0.0%	100
Oesophagus	2	0.5%	0	0.0%	100
Stomach	39	9.9%	27	6.5%	100
Colon/rectum	10	2.5%	11	2.6%	100
Liver	26	6.6%	3	0.7%	100
Pancreas	1	0.3%	0	0.0%	100
Larynx	1	0.3%	0	0.0%	100
Lung	0	0.0%	0	0.0%	100
Melanoma	18	4.6%	12	2.9%	100
Other skin	52	13.2%	43	10.3%	100
Kaposi sarcoma	45	11.5%	8	1.9%	100
Breast	2	0.5%	70	16.8%	100
Cervix uteri			89	21.4%	100
Corpus uteri			6	1.4%	100
Ovary etc.			18	4.3%	100
Prostate	9	2.3%			100
Penis	18	4.6%			100
Bladder	1	0.3%	1	0.2%	100
Kidney etc.	5	1.3%	5	1.2%	100
Brain, nervous system	0	0.0%	0	0.0%	100
Eye	6	1.5%	7	1.7%	100
Thyroid	3	0.8%	10	2.4%	100
Non-Hodgkin lymphoma	32	8.1%	17	4.1%	100
Hodgkin disease	10	2.5%	3	0.7%	100
Myeloma	5	1.3%	0	0.0%	100
Leukaemia	2	0.5%	0	0.0%	100
ALL SITES	393	100.0%	416	100.0%	100

[1]Lip and tongue

3.4.13 Somalia

Background

Climate: Principally desert; December to February—northeast monsoon, moderate temperatures in north and very hot in south; May to October—southwest monsoon, torrid in the north and hot in the south, irregular rainfall, hot and humid periods (tangambili) between monsoons

Terrain: Mostly flat to undulating plateau rising to hills in north

Ethnic groups: Somali 85%, Bantu and other non-somali (including Arabs 30 000)

Religions: Sunni Muslim

Economy—overview: Somalia has few resources. Much of the economy has been devastated by civil war. Agriculture is the most important sector, with livestock accounting for about 40% of GDP and about 65% of export earnings. Nomads and semi-nomads, who are dependent upon livestock for their livelihood, make up a large portion of the population. Crop production generates only 10% of GDP and employs about 20% of the work force. After livestock, bananas are the principal export; sugar, sorghum, corn and fish are produced for the domestic market. The small industrial sector, based on the processing of agricultural products, accounts for less than 10% of GDP; most facilities have been shut down because of the civil strife. Moreover, continuing civil disturbances in Mogadishu and outlying areas interfere with any substantial economic advance.

Industries: A few small industries, including sugar refining, textiles, petroleum refining (mostly shut down)

Agriculture—products: Bananas, sorghum, corn, sugar-cane, mangoes, sesame seeds, beans; cattle, sheep, goats; fishing potential largely unexploited

Cancer registration

No cancer registration is being conducted in Somalia.

3.4.14 Tanzania, United Republic of

Background

Climate: Varies from tropical along coast to temperate in highlands

Terrain: Plains along coast; central plateau; highlands in north and south

Ethnic groups: Mainland—native African 99% (of which 95% are Bantu consisting of more than 130 tribes), other 1% (consisting of Asian, European and Arab). Zanzibar—Arab, native African, mixed Arab and native African

Religions: Mainland—Christian 45%, Muslim 35%, indigenous beliefs 20%. Zanzibar—more than 99% Muslim

Economy—overview: Tanzania is one of the poorest countries in the world. The economy is heavily dependent on agriculture, which accounts for 57% of GDP, provides 85% of exports and employs 90% of the work force. Topography and climatic conditions, however, limit cultivated crops to only 4% of the land area. Industry accounts for 17% of GDP and is mainly limited to processing agricultural products and light consumer goods. In the last 10 years there has been a substantial increase in output of minerals, led by gold. Natural gas exploration in the Rufiji Delta looks promising and production could start by 2002.

Industries: Primarily agricultural processing (sugar, beer, cigarettes, sisal twine), diamond and gold mining, oil refining, shoes, cement, textiles, wood products, fertilizer, salt

Agriculture—products: Coffee, sisal, tea, cotton, pyrethrum (insecticide made from chrysanthemums), cashews, tobacco, cloves (Zanzibar), corn, wheat, cassava (tapioca), bananas, fruits, vegetables; cattle, sheep, goats

Cancer registration

The Tanzania Cancer Registry was established in 1966 and is located in the Pathology Department of Muhumbili Medical Centre. It is a pathology-based cancer registry for cases diagnosed at all the hospitals in the central and southern parts of the Republic of Tanzania. However, the registry is also occasionally notified of histopathologically diagnosed cases from Mwanza Hospital, which acts a reference hospital to the northern and eastern parts of the country.

Kilimanjaro Cancer Registry is located in the Department of Pathology of the Kilimanjaro Christian Medical Centre (KCMC), in Moshi, north-western Tanzania. KCMC is a 420-bed hospital where all the major specialties are present and which provides specialist services for the north-western regions of the country. The registry was started in 1974 and recorded pathology-based data between 1975 and 1981 (Lauren & Kitinya, 1986). Approximately half of the cases at that time were from KCMC, the remainder coming from many other hospitals in the northern part of the country.

In 1998, the registry was restarted as a population-based registry, covering four districts (Moshi, urban and rural, Rombo, Hai) in Kilimanjaro region, with a population of about 840 386. Data collection is not only from the pathology department, but also by scheduled visits to all of the hospitals within these four districts by the cancer registrar.

A hospital cancer registry is present in the Ocean Road Cancer Centre in Dar es Salaam, the only specialized treatment centre for cancer in the whole country.

Review of data

Two sets of data are presented in this volume: from the Tanzania (Dar es Salaam) Cancer Registry, for the years 1990–91 (Table 1) and from the Kilimanjaro Cancer Registry (Table 2). The data from the Tanzania Cancer Registry represent 1881 cases diagnosed histologically only. In men, the most common cancers were Kaposi sarcoma (17.5% of cases, excluding non-melanoma skin cancers), oesophagus (9.5%) and non-Hodgkin lymphoma (9.1%), and in women, cervix cancer (46.9%) and breast cancer (12.7%).

These results can be compared with previous reports from this registry, from 1969–73 (Hiza, 1976) and from 1980–81 (Shaba & Owor, 1986) (Table 3). The latter report includes separate tables for cases notified to the National Registry from the pathology departments in Muhimbili Medical Centre, Dar es Salaam (2384 cases) and from Mwanza Hospital in the north-east of the country, south of Lake Victoria (422 cases). In males the frequency of cancer of the oesophagus is notable, and relatively constant between the series. The frequency of liver cancer, based only on histologically confirmed cases, is underestimated. Kaposi sarcoma comprised 3.6% cases in males in the 1980–81 data from Muhimbili Medical Centre and over two thirds of the cases with age recorded were over 45 years. The frequency in Mwanza was noted to be higher (18/191 cases in men, 9.4%). However, it is clear that there was a considerable increase in frequency by 1990–91, and two thirds of cases in men are now aged less than 45 years.

The Kilimanjaro Cancer Registry recorded 1204 cases in 1998–2000, 72% with a diagnosis based upon histology or cytology (Table 2). There are no recent census data, to permit calculation of incidence rates, so the results are presented simply as frequencies of the different cancers. The most frequently diagnosed cancer in men is cancer of the prostate (20.2% of cases), followed by stomach (12.4%), liver (8.8%), oesophagus (7.8%) and Kaposi sarcoma (6.5%). In women, the principal cancers are cervix (29.8%) and breast (12.2%). Cancers of the eye were also common in both sexes; the cases in adults were predominantly squamous cell carcinomas of the conjunctiva (Chapter 4.5, Table 3).

These results are rather different from the earlier series from the registry, for the years1975-1979 (Table 3), in paricular, in the increased frequency of prostate and oesophageal cancers. The frequency of KS was not reported. Cervix cancer was still the most common cancer of women; Kitinya and Lauren (1988) also estimated age adjusted incidence rates of cervical cancer among the two main tribal groups, and found a higher rate in the Pare ethnic group compared to Chagga. They ascribed this to differences in sexual lifestyles. The relatively high frequency of stomach cancer in the data from Kilimanjaro has also been commented on (Kitinya et al, 1988), with respect to the larger proportion of tumours of intestinal-type histology than in lower-risk areas, and the possible role of volcanic soils in the aetiology.

Childhood cancer

The cases of childhood cancer recorded in the Tanzania Cancer Registry (histology-based) in 1990–91 are shown in Table 4. Earlier series (Table 5) are essentially from the same source. Shaba (1988) reported a series of 258 cases of childhood cancer diagnosed histologically in three government referral hospitals (Mwanza, Kilimanjaro Christian Medical Centre (Moshi) and Muhimbili Medical Centre in Dar es Salaam) during 1980–81. The series reported by Carneiro *et al.* represents the childhood cancer cases collected by the Department of Pathology at Muhimbili Medical Centre in Dar es Salaam over a period of 22 years (1973–95), a total of 1874 cases.

Table 1. Tanzania, Dar Es Salaam (1990-1991)

NUMBER OF CASES BY AGE GROUP - MALE

SITE	ALL AGES	AGE UNK	MV (%)	0-	15-	25-	35-	45-	55-	65+	%	*ICD (10th)*
Mouth	26	2	100	-	1	3	1	4	12	3	4.0	*C00-06*
Salivary gland	7	1	100	-	-	1	1	2	1	1	1.1	*C07-08*
Nasopharynx	19	0	100	-	4	2	3	6	2	2	2.9	*C11*
Other pharynx	12	1	100	-	-	-	1	4	2	4	1.8	*C09-10,C12-14*
Oesophagus	62	2	100	-	-	4	5	18	18	15	9.5	*C15*
Stomach	8	1	100	-	-	-	1	1	5	-	1.2	*C16*
Colon, rectum and anus	21	1	100	-	1	2	5	5	3	4	3.2	*C18-21*
Liver	12	3	100	-	1	-	5	1	2	-	1.8	*C22*
Gallbladder etc.	0	0	-	-	-	-	-	-	-	-	0.0	*C23-24*
Pancreas	0	0	-	-	-	-	-	-	-	-	0.0	*C25*
Larynx	22	1	100	1	1	-	1	6	9	3	3.4	*C32*
Trachea, bronchus and lung	6	0	100	-	-	1	-	2	3	-	0.9	*C33-34*
Bone	17	2	100	1	5	4	1	-	3	1	2.6	*C40-41*
Melanoma of skin	5	1	100	-	-	-	1	2	1	-	0.8	*C43*
Other skin	54	9	100	2	7	16	2	8	5	5		*C44*
Mesothelioma	0	0	-	-	-	-	-	-	-	-	0.0	*C45*
Kaposi sarcoma	114	15	99	-	7	32	27	14	5	14	17.5	*C46*
Peripheral nerves	6	1	100	2	-	1	1	-	1	-	0.9	*C47*
Connective and soft tissue	24	4	100	4	4	4	5	2	-	1	3.7	*C49*
Breast	0	0	-	-	-	-	-	-	-	-	0.0	*C50*
Penis	8	0	100	1	-	1	-	1	4	1	1.2	*C60*
Prostate	42	10	100	-	-	-	-	2	10	20	6.5	*C61*
Testis	4	2	100	-	-	1	-	1	-	-	0.6	*C62*
Kidney	3	0	100	2	-	-	1	-	-	-	0.5	*C64*
Renal pelvis, ureter and other urinary	1	0	100	-	-	-	-	-	-	1	0.2	*C65-66,C68*
Bladder	29	5	100	-	1	1	2	5	6	9	4.5	*C67*
Eye	39	8	100	9	5	5	6	4	1	1	6.0	*C69*
Brain, nervous system	2	0	100	1	-	-	1	-	-	-	0.3	*C70-72*
Thyroid	6	0	100	-	1	1	1	-	2	1	0.9	*C73*
Hodgkin disease	8	0	100	4	2	2	-	-	-	-	1.2	*C81*
Non-Hodgkin lymphoma	59	5	100	31	10	3	3	5	2	-	9.1	*C82-85,C96*
Multiple myeloma	3	0	100	-	-	-	1	1	1	-	0.5	*C90*
Lymphoid leukaemia	25	0	100	8	4	-	4	4	2	3	3.8	*C91*
Myeloid leukaemia	22	0	100	4	5	2	6	2	2	1	3.4	*C92-94*
Leukaemia, unspecified	2	0	100	2	-	-	-	-	-	-	0.3	*C95*
Other and unspecified	36	7	100	2	1	3	4	5	5	9	5.5	*O&U*
All sites	704	81	100	74	60	89	89	105	107	99		*ALL*
All sites but C44	650	72	100	72	53	73	87	97	102	94	100.0	*ALLbC44*

Table 1. Tanzania, Dar Es Salaam (1990-1991)

NUMBER OF CASES BY AGE GROUP - FEMALE

SITE	ALL AGES	AGE UNK	MV (%)	0-	15-	25-	35-	45-	55-	65+	%	*ICD (10th)*
Mouth	34	2	100	1	2	2	4	14	8	1	3.0	*C00-06*
Salivary gland	7	1	100	2	1	2	1	-	-	-	0.6	*C07-08*
Nasopharynx	9	0	100	1	1	-	2	3	2	-	0.8	*C11*
Other pharynx	9	2	100	-	1	2	1	-	1	2	0.8	*C09-10,C12-14*
Oesophagus	25	2	100	-	2	1	4	4	7	5	2.2	*C15*
Stomach	9	2	100	-	-	-	1	-	2	4	0.8	*C16*
Colon, rectum and anus	19	3	100	-	-	1	3	2	10	-	1.7	*C18-21*
Liver	4	1	100	-	2	-	1	-	-	-	0.4	*C22*
Gallbladder etc.	1	0	100	-	-	-	-	1	-	-	0.1	*C23-24*
Pancreas	0	0	-	-	-	-	-	-	-	-	0.0	*C25*
Larynx	6	0	100	1	-	1	1	3	-	-	0.5	*C32*
Trachea, bronchus and lung	3	0	100	-	-	-	3	-	-	-	0.3	*C33-34*
Bone	14	1	100	2	6	1	1	1	2	-	1.2	*C40-41*
Melanoma of skin	7	0	86	-	-	1	1	3	1	1	0.6	*C43*
Other skin	47	7	100	-	4	6	8	5	9	8		*C44*
Mesothelioma	0	0	-	-	-	-	-	-	-	-	0.0	*C45*
Kaposi sarcoma	42	6	100	1	8	13	8	1	3	2	3.7	*C46*
Peripheral nerves	4	1	100	2	1	-	-	-	-	-	0.4	*C47*
Connective and soft tissue	18	1	100	1	4	7	-	1	4	-	1.6	*C49*
Breast	143	12	100	1	3	17	30	36	24	20	12.7	*C50*
Vulva	9	0	100	-	-	-	-	6	2	1	0.8	*C51*
Vagina	6	1	100	-	-	2	-	3	-	-	0.5	*C52*
Cervix uteri	530	83	100	1	3	56	115	144	87	41	46.9	*C53*
Uterus	40	7	100	-	2	4	10	8	7	2	3.5	*C54-55*
Ovary	11	0	100	-	2	2	3	1	2	1	1.0	*C56*
Placenta	0	0	-	-	-	-	-	-	-	-	0.0	*C58*
Kidney	2	0	100	1	-	1	-	-	-	-	0.2	*C64*
Renal pelvis, ureter and other urinary	5	0	100	-	-	2	2	-	1	-	0.4	*C65-66,C68*
Bladder	24	3	100	2	1	3	3	2	10	-	2.1	*C67*
Eye	29	3	100	9	3	5	1	4	1	3	2.6	*C69*
Brain, nervous system	1	0	100	-	1	-	-	-	-	-	0.1	*C70-72*
Thyroid	1	0	100	-	-	-	-	-	1	-	0.1	*C73*
Hodgkin disease	5	0	100	-	-	2	3	-	-	-	0.4	*C81*
Non-Hodgkin lymphoma	40	1	100	23	3	3	2	2	4	2	3.5	*C82-85,C96*
Multiple myeloma	2	0	100	-	-	-	-	-	1	1	0.2	*C90*
Lymphoid leukaemia	8	0	100	-	-	-	1	3	3	1	0.7	*C91*
Myeloid leukaemia	14	0	100	5	2	4	1	2	-	-	1.2	*C92-94*
Leukaemia, unspecified	2	0	100	-	-	-	2	-	-	-	0.2	*C95*
Other and unspecified	47	5	100	2	4	6	10	11	6	3	4.2	*O&U*
All sites	1177	144	100	55	56	144	222	260	198	98		*ALL*
All sites but C44	1130	137	100	55	52	138	214	255	189	90	100.0	*ALLbC44*

Table 2. Tanzania, Kilimanjaro (1998-2000)

NUMBER OF CASES BY AGE GROUP - MALE

SITE	ALL AGES	AGE UNK	MV (%)	0-	15-	25-	35-	45-	55-	65+	%	*ICD (10th)*
Mouth	13	0	92	1	-	-	1	2	3	6	2.1	*C00-06*
Salivary gland	2	0	100	-	-	-	-	-	2	-	0.3	*C07-08*
Nasopharynx	7	0	100	-	3	1	-	1	1	1	1.1	*C11*
Other pharynx	5	0	100	-	-	-	-	1	3	1	0.8	*C09-10,C12-14*
Oesophagus	76	0	25	-	-	4	4	12	19	37	12.4	*C15*
Stomach	48	2	44	-	-	-	1	11	10	24	7.8	*C16*
Colon, rectum and anus	11	0	64	-	1	1	1	1	2	5	1.8	*C18-21*
Liver	54	1	37	-	2	8	6	14	8	15	8.8	*C22*
Gallbladder etc.	1	0	100	-	-	-	1	-	-	-	0.2	*C23-24*
Pancreas	10	0	10	-	-	3	1	1	-	5	1.6	*C25*
Larynx	17	0	82	-	-	-	-	2	5	10	2.8	*C32*
Trachea, bronchus and lung	5	0	20	-	-	-	-	1	-	4	0.8	*C33-34*
Bone	7	0	71	-	4	-	1	-	1	1	1.1	*C40-41*
Melanoma of skin	4	0	100	-	-	1	-	-	2	1	0.7	*C43*
Other skin	18	0	100	-	5	2	4	2	3	2		*C44*
Mesothelioma	0	0	-	-	-	-	-	-	-	-	0.0	*C45*
Kaposi sarcoma	40	0	73	2	4	7	13	4	2	8	6.5	*C46*
Peripheral nerves	2	0	100	-	-	-	-	-	-	2	0.3	*C47*
Connective and soft tissue	5	0	100	-	1	1	2	-	-	1	0.8	*C49*
Breast	6	0	67	-	-	-	1	1	2	2	1.0	*C50*
Penis	2	0	100	-	-	-	-	1	1	-	0.3	*C60*
Prostate	124	3	96	-	-	-	-	4	16	101	20.2	*C61*
Testis	1	0	0	-	1	-	-	-	-	-	0.2	*C62*
Kidney	6	0	83	4	-	-	-	1	1	-	1.0	*C64*
Renal pelvis, ureter and other urinary	1	0	100	-	-	-	-	1	-	-	0.2	*C65-66,C68*
Bladder	22	1	82	1	-	-	-	2	5	13	3.6	*C67*
Eye	37	1	95	8	-	8	8	5	3	4	6.0	*C69*
Brain, nervous system	3	0	0	2	-	-	-	1	-	-	0.5	*C70-72*
Thyroid	5	0	100	2	-	1	-	-	1	1	0.8	*C73*
Hodgkin disease	4	0	100	1	2	1	-	-	-	-	0.7	*C81*
Non-Hodgkin lymphoma	19	0	95	6	-	2	1	2	4	4	3.1	*C82-85,C96*
Multiple myeloma	1	0	100	-	-	-	-	1	-	-	0.2	*C90*
Lymphoid leukaemia	7	0	100	1	1	-	-	-	1	4	1.1	*C91*
Myeloid leukaemia	8	0	100	2	-	2	3	-	1	-	1.3	*C92-94*
Leukaemia, unspecified	5	0	60	2	1	2	-	-	-	-	0.8	*C95*
Other and unspecified	56	0	75	1	5	4	5	12	14	15	9.1	*O&U*
All sites	632	8	70	33	30	48	53	83	110	267		*ALL*
All sites but C44	614	8	70	33	25	46	49	81	107	265	100.0	*ALLbC44*

Table 2. Tanzania, Kilimanjaro (1998-2000)

NUMBER OF CASES BY AGE GROUP - FEMALE

SITE	ALL AGES	AGE UNK	MV (%)	0-	15-	25-	35-	45-	55-	65+	%	*ICD (10th)*
Mouth	7	0	86	-	-	-	1	1	3	2	1.2	*C00-06*
Salivary gland	1	0	100	-	-	1	-	-	-	-	0.2	*C07-08*
Nasopharynx	3	0	100	1	-	-	-	-	1	1	0.5	*C11*
Other pharynx	2	0	100	-	-	-	2	-	-	-	0.4	*C09-10,C12-14*
Oesophagus	24	2	17	-	-	-	2	8	5	7	4.3	*C15*
Stomach	34	0	41	-	-	2	6	5	8	13	6.0	*C16*
Colon, rectum and anus	13	1	54	-	-	-	1	5	2	4	2.3	*C18-21*
Liver	23	2	43	-	-	3	5	3	3	7	4.1	*C22*
Gallbladder etc.	1	0	0	-	-	-	-	1	-	-	0.2	*C23-24*
Pancreas	4	0	0	-	-	-	1	1	-	2	0.7	*C25*
Larynx	3	0	100	-	-	-	-	1	1	1	0.5	*C32*
Trachea, bronchus and lung	1	0	100	-	-	-	-	-	1	-	0.2	*C33-34*
Bone	3	0	67	-	1	2	-	-	-	-	0.5	*C40-41*
Melanoma of skin	5	0	100	-	-	1	1	1	-	2	0.9	*C43*
Other skin	8	0	100	-	-	-	2	3	1	2		*C44*
Mesothelioma	0	0	-	-	-	-	-	-	-	-	0.0	*C45*
Kaposi sarcoma	23	0	57	3	4	7	6	1	1	1	4.1	*C46*
Peripheral nerves	0	0	-	-	-	-	-	-	-	-	0.0	*C47*
Connective and soft tissue	10	0	100	1	2	2	1	1	1	2	1.8	*C49*
Breast	69	1	68	-	1	8	19	18	12	10	12.2	*C50*
Vulva	4	0	100	-	-	-	2	2	-	-	0.7	*C51*
Vagina	0	0	-	-	-	-	-	-	-	-	0.0	*C52*
Cervix uteri	168	1	89	-	-	13	48	54	30	22	29.8	*C53*
Uterus	14	0	86	-	2	4	1	3	2	2	2.5	*C54-55*
Ovary	29	0	79	1	1	6	7	8	2	4	5.1	*C56*
Placenta	0	0	-	-	-	-	-	-	-	-	0.0	*C58*
Kidney	8	0	100	7	-	-	1	-	-	-	1.4	*C64*
Renal pelvis, ureter and other urinary	0	0	-	-	-	-	-	-	-	-	0.0	*C65-66,C68*
Bladder	4	0	50	-	-	-	-	-	1	3	0.7	*C67*
Eye	29	0	100	5	-	11	8	2	-	3	5.1	*C69*
Brain, nervous system	0	0	-	-	-	-	-	-	-	-	0.0	*C70-72*
Thyroid	10	0	80	1	2	1	3	-	1	2	1.8	*C73*
Hodgkin disease	3	0	100	1	2	-	-	-	-	-	0.5	*C81*
Non-Hodgkin lymphoma	11	0	64	3	1	2	-	1	2	2	2.0	*C82-85,C96*
Multiple myeloma	1	0	100	-	-	-	-	-	-	1	0.2	*C90*
Lymphoid leukaemia	5	0	100	1	-	-	-	-	1	3	0.9	*C91*
Myeloid leukaemia	6	0	100	-	1	-	2	1	2	-	1.1	*C92-94*
Leukaemia, unspecified	7	0	71	3	2	-	-	1	-	1	1.2	*C95*
Other and unspecified	39	3	82	-	1	4	4	4	6	17	6.9	*O&U*
All sites	572	10	75	27	20	67	123	125	86	114		*ALL*
All sites but C44	564	10	75	27	20	67	121	122	85	112	100.0	*ALLbC44*

Table 3. Tanzania: case series

Site	Tanzania Cancer Registry, 1969–73 (Hiza,1976)					Tanzania Cancer Registry, 1980–81: Muhimbili M.C.(Shaba & Owor, 1986)					Kilimanjaro Cancer Registry, 1975–79 (Lauren & Kitinya, 1986)				
	Male		Female		%HV	Male		Female		%HV	Male		Female		%HV
	No.	%	No.	%		No.	%	No.	%		No.	%	No.	%	
Oral cavity[1]	139		116		100	73	7.2%	51	4.0%	100	44	8.6%	29	7.2%	100
Nasopharynx						13	1.3%	5	0.4%	100	20	3.9%	6	1.5%	100
Other pharynx	13		8		100	14	1.4%	3	0.2%	100	5	1.0%	0	0.0%	100
Oesophagus	106		8		100	97	9.5%	18	1.4%	100	19	3.7%	5	1.2%	100
Stomach	135		65		100	17	1.7%	19	1.5%	100	44	8.6%	40	9.9%	100
Colon/rectum	93		60		100	26	2.6%	31	2.4%	100	9	1.8%	6	1.5%	100
Liver	236		66		100	68	6.7%	35	2.7%	100	78	15.3%	15	3.7%	100
Pancreas	11		10		100	1	0.1%	1	0.1%	100	5	1.0%	1	0.2%	100
Lung						4	0.4%	4	0.3%	100	5	1.0%	0	0.0%	100
Melanoma						32	3.1%	23	1.8%	100	9	1.8%	11	2.7%	100
Other skin						115	11.3%	90	7.1%	100	26	5.1%	20	4.9%	100
Kaposi sarcoma						37	3.6%	10	0.8%	100					
Breast	33		328		100	20	2.0%	119	9.3%	100	3	0.6%	49	12.1%	100
Cervix uteri								482	37.8%	100			85	21.0%	100
Corpus uteri								18	1.4%	100			8	2.0%	100
Ovary etc.								33	2.6%	100			20	4.9%	100
Prostate	149				100	59	5.8%			100	57	11.2%			100
Penis	116				100	25	2.5%			100	4	0.8%			100
Bladder	154		70		100	50	4.9%	23	1.8%	100	15	2.9%	4	1.0%	100
Kidney etc.						5	0.5%	12	0.9%	100	6	1.2%	9	2.2%	100
Eye						32	3.1%	18	1.4%	100	9	1.8%	7	1.7%	100
Brain, nervous system						0	0.0%	0	0.0%	100	6	1.2%	3	0.7%	100
Thyroid						7	0.7%	15	1.2%	100	3	0.6%	3	0.7%	100
Non-Hodgkin lymphoma						64	6.3%	44	3.5%	100	39	7.7%	17	4.2%	100
Hodgkin disease						33	3.2%	7	0.5%	100	15	2.9%	10	2.5%	100
Myeloma						10	1.0%	1	0.1%	100	2	0.4%	0	0.0%	100
Leukaemia						30	2.9%	30	2.4%	100	4	0.8%	1	0.2%	100
ALL SITES						1019	100.0%	1275	100.0%	100	509	100.0%	405	100.0%	100

[1] Includes salivary gland tumours

Table 4. Childhood cancer, Tanzania, Dar Es salaam (1990-1991)

	NUMBER OF CASES					REL. FREQ.(%)	RATES PER MILLION					
	0-4	5-9	10-14	**All**	*M/F*	Overall	0-4	5-9	10-14	Crude	**ASR**	%MV
Leukaemia	2	6	11	**19**	*2.8*	14.7	-	-	-	-	-	100.0
Acute lymphoid leukaemia	1	1	5	**7**	-	5.4	-	-	-	-	-	100.0
Lymphoma	10	38	10	**58**	*1.5*	45.0	-	-	-	-	-	100.0
Hodgkin disease	1	3	0	**4**	-	3.1	-	-	-	-	-	100.0
Burkitt lymphoma	6	23	2	**31**	*0.9*	24.0	-	-	-	-	-	100.0
Brain and spinal neoplasms	0	0	1	**1**	-	0.8	-	-	-	-	-	100.0
Neuroblastoma	2	1	1	**4**	*3.0*	3.1	-	-	-	-	-	100.0
Retinoblastoma	9	5	0	**14**	*0.8*	10.9	-	-	-	-	-	100.0
Wilms tumour	2	0	0	**2**	-	1.6	-	-	-	-	-	100.0
Bone tumours	0	0	3	**3**	*0.5*	2.3	-	-	-	-	-	100.0
Soft tissue sarcomas	2	2	2	**6**	*2.0*	4.7	-	-	-	-	-	100.0
Kaposi sarcoma	0	1	0	**1**	-	0.8	-	-	-	-	-	100.0
Germ cell tumours	0	0	0	**0**	-	-	-	-	-	-	-	-
Other	5	8	9	**22**	*0.6*	17.1	-	-	-	-	-	100.0
All	32	60	37	**129**	*1.3*	100.0	-	-	-	-	-	100.0

Table 5. Tanzania: childhood case series

Cancer	Shaba, 1988		Carneiro *et al.*, 1998	
	No.	%	No.	%
Leukaemia	12	4.7%	85	4.5%
Acute lymphocytic leukaemia	4	1.6%		
Lymphoma	115	44.6%	728	38.8%
Burkitt lymphoma	53	20.5%	388	20.7%
Hodgkin disease	33	12.8%	126	6.7%
Brain and spinal neoplasms	1	0.4%	6	0.3%
Neuroblastoma	1	0.4%	31	1.7%
Retinoblastoma	26	10.1%	207	11.0%
Wilms tumour	15	5.8%	109	5.8%
Bone tumours	7	2.7%	32	1.7%
Soft-tissue sarcomas	51	19.8%	245	13.1%
Kaposi sarcoma	26	10.1%	90	4.8%
Other	30	11.6%	431	23.0%
Total	258	100.0%	1874	100.0%

The results are shown in Table 5. Lymphomas predominate in all these series, with about half the cases being Burkitt lymphomas.

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3.4.15 Uganda

Background

Climate: Tropical; generally rainy with two dry seasons (December to February, June to August); semi-arid in north-east

Terrain: Mostly plateau with rim of mountains

Ethnic groups: Baganda 17%, Karamojong 12%, Basogo 8%, Iteso 8%, Langi 6%, Rwanda 6%, Bagisu 5%, Acholi 4%, Lugbara 4%, Bunyoro 3%, Batobo 3%, non-African (European, Asian, Arab) 1%, other 23%

Religions: Roman Catholic 33%, Protestant 33%, Muslim 16%, indigenous beliefs 18%

Economy—overview: Uganda has substantial natural resources, including fertile soils, regular rainfall and sizable mineral deposits of copper and cobalt. Agriculture is the most important sector of the economy, employing over 80% of the work force. Coffee is the major export crop and accounts for the bulk of export revenues.

Industries: The limited manufacturing industry is concentrated in a few towns and involved mainly in repacking of merchandise, sugar, brewing, tobacco, cotton textiles, cement

Agriculture—products: Coffee, tea, cotton, tobacco, cassava (tapioca), potatoes, corn, millet, pulses; beef, goat meat, milk, poultry

Cancer registration

Uganda has had well established cancer registration since the early 1950s. An account of the development of statistical data on cancer, since the early observations of Sir Albert Cook in 1901 to the early 1970s, is provided by Templeton and Hutt (1972).

Kampala Cancer Registry was established in 1954, in the Department of Pathology of Makerere University Medical School. The aim was to obtain information on cancer occurrence in the population of Kyadondo County, in which the capital city of Kampala is situated. The registry functioned continuously both before and after independence (1962), until the coup d'état of General Idi Amin Dada in 1971. Thereafter, full population coverage was not possible, although a register was maintained within the Department of Pathology until 1980, when all registration ceased. With the return of political stability, the registry restarted in 1989 and has functioned continuously since.

Initially, the registry used request/result forms of the Department of Pathology, redesigned specifically to permit registration of cancers. Thus, they contained demographic information on the patient, as well as the source of the specimen and the results of the examination. In addition to data collected in this way, tumour registrars have been employed to search for cancer cases admitted to, or treated in, the four main hospitals in Kampala (and, in recent years, the Uganda Hospice) and, for individuals resident in Kyadondo County, to extract somewhat more extensive information onto special notification forms.

Between 1954 and 1980, registration was manual, apart from the period 1964–68, when the data were transferred to punched cards (Templeton, 1973), which are no longer available in Uganda. The details of all patients were entered into a large register. Since 1989 the registration process has been computerized, using the CanReg system of IARC.

West Nile Cancer Registry was essentially a hospital cancer registry, based in Kuluva Hospital, in the West Nile District, in the far northwest of the country. The registry functioned between 1961 and 1978, and provided a basis for a variety of research studies on the epidemiology of Burkitt lymphoma.

Mbarara: Cancer registration for Mbarara district in the south-west of Uganda was initiated in 2000, based on the department of pathology in Mbarara University Teaching Hospital (MUTH). The registry depended upon case-finding by the pathologist, and was based upon cancers diagnosed in the department of pathology, but also those traced via the medical records department in MUTH and in several smaller hospitals in Mbarara and neighbouring districts, as well as Mbarara hospice. Data collection was retrospective, beginning in 1997.

Review of data

Reports of cancer in Uganda date back to end of 19th century, when the first missionary doctor established western medicine in Uganda. Davies *et al.* (1964) reviewed the hospital records of Mengo Hospital (in Kyadondo County) from 1897 to 1956. Although the frequency of different cancers was not available by sex, they noted that the general pattern of malignant diseases admitted to the hospital changed little during the period.

Kampala Cancer Registry

The most complete set of data comes from the Kampala Cancer Registry.

Registry data for the whole country were analysed by Templeton (1973) and published as a monograph. The focus was on the 6956 cases of cancer histologically diagnosed in the Department of Pathology during the years 1964–68, although 391 cases clinically diagnosed in the Kampala hospitals were also included. Because the observed incidence rates are markedly affected by differing referral/biopsy rates (Templeton & Bianchi, 1972), much of the analysis of regional and ethnic variation is based on proportions. These serve to suggest variations in the cancer patterns in different regions or ethnic groups, with, for example, relatively high frequencies of stomach cancer among Rwandans, penile cancer among the Bunyoro, bladder cancer among Baganda, and Burkitt lymphoma among the Lugbara.

Incidence rates for the population of Kyadondo County have been published for the periods 1954–60 (Davies *et al.*, 1962, 1965), 1968–70 (Templeton *et al.*, 1972), 1989–91 (Wabinga *et al.*, 1993) and 1991–93 (in Parkin *et al.*, 1997). In addition, frequency data, from the period when population coverage was incomplete (1971–80), were published by Owor (1986). The results presented in this monograph represent a recent five-year period, 1993–97 (Table 1). Table 2 shows the results for the period 1954–1960, as published in *Cancer Incidence in Five Continents*, Vol. I (Doll *et al.*, 1966). A complete review of the data set, for four time periods (1960–66, 1967–71, 1991–94, 1995–97) has been published by Wabinga *et al.* (2000). Table 3 shows the summary age-standardized incidence rates for the major sites, for the four different periods.

The most striking feature is the very high incidence of Kaposi sarcoma (KS), the most common cancer of men (41.3% cases), with an age-standardized incidence (ASR 37.7 per 100 000), about double that in women (20.5 per 100 000). These high rates reflect the effects of the epidemic of AIDS, Uganda being one of the first countries in Africa to have been affected, and incidence rates have been more or less stable throughout the 1990s (Parkin *et al.*, 1999). As seen in the earlier data reported here, KS has always been observed in the Ugandan population, although before the AIDS epidemic it was of the typical 'endemic' pattern, involving the skin,

Table 1. Uganda, Kyadondo County (1993-1997)

NUMBER OF CASES BY AGE GROUP AND SUMMARY RATES OF INCIDENCE - MALE

SITE	ALL AGES	AGE UNK	MV (%)	0-	15-	25-	35-	45-	55-	65+	CRUDE RATE	%	CR 64	ASR (W)	*ICD (10th)*
Mouth	23	2	91	-	1	2	7	6	2	3	0.8	1.1	0.14	**2.1**	*C00-06*
Salivary gland	4	0	75	-	-	1	2	-	-	1	0.1	0.2	0.01	**0.3**	*C07-08*
Nasopharynx	33	0	82	4	2	14	6	3	4	-	1.2	1.6	0.18	**1.8**	*C11*
Other pharynx	17	2	65	-	-	3	2	5	4	1	0.6	0.8	0.16	**1.8**	*C09-10,C12-14*
Oesophagus	106	2	40	-	2	7	14	34	19	28	3.8	5.2	0.82	**13.3**	*C15*
Stomach	57	1	51	2	2	6	7	10	11	18	2.0	2.8	0.39	**7.2**	*C16*
Colon, rectum and anus	68	2	59	-	3	9	13	10	9	22	2.4	3.3	0.39	**8.0**	*C18-21*
Liver	74	5	36	2	6	15	16	9	12	9	2.6	3.6	0.48	**6.5**	*C22*
Gallbladder etc.	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C23-24*
Pancreas	8	0	25	-	-	1	1	1	1	4	0.3	0.4	0.04	**1.1**	*C25*
Larynx	10	0	90	-	-	-	2	3	4	1	0.4	0.5	0.12	**1.3**	*C32*
Trachea, bronchus and lung	33	3	61	-	-	4	9	5	7	5	1.2	1.6	0.28	**3.6**	*C33-34*
Bone	24	0	67	5	8	4	1	3	1	2	0.9	1.2	0.08	**1.4**	*C40-41*
Melanoma of skin	11	0	91	-	-	1	1	6	-	3	0.4	0.5	0.06	**1.3**	*C43*
Other skin	32	0	81	3	1	3	2	9	4	10	1.1		0.19	**3.8**	*C44*
Mesothelioma	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C45*
Kaposi sarcoma	843	31	83	81	63	343	225	62	24	14	30.0	41.3	2.94	**37.7**	*C46*
Peripheral nerves	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C47*
Connective and soft tissue	35	3	91	7	4	3	10	4	2	2	1.2	1.7	0.16	**2.2**	*C49*
Breast	10	0	70	-	1	1	1	4	-	3	0.4	0.5	0.04	**1.1**	*C50*
Penis	34	2	76	-	1	4	6	6	1	14	1.2	1.7	0.12	**4.1**	*C60*
Prostate	215	20	77	2	-	-	1	17	40	135	7.6	10.5	1.19	**38.6**	*C61*
Testis	6	0	50	-	3	-	-	1	2	-	0.2	0.3	0.06	**0.5**	*C62*
Kidney	21	0	71	13	1	3	1	1	1	1	0.7	1.0	0.06	**0.9**	*C64*
Renal pelvis, ureter and other urinary	1	0	100	-	-	-	-	-	1	-	0.0	0.0	0.02	**0.2**	*C65-66,C68*
Bladder	17	0	53	-	-	1	-	2	3	11	0.6	0.8	0.09	**2.9**	*C67*
Eye	76	3	74	14	10	30	10	8	1	-	2.7	3.7	0.22	**2.9**	*C69*
Brain, nervous system	11	0	64	3	2	-	3	1	2	-	0.4	0.5	0.08	**0.8**	*C70-72*
Thyroid	6	1	100	1	-	2	-	-	2	-	0.2	0.3	0.06	**0.6**	*C73*
Hodgkin disease	18	0	94	5	3	4	1	2	1	2	0.6	0.9	0.06	**1.1**	*C81*
Non-Hodgkin lymphoma	141	0	79	84	16	13	14	9	1	4	5.0	6.9	0.33	**5.7**	*C82-85,C96*
Multiple myeloma	2	0	100	-	-	1	1	-	-	-	0.1	0.1	0.01	**0.1**	*C90*
Lymphoid leukaemia	6	0	33	3	2	1	-	-	-	-	0.2	0.3	0.01	**0.2**	*C91*
Myeloid leukaemia	8	0	50	4	-	3	1	-	-	-	0.3	0.4	0.02	**0.2**	*C92-94*
Leukaemia, unspecified	9	0	44	2	1	2	2	2	-	-	0.3	0.4	0.04	**0.4**	*C95*
Other and unspecified	115	10	69	11	9	14	15	19	15	22	4.1	5.6	0.67	**11.2**	*O&U*
All sites	2074	87	74	246	141	495	374	242	174	315	73.7		9.47	**163.3**	*ALL*
All sites but C44	2042	87	74	243	140	492	372	233	170	305	72.6	100.0	9.28	**159.5**	*ALLbC44*
Average annual population				228305	135021	112285	47364	22622	9270	7312					

Table 1. Uganda, Kyadondo County (1993-1997)

NUMBER OF CASES BY AGE GROUP AND SUMMARY RATES OF INCIDENCE - FEMALE

SITE	ALL AGES	AGE UNK	MV (%)	0-	15-	25-	35-	45-	55-	65+	CRUDE RATE	%	CR 64	ASR (W)	*ICD (10th)*
Mouth	16	0	81	-	-	2	2	5	2	5	0.6	0.7	0.11	**1.8**	*C00-06*
Salivary gland	9	0	56	-	1	1	3	1	2	1	0.3	0.4	0.07	**0.8**	*C07-08*
Nasopharynx	30	0	73	4	6	10	6	2	2	-	1.0	1.3	0.12	**1.4**	*C11*
Other pharynx	6	0	67	-	-	1	1	1	3	-	0.2	0.3	0.08	**0.7**	*C09-10,C12-14*
Oesophagus	91	0	42	-	-	2	11	18	20	40	3.1	4.1	0.68	**12.1**	*C15*
Stomach	47	2	45	-	1	3	6	14	15	6	1.6	2.1	0.51	**5.6**	*C16*
Colon, rectum and anus	61	1	67	-	4	5	8	14	12	17	2.1	2.7	0.47	**7.0**	*C18-21*
Liver	59	4	39	2	4	9	12	13	9	6	2.0	2.6	0.46	**5.5**	*C22*
Gallbladder etc.	1	0	0	-	-	-	-	1	-	-	0.0	0.0	0.01	**0.1**	*C23-24*
Pancreas	9	0	22	-	-	-	3	-	5	1	0.3	0.4	0.12	**1.1**	*C25*
Larynx	8	1	88	-	-	1	-	1	-	5	0.3	0.4	0.02	**1.0**	*C32*
Trachea, bronchus and lung	23	1	65	-	2	6	2	4	5	3	0.8	1.0	0.20	**2.3**	*C33-34*
Bone	16	0	63	5	6	1	2	-	-	2	0.6	0.7	0.03	**0.7**	*C40-41*
Melanoma of skin	13	0	62	-	-	-	-	1	5	7	0.4	0.6	0.12	**2.0**	*C43*
Other skin	12	1	75	-	-	6	-	2	1	2	0.4		0.07	**1.0**	*C44*
Mesothelioma	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C45*
Kaposi sarcoma	533	11	85	46	129	243	72	22	4	6	18.4	23.9	1.49	**20.5**	*C46*
Peripheral nerves	1	0	100	-	1	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C47*
Connective and soft tissue	46	2	85	7	4	13	5	9	3	3	1.6	2.1	0.24	**3.1**	*C49*
Breast	224	6	63	-	13	34	68	44	30	29	7.7	10.0	1.62	**21.0**	*C50*
Vulva	5	2	80	-	1	-	-	-	1	1	0.2	0.2	0.04	**0.6**	*C51*
Vagina	8	0	63	2	1	1	1	3	-	-	0.3	0.4	0.04	**0.5**	*C52*
Cervix uteri	465	13	64	-	15	102	146	99	47	43	16.1	20.9	3.26	**40.7**	*C53*
Uterus	48	2	83	-	5	4	7	17	9	4	1.7	2.2	0.46	**5.1**	*C54-55*
Ovary	75	1	55	3	7	15	19	11	10	9	2.6	3.4	0.50	**6.4**	*C56*
Placenta	16	0	75	-	7	4	1	3	1	-	0.6	0.7	0.07	**0.8**	*C58*
Kidney	17	0	76	7	2	2	1	3	2	-	0.6	0.8	0.10	**1.1**	*C64*
Renal pelvis, ureter and other urinary	5	0	60	-	-	1	2	-	1	1	0.2	0.2	0.03	**0.4**	*C65-66,C68*
Bladder	8	0	25	-	-	-	1	1	2	4	0.3	0.4	0.05	**1.1**	*C67*
Eye	64	1	58	9	12	25	11	4	2	-	2.2	2.9	0.23	**2.8**	*C69*
Brain, nervous system	6	0	100	1	1	-	2	2	-	-	0.2	0.3	0.03	**0.4**	*C70-72*
Thyroid	47	2	81	1	3	6	11	14	8	2	1.6	2.1	0.41	**4.5**	*C73*
Hodgkin disease	20	1	90	4	3	9	3	-	-	-	0.7	0.9	0.05	**0.7**	*C81*
Non-Hodgkin lymphoma	110	2	83	61	16	17	6	1	3	4	3.8	4.9	0.25	**4.1**	*C82-85,C96*
Multiple myeloma	9	0	22	-	-	-	1	3	2	3	0.3	0.4	0.08	**1.2**	*C90*
Lymphoid leukaemia	7	0	14	4	-	-	1	-	2	-	0.2	0.3	0.05	**0.5**	*C91*
Myeloid leukaemia	7	0	71	1	-	-	3	1	2	-	0.2	0.3	0.06	**0.6**	*C92-94*
Leukaemia, unspecified	10	0	10	4	3	-	1	-	-	2	0.3	0.4	0.02	**0.5**	*C95*
Other and unspecified	109	7	66	8	11	20	18	17	14	14	3.8	4.9	0.69	**9.2**	*O&U*
All sites	2241	60	69	169	258	543	436	331	224	220	77.4		12.83	**169.0**	*ALL*
All sites but C44	2229	59	69	169	258	537	436	329	223	218	77.0	100.0	12.76	**168.0**	*ALLbC44*
Average annual population				251703	158288	95571	35540	18232	9673	9771					

Table 2. Uganda, Kyadondo (1954-1960)

NUMBER OF CASES BY AGE GROUP AND SUMMARY RATES OF INCIDENCE - MALE

SITE	ALL AGES	AGE UNK	0-	15-	25-	35-	45-	55-	65+	CRUDE RATE	%	ASR (W)	*ICD (10th)*
Mouth	2	0	-	-	1	1	-	-	-	*0.2*	0.6	*0.2*	*C00-C08*
Nasopharynx	0	0	-	-	-	-	-	-	-	*0.0*	0.0	*0.0*	*C11*
Other pharynx	2	0	-	-	-	1	-	1	-	*0.2*	0.6	*0.4*	*C09-C10,C12-C14*
Oesophagus	8	0	-	-	1	-	4	3	-	*1.0*	2.5	*1.8*	*C15*
Stomach	13	0	-	-	3	3	4	3	-	*1.6*	4.0	*2.3*	*C16*
Colon, rectum and anus	5	0	-	-	-	-	1	3	1	*0.6*	1.5	*1.4*	*C18-C21*
Liver	46	0	-	3	17	12	10	1	3	*5.6*	14.2	*6.3*	*C22*
Pancreas	7	0	-	-	2	1	1	3	-	*0.8*	2.2	*1.4*	*C25*
Larynx	3	0	-	-	-	-	1	1	1	*0.4*	0.9	*0.9*	*C32*
Trachea, bronchus and lung	7	0	1	1	1	3	1	-	-	*0.8*	2.2	*0.9*	*C33-C34*
Melanoma of skin	6	0	-	1	-	1	-	2	2	*0.7*	1.8	*1.5*	*C43*
Other skin	40	0	-	4	9	10	8	5	4	*4.9*		*6.7*	*C44*
Kaposi sarcoma													*C46*
Breast	1	0	-	-	-	-	-	1	-	*0.1*	0.3	*0.3*	*C50*
Penis	31	0	-	1	2	7	10	6	5	*3.8*	9.5	*6.6*	*C60*
Prostate	16	0	-	-	-	-	6	5	5	*1.9*	4.9	*4.5*	*C61*
Kidney etc.	1	0	1	-	-	-	-	-	-	*0.1*	0.3	*0.1*	*C64-C66,C68*
Bladder	26	0	-	-	1	4	4	10	7	*3.2*	8.0	*6.8*	*C67*
Eye	8	0	2	2	1	1	2	-	-	*1.0*	2.5	*1.0*	*C69*
Brain, nervous system	2	0	1	-	1	-	-	-	-	*0.2*	0.6	*0.2*	*C70-C72*
Thyroid	1	0	-	-	1	-	-	-	-	*0.1*	0.3	*0.1*	*C73*
Hodgkin disease	13	0	2	2	6	1	1	-	1	*1.6*	4.0	*1.5*	*C81*
Non-Hodgkin lymphoma	24	1	6	6	3	3	4	1	-	*2.9*	7.4	*3.2*	*C82-C85,C96*
Multiple myeloma	2	0	-	-	-	1	-	-	1	*0.2*	0.6	*0.5*	*C90*
Leukaemia	19	0	4	7	2	2	3	1	-	*2.3*	5.8	*2.5*	*C91-C95*
Other and unspecified	42	0	8	4	8	5	8	5	4	*5.1*	12.9	*7.1*	*O&U*
All sites	325	1	25	31	59	56	68	51	34	*39.4*	100.0	*58.1*	*ALL*
All sites but C44	285	1	25	27	50	46	60	46	30	*34.6*	87.7	*51.4*	*ALLbC44*
Average annual population			33640	27120	28250	14490	7580	3830	2900				

Source: Cancer Incidence in Five Continents volume 1

Table 2. Uganda, Kyadondo (1954-1960)

NUMBER OF CASES BY AGE GROUP AND SUMMARY RATES OF INCIDENCE - FEMALE

SITE	ALL AGES	AGE UNK	0-	15-	25-	35-	45-	55-	65+	CRUDE RATE	%	ASR (W)	*ICD (10th)*
Mouth	8	0	-	1	1	4	1	1	-	*1.3*	2.7	*1.8*	*C00-C08*
Nasopharynx	0	0	-	-	-	-	-	-	-	*0.0*	0.0	*0.0*	*C11*
Other pharynx	1	0	-	-	-	-	-	-	1	*0.2*	0.3	*0.5*	*C09-C10,C12-C14*
Oesophagus	3	0	-	-	-	-	2	1	-	*0.5*	1.0	*1.1*	*C15*
Stomach	3	0	-	-	-	1	2	-	-	*0.5*	1.0	*0.9*	*C16*
Colon, rectum and anus	12	0	-	-	6	-	3	2	1	*2.0*	4.1	*3.0*	*C18-C21*
Liver	10	0	1	-	3	3	2	1	-	*1.7*	3.4	*2.2*	*C22*
Pancreas	4	0	-	-	1	1	2	-	-	*0.7*	1.4	*1.0*	*C25*
Larynx	0	0	-	-	-	-	-	-	-	*0.0*	0.0	*0.0*	*C32*
Trachea, bronchus and lung	0	0	-	-	-	-	-	-	-	*0.0*	0.0	*0.0*	*C33-C34*
Melanoma of skin	0	0	-	-	-	-	-	-	-	*0.0*	0.0	*0.0*	*C43*
Other skin	12	0	-	-	4	2	4	1	1	*2.0*		*3.1*	*C44*
Kaposi sarcoma													*C46*
Breast	32	1	-	-	8	7	7	7	2	*5.3*	10.9	*8.8*	*C50*
Cervix uteri	76	1	-	3	11	21	22	14	4	*12.6*	25.9	*21.4*	*C53*
Uterus	10	0	-	1	2	1	2	1	3	*1.7*	3.4	*3.1*	*C54-C55*
Ovary etc.	26	0	-	-	1	12	6	6	1	*4.3*	8.8	*7.6*	*C56-C57*
Kidney etc.	1	0	1	-	-	-	-	-	-	*0.2*	0.3	*0.1*	*C64-C66,C68*
Bladder	5	0	-	-	-	2	2	1	-	*0.8*	1.7	*1.5*	*C67*
Eye	6	0	-	-	1	3	1	-	1	*1.0*	2.0	*1.6*	*C69*
Brain, nervous system	1	0	-	-	-	1	-	-	-	*0.2*	0.3	*0.2*	*C70-C72*
Thyroid	10	0	-	2	1	2	3	2	-	*1.7*	3.4	*2.6*	*C73*
Hodgkin disease	4	0	-	1	2	-	1	-	-	*0.7*	1.4	*0.7*	*C81*
Non-Hodgkin lymphoma	12	0	7	-	-	1	1	1	2	*2.0*	4.1	*2.9*	*C82-C85,C96*
Multiple myeloma	0	0	-	-	-	-	-	-	-	*0.0*	0.0	*0.0*	*C90*
Leukaemia	12	0	3	1	1	2	2	-	3	*2.0*	4.1	*3.2*	*C91-C95*
Other and unspecified	46	0	3	9	7	10	9	6	2	*7.6*	15.6	*10.9*	*O&U*
All sites	294	2	15	18	49	73	72	44	21	*48.7*	100.0	*78.1*	*ALL*
All sites but C44	282	2	15	18	45	71	68	43	20	*46.8*	95.9	*75.0*	*ALLbC44*
Average annual population			31010	20360	17050	8210	4560	2880	2090				

Source: Cancer Incidence in Five Continents volume 1

Table 3. Incidence of the major cancers in Kyadondo County, Uganda, in four time periods

Site	1960–66			1967–71			1991–94			1995–97		
	No.	ASR	(standard error)	No.	ASR	(standard error)	No.	ASR	(standard error)	No.	ASR	(standard error)
Males												
Nasopharynx	3	0.3	(0.2)	9	1.8	(0.7)	11	0.7	(0.2)	26	2.3	(0.6)++
Oesophagus	8	1.7	(0.6)	25	5.1	(1.1)+++	83	15.8	(1.9)+++	68	13.0	(1.8)
Stomach	14	2.7	(0.8)	20	4.7	(1.1)	31	4.7	(1.0)	37	7.6	(1.4)
Colon/rectum	14	3.0	(0.8)	23	4.8	(1.1)	52	8.3	(1.3)+	38	6.8	(1.4)
Liver	44	6.0	(1.1)	75	11.7	(1.6)+++	73	9.8	(1.4)-	41	5.9	(1.2)-
Lung	5	0.8	(0.4)	10	2.1	(0.8)	25	4.1	(1.0)	19	3.2	(1.0)
Melanoma	1	0.1	(0.1)	8	1.3	(0.6)+	7	1.5	(0.7)	7	1.1	(0.5)
Skin	26	3.7	(0.8)	27	4.3	(0.9)	18	2.5	(0.7)--	20	4.1	(1.0)
Kaposi sarcoma	28	3.2	(0.7)	29	3.7	(0.8)	670	39.3	(2.1)+++	513	39.3	(2.3)
Prostate	13	3.1	(0.9)	27	6.8	(1.4)+	113	26.3	(2.6)+++	139	39.2	(3.7)+
Penis	29	5.5	(1.1)	30	6.3	(1.2)	18	2.9	(0.8)--	23	4.4	(1.1)
Bladder	24	5.2	(1.1)	27	5.9	(1.2)	13	2.5	(0.8)---	10	2.9	(0.9)
Eye	5	0.4	(0.2)	12	1.1	(0.4)	43	2.3	(0.4)+	47	3.0	(0.6)
Hodgkin disease	16	1.9	(0.6)	17	1.7	(0.5)	8	0.8	(0.4)---	11	1.3	(0.6)
Non-Hodgkin lymphoma	32	3.9	(0.8)	32	3.6	(0.7)	76	3.6	(0.5)	95	7.4	(1.1)++
Leukaemia	22	2.2	(0.6)	24	3.2	(0.9)	13	0.7	(0.2)---	16	1.1	(0.3)
ALL	352	54.2	(3.3)	478	81.2	(4.3)	1456	149.1	(5.2)	1290	166.6	(6.2)
ALL (except KS)	324	51.0		449	77.5		780	109.8		777	127.3	
Females												
Nasopharynx	3	0.7	(0.4)	2	0.3	(0.2)	13	0.9	(0.3)	21	1.6	(0.4)+
Oesophagus	9	2.6	(0.9)	31	7.9	(1.5)+++	55	9.4	(1.3)	63	14.2	(1.9)+
Stomach	4	0.8	(0.5)	14	3.4	(1.0)+	22	3.2	(0.7)	28	5.6	(1.1)
Colon/rectum	11	2.7	(0.9)	22	6.3	(1.5)+	36	5.7	(1.1)	34	6.6	(1.2)
Liver	9	1.8	(0.6)	21	5.0	(1.3)	42	5.1	(1.0)	35	6.3	(1.3)
Lung	3	0.6	(0.4)	6	1.4	(0.6)	7	0.7	(0.3)	18	3.2	(0.9)++
Melanoma	7	1.8	(0.7)	9	2.5	(0.8)	8	1.3	(0.5)	8	2.2	(0.8)
Skin	16	4.0	(1.1)	15	3.1	(0.9)	12	1.4	(0.5)-	8	1.0	(0.4)
Kaposi sarcoma	1	0.1	(0.1)	2	0.2	(0.1)	360	17.9	(1.2)+++	335	21.8	(1.5)
Breast	52	11.7	(1.8)	45	9.8	(1.6)	161	19.1	(1.8)+++	146	22.0	(2.1)
Cervix uteri	84	17.7	(2.2)	109	22.5	(2.5)	341	39.7	(2.5)+++	296	44.1	(3.0)
Corpus uteri	14	3.1	(0.9)	18	4.6	(1.3)	30	4.1	(0.9)	21	4.0	(0.9)
Ovary	26	5.7	(1.3)	19	3.2	(0.8)	62	6.9	(1.1)	41	5.3	(1.0)
Vulva/vagina	8	1.8	(0.7)	10	2.1	(0.8)	7	0.6	(0.3)	11	1.6	(0.6)
Eye	4	0.3	(0.2)	3	0.2	(0.1)	37	1.7	(0.4)+++	45	3.4	(0.7)+
Thyroid	5	1.3	(0.6)	12	3.0	(1.0)	22	2.6	(0.7)	34	5.6	(1.1)
Hodgkin disease	2	0.6	(0.5)	7	0.7	(0.3)	7	0.2	(0.1)	13	0.9	(0.3)
Non-Hodgkin lymphoma	14	2.2	(0.7)	15	2.2	(0.7)	48	2.1	(0.4)	82	5.7	(0.9)+++
Leukaemia	13	2.3	(0.7)	20	2.8	(0.7)	17	1.2	(0.4)---	17	1.9	(0.6)
ALL	338	73.0	(4.4)	469	98.9	(5.3)	1508	146.8	(4.8)	1421	179.7	(6.0)
ALL (except KS)	337	72.9		467	98.7		1148	128.9		1086	157.9	

Significant increase since preceding period: + $p < 0.05$; ++ $p < 0.01$; +++ $p < 0.001$

Significant decrease since preceding period: - $p < 0.05$; -- $p < 0.05$; --- $p < 0.001$

Source: Wabinga *et al.* (2000)

particularly the legs, and affecting principally males, with the risk rising progressively with age (Taylor *et al.*, 1971; Templeton, 1981). The results from the 1990s indicate an enormous increase in incidence of KS, together with the narrowing of the sex ratio (from 18:1 in 1960–71 to 1.7:1 in the 1990s). Ziegler and Katangole-Mbidde (1996) have drawn attention to the dramatic increase in the incidence of KS in children. The age-specific incidence of KS now corresponds closely to the age-specific reporting rates for AIDS, which are highest at ages 30–44 years for men and 25–34 years for women (Table 1). Current evidence suggests that human herpes virus 8 (HHV8) is the etiological agent responsible for KS (IARC, 1998). HHV8 has been identified in over 85% of KS tissue specimens in Uganda (Chang *et al.*, 1996). Seroprevalence studies suggest a relatively high prevalence of infection by HHV8 in the general population of Uganda – considerably higher than in the United States and Europe, which would be consistent with the elevated frequency of 'endemic' KS which preceded the AIDS epidemic (Gao *et al.*, 1996; Simpson *et al.*, 1996).

The incidence of oesophageal cancer is relatively high, and the rates in women are similar to those in men. This would seem to exclude tobacco and alcohol as major risk factors in this population. It is possible that the risk relates to some type of dietary deficiency. The other major cancers of the gastrointestinal tract – stomach and large bowel – have long been remarked to be relatively infrequent in Uganda (Hutt *et al.*, 1967; Burkitt, 1971). Templeton (1973) noted the very different relative frequency of stomach cancer in the different tribes, with the highest frequency among Rwandans, from the southwest of the country. The variation appears to be due to pyloric tumours, of intestinal-type histology. The rather higher incidence rates of gastric cancer in the more recent periods possibly reflect better diagnosis because of the availability of gastroscopy, although incidence remains low. This is not the result of a low prevalence of *Helicobacter pylori* since infection appears to be common, at least in the western part of Uganda (Wabinga, 1996).

The reported rates of liver cancer in Uganda are low in comparison with other parts of sub-Saharan Africa. The reasons for this are not clear. The prevalence of chronic carriage of hepatitis B in Uganda is similar to that in other countries, and aflatoxin contamination of foodstuffs appears to be common (Sebunya & Yourtee, 1990), though less perhaps in Kampala than in other parts of the country (Alpert *et al.*, 1971).

The incidence rate of cervix cancer in women is high, and the rates have increased markedly between the 1950s and 60s, and the 1990s. This increase is unlikely to be related to the epidemic of AIDS. It is possible that the social disruption of the Amin dictatorship and the subsequent civil wars (1972–86) favoured the spread of human papillomavirus (HPV), like other sexually transmitted diseases; HPV is present in the great majority of cervix cancers in Uganda, with HPV type 16 in 53% (Bosch *et al.*, 1995).

Non-Hodgkin lymphomas are relatively frequent. Burkitt lymphomas of childhood are responsible for about one third of the cases (see below). The incidence remained relatively stable in Kyadondo County until the early 1990s, but by 1995–97 there appeared to have been a significant increase in incidence in both males and females (Wabinga *et al.*, 2000). This may relate to improved survival of patients with HIV infection as other opportunistic infections are controlled, permitting a more prolonged duration of immunosuppression and the development of more clinically-evident lymphomas.

The absolute incidence of breast cancer is relatively low, but the incidence appears to have increased twofold since the 1960s. It is possible that some of the increase is related to declines in fertility.

The incidence of cancer of the prostate is one of the highest recorded in Africa. The rate has increased remarkably, from an ASR of 3–6 per 100 000 in the 1950s and 60s, to 40 per 100 000 in the late 1990s. Most of this increase is in elderly men, aged 65 years or over, although the actual rates are not exceptionally high compared with those reported in Europe and North America. The increase in Uganda is certainly not due to screening, although it is quite likely that increased awareness, a greater readiness to perform prostatectomy for urinary symptoms in elderly men, and histological examination of operative biopsies have played a role; the level of histological confirmation of diagnosis has certainly increased over time (Wabinga *et al.*, 2000).

The incidence of cancer of the penis is relatively high: the age-standardized rate is 4.1 per 100 000 in Kampala compared with 0.8 in the black population in the United States SEER registries (Parkin *et al.*, 1997). However, the rate is lower than in the 1960s. Penile cancer was clearly very frequent in the early case series from Kampala (Davies *et al.*, 1964) and Dodge *et al.* (1973) found it 'the commonest tumour registered in males' in 1964–68. In the 1964–68 registry data, there appears to have been considerable variation in the frequency of penile cancer between different tribes, with the highest percentages in the Bunyoro (41.4% cancers) and Toro (31.2%) from the west of the country (Dodge *et al.*, 1973). The decline in incidence since that time is probably real, since penile cancer is easily diagnosed and probably always brought for medical attention. Penile cancer has been related to genital hygiene (Kyalwazi, 1966) and the decline in incidence may be related to improved hygiene as a consequence of urbanization and greater availability of piped water supplies.

Bladder cancer incidence is also significantly lower in the 1990s than in the 1960s. In Uganda, bladder cancer has been linked to the presence of urethral stricture. Dodge (1964) found that 30% of bladder cancer cases had such strictures and Owor (1975) found 4% of patients with strictures developed bladder cancer. Since strictures are a sequel to gonococcal infection, it is possible that better treatment for sexually transmitted diseases may have reduced their prevalence. Kyadondo County is not an endemic area for *Schistosoma haematobium* (Bradley *et al.*, 1967).

Eye cancers are relatively frequent (3.7% in men, 2.9% in women). Although some are retinoblastomas, the majority are now squamous-cell carcinomas of the conjunctiva. The large increase in incidence of eye cancers is the consequence of increasing incidence of these conjunctival tumours, from 4/17 eye cancers (23.5%) in men in 1960–71 (none of the 7 eye cancers in women), to 32/45 (71% in men) and 34/40 (85%) in women in 1995–97 (Wabinga *et al.*, 2000). These cancers have been recognized for many years as more common in Africans than in Europeans, but there is also a considerable (tenfold or more) increase in risk in the presence of HIV infection, and Ateenyi-Agaba (1995) reported a large increase in the numbers of cases presenting clinically in Kampala since the onset of the AIDS epidemic.

Registration rates are particularly low for melanoma, tumours of the brain and nervous system, and leukaemias.

West Nile Cancer Registry

The results have been presented by Williams (1988). The full series, from 1961 to 1978 (Table 4) is dominated by the high frequency of non-Hodgkin lymphomas. The great majority of these are Burkitt lymphomas (78% of non-Hodgkin lymphomas in males, 74% in females), most of which (95%) are in children. The West Nile district is well known for the high incidence of Burkitt lymphomas (Wright, 1973) and was the location for several studies on space–time clustering of Burkitt lymphomas (see chapter on Lymphomas).

The frequency of liver cancer (21% in men, 8% in women) appears to be rather higher than in Kampala; Williams (1986) noted that a rather high percentage of cases had morphological diagnosis – 60% by histology and 21% cytology of needle aspirate.

There were 50 cases of endemic KS (12% cancers) in men, but only two in women. Templeton (1973) confirmed the relatively high

Table 4. Uganda: West Nile Cancer Registry 1961–78

Site	Kuluva Hospital, West Nile, 1961–78 (Williams, 1988)				
	Male		Female		%HV
	No.	%	No.	%	
Oral cavity[1]	1	0.2%	4	1.3%	
Nasopharynx	13	3.1%	7	2.3%	
Other pharynx					
Oesophagus	4	0.9%	2	0.7%	
Stomach	2	0.5%	0	0.0%	
Colon/rectum	1	0.2%	2	0.7%	
Liver	91	21.4%	23	7.7%	
Pancreas	0	0.0%	0	0.0%	
Lung	8	1.9%	1	0.3%	
Melanoma	0	0.0%	0	0.0%	
Other skin	31	7.3%	24	8.1%	
Kaposi sarcoma	50	11.8%	2	0.7%	
Breast	4	0.9%	31	10.4%	
Cervix uteri			40	13.4%	
Corpus uteri			3	1.0%	
Ovary etc.			13	4.4%	
Prostate	4	0.9%			
Penis	13	3.1%			
Bladder	2	0.5%	0	0.0%	
Kidney etc.	4	0.9%	5	1.7%	
Eye	12	2.8%	11	3.7%	
Brain, nervous system	1	0.2%	2	0.7%	
Thyroid	1	0.2%	0	0.0%	
Non-Hodgkin lymphoma	111	26.1%	82	27.5%	
Hodgkin disease	5	1.2%	2	0.7%	
Myeloma	0	0.0%	1	0.3%	
Leukaemia	23	5.4%	18	6.0%	
ALL SITES	425	100.0%	298	100.0%	

[1] Includes salivary gland

frequency of KS in biopsies from northwest Uganda. McHardy *et al.* (1984) reported on geographical and tribal distribution of the tumour in the West Nile.

Mbarara Cancer Registry

Table 5 shows details of the 811 cases recorded in the Mbarara Cancer Registry (for district residents) in the years 1997–2000. Rather less than half of the cases (41%) had histological confirmation of diagnosis. Oesophageal cancer and Kaposi sarcoma are the most common cancers of males (13.2%), although Kaposi sarcoma appears to be relatively less frequent than in the data from Kampala (Table 1). The frequency of stomach cancer (10.1% of cases) is rather higher than in Kampala. In females, cervix cancer (30.0%) and breast cancer (12.0%) both outnumber Kaposi sarcoma (6.1%). The virtual absence of haematological malignancies (only one case of leukaemia recorded) must reflect the deficient diagnostic facilities in this region.

Childhood cancer

Table 6 shows the incidence of childhood cancer in Kyadondo County population for the period 1993–97. Results from the registry have been published as frequencies of all registered cases for the periods 1952–58 (O'Conor & Davies, 1960), 1964–68 (Davies, 1973), and 1968–82 (Owor, 1988), and as incidence rates for the Kyadondo population for 1968–82 (Owor, 1988 IICC1) and for 1992–95 (Wabinga *et al.*,1998). Frequency data from Kuluva Hospital, in West Nile district, have also been published (Williams, 1988) (Table 7).

The incidence of Burkitt lymphoma of childhood has remained relatively high. Data from Kampala Cancer Registry for 1959–68 were used to estimate the incidence of Burkitt lymphoma in Mengo district and its constituent counties (Morrow *et al.*, 1976). The age-standardized incidence was 19.1 per million in boys (0 to 14 years) and 12.1 per million in girls; however, rates in Kyadondo County were lower than for Mengo district as a whole (crude rate ratio 0.57). Table 8 shows a comparison of incidence rates of childhood cancers in 1960–71 and in 1991–97 (from Wabinga *et al.*, 2000). For Burkitt lymphoma, it does seem that that the incidence has increased since the 1960s. Three explanations appear possible. The first is that, with the economic and social disruption in Uganda in the 1970s and early 1980s, the make-up of the population of Kyadondo County changed markedly, with a higher representation of individuals from areas with high risk of Burkitt lymphoma. Although the frequency of Burkitt lymphoma varies markedly throughout the country, with very high frequencies in the north and northwest (Schmauz *et al.*, 1990), this seems unlikely to have been a cause for the change in incidence in young children; since other (non-Burkitt) lymphomas are also much more common in these areas, the incidence of other non-Hodgkin lymphomas would also have increased (which, as stated, it did not). A second possibility relates to a change in the endemicity of malaria; Morrow *et al.* (1976) observed a fall in incidence in Mengo district during the late 1960s which they ascribed to the increasing use of chloroquine. There are no data on malaria endemicity in Uganda over the last 20 to 30 years, but it seems quite likely that there has been an increase in prevalence and severity of infection. Finally, the AIDS epidemic may be responsible. In the United States and Europe, non-Hodgkin lymphomas are the most common malignancies in paediatric AIDS patients and about one third are Burkitt lymphomas. However, in a study in Uganda, Parkin *et al.* (2000) found that there was no increase in the risk of endemic, EBV-positive Burkitt lymphoma in HIV-infected children. A probable explanation is the poor survival of children infected perinatally with HIV – only 34% of HIV-infected children in Kampala survive to the age of three years (Marum *et al.*, 1997).

The case series from Kuluva Hospital, in West Nile district (Table 7), demonstrates the exceptionally high frequency of Burkitt lymphoma in this area at the time (1961–78). West Nile district was the focus of a considerable amount of research into patterns of space-time clustering and the relationship of incidence of Burkitt lymphoma to infection with the Epstein–Barr virus and malaria (see Chapter 4.10, Burkitt lymphoma)

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Table 5. Uganda, Mbarara (1997-2000)

NUMBER OF CASES BY AGE GROUP - MALE

SITE	ALL AGES	AGE UNK	MV (%)	0-	15-	25-	35-	45-	55-	65+	%	*ICD (10th)*
Mouth	14	0	79	-	-	-	1	2	4	7	4.4	*C00-06*
Salivary gland	4	0	50	-	-	1	2	1	-	-	1.3	*C07-08*
Nasopharynx	1	0	0	1	-	-	-	-	-	-	0.3	*C11*
Other pharynx	3	0	33	-	-	1	-	-	-	2	0.9	*C09-10,C12-14*
Oesophagus	42	0	24	-	1	-	4	10	14	13	13.2	*C15*
Stomach	32	0	28	2	1	4	4	4	8	9	10.1	*C16*
Colon, rectum and anus	9	0	33	1	-	1	-	2	2	3	2.8	*C18-21*
Liver	21	0	0	-	-	4	3	8	2	4	6.6	*C22*
Gallbladder etc.	1	0	0	-	-	-	-	-	-	1	0.3	*C23-24*
Pancreas	4	0	0	-	-	-	-	1	-	3	1.3	*C25*
Larynx	2	0	0	-	-	-	-	-	2	-	0.6	*C32*
Trachea, bronchus and lung	1	0	0	-	-	-	-	1	-	-	0.3	*C33-34*
Bone	12	0	42	2	7	-	3	-	-	-	3.8	*C40-41*
Melanoma of skin	1	0	100	-	-	-	-	1	-	-	0.3	*C43*
Other skin	7	0	71	-	1	2	2	-	2	-		*C44*
Mesothelioma	0	0	-	-	-	-	-	-	-	-	0.0	*C45*
Kaposi sarcoma	42	0	67	3	4	9	12	1	8	5	13.2	*C46*
Peripheral nerves	1	0	100	-	-	-	1	-	-	-	0.3	*C47*
Connective and soft tissue	7	0	71	3	-	1	-	-	2	1	2.2	*C49*
Breast	4	0	0	-	-	-	1	2	-	1	1.3	*C50*
Penis	7	0	57	1	1	-	-	1	1	3	2.2	*C60*
Prostate	28	0	46	1	-	1	1	1	7	17	8.8	*C61*
Testis	0	0	-	-	-	-	-	-	-	-	0.0	*C62*
Kidney	4	0	0	2	-	-	-	-	-	2	1.3	*C64*
Renal pelvis, ureter and other urinary	0	0	-	-	-	-	-	-	-	-	0.0	*C65-66,C68*
Bladder	2	0	0	-	1	-	-	-	-	1	0.6	*C67*
Eye	10	0	100	4	-	1	3	2	-	-	3.2	*C69*
Brain, nervous system	1	0	0	-	-	-	1	-	-	-	0.3	*C70-72*
Thyroid	1	0	100	-	-	-	-	-	1	-	0.3	*C73*
Hodgkin disease	2	0	100	-	-	1	1	-	-	-	0.6	*C81*
Non-Hodgkin lymphoma	33	0	58	22	4	3	2	1	-	1	10.4	*C82-85,C96*
Multiple myeloma	1	0	0	-	1	-	-	-	-	-	0.3	*C90*
Lymphoid leukaemia	0	0	-	-	-	-	-	-	-	-	0.0	*C91*
Myeloid leukaemia	0	0	-	-	-	-	-	-	-	-	0.0	*C92-94*
Leukaemia, unspecified	0	0	-	-	-	-	-	-	-	-	0.0	*C95*
Other and unspecified	27	0	44	5	-	-	5	5	6	6	8.5	*O&U*
All sites	324	0	44	47	21	29	46	43	59	79		*ALL*
All sites but C44	317	0	43	47	20	27	44	43	57	79	100.0	*ALLbC44*

Table 5. Uganda, Mbarara (1997-2000)

NUMBER OF CASES BY AGE GROUP - FEMALE

SITE	ALL AGES	AGE UNK	MV (%)	0-	15-	25-	35-	45-	55-	65+	%	*ICD (10th)*
Mouth	3	0	33	-	-	-	1	1	-	1	0.6	*C00-06*
Salivary gland	2	0	100	-	-	1	-	1	-	-	0.4	*C07-08*
Nasopharynx	0	0	-	-	-	-	-	-	-	-	0.0	*C11*
Other pharynx	1	0	0	-	-	-	-	-	-	1	0.2	*C09-10,C12-14*
Oesophagus	10	0	20	1	-	-	1	3	3	2	2.1	*C15*
Stomach	25	0	24	1	-	1	4	5	6	8	5.3	*C16*
Colon, rectum and anus	20	0	35	-	1	1	2	3	8	5	4.2	*C18-21*
Liver	20	0	10	1	1	2	2	3	9	2	4.2	*C22*
Gallbladder etc.	1	0	100	-	-	-	-	-	1	-	0.2	*C23-24*
Pancreas	0	0	-	-	-	-	-	-	-	-	0.0	*C25*
Larynx	0	0	-	-	-	-	-	-	-	-	0.0	*C32*
Trachea, bronchus and lung	0	0	-	-	-	-	-	-	-	-	0.0	*C33-34*
Bone	2	0	50	1	1	-	-	-	-	-	0.4	*C40-41*
Melanoma of skin	3	0	67	-	-	-	1	-	1	1	0.6	*C43*
Other skin	11	0	91	1	1	2	1	3	-	3		*C44*
Mesothelioma	0	0	-	-	-	-	-	-	-	-	0.0	*C45*
Kaposi sarcoma	29	0	59	2	6	16	4	-	-	1	6.1	*C46*
Peripheral nerves	0	0	-	-	-	-	-	-	-	-	0.0	*C47*
Connective and soft tissue	10	0	60	2	3	1	1	-	1	2	2.1	*C49*
Breast	57	0	40	3	4	8	13	15	7	7	12.0	*C50*
Vulva	3	0	0	-	1	-	-	2	-	-	0.6	*C51*
Vagina	3	0	0	1	1	-	-	-	-	1	0.6	*C52*
Cervix uteri	143	1	41	3	5	8	41	41	34	10	30.0	*C53*
Uterus	12	0	67	-	1	2	4	1	4	-	2.5	*C54-55*
Ovary	41	0	10	4	8	10	10	5	2	2	8.6	*C56*
Placenta	3	0	100	-	1	1	-	1	-	-	0.6	*C58*
Kidney	6	0	83	5	-	-	1	-	-	-	1.3	*C64*
Renal pelvis, ureter and other urinary	0	0	-	-	-	-	-	-	-	-	0.0	*C65-66,C68*
Bladder	0	0	-	-	-	-	-	-	-	-	0.0	*C67*
Eye	12	0	83	5	3	4	-	-	-	-	2.5	*C69*
Brain, nervous system	1	0	0	-	-	-	-	-	-	1	0.2	*C70-72*
Thyroid	2	0	50	-	1	-	-	1	-	-	0.4	*C73*
Hodgkin disease	0	0	-	-	-	-	-	-	-	-	0.0	*C81*
Non-Hodgkin lymphoma	25	0	64	13	5	3	2	-	-	2	5.3	*C82-85,C96*
Multiple myeloma	0	0	-	-	-	-	-	-	-	-	0.0	*C90*
Lymphoid leukaemia	1	0	0	-	1	-	-	-	-	-	0.2	*C91*
Myeloid leukaemia	0	0	-	-	-	-	-	-	-	-	0.0	*C92-94*
Leukaemia, unspecified	0	0	-	-	-	-	-	-	-	-	0.0	*C95*
Other and unspecified	41	0	24	7	4	4	7	7	5	7	8.6	*O&U*
All sites	487	1	40	50	48	64	95	92	81	56		*ALL*
All sites but C44	476	1	39	49	47	62	94	89	81	53	100.0	*ALLbC44*

Table 6. Childhood cancer, Uganda, Kyadondo County (1993-1997)

	NUMBER OF CASES					REL. FREQ.(%)	RATES PER MILLION					
	0-4	5-9	10-14	**All**	*M/F*	Overall	0-4	5-9	10-14	Crude	**ASR**	%MV
Leukaemia	2	8	8	**18**	*1.0*	4.3	2.0	11.4	11.9	7.5	**7.9**	33.3
Acute lymphoid leukaemia	1	2	3	**6**	*0.5*	1.4	1.0	2.8	4.5	2.5	**2.6**	-
Lymphoma	53	63	38	**154**	*1.4*	37.1	51.8	89.7	56.4	64.2	**65.3**	85.5
Hodgkin disease	4	4	1	**9**	*1.3*	2.2	3.9	5.7	1.5	3.7	**3.8**	88.9
Burkitt lymphoma	30	38	22	**90**	*1.4*	21.7	29.3	54.1	32.7	37.5	**38.3**	78.9
Brain and spinal neoplasms	0	3	1	**4**	*3.0*	1.0	-	4.3	1.5	1.7	**1.8**	50.0
Neuroblastoma	0	0	0	**0**	-	-	-	-	-	-	**-**	-
Retinoblastoma	18	1	1	**20**	*1.5*	4.8	17.6	1.4	1.5	8.3	**7.7**	65.0
Wilms tumour	13	3	2	**18**	*2.0*	4.3	12.7	4.3	3.0	7.5	**7.2**	94.4
Bone tumours	2	2	6	**10**	*1.0*	2.4	2.0	2.8	8.9	4.2	**4.3**	60.0
Soft tissue sarcomas	66	48	27	**141**	*1.7*	34.0	64.4	68.3	40.1	58.7	**58.6**	100.0
Kaposi sarcoma	62	45	20	**127**	*1.8*	30.6	60.5	64.0	29.7	52.9	**52.7**	92.1
Germ cell tumours	1	2	0	**3**	*0.5*	0.7	1.0	2.8	-	1.2	**1.3**	100.0
Other	15	13	19	**47**	*1.4*	11.3	14.6	18.5	28.2	19.6	**19.8**	61.7
All	170	143	102	**415**	*1.5*	100.0	166.0	203.5	151.5	172.9	**173.9**	79.8

Table 7. Uganda, West Nile: childhood cancers, 1961–78

Cancer	West Nile 1961–78 (Williams, 1988)	
	No.	%
Leukaemia	8	3.9%
Acute lymphocytic leukaemia	0	0.0%
Lymphoma	155	75.6%
Burkitt lymphoma	140	68.3%
Hodgkin disease	1	0.5%
Brain and spinal neoplasms	0	0.0%
Neuroblastoma	0	0.0%
Retinoblastoma	12	5.9%
Wilms tumour	9	4.4%
Bone tumours	2	1.0%
Soft-tissue sarcomas	6	2.9%
Kaposi sarcoma	1	0.5%
Other	13	6.3%
Total	205	100.0%

Table 8. Uganda, Kyadondo county: childhood cancer (age 0–14 years), 1960–71 and 1991–97

Cancer	1960–71				1991–97			
	No.	(%)	M:F	Age-stand. rate (per 10^6)	No.	(%)	M:F	Age-stand. rate (per 10^6)
Leukaemia	25	(18.4)	1.1	18.7	27	(4.9)	0.7	8.6
Hodgkin disease	11	(8.1)	2.7	8.7	9	(1.6)	1.3	2.8
Burkitt lymphoma	13	(9.6)	1.6	9.5	109	(19.7)	1.5	34.3
Other non-hodgkin lymphoma*	18	(13.4)	2.6	13.1	61	(11.1)	1.3	19.1
Brain & central nervous system	4	(2.9)	0.3	3.0	7	(1.3)	2.5	2.3
Neuroblastoma	5	(3.7)	1.5	2.9	1	(0.2)	-	0.3
Retinoblastoma	16	(11.8)	1.7	9.4	33	(6.0)	1.4	9.3
Wilms tumour	10	(7.4)	0.7	6.1	29	(5.3)	1.6	8.6
Osteosarcoma	5	(3.7)	1.5	4.2	6	(1.1)	4.0	1.9
Kaposi sarcoma	3	(2.2)	2.0	2.5	183	(33.2)	1.5	55.8
Other soft-tissue sarcoma	10	(7.4)	4.0	7.6	20	(3.6)	0.8	6.0
Carcinomas	9	(6.7)	2.0	7.4	18	(3.3)	1.3	5.7
Total	136	(100.0)	1.6	97.8	552	(100.0)	1.4	169.7

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3.4.16 Zambia

Background

Climate: Tropical; modified by altitude; rainy season (October to April)

Terrain: Mostly high plateau with some hills and mountains, the lowest point being the Zambezi river at 329 m and the highest 2301 m.

Ethnic groups: African 98.7%, European 1.1%, other 0.2%

Religions: Christian 50–75%, Muslim and Hindu 24–49%, indigenous beliefs 1%

Economy—overview: Zambia is rich in copper, cobalt, zinc, lead, coal, emeralds, gold, silver and uranium. Agriculture contributes 23%, industry 40% and services 37% of the GDP. However, in 1993, 86% of the population was estimated to live below the poverty line. Zambia's copper mining sector accounts for over 80% of the nation's foreign currency. The main exports are copper, cobalt, zinc, lead and tobacco.

Industries: Copper mining and processing, construction, foodstuffs, beverages, chemicals, textiles, fertilizers

Agriculture—products: Corn, sorghum, rice, peanuts, sunflower seed, tobacco, cotton, sugarcane, cassava (tapioca); cattle, goats, pigs, poultry, beef, pork, poultry meat, milk, eggs, hides

Cancer registration

The Zambian National Cancer Registry, based in the Department of Community Health of the School of Medicine in Lusaka, operated for several years after its inception in November 1981. The registry relied upon voluntary notification of cases of cancer treated in all of the hospitals in Zambia, using a special notification form. The extent to which cancer patients were notified by different hospitals varied enormously, and registration was certainly very incomplete. Additional information on cancer cases was collected from records of cases of cancer diagnosed at the pathology laboratory of Lusaka, which handles specimens from all over the country, apart from hospitals in or near the Copperbelt region.

Review of data

Watts (1986) presented a report for 1981–83 from the National Cancer Registry for both sexes (see Table 1). 1250 malignant tumours (excluding carcinoma *in situ*) were registered; 64% of cases in males and 61% in females had histological verification of diagnosis.

Carcinoma of the cervix was by far the most commonly encountered cancer – 38% of all cancers in females – while breast cancer was second in importance in females, followed by cancers of the bladder, stomach and liver.

In males, primary cancer of the liver (16.4% of cases) was the most frequent cancer. Bladder cancer (8.2%) was also common; the majority were squamous-cell carcinomas, presumably related to schistosomiasis, which is endemic in Zambia, particularly in the east. Prostate cancer was third in frequency in males, followed by connective-tissue tumours, the majority of which were Kaposi sarcoma, predominantly in young males (90% of cases were in males, of whom 70% were under 45 years of age) and mainly lesions of the lower limbs. Cancer of the penis accounted for 5.2% of cancers in men (in a pathology series from University Department of Pathology in 1970–74 (Naik, 1977), it accounted for 3%).

Non-Hodgkin lymphomas were about twice as frequent in males as in females, accounting for 6.2% of tumours in males; about one third were Burkitt lymphomas, which occur almost exclusively in children. Similar findings were reported from the pathology series (Naik & Bhagwandeen, 1977).

Patil *et al.* (1995) reviewed the pattern of cancers seen at the University Teaching Hospital histopathology laboratory between 1980 and 1989 (see Table 1). Kaposi sarcoma appears to have increased in relative frequency from about 2% of all cancers in the National Cancer Registry reports (Watts, 1986) to about 7% of all cancers in the histopathology data. Given that these data-sets overlap considerably, it is likely that the proportion of cases of Kaposi sarcoma was much higher in the later period.

Table 1 also shows the relative frequency of different cancers diagnosed in the pathology department of the hospital in Ndola, in north-central Zambia, during 1976–1979 (O'Riordan, 1986).

Childhood cancer

Two reports of the frequency of paediatric malignancies treated in the University Teaching Hospital have been published (Table 2). Patil *et al.* (1992) presented data on 525 cases diagnosed by histology, autopsy and haematology in 1980–89 (the estimated incidence rates are incorrect by a factor of 10). Chintu *et al.* (1995) compared the histopathologically diagnosed cases from 1980–82 (114 cases) and 1990–92 (200 cases), with a view to estimating the influence of the AIDS epidemic on the profile of childhood cancer. The frequency of Kaposi sarcoma increased from 2.6% of childhood cancers in 1980–82 to 19.5% in 1990–92, while the frequency of Burkitt lymphoma declined (15.8% to 5.5%).

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Table 1. Zambia: case series

Site	Cancer Registry of Zambia 1981–83 (Watts, 1986)					Ndola, Dept, Pathology, 1976–79 (O'Riordan, 1986)					University Teaching Hospital, pathology data, 1980–89 (Patil *et al.*, 1995)		
	Male		Female		%HV	Male		Female		%HV	Both sexes		%HV
	No.	%	No.	%		No.	%	No.	%		No.	%	
Oral cavity[1]	18	3.0%	2	0.3%		5	1.6%	1	0.3%	100	73	0.9%	100
Nasopharynx	2	0.3%	1	0.2%		0	0.0%	0	0.0%				
Other pharynx	2	0.3%	0	0.0%		1	0.3%	2	0.6%				
Oesophagus	30	5.0%	9	1.4%		13	4.1%	3	0.8%	100	205	2.6%	100
Stomach	30	5.0%	32	4.9%		9	2.8%	5	1.4%	100	202	2.6%	100
Colon/rectum	23	3.8%	14	2.1%		21	6.6%	4	1.1%	100	204	2.6%	100
Liver	98	16.4%	30	4.6%		32	10.0%	11	3.1%	100	452	5.8%	100
Pancreas	8	1.3%	6	0.9%		1	0.3%	0	0.0%	100		0.0%	100
Lung	31	5.2%	6	0.9%		1	0.3%	0	0.0%	100	91	1.2%	100
Melanoma	9	1.5%	11	1.7%		11	3.4%	10	2.8%	100	206	2.6%	100
Other skin	30	5.0%	32	4.9%		46	14.4%	10	2.8%	100	521	6.6%	100
Kaposi sarcoma	26	4.3%	3	0.5%		10	3.1%	0	0.0%	100	548	7.0%	100
Breast	2	0.3%	58	8.9%		4	1.3%	33	9.3%	100	347	4.4%	100
Cervix uteri			248	38.0%				141	39.8%	100	1533	19.6%	100
Corpus uteri			16	2.5%				11	3.1%	100	115	1.5%	100
Ovary etc.			18	2.8%				10	2.8%	100	86	1.1%	100
Prostate	48	8.0%		0.0%		0	0.0%			100	264	3.4%	100
Penis	31	5.2%		0.0%		0	0.0%			100	169	2.2%	100
Bladder	49	8.2%	42	6.4%		34	10.6%	17	4.8%	100	491	6.3%	100
Kidney etc.	9	1.5%	3	0.5%		5	1.6%	5	1.4%	100			100
Eye	12	2.0%	5	0.8%		8	2.5%	2	0.6%	100	165	2.1%	100
Brain, nervous system	1	0.2%	1	0.2%			0.0%	1	0.3%	100		0.0%	100
Thyroid	2	0.3%	7	1.1%		1	0.3%	7	2.0%	100		0.0%	100
Non-Hodgkin lymphoma	37	6.2%	19	2.9%		34	10.6%	11	3.1%	100	290	3.7%	100
Hodgkin disease	11	1.8%	3	0.5%		12	3.8%	2	0.6%	100	69	0.9%	100
Myeloma	3	0.5%	3	0.5%		1	0.3%	2	0.6%	100			100
Leukaemia	5	0.8%	13	2.0%		3	0.9%	0	0.0%	100			100
ALL SITES	598	100.0%	652	100.0%	63%	320	100.0%	354	100.0%	100	7836	100.0%	100

[1] Includes salivary gland

Table 2. Zambia: childhood case series

Cancer	1980–89 (Patil *et al.*, 1992)		1980–82 (Chintu *et al.*, 1995)		1990–92 (Chintu *et al.*, 1995)	
	No.	%	No.	%	No.	%
Leukaemia	42	8.0%	0	0.0%	0	0.0%
Acute lymphocytic leukaemia	21	4.0%				
Lymphoma	196	37.3%	48	42.1%	65	32.5%
Burkitt lymphoma	73	13.9%	18	15.8%	11	5.5%
Hodgkin disease	31	5.9%	6	5.3%	10	5.0%
Brain and spinal neoplasms	3	0.6%	0	0.0%	0	0.0%
Neuroblastoma	7	1.3%	0	0.0%	1	0.5%
Retinoblastoma	60	11.4%	7	6.1%	37	18.5%
Wilms tumour	31	5.9%	8	7.0%	24	12.0%
Bone tumours	16	3.0%				
Soft-tissue sarcomas	76	14.5%	17	14.9%	58	29.0%
Kaposi sarcoma	31	5.9%	3	2.6%	39	19.5%
Other	94	17.9%	34	29.8%	15	7.5%
Total	525	100.0%	114	100.0%	200	100.0%

3.4.17 Zimbabwe

Background

Climate: Tropical; moderated by altitude; rainy season (November to March)

Terrain: Mostly high plateau with higher central plateau (high veld); mountains in east

Ethnic groups: African 98% (Shona 71%, Ndebele 16%, other 11%), white 1%, mixed and Asian 1%

Religions: Syncretic (part Christian, part indigenous beliefs) 50%, Christian 25%, indigenous beliefs 24%, Muslim and other 1%

Economy—overview: Agriculture employs 27% of the labour force of this landlocked nation and supplies almost 25% of exports. Mining accounts for only 5% of both GDP and employment, but minerals and metals account for about 20% of exports. The country faces many economic problems. The annual inflation rate rose from 32% in 1998 to 59% in 1999. About 60% of the population lives below the poverty line.

In 1994, Zimbabwe ranked as the world's sixth largest producer of tobacco and the third largest exporter.

Industries: Mining (coal, clay, numerous metallic ores (chromium, gold, nickel, copper, iron, vanadium, lithium, tin and platinum) and chrysotile asbestos), copper, steel, nickel, tin, wood products, cement, chemicals, fertilizer, clothing and footwear, foodstuffs, beverages

Agriculture—products: corn, cotton, tobacco, wheat, coffee, sugarcane, peanuts; cattle, sheep, goats, pigs

Cancer registration

Following several reports of hospital and laboratory series, a population-based registry was established in Bulawayo in 1963, which functioned for 15 years. The Zimbabwe National Cancer Registry, established in 1985, covers the population of the city of Harare, and has continued until the present.

Bulawayo Cancer Registry

The cancer registry of Bulawayo was founded in 1963 and functioned for 15 years. It was located in the Mpilo Central Hospital which, in addition to providing the only hospital service to the black African population of the city of Bulawayo, also acted as the referral centre for cancer cases from the south-western part of Zimbabwe (until 1980, Rhodesia), including the provinces of Matabeleland (North and South), Masvingo (formerly Victoria) and Midlands. New cases of cancer were notified from all hospital wards and departments; case notes with a diagnosis of cancer or suspected cancer were sent to the registry on discharge or death. Copies of all histology and autopsy reports mentioning cancer were scrutinized monthly by the registrar. Since death certification before burial was mandatory in the city of Bulawayo, persons who died outside hospital were brought for autopsy before certification. This, together with the very high autopsy rate within the hospital, meant that, for the great majority of cases registered, histological information of diagnosis was available. An attempt was made to interview all cases notified; if the individuals themselves could not be questioned, the relatives were interviewed.

Zimbabwe National Cancer Registry

The Zimbabwe National Cancer Registry, established in 1985 as a result of a collaborative agreement between the Zimbabwean Ministry of Health and the International Agency for Research on Cancer, began operations in Harare in 1986. Acceptably complete coverage of the population of the city of Harare was achieved in 1990.

The Registry is situated in the Parirenyatwa Central Hospital complex, which provides most of the specialized cancer-management services for the northern part of the country and is the teaching hospital of the University of Zimbabwe School of Medicine. Registry staff make weekly visits to the inpatient wards and oncology outpatient clinics of the two government-referral hospitals (Harare and Parirenyatwa). In addition, they periodically collect information from: (i) medical records of discharged and deceased cancer patients, (ii) copies of histology reports of cancer patients from public and private histology laboratories, (iii) death certificates of cancer patients who die in the greater Harare area and (iv) records of specific cancer research studies including case series assembled by clinicians. Death certificate notifications are followed up to obtain additional information on the diagnosis and management of the cancer, and if this proves fruitless, cases are registered on the basis of the death certificate only.

The registry records all cases identified, but the population base for calculation of incidence rates includes only residents of the target population (Harare City), defined as people who have lived in the city for at least six months.

Review of data

Cancer patterns derived from a series of cases diagnosed histologically and by autopsy in 1939–46 from Salisbury (Harare) were described by Gelfand (1949), a series of 2000 histologically diagnosed cases from Bulawayo in 1948–61 by Tulloch (1963), a series of cases diagnosed histologically in Salisbury (Harare) in 1955–65 by Ross (1967a, b) and cases from Harare hospital and histopathology records from Parirenyatwa hospital in 1980–82 by Stein (1984a, b) (Table 1).

Bulawayo Cancer Registry

The results from the registry were published as incidence rates for the period 1963–72. The unilateral declaration of independence by the colony of Rhodesia in 1965 and the ensuing civil war meant that it was impossible to derive accurate population denominators, so that the data from the final quinquennium of registration (1973–77) were simply presented as relative frequencies (Skinner *et al.*, 1970, 1976, 1993; Skinner, 1986; Parkin *et al.*, 1994).

During the 10-year period (1963–72) for which reasonably valid estimates of the population at risk were available, 1281 cancers were registered among the residents of Bulawayo, 991 cases in men (corresponding to a crude annual incidence of 93.8 per 100 000) and 290 cases in women (39.5 per 100 000). Table 2 shows the age-specific, crude and age-standardized incidence rates by cancer site. Three cancers dominate the picture in men: liver, oesophagus, and lung, the precise ranking depending upon the index chosen. Thus, with the age-standardized (world) rate, oesophagus cancer is first in importance, although the high rate (ASR 55.6) is strongly influenced by 33 cases in the oldest age-group (65+), so that with the cumulative rate (0–64 years), liver cancer is first. Moderately high rates are also observed for cancers of the prostate (ASR 20.8) and bladder (ASR 15.8). In women, cervix cancer is the dominant malignant tumour (ASR 29.5), followed by cancers of the liver (ASR 20.1), breast (ASR 13.7), bladder (ASR 11.2) and oesophagus (ASR 6.9). A very high proportion of cancer cases had histological verification of diagnosis (94% overall).

The risk factors for various cancers were evaluated in case–control analyses in which other cancer cases (excluding tobacco-related cancers in men and hormone-related cancers in women) were considered as controls (Parkin *et al.*, 1994; Vizcaino *et al.*, 1994; Vizcaino *et al.*, 1995).

The high rates of oesophageal cancer in men in Bulawayo are similar to those observed in the former Transkei region of South Africa, an area of known high oesophageal cancer risk. The incidence is some three times higher than in the more recent data from Harare (see below). In men, tobacco smoking was associated with increased risk (odds ratio (OR) = 5.7) in the highest consumption category (15 g of tobacco per day) compared with non-smokers. There was no independent effect of alcohol consumption (Vizcaino *et al.*, 1995).

Lung cancer rates in men in Bulawayo in the 1960s are among the highest recorded in Africa (see Chapter 4.9, Table 1). Tulloch (1963) had earlier noted the higher frequency of lung cancer in Bulawayo than in Salisbury (Harare). The OR associated with the highest category of tobacco consumption (15 g of tobacco per day) was 5.2, compared with non-smokers. Although 41% of men at this period were smokers, consumption was not high: 86% of smokers were smoking less than 15 cigarettes daily. Osburn (1957) noted the frequency of lung cancer in the Gwanda area of Matabeleland and related this to the arsenic content of the local mines. Parkin *et al.* (1994) found that copper (OR 1.5), gold (OR 1.5) and nickel (OR 2.6) miners had increased risks of lung cancer and noted that the copper/nickel ore mined at Filabusi in Matabeleland contains varying amounts of arsenic. No increase in risk was found, however, among asbestos miners (OR 0.7). Previous studies had also failed to identify an excess of lung cancer in asbestos miners (Osburn, 1957; Mossop, 1983). The asbestos mined in Zimbabwe is chrysotile.

Squamous cell carcinomas were 71% of bladder cancers; the presence of schistosomiasis was associated with a significantly increased risk (OR 3.9 in men, 5.7 in women) (Vizcaino *et al.*, 1994).

The risk of invasive cervical cancer increased with number of children—the estimated odds ratio was 1.8 in women with six or more births—but no consistent association was found for age at first intercourse. In postmenopausal women, the risk of breast cancer increased with age at first pregnancy (but not in the highly fertile) and decreased with high parity, if age at first pregnancy was 19 or more (Parkin *et al.*, 1994).

Zimbabwe Cancer Registry

The first (non-population-based) series of data for 1986–89 was published by Bassett *et al.* (1992). The first population-based results for the two main ethnic groups (Africans and Europeans) for the period 1990–92 were reported separately in 1995 (Bassett *et al.*, 1995a, b), and these data were reproduced in volume VII of *Cancer Incidence in Five Continents* (Parkin *et al.*, 1997). An updated analysis for 1993–95 (Chokunonga *et al.*, 2000) has also been published.

In this volume, three sets of tables are shown. For the African population, the rates for 1990–93 (Table 3) and 1994–97 (Table 4), and for the European population, the incidence over the full eight-year period 1990–97 (Table 5).

In the most recent period (1994–97), among the African population, the leading cancers in males were Kaposi sarcoma (41.8% of the total, ASR 50.9 per 100 000), cancer of the liver (9.2%, ASR 26.0), prostate (6.8%, ASR 28.5), oesophagus (5.5%, ASR 17.2) and lung (3.9%, ASR 12.1). In females, the principal cancers are cancer of the cervix (comprising 22.6% of all cancers, ASR 53.1), Kaposi's sarcoma (21.4% ASR 21.6), breast (8.2% ASR 19.8) and liver (3.7%, ASR 10.6) and stomach (3.1%, ASR 10.3).

Many of the features of the cancer profile are a consequence of the epidemic of AIDS, which is particularly severe in Zimbabwe (Chokunonga *et al.*, 1999). Kaposi sarcoma has always been observed in Zimbabwe, as the old series summarized in Table 1 testify. It was typically an indolent tumour affecting elderly men (Gordon, 1973). The data from Bulawayo (Table 2) show an incidence of 2.6 in men and 0.3 in women in 1963–72. The incidence in Harare is now much higher, and it has almost doubled between 1990–93 and 1994–97. The median ages at diagnosis, 35 and 32 years in men and women, respectively, reflect the difference in age-specific prevalence of HIV infection between the sexes. The relatively high rates for cancer of the eye in both sexes are a consequence of a high proportion of squamous-cell carcinoma of the conjunctiva (see Chapter 4.5). This tumour is recognized as an AIDS-related cancer in sub-Saharan Africa. There has also been an increase in the incidence of non-Hodgkin lymphoma between 1990–93 and 1994–97. Chokunonga *et al.* (1999) noted that most of this increase had been in adults (aged 15–54 years), with no significant change in the incidence in children.

The high incidence of liver cancer reflects a relatively high rate of infection with hepatitis B virus (Tswana, 1985). Blood-donor and community data do not suggest any major geographical variation in the prevalence of this infection in Zimbabwe. Aflatoxin exposure has been suggested to be important in determining geographical variations in incidence of liver cancer in southern Africa, but the prevalence of exposure appears to be low in Zimbabwe, based on analysis of urine samples (Nyathi *et al.*, 1987).

The incidence of bladder cancer in the African population is moderately high, and squamous-cell tumours predominate (Chapter 4.1, Table 3), as in Bulawayo and in earlier Zimbabwean studies (Houston, 1964; Thomas *et al.*, 1990). Several studies have linked infection with *Schistosoma haematobium* with bladder cancer. *S. haematobium* infection is endemic in Zimbabwe, its prevalence varying with the presence of standing water (Taylor & Makura, 1985) and regional variations in bladder cancer incidence within the country vary directly with the prevalence of infection (Thomas *et al.*, 1990; Vizcaino *et al.*, 1994). The lower incidence of bladder cancer recorded in Harare, compared with Bulawayo, is somewhat puzzling, because *S. haematobium* infection is more common in Mashonaland than in the semi-arid Matabeleland.

As noted in an earlier clinical series (Levy, 1984, 1988), myeloid leukaemia is more frequent than lymphoid in the African population of Zimbabwe. However, the age-specific incidence rates confirm the predominance of acute lymphocytic leukaemia in young children, and of chronic lymphocytic leukaemia in the elderly.

In the European-origin population (Table 5), most registered cases are non-melanoma skin cancers (61.4% of cases in men and 50.4% in women). Excluding these, the ASR per 100 000 was 372.6 in males and 340.3 in females. The incidence of malignant melanoma is very high (ASR 40.5 in men and 30.2 in women), somewhat higher than the rates among whites in Australia (ASR 36.7 in males and 28.4 in women (Parkin *et al.*, 2002)). In men, other leading cancers are prostate (ASR 70.1), colon/rectum (ASR 49.8), and lung (ASR 38.4). In females, the leading cancers were breast (ASR 121.2), colon/rectum (ASR 35.5) and lung (ASR 24.5). The incidence of cancer of the liver is higher than that observed in western countries (in males 8.4 vs. 2.5 in England and 3.9 in US whites (Chapter 4.8, Table 1)). Similarly bladder cancer incidence rates are elevated (ASR 25.6) compared with western rates (e.g., ASR 19.8 in England (Chapter 4.1, Table 1)). Breast cancer appears to be more common in Harare whites than in Los Angeles (ASR 103.9 (Parkin *et al.*, 2002)) and six times more common than in Harare black females (ASR 19.8).

Childhood cancer

Data on cancer in childhood from Bulawayo Cancer Registry were published by Skinner (1988). Tables of relative frequency for all 543 childhood cancers registered in 1963–97, as well as incidence rates for residents of Bulawayo (78 cases) were presented (Table 6).

Chokunonga *et al.* (1998) published data for residents of Harare (347 cases) diagnosed in 1990–94. The data shown in this volume (Table 7) update this material to the period 1990–97. In this series, the leading cancers among African children are leukaemia (19.4%, ASR 21.6 per million), Wilms tumour (12.7%, ASR 14.0 per million), and lymphoma (12.4%, ASR 13.8 per million). Among the lymphomas, Burkitt lymphoma is not especially frequent (only 6/48 cases), while Kaposi sarcoma now comprises 9.3% of childhood cancers. In a clinical series from the paediatric wards of Parirenyatwa Hospital, Chitsike and Siziya (1998) found that non-Hodgkin lymphomas comprised 22.4% of 64 cases and Kaposi sarcoma 15.8%. All of the 12 children with Kaposi sarcoma were HIV-positive, as were 9 out of 17 (53%) non-Hodgkin lymphoma cases, compared with only 6 of 34 (17.6%) children with other tumours.

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Table 1. Zimbabwe: case series

Site	Pathology cases (histology and autopsy) (Gelfand, 1949)			Histologically diagnosed cases, Salisbury (Harare), 1955–65 (Ross, 1967a, b)					Harare hospital and pathology cases (Parirenyatwa Hospital) (Stein,1984 a, b)		
	Both sexes		%HV	Male		Female		%HV	Both sexes		%HV
	No.	%		No.	%	No.	%		No.	%	
Oral cavity[a]									52	0.9%	65.4
Nasopharynx	9	2.7%		70	2.7%	28	1.9%	100	270	4.6%	54.4
Other pharynx										0.0%	
Oesophagus	2	0.6%		226	8.7%	8	0.6%	100	624	10.6%	43.3
Stomach	5	1.5%		99	3.8%	33	2.3%	100	233	4.0%	42.9
Colon/rectum	11	3.3%		81	3.1%	19	1.3%	100	140	2.4%	50.0
Liver	25	7.5%		175	6.8%	25	1.7%	100	369	6.3%	42.0
Pancreas	3	0.9%		15	0.6%	4	0.3%	100	30	0.5%	6.7
Lung	7	2.1%		134b	5.2%	12	0.8%	100	395	6.7%	42.0
Melanoma	29	8.7%		55	2.1%	65	4.5%	100	82	1.4%	76.8
Other skin	89	26.6%		289	11.2%	146	10.1%	100	239	4.1%	86.2
Kaposi sarcoma	2	0.6%		128	4.9%	4	0.3%	100	55	0.9%	100
Breast	10	3.0%		6	0.2%	100	6.9%	100	214	3.6%	55.6
Cervix uteri	4	1.2%			0.0%	323	22.4%	100	1034	17.5%	52.0
Corpus uteri	2	0.6%			0.0%	16	1.1%	100	83	1.4%	59.0
Ovary etc.					0.0%	54	3.7%	100	57	1.0%	59.7
Prostate	1	0.3%		96	3.7%		0.0%	100	168	2.8%	51.2
Penis				105	4.1%		0.0%	100	83	1.4%	68.7
Bladder				245	9.5%	109	7.5%	100	317	5.4%	49.2
Kidney etc.	9	2.7%		31	1.2%	28	1.9%	100	74	1.3%	28.4
Eye	1	0.3%		113	4.4%	53	3.7%	100	63	1.1%	31.8
Brain, nervous system				27	1.0%	19	1.3%	100	52	0.9%	59.6
Thyroid	1	0.3%		38	1.5%	44	3.0%	100	82	1.4%	45.1
Non-Hodgkin lymphoma				180	7.0%	55	3.8%	100	99	1.7%	54.6
Hodgkin disease				48	1.9%	8	0.6%	100	51	0.9%	21.6
Myeloma				8	0.3%	2	0.1%	100	71	1.2%	28.2
Leukaemia				5	0.2%	3	0.2%	100	88	1.5%	100
ALL SITES	334	100.0%		2587	100.0%	1444	100.0%	100	5895	100.0%	50.2

[a] Includes salivary gland

Table 2. Zimbabwe, Bulawayo: African (1963-1972)

NUMBER OF CASES BY AGE GROUP AND SUMMARY RATES OF INCIDENCE - MALE

SITE	ALL AGES	AGE UNK	0-	15-	25-	35-	45-	55-	65+	CRUDE RATE	%	ASR (W)	*ICD (10th)*
Mouth	16	0	-	1	4	5	4	-	2	*1.5*	1.6	*3.2*	*C00-C08*
Nasopharynx	2	0	-	-	1	1	-	-	-	*0.2*	0.2	*0.1*	*C11*
Other pharynx	8	0	-	-	-	2	2	4	-	*0.8*	0.8	*1.7*	*C09-C10,C12-C14*
Oesophagus	164	0	-	-	3	27	60	41	33	*15.5*	16.5	*55.6*	*C15*
Stomach	36	0	-	-	1	6	16	9	4	*3.4*	3.6	*9.4*	*C16*
Colon, rectum and anus	28	0	-	2	5	6	8	3	4	*2.7*	2.8	*6.8*	*C18-C21*
Liver	261	0	-	11	41	56	87	45	21	*24.7*	26.3	*53.7*	*C22*
Pancreas	23	0	-	-	1	3	9	6	4	*2.2*	2.3	*7.3*	*C25*
Larynx	16	0	-	-	1	4	4	4	3	*1.5*	1.6	*5.1*	*C32*
Trachea, bronchus and lung	121	0	-	-	6	10	38	42	25	*11.5*	12.2	*44.1*	*C33-C34*
Melanoma of skin	6	0	-	-	1	3	1	-	1	*0.6*	0.6	*1.4*	*C43*
Other skin	18	0	-	3	4	2	3	3	3	*1.7*		*4.9*	*C44*
Kaposi sarcoma	17	0	-	2	5	4	4	1	1	*1.6*	1.7	*2.6*	*C46*
Breast	2	0	-	-	-	1	-	1	-	*0.2*	0.2	*0.4*	*C50*
Penis	12	0	-	-	1	1	1	6	3	*1.1*	1.2	*5.1*	*C60*
Prostate	37	0	-	-	-	-	9	12	16	*3.5*	3.7	*20.8*	*C61*
Kidney etc.	14	0	3	-	-	4	4	2	1	*1.3*	1.4	*2.7*	*C64-C66,C68*
Bladder	63	0	-	1	7	20	14	13	8	*6.0*	6.4	*15.8*	*C67*
Eye	7	1	2	2	1	-	-	1	-	*0.7*	0.7	*0.9*	*C69*
Brain, nervous system	7	0	4	1	-	-	1	1	-	*0.7*	0.7	*0.9*	*C70-C72*
Thyroid	5	0	-	-	1	1	-	2	1	*0.5*	0.5	*1.7*	*C73*
Hodgkin disease	23	0	1	4	7	4	6	1	-	*2.2*	2.3	*2.2*	*C81*
Non-Hodgkin lymphoma	19	0	4	2	3	6	3	1	-	*1.8*	1.9	*1.9*	*C82-C85,C96*
Multiple myeloma	8	0	-	-	1	1	1	4	1	*0.8*	0.8	*2.5*	*C90*
Leukaemia	30	0	6	6	6	5	3	3	1	*2.8*	3.0	*4.1*	*C91-C95*
Other and unspecified	48	0	5	7	8	8	7	12	1	*4.5*	4.8	*7.8*	*O&U*
All sites	991	1	25	42	108	180	285	217	133	*93.8*	100.0	*263.0*	*ALL*
All sites but C44	973	1	25	39	104	178	282	214	130	*92.1*	98.2	*258.0*	*ALLbC44*
Average annual population			30963	20040	25829	17285	8295	2507	709				

Source: Cancer Incidence in Five Continents volume 2 and 3

Table 2. Zimbabwe, Bulawayo: African (1963-1972)

NUMBER OF CASES BY AGE GROUP AND SUMMARY RATES OF INCIDENCE - FEMALE

SITE	ALL AGES	AGE UNK	0-	15-	25-	35-	45-	55-	65+	CRUDE RATE	%	ASR (W)	*ICD (10th)*
Mouth	2	0	2	-	-	-	-	-	-	*0.3*	0.7	*0.2*	*C00-C08*
Nasopharynx	1	0	-	-	-	-	-	1	-	*0.1*	0.3	*1.1*	*C11*
Other pharynx	0	0	-	-	-	-	-	-	-	*0.0*	0.0	*0.0*	*C09-C10,C12-C14*
Oesophagus	10	0	-	-	1	3	2	3	1	*1.4*	3.4	*6.9*	*C15*
Stomach	9	0	-	-	1	2	3	2	1	*1.2*	3.1	*6.1*	*C16*
Colon, rectum and anus	6	0	-	-	1	1	1	3	-	*0.8*	2.1	*3.8*	*C18-C21*
Liver	33	0	-	-	8	8	8	5	4	*4.5*	11.4	*20.1*	*C22*
Pancreas	4	0	-	-	1	1	1	-	1	*0.5*	1.4	*3.1*	*C25*
Larynx	3	0	-	-	1	-	1	1	-	*0.4*	1.0	*1.5*	*C32*
Trachea, bronchus and lung	6	0	-	-	-	1	4	1	-	*0.8*	2.1	*2.8*	*C33-C34*
Melanoma of skin	5	0	-	1	2	-	1	1	-	*0.7*	1.7	*1.7*	*C43*
Other skin	6	0	-	-	2	3	1	-	-	*0.8*		*1.1*	*C44*
Kaposi sarcoma	3	0	1	1	1	-	-	-	-	*0.4*	1.0	*0.3*	*C46*
Breast	30	0	-	-	7	9	9	3	2	*4.1*	10.3	*13.7*	*C50*
Cervix uteri	60	0	-	-	10	22	15	9	4	*8.2*	20.7	*29.5*	*C53*
Uterus	11	0	-	-	2	2	4	2	1	*1.5*	3.8	*6.6*	*C54-C55*
Ovary etc.	11	0	1	-	1	2	3	2	2	*1.5*	3.8	*8.6*	*C56-C57*
Kidney etc.	3	0	1	-	-	1	1	-	-	*0.4*	1.0	*0.7*	*C64-C66,C68*
Bladder	14	0	-	2	2	5	1	-	4	*1.9*	4.8	*11.2*	*C67*
Eye	4	0	3	-	-	1	-	-	-	*0.5*	1.4	*0.5*	*C69*
Brain, nervous system	9	1	5	1	1	-	1	-	-	*1.2*	3.1	*1.2*	*C70-C72*
Thyroid	6	0	-	1	-	2	3	-	-	*0.8*	2.1	*1.6*	*C73*
Hodgkin disease	1	0	-	1	-	-	-	-	-	*0.1*	0.3	*0.1*	*C81*
Non-Hodgkin lymphoma	6	0	3	-	2	1	-	-	-	*0.8*	2.1	*0.6*	*C82-C85,C96*
Multiple myeloma	3	0	-	-	-	-	2	-	1	*0.4*	1.0	*3.2*	*C90*
Leukaemia	15	0	4	1	4	1	1	2	2	*2.0*	5.2	*8.4*	*C91-C95*
Other and unspecified	29	0	4	4	11	5	2	-	3	*4.0*	10.0	*10.7*	*O&U*
All sites	290	1	24	12	58	70	64	35	26	*39.5*	100.0	*145.8*	*ALL*
All sites but C44	284	1	24	12	56	67	63	35	26	*38.7*	97.9	*144.8*	*ALLbC44*
Average annual population			30700	16058	15172	7630	2725	760	291				

Source: Cancer Incidence in Five Continents volume 2 and 3

Table 3. Zimbabwe, Harare: African (1990-1993)

NUMBER OF CASES BY AGE GROUP AND SUMMARY RATES OF INCIDENCE - MALE

SITE	ALL AGES	AGE UNK	MV (%)	0-	15-	25-	35-	45-	55-	65+	CRUDE RATE	%	CR 64	ASR (W)	*ICD (10th)*
Mouth	17	1	82	-	2	-	2	5	4	3	0.7	0.7	0.10	**1.7**	*C00-06*
Salivary gland	7	0	86	-	-	1	2	2	-	2	0.3	0.3	0.02	**0.7**	*C07-08*
Nasopharynx	14	0	86	-	1	5	1	2	1	4	0.6	0.6	0.04	**1.4**	*C11*
Other pharynx	6	0	67	-	1	-	-	1	2	2	0.3	0.3	0.03	**0.8**	*C09-10,C12-14*
Oesophagus	212	0	52	-	-	1	24	43	78	66	8.9	9.1	1.38	**27.9**	*C15*
Stomach	90	0	49	-	-	3	10	21	20	36	3.8	3.9	0.44	**12.6**	*C16*
Colon, rectum and anus	84	0	62	1	6	7	13	20	20	17	3.5	3.6	0.47	**8.5**	*C18-21*
Liver	289	0	22	2	10	38	46	59	66	68	12.2	12.4	1.51	**30.7**	*C22*
Gallbladder etc.	4	0	50	-	-	-	1	1	1	1	0.2	0.2	0.02	**0.5**	*C23-24*
Pancreas	44	0	27	-	-	4	2	8	14	16	1.9	1.9	0.25	**6.1**	*C25*
Larynx	37	1	73	-	-	-	1	7	18	10	1.6	1.6	0.28	**4.8**	*C32*
Trachea, bronchus and lung	156	0	37	-	-	6	7	33	60	50	6.6	6.7	1.03	**20.9**	*C33-34*
Bone	21	0	90	4	10	-	2	1	3	1	0.9	0.9	0.09	**1.3**	*C40-41*
Melanoma of skin	18	0	94	-	2	2	3	3	5	3	0.8	0.8	0.10	**1.7**	*C43*
Other skin	28	2	93	-	2	2	6	3	4	9	1.2		0.11	**3.4**	*C44*
Mesothelioma	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C45*
Kaposi sarcoma	679	4	73	11	44	299	183	76	48	14	28.6	29.1	2.45	**31.3**	*C46*
Peripheral nerves	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C47*
Connective and soft tissue	26	0	96	3	6	4	6	2	3	2	1.1	1.1	0.10	**1.6**	*C49*
Breast	5	0	80	-	-	-	1	3	1	-	0.2	0.2	0.04	**0.4**	*C50*
Penis	17	0	71	-	-	-	2	4	5	6	0.7	0.7	0.10	**2.3**	*C60*
Prostate	161	4	65	-	-	-	3	18	56	80	6.8	6.9	0.88	**26.9**	*C61*
Testis	6	0	50	-	1	1	1	1	1	1	0.3	0.3	0.03	**0.5**	*C62*
Kidney	19	0	95	11	1	-	1	3	1	2	0.8	0.8	0.06	**1.3**	*C64*
Renal pelvis, ureter and other urinary	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C65-66,C68*
Bladder	95	0	61	1	1	3	8	27	23	32	4.0	4.1	0.53	**12.5**	*C67*
Eye	17	0	94	10	1	2	-	2	1	1	0.7	0.7	0.05	**1.0**	*C69*
Brain, nervous system	32	0	28	9	6	5	5	2	4	1	1.3	1.4	0.12	**1.7**	*C70-72*
Thyroid	11	0	64	1	-	1	1	1	5	2	0.5	0.5	0.08	**1.2**	*C73*
Hodgkin disease	18	0	100	4	2	3	4	3	2	-	0.8	0.8	0.08	**0.9**	*C81*
Non-Hodgkin lymphoma	73	0	86	15	5	16	13	12	9	3	3.1	3.1	0.30	**4.2**	*C82-85,C96*
Multiple myeloma	27	0	93	-	-	2	5	7	9	4	1.1	1.2	0.18	**2.6**	*C90*
Lymphoid leukaemia	26	0	92	12	3	1	1	1	3	5	1.1	1.1	0.08	**2.2**	*C91*
Myeloid leukaemia	38	0	92	9	6	9	5	6	2	1	1.6	1.6	0.13	**1.9**	*C92-94*
Leukaemia, unspecified	2	0	50	-	-	-	-	-	1	1	0.1	0.1	0.01	**0.4**	*C95*
Other and unspecified	86	4	57	4	7	5	12	11	27	16	3.6	3.7	0.52	**8.8**	*O&U*
All sites	2365	16	61	97	117	420	371	388	497	459	99.6		11.61	**224.7**	*ALL*
All sites but C44	2337	14	60	97	115	418	365	385	493	450	98.4	100.0	11.50	**221.3**	*ALLbC44*
Average annual population				192913	140631	122669	70844	39116	20277	7334					

Table 3. Zimbabwe, Harare: African (1990-1993)

NUMBER OF CASES BY AGE GROUP AND SUMMARY RATES OF INCIDENCE - FEMALE

SITE	ALL AGES	AGE UNK	MV (%)	0-	15-	25-	35-	45-	55-	65+	CRUDE RATE	%	CR 64	ASR (W)	*ICD (10th)*
Mouth	5	0	100	-	-	-	1	2	-	2	0.2	0.3	0.03	**1.0**	*C00-06*
Salivary gland	6	0	100	-	1	3	1	-	-	1	0.3	0.4	0.01	**0.5**	*C07-08*
Nasopharynx	7	0	86	-	4	-	1	-	1	1	0.3	0.4	0.04	**0.7**	*C11*
Other pharynx	4	0	75	-	-	-	-	2	1	1	0.2	0.3	0.06	**0.9**	*C09-10,C12-14*
Oesophagus	36	0	36	-	-	2	2	4	14	14	1.7	2.3	0.48	**8.6**	*C15*
Stomach	67	0	57	-	-	3	6	18	10	30	3.1	4.3	0.58	**15.1**	*C16*
Colon, rectum and anus	47	1	66	-	4	4	10	12	10	6	2.2	3.0	0.53	**7.1**	*C18-21*
Liver	93	0	24	2	2	10	12	17	35	15	4.4	5.9	1.39	**17.1**	*C22*
Gallbladder etc.	3	0	67	-	-	-	-	1	1	1	0.1	0.2	0.04	**0.7**	*C23-24*
Pancreas	27	0	19	-	-	2	2	2	8	13	1.3	1.7	0.28	**6.7**	*C25*
Larynx	3	0	67	-	-	-	-	-	1	2	0.1	0.2	0.03	**0.9**	*C32*
Trachea, bronchus and lung	32	0	41	-	1	2	4	4	7	14	1.5	2.0	0.29	**7.2**	*C33-34*
Bone	14	0	86	2	6	-	5	-	1	-	0.7	0.9	0.07	**0.8**	*C40-41*
Melanoma of skin	17	0	88	1	1	1	2	1	6	5	0.8	1.1	0.22	**3.5**	*C43*
Other skin	21	0	90	-	3	1	3	1	4	9	1.0		0.16	**4.4**	*C44*
Mesothelioma	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C45*
Kaposi sarcoma	185	1	72	4	35	83	43	17	2	-	8.7	11.8	0.75	**9.4**	*C46*
Peripheral nerves	2	0	100	1	-	-	1	-	-	-	0.1	0.1	0.01	**0.1**	*C47*
Connective and soft tissue	21	2	90	3	6	5	2	-	2	1	1.0	1.3	0.11	**1.6**	*C49*
Breast	171	3	85	-	2	27	65	37	23	14	8.0	10.9	1.55	**20.3**	*C50*
Vulva	9	0	89	1	-	-	-	4	3	1	0.4	0.6	0.15	**1.7**	*C51*
Vagina	2	1	100	-	-	-	-	-	-	1	0.1	0.1	0.00	**0.7**	*C52*
Cervix uteri	410	7	78	-	10	48	100	102	78	65	19.2	26.2	4.30	**62.6**	*C53*
Uterus	33	0	67	-	1	2	6	10	7	7	1.5	2.1	0.39	**5.9**	*C54-55*
Ovary	52	0	65	2	3	7	7	9	19	5	2.4	3.3	0.75	**8.3**	*C56*
Placenta	20	0	85	-	10	8	1	1	-	-	0.9	1.3	0.05	**0.8**	*C58*
Kidney	15	0	100	13	-	-	1	1	-	-	0.7	1.0	0.04	**0.7**	*C64*
Renal pelvis, ureter and other urinary	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C65-66,C68*
Bladder	54	0	61	1	-	5	8	12	13	15	2.5	3.5	0.62	**10.5**	*C67*
Eye	17	3	94	8	1	4	-	-	1	-	0.8	1.1	0.07	**0.9**	*C69*
Brain, nervous system	18	0	33	8	1	2	5	1	1	-	0.8	1.2	0.09	**1.1**	*C70-72*
Thyroid	31	0	65	-	3	5	4	3	9	7	1.5	2.0	0.35	**5.4**	*C73*
Hodgkin disease	6	0	100	1	1	1	1	2	-	-	0.3	0.4	0.04	**0.4**	*C81*
Non-Hodgkin lymphoma	38	0	95	3	5	11	5	5	3	6	1.8	2.4	0.22	**4.3**	*C82-85,C96*
Multiple myeloma	18	0	94	-	-	-	1	4	8	5	0.8	1.2	0.29	**4.1**	*C90*
Lymphoid leukaemia	16	0	100	8	1	1	-	2	3	1	0.7	1.0	0.14	**1.7**	*C91*
Myeloid leukaemia	26	0	96	8	4	3	5	1	2	3	1.2	1.7	0.12	**2.4**	*C92-94*
Leukaemia, unspecified	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C95*
Other and unspecified	60	1	47	5	6	9	8	8	8	15	2.8	3.8	0.43	**9.2**	*O&U*
All sites	1586	19	70	71	111	249	312	283	281	260	74.2		14.73	**227.3**	*ALL*
All sites but C44	1565	19	70	71	108	248	309	282	277	251	73.2	100.0	14.57	**222.9**	*ALLbC44*
Average annual population				200988	153846	97159	47293	21069	8621	5369					

Table 4. Zimbabwe, Harare: African (1994-1997)

NUMBER OF CASES BY AGE GROUP AND SUMMARY RATES OF INCIDENCE - MALE

SITE	ALL AGES	AGE UNK	MV (%)	0-	15-	25-	35-	45-	55-	65+	CRUDE RATE	%	CR 64	ASR (W)	*ICD (10th)*
Mouth	23	0	74	-	1	-	4	11	2	5	0.8	0.8	0.10	**1.9**	*C00-06*
Salivary gland	13	0	69	-	1	3	1	2	4	2	0.5	0.4	0.07	**1.0**	*C07-08*
Nasopharynx	12	0	75	3	1	-	3	3	2	-	0.4	0.4	0.05	**0.6**	*C11*
Other pharynx	15	0	73	-	-	2	-	2	9	2	0.5	0.5	0.11	**1.3**	*C09-10,C12-14*
Oesophagus	169	3	41	-	2	8	10	38	53	55	6.1	5.5	0.89	**17.2**	*C15*
Stomach	105	4	64	-	-	8	8	15	37	33	3.8	3.4	0.57	**10.6**	*C16*
Colon, rectum and anus	82	1	62	-	3	10	9	14	20	25	2.9	2.7	0.34	**7.4**	*C18-21*
Liver	281	1	16	3	13	24	36	46	70	88	10.1	9.2	1.22	**26.0**	*C22*
Gallbladder etc.	6	0	33	-	-	1	1	1	-	3	0.2	0.2	0.01	**0.6**	*C23-24*
Pancreas	40	0	20	-	-	3	4	7	18	8	1.4	1.3	0.25	**3.6**	*C25*
Larynx	40	0	65	-	-	3	4	7	11	15	1.4	1.3	0.19	**4.2**	*C32*
Trachea, bronchus and lung	120	0	42	-	-	3	17	19	43	38	4.3	3.9	0.66	**12.1**	*C33-34*
Bone	24	0	67	5	6	7	1	1	-	4	0.9	0.8	0.04	**1.3**	*C40-41*
Melanoma of skin	24	0	75	-	-	3	3	5	8	5	0.9	0.8	0.12	**2.0**	*C43*
Other skin	50	3	88	5	4	7	9	7	8	7	1.8		0.20	**3.3**	*C44*
Mesothelioma	3	0	67	-	-	1	-	1	1	-	0.1	0.1	0.02	**0.2**	*C45*
Kaposi sarcoma	1278	17	60	15	51	523	407	170	75	20	45.8	41.8	4.15	**50.9**	*C46*
Peripheral nerves	1	0	100	-	-	-	-	-	-	1	0.0	0.0	0.00	**0.2**	*C47*
Connective and soft tissue	24	2	71	2	7	4	3	1	4	1	0.9	0.8	0.09	**1.2**	*C49*
Breast	4	0	75	-	-	-	-	-	2	2	0.1	0.1	0.02	**0.5**	*C50*
Penis	17	0	82	-	-	3	2	1	5	6	0.6	0.6	0.07	**1.6**	*C60*
Prostate	209	6	55	-	-	-	2	12	59	130	7.5	6.8	0.78	**28.5**	*C61*
Testis	10	0	70	-	3	2	3	-	1	1	0.4	0.3	0.03	**0.5**	*C62*
Kidney	23	1	74	12	3	1	-	2	3	1	0.8	0.8	0.07	**1.1**	*C64*
Renal pelvis, ureter and other urinary	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C65-66,C68*
Bladder	71	0	48	-	2	4	4	15	24	22	2.5	2.3	0.40	**7.1**	*C67*
Eye	67	7	90	16	3	20	15	3	1	2	2.4	2.2	0.16	**2.6**	*C69*
Brain, nervous system	44	1	59	13	7	5	4	4	5	5	1.6	1.4	0.15	**2.5**	*C70-72*
Thyroid	12	0	75	-	3	2	1	4	-	2	0.4	0.4	0.04	**0.8**	*C73*
Hodgkin disease	18	0	94	5	5	4	4	-	-	-	0.6	0.6	0.04	**0.6**	*C81*
Non-Hodgkin lymphoma	120	3	81	9	6	27	36	17	15	7	4.3	3.9	0.46	**6.2**	*C82-85,C96*
Multiple myeloma	27	1	85	-	-	-	2	7	8	9	1.0	0.9	0.15	**2.9**	*C90*
Lymphoid leukaemia	25	0	100	15	4	-	1	1	2	2	0.9	0.8	0.06	**1.2**	*C91*
Myeloid leukaemia	35	0	97	4	6	12	7	3	1	2	1.3	1.1	0.09	**1.4**	*C92-94*
Leukaemia, unspecified	6	0	50	1	1	1	-	1	-	2	0.2	0.2	0.01	**0.5**	*C95*
Other and unspecified	108	2	47	10	10	12	16	16	16	26	3.9	3.5	0.39	**8.4**	*O&U*
All sites	3106	52	57	118	142	703	617	436	507	531	111.3		12.02	**211.9**	*ALL*
All sites but C44	3056	49	56	113	138	696	608	429	499	524	109.5	100.0	11.81	**208.6**	*ALLbC44*
Average annual population				229844	163096	148372	80020	41879	24090	10644					

Table 4. Zimbabwe, Harare: African (1994-1997)

NUMBER OF CASES BY AGE GROUP AND SUMMARY RATES OF INCIDENCE - FEMALE

SITE	ALL AGES	AGE UNK	MV (%)	0-	15-	25-	35-	45-	55-	65+	CRUDE RATE	%	CR 64	ASR (W)	*ICD (10th)*
Mouth	10	0	40	1	2	1	-	1	1	4	0.4	0.4	0.03	**1.2**	*C00-06*
Salivary gland	14	0	50	2	4	5	1	1	-	1	0.5	0.6	0.04	**0.7**	*C07-08*
Nasopharynx	7	0	71	-	2	1	1	-	2	1	0.3	0.3	0.04	**0.6**	*C11*
Other pharynx	2	0	50	1	-	-	-	1	-	-	0.1	0.1	0.01	**0.1**	*C09-10,C12-14*
Oesophagus	51	0	51	-	-	1	5	11	12	22	1.9	2.3	0.37	**8.4**	*C15*
Stomach	70	1	54	-	1	4	11	13	19	21	2.7	3.1	0.61	**10.3**	*C16*
Colon, rectum and anus	52	0	58	1	1	4	10	13	11	12	2.0	2.3	0.42	**6.7**	*C18-21*
Liver	84	0	21	3	4	8	17	16	12	24	3.2	3.7	0.51	**10.6**	*C22*
Gallbladder etc.	9	0	33	-	-	-	2	2	2	3	0.3	0.4	0.07	**1.3**	*C23-24*
Pancreas	23	0	35	1	-	3	2	3	7	7	0.9	1.0	0.20	**3.4**	*C25*
Larynx	5	0	60	-	-	1	-	-	1	3	0.2	0.2	0.03	**0.9**	*C32*
Trachea, bronchus and lung	40	1	43	-	2	4	3	6	9	15	1.5	1.8	0.25	**5.9**	*C33-34*
Bone	21	0	71	3	7	7	1	1	1	1	0.8	0.9	0.06	**1.0**	*C40-41*
Melanoma of skin	34	2	76	-	1	1	3	14	7	6	1.3	1.5	0.31	**4.4**	*C43*
Other skin	33	0	97	2	5	8	7	1	8	2	1.3		0.22	**2.5**	*C44*
Mesothelioma	1	0	100	-	-	1	-	-	-	-	0.0	0.0	0.00	**0.0**	*C45*
Kaposi sarcoma	482	7	58	6	71	227	117	32	16	6	18.3	21.4	1.70	**21.6**	*C46*
Peripheral nerves	1	0	100	-	-	-	-	-	-	1	0.0	0.0	0.00	**0.2**	*C47*
Connective and soft tissue	27	1	81	5	4	5	5	1	2	4	1.0	1.2	0.09	**2.0**	*C49*
Breast	186	4	72	-	7	12	49	56	36	22	7.0	8.2	1.50	**19.8**	*C50*
Vulva	7	1	71	-	-	1	1	-	2	2	0.3	0.3	0.06	**1.0**	*C51*
Vagina	3	0	67	-	-	-	-	1	1	1	0.1	0.1	0.02	**0.5**	*C52*
Cervix uteri	510	8	69	-	8	80	129	128	87	70	19.3	22.6	3.73	**53.1**	*C53*
Uterus	56	1	66	-	-	5	5	11	18	16	2.1	2.5	0.49	**8.1**	*C54-55*
Ovary	76	0	47	3	9	16	9	15	14	10	2.9	3.4	0.53	**7.4**	*C56*
Placenta	8	0	75	-	2	5	1	-	-	-	0.3	0.4	0.02	**0.2**	*C58*
Kidney	25	0	80	15	2	1	-	2	2	3	0.9	1.1	0.09	**1.8**	*C64*
Renal pelvis, ureter and other urinary	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C65-66,C68*
Bladder	62	1	47	1	1	4	9	12	19	15	2.3	2.7	0.56	**8.5**	*C67*
Eye	73	13	90	10	4	23	14	6	2	1	2.8	3.2	0.27	**3.6**	*C69*
Brain, nervous system	26	0	50	11	2	4	4	3	1	1	1.0	1.2	0.09	**1.4**	*C70-72*
Thyroid	21	1	57	-	1	2	1	4	3	9	0.8	0.9	0.11	**3.2**	*C73*
Hodgkin disease	15	0	87	3	-	5	7	-	-	-	0.6	0.7	0.04	**0.6**	*C81*
Non-Hodgkin lymphoma	77	1	84	8	6	26	15	9	6	6	2.9	3.4	0.34	**5.2**	*C82-85,C96*
Multiple myeloma	25	0	96	-	-	1	2	9	7	6	0.9	1.1	0.25	**3.7**	*C90*
Lymphoid leukaemia	15	0	93	7	1	-	1	2	1	3	0.6	0.7	0.06	**1.3**	*C91*
Myeloid leukaemia	35	0	91	10	7	7	8	2	-	1	1.3	1.6	0.10	**1.6**	*C92-94*
Leukaemia, unspecified	5	0	60	1	1	-	1	1	1	-	0.2	0.2	0.03	**0.4**	*C95*
Other and unspecified	97	3	40	6	6	17	13	14	21	17	3.7	4.3	0.69	**10.6**	*O&U*
All sites	2288	45	63	100	161	490	454	391	331	316	86.7		13.95	**214.4**	*ALL*
All sites but C44	2255	45	62	98	156	482	447	390	323	314	85.4	100.0	13.74	**211.9**	*ALLbC44*
Average annual population				244515	185833	119978	61553	27504	12768	7635					

Table 5. Zimbabwe, Harare: European (1990-1997)

NUMBER OF CASES BY AGE GROUP AND SUMMARY RATES OF INCIDENCE - MALE

SITE	ALL AGES	AGE UNK	MV (%)	0-	15-	25-	35-	45-	55-	65+	CRUDE RATE	%	CR 64	ASR (W)	*ICD (10th)*
Mouth	24	0	96	-	-	-	1	6	5	12	15.7	2.4	0.58	**9.4**	*C00-06*
Salivary gland	2	0	100	-	-	-	-	-	1	1	1.3	0.2	0.05	**0.7**	*C07-08*
Nasopharynx	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C11*
Other pharynx	5	0	80	-	-	-	-	1	1	3	3.3	0.5	0.10	**1.8**	*C09-10,C12-14*
Oesophagus	18	0	50	-	-	1	-	-	3	14	11.8	1.8	0.19	**6.3**	*C15*
Stomach	41	0	78	-	-	-	4	4	14	19	26.8	4.1	1.06	**15.8**	*C16*
Colon, rectum and anus	133	3	70	-	1	1	6	16	26	80	87.0	13.4	2.48	**49.8**	*C18-21*
Liver	23	0	39	-	-	-	-	3	7	13	15.1	2.3	0.48	**8.4**	*C22*
Gallbladder etc.	1	0	0	-	-	-	-	-	-	1	0.7	0.1	0.00	**0.3**	*C23-24*
Pancreas	23	0	26	-	-	-	1	1	1	20	15.1	2.3	0.15	**7.8**	*C25*
Larynx	35	0	86	-	-	-	-	3	8	24	22.9	3.5	0.53	**12.2**	*C32*
Trachea, bronchus and lung	112	0	47	-	-	-	-	3	32	77	73.3	11.2	1.70	**38.4**	*C33-34*
Bone	5	0	100	-	-	-	-	-	1	4	3.3	0.5	0.05	**1.7**	*C40-41*
Melanoma of skin	91	0	96	1	3	6	9	20	21	31	59.5	9.1	2.91	**40.5**	*C43*
Other skin	1584	51	99	2	9	42	130	242	424	684	1036.5		42.34	**635.3**	*C44*
Mesothelioma	4	0	50	-	-	-	-	-	2	2	2.6	0.4	0.10	**1.4**	*C45*
Kaposi sarcoma	2	0	50	-	-	1	1	-	-	-	1.3	0.2	0.09	**1.3**	*C46*
Peripheral nerves	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C47*
Connective and soft tissue	16	1	100	-	1	1	1	4	4	4	10.5	1.6	0.56	**7.3**	*C49*
Breast	2	0	100	-	-	-	-	-	-	2	1.3	0.2	0.00	**0.6**	*C50*
Penis	1	0	100	-	-	-	-	-	-	1	0.7	0.1	0.00	**0.3**	*C60*
Prostate	210	10	84	-	-	-	1	5	33	161	137.4	21.1	1.99	**70.1**	*C61*
Testis	5	0	100	-	2	1	2	-	-	-	3.3	0.5	0.24	**3.5**	*C62*
Kidney	14	0	100	-	-	-	-	2	5	7	9.2	1.4	0.34	**5.2**	*C64*
Renal pelvis, ureter and other urinary	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C65-66,C68*
Bladder	74	0	88	-	-	1	1	2	18	52	48.4	7.4	1.06	**25.6**	*C67*
Eye	6	0	100	-	1	-	-	1	1	3	3.9	0.6	0.15	**2.7**	*C69*
Brain, nervous system	24	0	67	-	4	1	2	5	6	6	15.7	2.4	0.87	**11.9**	*C70-72*
Thyroid	1	0	100	-	1	-	-	-	-	-	0.7	0.1	0.05	**0.9**	*C73*
Hodgkin disease	2	0	100	1	1	-	-	-	-	-	1.3	0.2	0.11	**2.0**	*C81*
Non-Hodgkin lymphoma	15	1	80	-	-	1	-	4	4	5	9.8	1.5	0.46	**6.1**	*C82-85,C96*
Multiple myeloma	12	0	75	-	-	-	-	-	2	10	7.9	1.2	0.10	**3.9**	*C90*
Lymphoid leukaemia	11	0	55	2	-	-	-	-	3	6	7.2	1.1	0.27	**5.4**	*C91*
Myeloid leukaemia	14	1	50	-	-	-	1	1	4	7	9.2	1.4	0.31	**5.3**	*C92-94*
Leukaemia, unspecified	5	0	20	-	-	-	-	-	2	3	3.3	0.5	0.10	**1.7**	*C95*
Other and unspecified	65	0	54	-	-	2	-	9	14	40	42.5	6.5	1.21	**23.9**	*O&U*
All sites	2580	67	89	6	23	58	160	332	642	1292	1688.3		60.61	**1007.6**	*ALL*
All sites but C44	996	16	73	4	14	16	30	90	218	608	651.8	100.0	18.36	**372.6**	*ALLbC44*
Average annual population				3200	2476	2854	2619	2624	2556	2773					

Warning, percentages will be distored because of the high rates for 'Other skin cancer'

Table 5. Zimbabwe, Harare: European (1990-1997)

NUMBER OF CASES BY AGE GROUP AND SUMMARY RATES OF INCIDENCE - FEMALE

SITE	ALL AGES	AGE UNK	MV (%)	0-	15-	25-	35-	45-	55-	65+	CRUDE RATE	%	CR 64	ASR (W)	*ICD (10th)*
Mouth	17	1	76	-	-	1	-	1	6	8	10.1	1.7	0.38	**5.4**	*C00-06*
Salivary gland	2	0	50	-	-	-	-	1	1	-	1.2	0.2	0.09	**0.8**	*C07-08*
Nasopharynx	2	0	100	-	-	1	1	-	-	-	1.2	0.2	0.09	**1.2**	*C11*
Other pharynx	5	0	60	-	-	-	1	-	1	3	3.0	0.5	0.09	**1.6**	*C09-10,C12-14*
Oesophagus	8	0	25	-	-	-	-	-	3	5	4.7	0.8	0.14	**2.3**	*C15*
Stomach	18	0	78	-	-	-	1	-	4	13	10.7	1.8	0.23	**5.0**	*C16*
Colon, rectum and anus	118	0	76	-	1	3	1	12	25	76	70.0	11.6	1.90	**35.5**	*C18-21*
Liver	15	0	13	-	-	-	-	1	3	11	8.9	1.5	0.18	**4.1**	*C22*
Gallbladder etc.	3	0	67	-	-	-	-	-	3	-	1.8	0.3	0.14	**1.1**	*C23-24*
Pancreas	28	0	21	-	-	-	-	2	5	21	16.6	2.7	0.32	**7.5**	*C25*
Larynx	8	0	75	-	-	1	-	-	1	6	4.7	0.8	0.09	**2.3**	*C32*
Trachea, bronchus and lung	86	1	51	-	-	-	1	8	18	58	51.0	8.4	1.24	**24.5**	*C33-34*
Bone	3	0	100	-	-	1	-	1	-	1	1.8	0.3	0.09	**1.2**	*C40-41*
Melanoma of skin	78	2	97	-	1	3	15	13	19	25	46.2	7.6	2.34	**30.2**	*C43*
Other skin	1036	27	100	2	5	36	96	173	246	451	614.2		25.68	**363.3**	*C44*
Mesothelioma	1	0	100	-	-	-	-	-	-	1	0.6	0.1	0.00	**0.2**	*C45*
Kaposi sarcoma	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C46*
Peripheral nerves	1	0	100	-	-	1	-	-	-	-	0.6	0.1	0.04	**0.6**	*C47*
Connective and soft tissue	7	0	100	-	2	1	1	-	1	2	4.1	0.7	0.22	**3.3**	*C49*
Breast	347	5	85	-	-	4	38	74	73	153	205.7	34.0	8.55	**121.2**	*C50*
Vulva	2	0	100	-	-	-	-	1	-	1	1.2	0.2	0.04	**0.7**	*C51*
Vagina	1	0	100	-	-	-	-	-	-	1	0.6	0.1	0.00	**0.2**	*C52*
Cervix uteri	32	1	91	-	1	4	4	6	5	11	19.0	3.1	0.91	**12.7**	*C53*
Uterus	40	2	85	-	-	1	2	4	12	19	23.7	3.9	0.91	**12.8**	*C54-55*
Ovary	28	0	86	-	-	1	4	5	7	11	16.6	2.7	0.76	**10.3**	*C56*
Placenta	1	0	100	-	-	1	-	-	-	-	0.6	0.1	0.04	**0.5**	*C58*
Kidney	6	0	83	-	-	-	1	1	-	4	3.6	0.6	0.09	**2.0**	*C64*
Renal pelvis, ureter and other urinary	2	0	100	-	-	-	-	-	-	2	1.2	0.2	0.00	**0.5**	*C65-66,C68*
Bladder	32	0	78	-	-	1	1	1	7	22	19.0	3.1	0.45	**9.1**	*C67*
Eye	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C69*
Brain, nervous system	24	0	50	2	1	-	1	5	4	11	14.2	2.4	0.62	**10.2**	*C70-72*
Thyroid	7	0	71	-	-	1	-	2	-	4	4.1	0.7	0.13	**2.5**	*C73*
Hodgkin disease	5	0	100	-	1	1	1	1	-	1	3.0	0.5	0.18	**2.8**	*C81*
Non-Hodgkin lymphoma	19	0	79	-	-	-	2	1	4	12	11.3	1.9	0.32	**5.7**	*C82-85,C96*
Multiple myeloma	8	1	63	-	-	-	-	-	1	6	4.7	0.8	0.05	**2.0**	*C90*
Lymphoid leukaemia	5	0	100	1	-	-	-	-	-	4	3.0	0.5	0.05	**2.2**	*C91*
Myeloid leukaemia	7	0	86	-	-	-	1	1	1	4	4.1	0.7	0.13	**2.3**	*C92-94*
Leukaemia, unspecified	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	**0.0**	*C95*
Other and unspecified	55	1	38	-	-	-	1	5	13	35	32.6	5.4	0.88	**16.0**	*O&U*
All sites	2057	41	87	5	12	62	173	319	463	982	1219.4		47.33	**703.5**	*ALL*
All sites but C44	1021	14	75	3	7	26	77	146	217	531	605.3	100.0	21.68	**340.3**	*ALLbC44*
Average annual population				3275	2558	3024	2785	2925	2687	3832					

Warning, percentages will be distored because of the high rates for 'Other skin cancer'

Table 6. Zimbabwe, Bulawayo: childhood cancer (Skinner, 1988)

Cancer	Bulawayo, 1963–77 (all cases)		Bulawayo, 1963–77 (residents only)		
	No.	%	No.	%	ASR (per million)
Leukaemia	78	14.4%	15	19.2%	16.1
Acute lymphocytic leukaemia	30	5.5%			
Lymphoma	83	15.3%	14	17.9%	14.6
Burkitt lymphoma	19	3.5%			
Hodgkin disease					
Brain and spinal neoplasms	38	7.0%	14	17.9%	14.8
Neuroblastoma	19	3.5%	7	9.0%	8.0
Retinoblastoma	77	14.2%	5	6.4%	5.9
Wilms tumour	69	12.7%	7	9.0%	8.3
Bone tumours	22	4.1%	2	2.6%	2.0
Soft-tissue sarcomas	75	13.8%	8	10.3%	8.6
Kaposi sarcoma					
Other	82	15.1%	6	7.7%	6.8
Total	543	100.0%	78	100.0%	85.1

Table 7. Childhood cancer, Zimbabwe, Harare: African (1990-1997)

	NUMBER OF CASES					REL. FREQ.(%)	RATES PER MILLION					
	0-4	5-9	10-14	**All**	*M/F*	Overall	0-4	5-9	10-14	Crude	**ASR**	%MV
Leukaemia	17	31	27	**75**	*1.2*	19.4	12.6	27.0	27.5	21.6	**21.6**	94.1
Acute lymphoid leukaemia	11	20	10	**41**	*1.7*	10.6	8.2	17.4	10.2	11.8	**11.8**	95.1
Lymphoma	13	21	14	**48**	*2.2*	12.4	9.7	18.3	14.3	13.8	**13.8**	86.2
Hodgkin disease	2	4	7	**13**	*2.3*	3.4	1.5	3.5	7.1	3.7	**3.8**	92.3
Burkitt lymphoma	2	4	0	**6**	*1.0*	1.6	1.5	3.5	-	1.7	**1.7**	100.0
Brain and spinal neoplasms	12	10	19	**41**	*1.2*	10.6	8.9	8.7	19.4	11.8	**11.9**	53.7
Neuroblastoma	8	3	1	**12**	*1.4*	3.1	5.9	2.6	1.0	3.5	**3.4**	75.0
Retinoblastoma	31	5	1	**37**	*1.8*	9.6	23.0	4.4	1.0	10.7	**10.6**	89.2
Wilms tumour	34	13	2	**49**	*0.8*	12.7	25.3	11.3	2.0	14.1	**14.0**	95.9
Bone tumours	2	1	11	**14**	*1.8*	3.6	1.5	0.9	11.2	4.0	**4.1**	85.7
Soft tissue sarcomas	27	16	6	**49**	*1.7*	12.7	20.1	14.0	6.1	14.1	**14.0**	100.0
Kaposi sarcoma	21	11	4	**36**	*2.6*	9.3	15.6	9.6	4.1	10.4	**10.3**	75.0
Germ cell tumours	2	4	1	**7**	*0.2*	1.8	1.5	3.5	1.0	2.0	**2.0**	100.0
Other	8	13	33	**54**	*0.9*	14.0	5.9	11.3	33.7	15.5	**15.7**	57.4
All	154	117	115	**386**	*1.3*	100.0	114.4	102.1	117.3	111.1	**111.3**	81.6