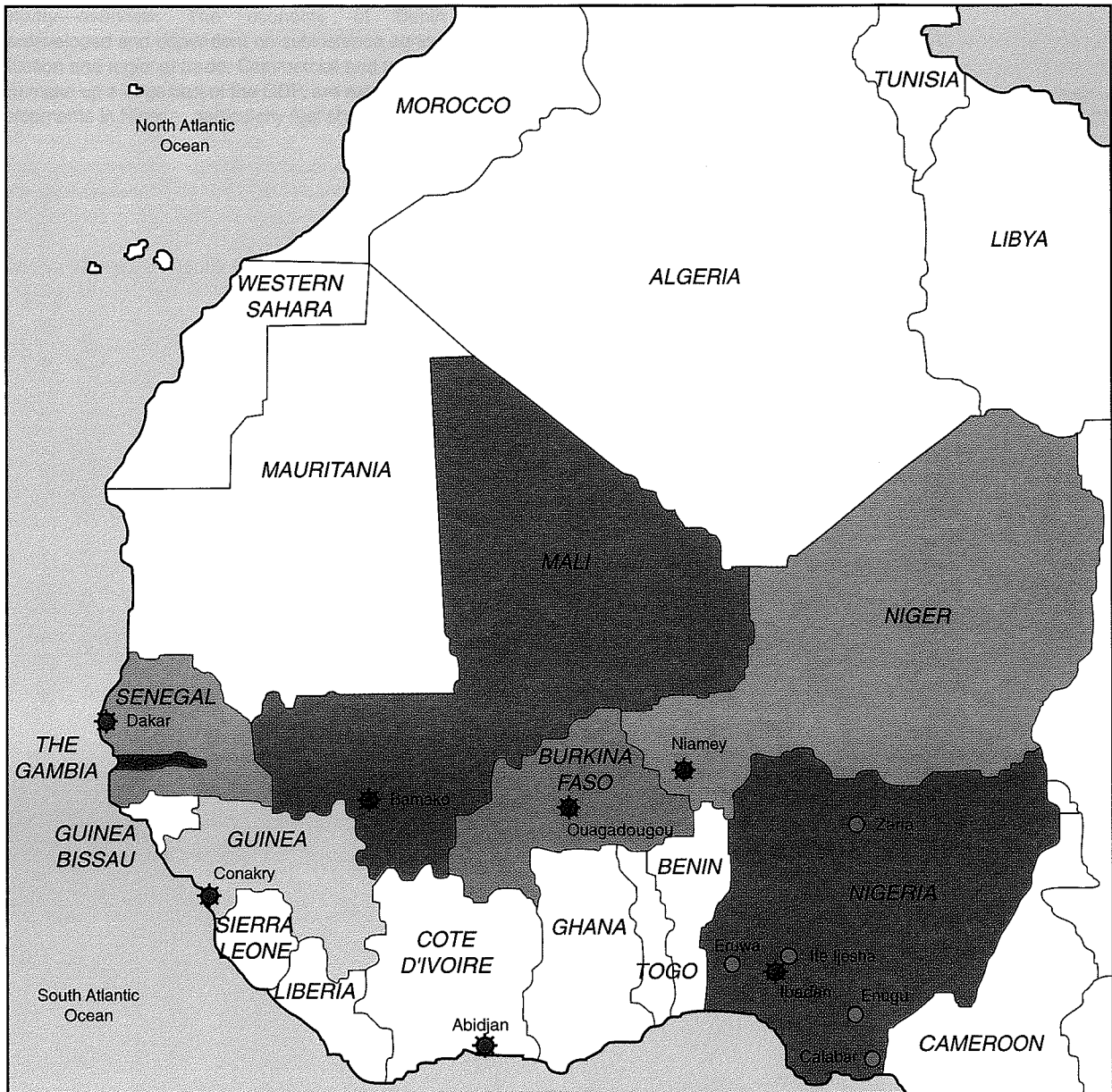


3.2 West Africa



3.2.1 Benin

Background

Climate: Tropical; hot, humid in south; semiarid in north

Terrain: Mostly flat to undulating plain; some hills and low mountains

Ethnic groups: African 99% (42 ethnic groups, most important being Fon, Adja, Yoruba, Bariba), Europeans 5500

Religions: Indigenous beliefs 70%, Muslim 15%, Christian 15%

Economy—overview: The economy of Benin remains underdeveloped and dependent on subsistence agriculture, cotton production and regional trade. Commercial and transport activities, which make up a large part of the GDP, are extremely vulnerable to developments in Nigeria, particularly fuel shortages.

Industries: Textiles, cigarettes; beverages, food; construction materials, petroleum

Agriculture—products: Corn, sorghum, cassava (tapioca), yams, beans, rice, cotton, palm oil, peanuts; poultry, livestock

Cancer registration

There has been no cancer registry in Benin.

Review of data

There is no published material on the cancer profile in the country.

3.2.2 Burkina Faso

Background

Climate: Tropical; warm, dry winters; hot, wet summers

Terrain: Mostly flat to dissected, undulating plains; hills in west and southeast

Ethnic groups: Mossi about 24%, Gurunsi, Senufo, Lobi, Bobo, Mande, Fulani

Religions: Indigenous beliefs 40%, Muslim 50%, Christian (mainly Roman Catholic) 10%

Economy—overview: One of the poorest countries in the world, landlocked Burkina Faso has a high population density, few natural resources and a fragile soil. Over 80% of the population is engaged in subsistence agriculture, which is highly vulnerable to variations in rainfall. Industry remains undeveloped.

Industries: Cotton lint, beverages, agricultural processing, soap, cigarettes, textiles, gold

Agriculture—products: Peanuts, shea nuts, sesame, cotton, sorghum, millet, corn, rice; livestock

Cancer registration

A population-based cancer registry was established in 1997, in the Department of Anatomical Pathology, in the main teaching hospital

of the capital, Ouagadougou. The objective was to record all cases of cancer among residents of the city, but cases in non-residents, from hospital or laboratory sources, were also registered. Registration was principally by active case finding through visits to the various clinical services in the National Hospital Yalgado Ouedraogo (the only major tertiary care facility) and to several smaller private clinics. All pathology reports mentioning cancer are obtained from the laboratory in the hospital, and from laboratories in three private clinics.

The registration process is carried out with a microcomputer using the CANREG software.

Review of data

The results are presented in Table 1 for the first complete year of registration (1998). 407 cases were registered, 51% of which had microscopically verified diagnosis.

In males, liver cancer is the most commonly registered tumour (25.9%) with 14% microscopic verification, followed by prostate (16.2%) and bladder cancers (9.1%). In women, breast cancer (28.6%) is registered more frequently than cervix cancer (20.6%), with liver cancer (7.5%) in third rank.

We are not aware of any other published data of the cancer profile in Burkina Faso.

Table 1. Burkina Faso, Ouagadougou (1998)

NUMBER OF CASES BY AGE GROUP - MALE

SITE	ALL AGES	AGE UNK	MV (%)	0-	15-	25-	35-	45-	55-	65+	%	ICD (10th)
Mouth	5	0	40	1	-	-	1	1	1	1	2.5	C00-06
Salivary gland	1	0	0	-	-	-	-	-	1	-	0.5	C07-08
Nasopharynx	0	0	-	-	-	-	-	-	-	-	0.0	C11
Other pharynx	4	0	50	-	-	-	-	-	2	2	2.0	C09-10,C12-14
Oesophagus	5	0	60	-	-	-	-	-	3	2	2.5	C15
Stomach	5	0	20	-	-	-	1	-	2	2	2.5	C16
Colon, rectum and anus	8	0	88	-	1	-	-	2	1	4	4.1	C18-21
Liver	51	0	14	1	1	7	15	13	6	8	25.9	C22
Gallbladder etc.	1	0	100	-	-	-	-	-	-	1	0.5	C23-24
Pancreas	0	0	-	-	-	-	-	-	-	-	0.0	C25
Larynx	0	0	-	-	-	-	-	-	-	-	0.0	C32
Trachea, bronchus and lung	9	0	100	-	-	-	-	1	4	4	4.6	C33-34
Bone	9	0	33	1	2	2	-	1	2	1	4.6	C40-41
Melanoma of skin	0	0	-	-	-	-	-	-	-	-	0.0	C43
Other skin	4	0	25	2	-	-	-	-	1	1	4.4	C44
Mesothelioma	1	0	100	-	-	-	-	-	1	-	0.5	C45
Kaposi sarcoma	3	0	100	-	-	1	2	-	-	-	1.5	C46
Peripheral nerves	0	0	-	-	-	-	-	-	-	-	0.0	C47
Connective and soft tissue	6	0	67	2	-	1	-	1	-	2	3.0	C49
Breast	2	0	100	-	-	-	-	-	2	-	1.0	C50
Penis	0	0	-	-	-	-	-	-	-	-	0.0	C60
Prostate	32	0	31	-	-	-	-	-	6	26	16.2	C61
Testis	1	0	100	-	-	-	1	-	-	-	0.5	C62
Kidney	1	0	0	-	-	-	-	-	1	-	0.5	C64
Renal pelvis, ureter and other urinary	0	0	-	-	-	-	-	-	-	-	0.0	C65-66,C68
Bladder	18	0	17	1	1	1	2	5	2	6	9.1	C67
Eye	9	0	44	7	-	-	-	2	-	-	4.6	C69
Brain, nervous system	0	0	-	-	-	-	-	-	-	-	0.0	C70-72
Thyroid	0	0	-	-	-	-	-	-	-	-	0.0	C73
Hodgkin disease	3	0	100	2	-	-	1	-	-	-	1.5	C81
Non-Hodgkin lymphoma	7	0	100	2	-	1	2	-	-	2	3.6	C82-85,C96
Multiple myeloma	0	0	-	-	-	-	-	-	-	-	0.0	C90
Lymphoid leukaemia	2	0	100	-	-	-	-	-	2	-	1.0	C91
Myeloid leukaemia	2	0	100	1	1	-	-	-	-	-	1.0	C92-94
Leukaemia, unspecified	1	0	100	1	-	-	-	-	-	-	0.5	C95
Other and unspecified	11	0	55	1	-	1	1	1	3	4	5.6	O&U
All sites	201	0	42	22	6	14	26	27	40	66		ALL
All sites but C44	197	0	43	20	6	14	26	27	39	65	100.0	ALLbC44

Table 1. Burkina Faso, Ouagadougou (1998)

NUMBER OF CASES BY AGE GROUP - FEMALE

S I T E	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	1	0	100	-	-	-	-	1	-	-	0.5	C07-08
Nasopharynx	0	0	-	-	-	-	-	-	-	-	0.0	C11
Other pharynx	1	0	0	-	-	1	-	-	-	-	0.5	C09-10,C12-14
Oesophagus	4	0	50	-	-	-	-	4	-	-	2.0	C15
Stomach	5	0	80	1	-	-	-	1	2	1	2.5	C16
Colon, rectum and anus	2	0	50	-	-	1	-	1	-	-	1.0	C18-21
Liver	15	0	13	-	1	3	4	1	5	1	7.5	C22
Gallbladder etc.	0	0	-	-	-	-	-	-	-	-	0.0	C23-24
Pancreas	2	0	0	-	-	-	2	-	-	-	1.0	C25
Larynx	0	0	-	-	-	-	-	-	-	-	0.0	C32
Trachea, bronchus and lung	3	0	100	-	-	1	-	-	1	1	1.5	C33-34
Bone	4	0	50	1	1	-	-	-	1	1	2.0	C40-41
Melanoma of skin	1	0	100	-	-	-	-	-	1	-	0.5	C43
Other skin	7	0	43	-	-	3	2	-	1	1	0.0	C44
Mesothelioma	0	0	-	-	-	-	-	-	-	-	0.0	C45
Kaposi sarcoma	0	0	-	-	-	-	-	-	-	-	0.0	C46
Peripheral nerves	0	0	-	-	-	-	-	-	-	-	0.0	C47
Connective and soft tissue	0	0	-	-	-	-	-	-	-	-	0.0	C49
Breast	57	0	63	-	5	13	14	9	10	6	28.6	C50
Vulva	0	0	-	-	-	-	-	-	-	-	0.0	C51
Vagina	0	0	-	-	-	-	-	-	-	-	0.0	C52
Cervix uteri	41	0	73	1	1	12	9	11	5	2	20.6	C53
Uterus	15	0	87	-	2	5	4	2	1	1	7.5	C54-55
Ovary	4	0	100	-	-	1	1	1	1	-	2.0	C56
Placenta	0	0	-	-	-	-	-	-	-	-	0.0	C58
Kidney	1	0	0	1	-	-	-	-	-	-	0.5	C64
Renal pelvis, ureter and other urinary	0	0	-	-	-	-	-	-	-	-	0.0	C65-66,C68
Bladder	5	0	40	-	-	2	1	1	1	-	2.5	C67
Eye	7	0	43	5	-	1	-	1	-	-	3.5	C69
Brain, nervous system	0	0	-	-	-	-	-	-	-	-	0.0	C70-72
Thyroid	1	0	100	-	-	-	-	-	-	1	0.5	C73
Hodgkin disease	0	0	-	-	-	-	-	-	-	-	0.0	C81
Non-Hodgkin lymphoma	5	0	60	1	1	1	-	2	-	-	2.5	C82-85,C96
Multiple myeloma	0	0	-	-	-	-	-	-	-	-	0.0	C90
Lymphoid leukaemia	2	0	50	1	-	-	1	-	-	-	1.0	C91
Myeloid leukaemia	2	0	50	2	-	-	-	-	-	-	1.0	C92-94
Leukaemia, unspecified	1	0	100	-	-	-	-	1	-	-	0.5	C95
Other and unspecified	19	0	47	2	-	3	2	4	3	5	9.5	O&U
All sites	206	0	60	15	11	47	40	40	32	21		ALL
All sites but C44	199	0	61	15	11	44	38	40	31	20	100.0	ALLbC44

3.2.3 Cape Verde

Background

Climate: Temperate; warm, dry summer; precipitation meager and very erratic

Terrain: Steep, rugged, rocky, volcanic

Ethnic groups: Creole (mulatto) 71%, African 28%, European 1%

Religions: Roman Catholicism fused with indigenous beliefs

Economy—overview: Cape Verde's low per capita GDP reflects a poor natural resource base, serious water shortages exacerbated by cycles of long-term drought, and a high birth rate. The economy is service-oriented, with commerce, transport and public services accounting for almost 70% of GDP. Although nearly 70% of the population lives in rural areas, the share of agriculture in the GDP in 1995 was only 8%, of which fishing accounted for 1.5%. About 90% of food must be imported. The fishing potential, mostly lobster and tuna, is not fully exploited.

Industries: Food and beverages, fish processing, shoes and garments, salt mining, ship repair

Agriculture—products: Bananas, corn, beans, sweet potatoes, sugarcane, coffee, peanuts; fish

Cancer registration

There has been no cancer registration in the country to date

Review of data

There are no published data on cancer incidence, or on clinical/pathological case series.

Mysteriously, some mortality data for 1980 were published in the World Health Statistics Annual of WHO (1983) for a limited series of sites (Table 1). No such data have appeared since. The rates are low and suggest under-registration of deaths. But some interesting features emerge, such as the frequency of stomach cancer as a cause of death (the leading cause of cancer death in both sexes).

Reference

WHO (1983) *World Health Statistics Annual, 1983*, Geneva

Table 1. Cape Verde: 1980 (source: WHO, 1983)

Site	ICD 8	Males			Females		
		Deaths	Rate	ASR(W)	Deaths	Rate	ASR(W)
Buccal cavity and pharynx	A045	1	0.7	0.6	2	1.3	0.8
Oesophagus	A046	6	4.4	3.3	6	3.8	3.1
Stomach	A047	21	15.3	12.1	20	12.6	9.2
Rectum, rectosigmoid junction, anus	A049	1	0.7	0.3	1	0.6	0.5
Larynx	A050	2	1.5	1.3	0	0	0
Trachea, bronchus and lung	A051	6	4.4	3.4	4	2.5	1.5
Bone	A052	1	0.7	0.6	1	0.6	0.4
Breast	A054				6	3.8	2.8
Cervix uteri	A055				12	7.5	5.6
Prostate	A057	4	2.9	2.3			
Leukaemia	A059	1	0.7	0.6	1	0.6	0.3
Other and unspecified sites	A058	15	10.9	7.1	16	10.1	8.0
ALL MALIGNANT NEOPLASMS		62	45.2	33.4	80	50.3	37.9

Male population: 137 100

Female population: 159 000

Rate: Crude rate per 100 000

ASR(W): Age-standardized rate (World population) per 100 000

3.2.4 Côte d'Ivoire

Background

Climate: Tropical along coast, semi-arid in far north; three seasons—warm and dry (November to March), hot and dry (March to May), hot and wet (June to October)

Terrain: Mostly flat to undulating plains; mountains in north-west

Ethnic groups: Baoule 23%, Bete 18%, Senoufou 15%, Malinke 11%, Agni, foreign Africans (mostly Burkinabe and Malians, about 3 million), non-Africans 130 000 to 330 000

Religions: Muslim 60%, Christian 12%, indigenous beliefs 25% (some overlap with the Christians and Muslims)

Economy—overview: Côte d'Ivoire is among the world's largest producers and exporters of coffee, cocoa beans, and palm oil. Consequently, the economy is highly sensitive to fluctuations in international prices for these products and to weather conditions. Despite attempts by the government to diversify the economy, it is still largely dependent on agriculture and related activities, which engage roughly 85% of the population.

Industries: Foodstuffs, beverages; wood products, oil refining, automobile assembly, textiles, fertilizer, construction materials, electricity

Agriculture—products: Coffee, cocoa beans, bananas, palm kernels, corn, rice, cassava (tapioca), sweet potatoes, sugar; cotton, rubber; timber

Cancer registration

The Abidjan cancer registry was founded in 1994, under the auspices of the Ministry of Public Health. It is located in the Department of Oncology at the University Hospital of Treichville. This department is a referral centre for cancer treatment in the capital. The registry was, from its inception, designed to be population-based with complete recording of all cancer cases diagnosed among the population of the city of Abidjan. The city comprises 10 administrative subdivisions and in 1996 the population was estimated to be almost 3 million.

Case finding is carried out by a cancer registrar and two full-time clerks, by active search for cases in all of the hospital services in the city where cancer might be diagnosed. Weekly visits are made to the major services (surgery, urology, medicine, gynaecology, paediatrics etc.) in the three major teaching hospitals (Treichville, Cocody and Yopougon), as well as less frequent visits to government, private hospitals, health centres and private clinics. Cases of cancer in residents of Abidjan who are admitted to the mission hospital in Dabou 50 km from Abidjan are notified to the registry by medical staff. In addition, cancer cases are identified from various case series (haematological malignancies, lymphomas, Kaposi sarcomas, etc.) collected by clinicians.

An important source of information is the two university departments of pathology which provide histopathology and cytology services for the whole of the south of the country. Two private laboratories are also used as sources of data. Death certificates are not used as a source of information, because of the difficulty in retrieving them from the different administrative offices where they are stored, and because the primary sources (hospitals, pathology laboratories) were already covered by the case-finding system.

Care is taken to distinguish residents of Abidjan from temporary visitors (the latter are generally individuals domiciled with their

extended family for the purpose of receiving treatment). The definition of 'usual resident' is a person who has lived in Abidjan for at least six months. The registration process is carried out with a microcomputer using the CANREG software.

Results for the three-year period 1995–97 have been published (Echimane *et al.*, 2000) and are reproduced in Table 1. The incidence rates calculated based on the estimated resident population are a little low, suggesting that some cases are not being found. In addition, the level of diagnostic confirmation by histology or cytology is relatively high (81.8%) compared with that in other registries in West Africa. Although this partly reflects the failure to detect a proportion of cases diagnosed without histology, it is quite likely that the proportion of cancer cases receiving a biopsy is higher in Abidjan, where there are numerous laboratories and pathologists, than elsewhere in the region. Suspected cases of liver cancer are frequently examined by aspiration cytology to confirm the diagnosis.

Review of data

Cancer Registry

The ranking of the different cancers differs depending on whether they are considered in terms of numbers of cases or ASRs. In men, prostate (15.3% cancers, ASR 31.4 per 100 000) and liver cancer (14.6 % of cases, ASR 10.0 per 100 000) rank first and second by both indices, but while the next most frequent in terms of numbers are non-Hodgkin lymphoma (10%), Kaposi sarcoma (7.5%) and lung cancer (5.1%), in terms of ASR, they are lung (6.2 per 100 000), stomach (3.3 per 100 000) and non-Hodgkin lymphoma (3.0 per 100 000).

In women, the most important sites are breast (25.2%), cervix uteri (23.6%), non-Hodgkin lymphoma (7.2%), ovary (4.8%) and liver (4.2%). Because of the different age distributions, the age-standardized incidence for cervix cancer (26.8 per 100 000) is rather higher than that for breast cancer (21.4 per 100 000); liver cancer has the third highest incidence (5.6 per 100 000), followed by stomach cancer (4.5 per 100 000). Of the 215 cases of cervix cancer with a histological diagnosis, 92.5% were squamous-cell carcinomas and 3.3% adenocarcinomas.

Among the non-Hodgkin lymphomas, 70 cases (44%) were recorded as Burkitt lymphoma; the proportion of non-Hodgkin lymphoma considered to be Burkitt lymphoma fell with age from 49/55 cases (89%) at 0–14 years to 20/74 (27%) at 15–44 years.

Previous studies

In an analysis of 5758 cancers histologically diagnosed in the laboratory of the University Hospital of Treichville between 1974 and 1983, Diomande *et al.* (1988) found cervix cancer to be almost three times more frequent (29.1% of female cancers) than breast cancer (10.5%). In the modern registry data, cervix cancer is slightly less common, despite similar rates of histological verification.

The high incidence of cervix cancer is presumably related to a high prevalence of infection with oncogenic subtypes of human papillomavirus, now accepted as the major causative agent for cervical cancer. In a study of women attending gynaecology clinics in Abidjan, La Ruche *et al.* (1998) found that 23.2% of women with no cytological abnormality of the cervix were infected with this virus.

Childhood cancer

Table 2 presents the neoplasms occurring in the childhood population (age 0–14 years) of Abidjan. There were a total of 137 cases, but because 21% had no histological diagnosis, 29 cases (21% of the total) fell into the 'other unspecified' category. The most

frequent childhood cancer was lymphoma (58 cases, 42.3% of the total), of which 49 (84.5%) were Burkitt lymphoma, followed by leukaemias (12 cases, 8.8%) and brain tumour (9 cases, 6.6%). The peak incidence for Burkitt lymphoma cases was in the 10–14-year age group. Some underdiagnosis of childhood cancers is likely, as witnessed by the low rates, absence of any cases in infants less than one year old, and the few cases of leukaemias and brain tumours recorded.

In a series of childhood cancers, collected over 10 years in the paediatric service of Treichville Hospital, Essoh *et al.* (1988) found that 50.5% of cancer cases admitted were non-Hodgkin lymphomas, of which Burkitt lymphoma comprised 96%.

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Table 1. Abidjan Cancer Registry, Côte d'Ivoire, 1995–97 (Echimane *et al.*, 2000)

Site		Male				Female				HV%
		Total	%	Crude rate	ASR (world)	Total	%	Crude rate	ASR (world)	
Mouth	C00–08	18	2.1%	0.3	2.4	15	1.5%	0.3	2.4	97.0
Nasopharynx	C11	7	0.8%	0.2	0.5	2	0.2%	0.0	0.1	55.6
Other pharynx	C09–10, C12–14	10	1.1%	0.2	0.7	4	0.4%	0.1	0.7	85.7
Oesophagus	C15	9	1.0%	0.2	0.7	1	0.1%	0.0	0.2	90.0
Stomach	C16	37	4.3%	0.8	3.3	23	2.3%	0.5	4.5	90.0
Colon/rectum	C18–21	37	4.3%	0.8	2.4	23	2.3%	0.6	2.5	80.0
Liver	C22	125	14.6%	2.7	10.0	43	4.2%	1.0	5.6	50.6
Pancreas	C25	11	1.3%	0.2	1.0	6	0.6%	0.1	0.9	47.1
Lung	C33–34	44	5.1%	1.0	6.2	9	0.9%	0.2	1.2	90.6
Melanoma of skin	C43	5	0.6%	0.1	0.7	5	0.5%	0.1	1.4	100
Other skin	C44	28	3.3%	0.6	2.2	17	1.7%	0.4	2.3	82.2
Kaposi sarcoma	C46	64	7.5%	1.4	2.2	19	1.9%	0.4	1.4	100
Breast	C50	9	1.0%	0.2	0.9	255	25.2%	5.9	21.4	89.0
Cervix	C53					239	23.6%	5.5	26.8	90.0
Corpus	C54					11	1.1%	0.3	2.3	75.0
Ovary etc.	C56–57					49	4.8%	1.1	4.0	65.3
Prostate	C61	131	15.3%	2.8	31.4					76.3
Penis	C60	3	0.3%	0.1	0.2					100
Bladder	C67	24	2.8%	0.5	2.2	9	0.9%	0.2	1.8	63.6
Kidney etc.	C64–66, C68	16	1.9%	0.3	1.0	10	1.0%	0.2	0.7	70.8
Eye	C69	3	0.3%	0.1	0.0	9	0.9%	0.3	0.9	58.3
Brain, nervous system	C71–72	9	1.0%	0.2	0.3	13	1.3%	0.3	0.9	63.6
Thyroid	C73	3	0.3%	0.1	0.1	17	1.7%	0.4	1.5	90.0
Non-Hodgkin lymphoma	C82–85, C96	86	10.0%	1.9	3.0	73	7.2%	1.7	2.9	98.1
Hodgkin disease	C81	21	2.4%	0.5	0.8	13	1.3%	0.3	0.7	100
Myeloma	C90	8	0.9%	0.2	1.8	5	0.5%	0.1	0.5	100
Leukaemia	C91–95	30	3.5%	0.7	1.0	28	2.8%	0.7	2.7	98.6
All sites	ALL	859	100.0%	18.7	83.7	1012	100.0%	23.3	98.6	100

Table 2. Côte d'Ivoire: childhood cancer

Cancer	Abidjan Cancer Registry, 1995-97 (Echimane <i>et al.</i> , 2000)		
	No.	%	ASR
Leukaemia	12	8.8%	3.3
Acute lymphocytic leukaemia	6	4.4%	1.6
Lymphoma	58	42.3%	16.8
Burkitt lymphoma	49	35.8%	13.5
Hodgkin disease	3	2.2%	0.8
Brain and spinal neoplasms	9	6.6%	2.5
Neuroblastoma	1	0.7%	0.3
Retinoblastoma	4	2.9%	1
Wilms tumour	7	5.1%	1.8
Bone tumours	8	5.8%	2.3
Soft-tissue sarcomas	4	2.9%	1.1
Kaposi sarcoma	2	1.5%	0.5
Other	34	24.8%	8.5
Total	137	100.0%	37.6

3.2.5 The Gambia

Background

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

Terrain: Flood plain of the Gambia River flanked by some low hills

Ethnic groups: African 99% (Mandinka 42%, Fula 18%, Wolof 16%, Jola 10%, Serahuli 9%, other 4%), non-African 1%

Religions: Muslim 90%, Christian 9%, indigenous beliefs 1%

Economy—overview: The Gambia has no important mineral or other natural resources and has a limited agricultural base. About 75% of the population depends on crops and livestock for its livelihood. Small-scale manufacturing activity features the processing of peanuts, fish and hides. Reexport trade constituted a major segment of economic activity, but the 50% devaluation of the CFA franc in January 1994 made Senegalese goods more competitive and hurt the reexport trade. The Gambia also has an important tourism industry.

Industries: Processing peanuts, fish and hides; tourism; beverages; agricultural machinery assembly, wood-working, metalworking; clothing

Agriculture—products: Peanuts, millet, sorghum, rice, corn, cassava (tapioca), palm kernels; cattle, sheep, goats; forest and fishing resources are not fully exploited

Cancer registration

The Gambian National Cancer Registry was started in July 1986 as part of the Gambia Hepatitis Intervention Study (GHIS). This collaborative project, involving the IARC, the Government of The Gambia and the UK Medical Research Council (MRC), was supported by the Government of Italy through its Ministry of Foreign Affairs and the Swedish Medical Research Council. It was designed as a community-based randomized controlled trial to evaluate the protective efficacy of infant hepatitis B immunization in preventing chronic liver disease, particularly primary liver cancer, in adult life. The registry is the first population-based one with nationwide coverage in Africa, and thus covers both rural and urban populations.

Since the inception of the GHIS, improvements have been made in the diagnosis of chronic liver disease, especially primary liver cell carcinoma, by use of alpha-fetoprotein estimation, abdominal ultrasound examination and blood testing for hepatitis B surface antigen (HBsAg). In addition, a local histopathology service was revived during the middle phase of the project so as to improve histological diagnosis of all cancers. The registry receives copies of all histology reports from the National Health Laboratory Services located in the capital city of Banjul. Until recently, the Gambia had three tertiary care hospitals, two of which are government-owned, namely the Royal Victoria Hospital (RVH) in Banjul and Bansang Hospital (BSG) located in the eastern region of the country and serving mainly a rural population. These hospitals are the major referral centres for the various government dispensaries and health centres, which are evenly located around the country. They provide general medical and laboratory services. The MRC ward hospital in Fajara is another major referral centre, with four out-reach stations in rural areas; this institution has a broad-based laboratory research facility. In addition, there are various private clinics and hospitals located mainly in and around Banjul and a few mission clinics in the peri-urban and rural areas that offer general medical care.

Data collection is an active process. Initially, this was done by regular visits (their frequency determined by the yield of cancer cases) to the hospitals, collaborating private clinics, mission clinics and seven of the major health centres manned by medical doctors. Since 1997, a registry clerk has been posted in each of the three tertiary care facilities, with responsibility to work closely with the clinical, nursing and medical records staff. All possible sources (medical records, log books, ward/admission books, histology report books, specific biochemistry request books, surgical operation lists, nursing report books, death certificate stubs) are scanned for diagnosis of cancer. Cases found during admission or consultation are interviewed personally by the registry staff.

Data entry and management are performed with the IARC CANREG-3 programme. Site and histology are coded according to ICD-O second edition.

Quality control checks, which involve re-abstracting tumour and patient details from the sources of information, are undertaken by the supervisor at regular intervals.

The population denominators for calculation of incidence rates are based on annual estimates using 1983 and 1993 census figures.

Review of data

Registry data

After the change in registration methodology in 1999, there was a noticeable increase in the annual number of registrations, from an average of 280 per year in 1988–96 to 463 per year in 1997–99. Table 1 therefore shows the incidence rates for the period 1997–98. Data for the 10-year period 1988–97 have been published (Bah *et al.*, 2001), as well as the results from the first two years of activity (Bah *et al.*, 1990).

During the period under review (1997–98), 926 malignant tumours (448 in males and 478 in females) were registered among residents of The Gambia (Table 1).

The most common cancer in male Gambians is liver cancer, which constitutes 58% of all malignancies. Cancers of the lung and prostate are next in importance. Among female Gambians, cervix cancer dominates (36.5% of cases), with an age-standardized incidence rate of 29.6 per 100 000 person-years, while cancer of the liver (19.5%) and breast (9%) rank second and third, respectively.

Table 1 shows that, of the 926 cancer cases, 22.7% were based on microscopic examination. The percentage is lowest for liver cancer (3.5%), mainly due to the wide use of alpha-fetoprotein estimation and ultrasound examination in the confirmation of suspected liver disease in this population. On average, 40% of the diagnoses of liver cancer were based on suggestive ultrasonography, while positive alpha-fetoprotein estimation accounted for an additional 30%.

Childhood cancer

Table 2 shows an analysis of childhood cancer cases registered in a 11-year period, 1988–98. There were 162 cases. The overall incidence is low (ASR 34.7 per million). Lymphomas are the most commonly recorded cancer type, with 44.8% of lymphoma cases diagnosed as Burkitt lymphoma (corresponding to an ASR of 6.1 per million). The paucity of CNS tumours probably reflects the absence of diagnostic facilities.

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Table 1. The Gambia (1997-1998)

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	0	75	-	-	-	-	2	1	1	0.4	0.9	0.07	0.9	C00-06
Salivary gland	2	0	100	2	-	-	-	-	-	-	0.2	0.5	0.01	0.1	C07-08
Nasopharynx	1	1	100	-	-	-	-	-	-	-	0.1	0.2	0.00	0.0	C11
Other pharynx	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C09-10, C12-14
Oesophagus	7	1	0	-	-	1	1	3	-	1	0.7	1.6	0.10	1.4	C15
Stomach	11	1	27	-	-	-	1	2	2	5	1.1	2.5	0.12	2.5	C16
Colon, rectum and anus	8	0	13	-	-	2	2	3	-	1	0.8	1.8	0.10	1.5	C18-21
Liver	257	17	4	1	13	43	52	55	45	31	26.0	58.1	3.92	48.9	C22
Gallbladder etc.	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C23-24
Pancreas	9	1	0	-	-	1	2	2	2	1	0.9	2.0	0.16	1.8	C25
Larynx	1	0	100	-	-	-	1	-	-	-	0.1	0.2	0.02	0.2	C32
Trachea, bronchus and lung	22	1	0	-	-	-	1	2	6	12	2.2	5.0	0.25	5.1	C33-34
Bone	7	0	14	2	1	1	-	-	2	1	0.7	1.6	0.08	1.0	C40-41
Melanoma of skin	2	0	50	1	-	-	-	1	-	-	0.2	0.5	0.02	0.3	C43
Other skin	6	2	100	-	1	-	1	1	-	1	0.6	-	0.05	1.0	C44
Mesothelioma	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C45
Kaposi sarcoma	4	2	0	-	1	-	1	-	-	-	0.4	0.9	0.04	0.6	C46
Peripheral nerves	1	0	100	1	-	-	-	-	-	-	0.1	0.2	0.00	0.1	C47
Connective and soft tissue	7	1	0	-	-	1	1	-	2	2	0.7	1.6	0.10	1.5	C49
Breast	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C50
Penis	4	0	25	-	-	2	-	1	-	1	0.4	0.9	0.04	0.7	C60
Prostate	20	2	20	-	-	-	-	-	3	15	2.0	4.5	0.10	4.7	C61
Testis	2	0	50	1	-	-	-	-	-	1	0.2	0.5	0.00	0.3	C62
Kidney	3	0	0	1	1	-	-	-	-	1	0.3	0.7	0.01	0.4	C64
Renal pelvis, ureter and other urinary	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C65-66, C68
Bladder	6	0	50	-	-	-	2	2	1	1	0.6	1.4	0.09	1.2	C67
Eye	6	0	67	1	-	1	2	1	-	1	0.6	1.4	0.06	1.0	C69
Brain, nervous system	1	0	0	1	-	-	-	-	-	-	0.1	0.2	0.00	0.1	C70-72
Thyroid	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C73
Hodgkin disease	6	2	67	3	-	1	-	-	-	-	0.6	1.4	0.03	0.5	C81
Non-Hodgkin lymphoma	19	0	53	10	-	1	3	2	1	2	1.9	4.3	0.16	2.4	C82-85, C96
Multiple myeloma	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C90
Lymphoid leukaemia	1	0	0	-	-	1	-	-	-	-	0.1	0.2	0.01	0.1	C91
Myeloid leukaemia	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C92-94
Leukaemia, unspecified	3	0	0	3	-	-	-	-	-	-	0.3	0.7	0.01	0.2	C95
Other and unspecified	28	4	36	-	1	2	5	4	7	5	2.8	6.3	0.46	5.8	O&U
All sites	448	35	15	27	18	57	75	81	72	83	45.4	-	6.05	84.3	ALL
All sites but C44	442	33	14	27	17	57	74	80	72	82	44.8	100.0	5.99	83.2	ALLbC44
Average annual population				250517	97019	53467	35224	25671	16280	15177					

Table 1. The Gambia (1997-1998)

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	1	57	1	1	-	1	2	-	1	0.7	1.5	0.07	1.2	C00-06
Salivary gland	2	2	100	-	-	-	-	-	-	-	0.2	0.4	0.00	0.0	C07-08
Nasopharynx	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C11
Other pharynx	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C09-10,C12-14
Oesophagus	5	2	20	-	-	-	-	-	1	-	0.5	1.1	0.05	1.1	C15
Stomach	8	0	25	-	-	-	-	2	4	2	0.8	1.7	0.19	2.1	C16
Colon, rectum and anus	14	0	14	-	-	5	1	4	1	3	1.4	3.0	0.16	2.5	C18-21
Liver	91	8	2	-	1	17	19	16	17	13	8.9	19.5	1.45	17.6	C22
Gallbladder etc.	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C23-24
Pancreas	7	0	57	-	-	-	1	1	3	2	0.7	1.5	0.17	1.9	C25
Larynx	1	0	100	-	-	-	-	1	-	-	0.1	0.2	0.02	0.2	C32
Trachea, bronchus and lung	3	0	67	-	1	-	-	-	1	1	0.3	0.6	0.04	0.5	C33-34
Bone	4	0	25	2	1	-	-	1	-	-	0.4	0.9	0.03	0.5	C40-41
Melanoma of skin	1	0	0	-	-	-	1	-	-	-	0.1	0.2	0.01	0.1	C43
Other skin	12	4	83	2	-	-	-	2	1	3	1.2	0.2	0.14	2.4	C44
Mesothelioma	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C45
Kaposi sarcoma	4	1	100	-	-	2	1	-	-	-	0.4	0.9	0.03	0.4	C46
Peripheral nerves	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C47
Connective and soft tissue	6	1	83	2	1	-	1	1	-	-	0.6	1.3	0.05	0.7	C49
Breast	41	10	51	-	3	4	11	8	-	5	4.0	8.8	0.47	7.0	C50
Vulva	1	0	0	-	-	-	-	-	1	-	0.1	0.2	0.03	0.2	C51
Vagina	2	0	0	-	1	1	-	-	-	-	0.2	0.4	0.01	0.2	C52
Cervix uteri	170	14	27	-	3	37	53	31	20	12	16.6	36.5	2.53	29.6	C53
Uterus	20	0	45	-	1	3	6	6	2	2	2.0	4.3	0.31	3.6	C54-55
Ovary	13	1	31	-	3	1	5	2	1	-	1.3	2.8	0.17	2.0	C56
Placenta	1	0	0	-	-	-	1	-	-	-	0.1	0.2	0.01	0.1	C58
Kidney	6	0	17	3	-	-	-	1	2	-	0.6	1.3	0.11	1.0	C64
Renal pelvis, ureter and other urinary	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C65-66,C68
Bladder	3	0	0	-	-	1	-	-	-	2	0.3	0.6	0.01	0.5	C67
Eye	5	0	40	2	1	1	-	-	1	-	0.5	1.1	0.05	0.6	C69
Brain, nervous system	1	0	100	-	-	-	-	-	1	-	0.1	0.2	0.03	0.2	C70-72
Thyroid	4	2	50	-	-	-	1	-	1	-	0.4	0.9	0.12	1.0	C73
Hodgkin disease	3	1	100	1	-	-	-	-	-	1	0.3	0.6	0.00	0.4	C81
Non-Hodgkin lymphoma	13	3	69	8	1	-	-	-	-	1	1.3	2.8	0.04	1.0	C82-85,C96
Multiple myeloma	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C90
Lymphoid leukaemia	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C91
Myeloid leukaemia	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C92-94
Leukaemia, unspecified	3	0	0	2	-	-	-	-	1	-	0.3	0.6	0.04	0.4	C95
Other and unspecified	27	3	26	4	3	2	2	5	2	6	2.6	5.8	0.28	4.6	O&U
All sites	478	53	30	27	21	74	104	83	60	56	46.7		6.71	84.5	ALL
All sites but C44	466	49	29	25	21	74	104	81	59	53	45.5	100.0	6.57	82.1	ALLbC44
Average annual population				246741	96651	73334	42577	23105	13728	15848					

Table 2. Childhood cancer, The Gambia (1988-1998)

	NUMBER OF CASES				<i>M/F</i>	REL. FREQ.(%)	RATES PER MILLION					
	0-4	5-9	10-14	All		Overall	0-4	5-9	10-14	Crude	ASR	%MV
Leukaemia	4	6	3	13	<i>1.6</i>	8.0	2.3	3.5	2.4	2.8	2.7	25.0
Acute lymphoid leukaemia	2	2	1	5	<i>1.5</i>	3.1	1.1	1.2	0.8	1.1	1.1	40.0
Lymphoma	14	29	22	65	<i>1.6</i>	40.1	8.0	17.1	17.6	13.8	13.7	59.3
Hodgkin disease	2	4	3	9	<i>3.5</i>	5.6	1.1	2.4	2.4	1.9	1.9	66.7
Burkitt lymphoma	5	13	11	29	<i>1.1</i>	17.9	2.9	7.7	8.8	6.2	6.1	44.8
Brain and spinal neoplasms	0	1	0	1	-	0.6	-	0.6	-	0.2	0.2	-
Neuroblastoma	1	0	1	2	<i>1.0</i>	1.2	0.6	-	0.8	0.4	0.5	50.0
Retinoblastoma	11	2	0	13	<i>0.9</i>	8.0	6.3	1.2	-	2.8	2.8	76.9
Wilms tumour	10	6	1	17	<i>1.4</i>	10.5	5.7	3.5	0.8	3.6	3.6	41.2
Bone tumours	0	0	8	8	<i>0.6</i>	4.9	-	-	6.4	1.7	1.9	12.5
Soft tissue sarcomas	3	2	0	5	<i>0.3</i>	3.1	1.7	1.2	-	1.1	1.0	100.0
Kaposi sarcoma	1	1	0	2	<i>1.0</i>	1.2	0.6	0.6	-	0.4	0.4	100.0
Germ cell tumours	1	0	0	1	-	0.6	0.6	-	-	0.2	0.2	100.0
Other	12	8	17	37	<i>0.9</i>	22.8	6.8	4.7	13.6	7.9	8.1	43.2
All	56	54	52	162	<i>1.2</i>	100.0	31.9	31.8	41.5	34.4	34.7	49.4

3.2.6 Ghana

Background

Climate: Tropical; warm and comparatively dry along the south-east coast; hot and humid in south-west; hot and dry in north

Terrain: Mostly low plains with dissected plateau in south-central area

Ethnic groups: Black African 99.8% (major tribes—Akan 44%, Moshi-Dagomba 16%, Ewe 13%, Ga 8%), European and other 0.2%

Religions: Indigenous beliefs 38%, Muslim 30%, Christian 24%, other 8%

Economy—overview: Well endowed with natural resources, Ghana has a much higher per capita output than many countries in West Africa, although it remains heavily dependent on international financial and technical assistance. Gold, timber and cocoa are major sources of foreign exchange. The domestic economy continues to revolve around subsistence agriculture, which accounts for 41% of GDP and employs 60% of the work force, mainly small landholders.

Industries: Mining, lumbering, light manufacturing, aluminium smelting, food processing

Agriculture—products: Cocoa, rice, coffee, cassava (tapioca), peanuts, corn, shea nuts, bananas; timber

Cancer registration

In 1972, with the aid of a grant from IARC, a cancer registry was established in the Korle Bu Teaching Hospital and later extended to cover all three major hospitals in Accra (Foli & Christian, 1976). There does not appear to be any comprehensive report of the results of this registry

Review of data

The only comprehensive review of the cancer profile in Ghana is the publication by Edington (1956), which presented data from histologically diagnosed cases from the Medical Research Institute, Accra, from 1942 to 1955 and autopsy cases from 1923 to 1955 (Table 1). Liver cancer accounted for 7.6% of cancers. Foli and Christian (1976), reporting cancer registry data, which included cases diagnosed using alpha-foetoprotein, pointed out that this was probably an underestimate; they found relative frequencies of 21.3% in men and 6.5% in women (overall, 14.5%).

Childhood cancer

Welbeck and Hesse (1998) reported the frequency of different cancers among children treated in the children's department of Korle Bu Teaching Hospital in 1992 to 1995 (Table 2). By far the most common malignant tumour was Burkitt lymphoma (60% of the total). The relatively high incidence of this tumour in Ghana had prompted the establishment of the Burkitt's Tumor Project at Korle Bu Hospital in 1965, and several publications have described epidemiological and clinical features of Burkitt lymphoma in Ghana (Biggar & Nkrumah, 1979; Biggar *et al.*, 1981).

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Table 1. Ghana: case series

Site	Medical Research Institute, Accra, 1942-55 (Edington, 1956)						%HV
	Male		Female		Both sexes		
	No.	%	No.	%	No.	%	
Oral cavity ¹	13	3.3%	7	2.1%	53	4.4%	100
Nasopharynx	2	0.5%	2	0.6%	14	1.2%	93
Other pharynx	0	0.0%	0	0.0%	0	0.0%	
Oesophagus	1	0.3%	0	0.0%	1	0.1%	0
Stomach	23	5.9%	14	4.2%	43	3.6%	72
Colon/rectum	9	2.3%	2	0.6%	20	1.7%	90
Liver	67	17.1%	9	2.7%	91	7.6%	34
Pancreas	10	2.6%	0	0.0%	11	0.9%	18
Lung	2	0.5%	2	0.6%	4	0.3%	0
Melanoma					63	5.3%	95
Other skin ²	38	9.7%	36	10.7%	153	12.8%	99
Kaposi sarcoma					10	0.8%	100
Breast	2	0.5%	42	12.5%	64	5.4%	97
Uterus (cervix & corpus)			71	21.1%	71	6.0%	99
Ovary etc.			33	9.8%	33	2.8%	88
Prostate	25	6.4%			25	2.1%	88
Penis	16	4.1%			16	1.3%	100
Bladder	20	5.1%	2	0.6%	30	2.5%	53
Kidney etc.	3	0.8%	1	0.3%	14	1.2%	79
Eye			1	0.3%	19	1.6%	100
Brain, nervous system					6	0.5%	100
Thyroid	5	1.3%	1	0.3%	13	1.1%	100
Non-Hodgkin lymphoma ³					77	6.5%	100
Hodgkin's disease					30	2.5%	100
Myeloma					7	0.6%	100
Leukaemia (non-lymph.)					12	1.0%	100
ALL SITES	392	100.0%	337	100.0%	1192	100.0%	84

¹ Includes salivary gland tumours

² Distribution between males and females estimated from subtotals

³ Includes lymphocytic leukaemia

Table 2. Ghana: childhood cancer

Cancer	Korle Bu Hospital, Accra, 1992-95 (Welbeck & Hesse, 1998)	
	No.	%
Leukaemia	21	8.1%
Acute lymphocytic leukaemia		0.0%
Lymphoma	179	69.4%
Burkitt lymphoma	153	59.3%
Hodgkin disease	6	2.3%
Brain and spinal neoplasms	2	0.8%
Neuroblastoma	3	1.2%
Retinoblastoma	22	8.5%
Wilms tumour	20	7.8%
Bone tumours		0.0%
Soft-tissue sarcomas		0.0%
Kaposi sarcoma		0.0%
Other	7*	2.7%
Total	254	100.0%

* 5 cases of hepatoma

3.2.7 Guinea

Background

Climate: Varies between regions, but generally hot and humid; monsoonal-type rainy season (June to November) with south-westerly winds; dry season (December to May) with north-easterly harmattan winds

Terrain: Generally flat coastal plain, hilly to mountainous interior, with savannah forest in some areas.

Ethnic groups: Peuhl, Malinke, Soussou and other smaller tribal groups.

Religions: Muslim 85%, Christian 8%, indigenous beliefs 7%

Economy—overview: Although possessing major mineral, hydropower and agricultural resources, Guinea remains one of the poorest countries in the world. The agricultural sector employs 80% of the work force. Guinea possesses over 25% of the world's bauxite reserves and is the second largest bauxite producer. The mining sector accounted for about 75% of exports in 1995.

Industries: Bauxite, gold, diamonds; alumina refining; light manufacturing and agricultural processing industries

Agriculture—products: Rice, coffee, pineapples, palm kernels, cassava (tapioca), bananas, sweet potatoes; cattle, sheep, goats; poultry; timber

Cancer registration

The cancer registry of Guinea is population-based, covering the capital city of Conakry. It was established in 1990 and is located in the Department of Pathology at the University Hospital of Donka, Conakry. There were approximately one million inhabitants in the city according to 1993 estimates. However, over the last decade Guinea has experienced a massive influx of refugees to the capital city and the forest region from neighbouring countries at war. Since 1990, refugees from Liberia, then Sierra Leone and Guinea Bissau have entered the country.

Case-finding is mainly active. Personnel from the registry search for cases from all hospitals that provide services to patients with cancer. These include two hospitals within the city, namely the university hospital (CHU) de Donka and Hôpital Ignace Deen, where major services, including surgery, urology, general medicine and gynaecology, are provided. Regular visits are made to these two hospitals, with visits to health centres and private clinics less frequently. The registry also relies on notifications received from medical officers in selected hospitals in Kindia, Kamsar and Fria, where some patients from Conakry receive treatment.

Copies of all reports of cancer cases diagnosed by histopathology, ultrasonography or specific biochemical assays (human chorionic gonadotrophin (HCG), alpha-foetoprotein) are received by the registry. For cultural and religious reasons, autopsies are not routinely performed in Guinea except for medico-legal purposes.

A six-month duration of stay is used as the criterion to distinguish cancer patients who are usual residents of the city from

temporary visitors (cases domiciled with their families for the purpose of receiving medical care). There is no system of death registration in Guinea, although deaths occurring in hospital are certified. Death certificates are not used as a source of information.

The cancer registry of Guinea was computerized from its inception, using the CANREG software of IARC.

Review of data

Cancer registry

The first results from the cancer registry, for the period 1992–95, were published by Koulibaly *et al.* (1997).

For the four-year period under review (1996–99), 1161 males and 1486 females were registered with cancer among residents of Conakry. Table 1 shows the distribution of cancers by sex, site and age group, as well as percentage frequency, crude and age-standardized rates (ASR). The population at risk has been estimated from the 1993 census.

Liver cancer ranks as the most common cancer in males (40.4%, ASR 37.6 per 100 000) followed by lung cancer (9%, ASR 8.2), prostate cancer (5.5%, ASR 9.7) and stomach cancer (5.3%, ASR 6.1).

In females, cervix cancer (45.4%, ASR 49.6 per 100 000) ranks first, followed by cancers of the breast (12.9%, ASR 15.5) and liver (9.9%, ASR 12.1).

43% of cancers in men and 59% in women had a diagnosis based on histology. Only 15% of liver cancers were diagnosed on the basis of microscopic examination of tissue. Liver cancer is three times more common in males than in females, in contrast to stomach cancer, for which the male/female ratio is 1.5.

The incidence of cervix cancer in Guinea is one of the highest recorded in the world.

Age-specific rates of liver cancer show a rapid increase in early age to reach a peak at ages 45–49 years among the male population. In contrast, a less dramatic increase in rates is observed in females. In this population, the incidence of liver cancer reaches a plateau at age 50 years. In both sexes, most liver cancers occur before the age of 55 years; as in most data-sets from sub-Saharan Africa.

Childhood cancer

Table 2 presents the neoplasms occurring in the childhood population (age 0–14 years) of Conakry. There were a total of 193 cases, with 60.6% having a histological diagnosis. The most frequent childhood cancer was lymphoma (64 cases, 33.2% of the total), of which 34 (17.6%) were Burkitt lymphoma, with an age-standardized incidence of 11.9 per million. Retinoblastoma comprised 16.1% of cancers (ASR 8.6 per million). Some underdiagnosis of childhood cancers is likely, in view of the low rates recorded and the few cases of leukaemias and brain tumours.

Reference

Koulibaly, M., Kabba, I.S., Cisse, A., Diallo, S.B., Diallo, M.B., Keita, N., Camara, N.D., Diallo, M.S., Sylla, B.S. & Parkin, D.M. (1997) Cancer incidence in Conakry, Guinea: first results from the Cancer Registry 1992–1995. *Int. J. Cancer*, **70**, 39–45

Table 1. Guinea, Conakry (1996-1999)
 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	33	0	67	-	1	2	11	12	4	3	1.4	2.9	0.21	2.9	C00-06
Salivary gland	3	0	67	1	-	-	1	1	-	-	0.1	0.3	0.01	0.2	C07-08
Nasopharynx	5	0	60	-	-	-	1	2	2	-	0.2	0.4	0.05	0.5	C11
Other pharynx	18	0	39	-	-	2	5	7	2	2	0.8	1.6	0.11	1.6	C09-10, C12-14
Oesophagus	13	0	62	-	-	4	2	6	1	-	0.6	1.2	0.08	0.9	C15
Stomach	59	0	58	-	1	2	17	18	11	10	2.6	5.3	0.38	6.1	C16
Colon, rectum and anus	35	0	57	-	-	3	12	8	8	4	1.5	3.1	0.23	3.2	C18-21
Liver	453	0	15	5	1	28	166	143	81	29	19.8	40.4	3.02	37.6	C22
Gallbladder etc.	1	0	100	-	-	-	-	-	1	-	0.0	0.1	0.02	0.1	C23-24
Pancreas	8	0	25	-	-	-	1	5	2	-	0.3	0.7	0.08	0.8	C25
Larynx	7	0	57	-	-	-	3	2	1	1	0.3	0.6	0.04	0.7	C32
Trachea, bronchus and lung	101	0	27	-	-	6	43	34	11	7	4.4	9.0	0.61	8.2	C33-34
Bone	22	0	91	9	3	1	1	5	3	-	1.0	2.0	0.10	1.3	C40-41
Melanoma of skin	18	0	100	-	-	1	2	9	6	-	0.8	1.6	0.16	1.6	C43
Other skin	40	0	55	-	-	3	11	13	9	4	1.7	-	0.30	3.8	C44
Mesothelioma	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C45
Kaposi sarcoma	2	0	100	-	-	-	-	2	-	-	0.1	0.2	0.02	0.2	C46
Peripheral nerves	5	0	100	2	-	2	1	-	-	-	0.2	0.4	0.01	0.2	C47
Connective and soft tissue	26	0	81	2	2	1	5	11	3	2	1.1	2.3	0.16	2.2	C49
Breast	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C50
Penis	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C60
Prostate	62	0	45	-	-	-	-	10	26	26	2.7	5.5	0.46	9.7	C61
Testis	6	0	67	1	1	-	2	2	-	-	0.3	0.5	0.03	0.3	C62
Kidney	26	0	54	16	-	-	2	6	1	1	1.1	2.3	0.09	1.5	C64
Renal pelvis, ureter and other urinary	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C65-66, C68
Bladder	12	0	58	-	-	1	-	2	6	3	0.5	1.1	0.10	1.5	C67
Eye	31	0	10	15	2	2	4	4	3	1	1.4	2.8	0.11	1.7	C69
Brain, nervous system	2	0	50	-	-	1	-	1	-	-	0.1	0.2	0.01	0.1	C70-72
Thyroid	6	0	67	-	2	-	1	2	-	1	0.3	0.5	0.02	0.5	C73
Hodgkin disease	27	0	100	6	4	4	9	1	1	2	1.2	2.4	0.09	1.6	C81
Non-Hodgkin lymphoma	61	0	95	17	6	7	10	11	7	3	2.7	5.4	0.29	3.9	C82-85, C96
Multiple myeloma	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C90
Lymphoid leukaemia	12	0	100	3	3	-	4	1	1	-	0.5	1.1	0.05	0.6	C91
Myeloid leukaemia	14	0	100	-	3	3	6	-	1	1	0.6	1.2	0.06	0.9	C92-94
Leukaemia, unspecified	2	0	100	-	-	1	1	-	-	-	0.1	0.2	0.01	0.1	C95
Other and unspecified	51	0	69	1	-	3	10	22	6	9	2.2	4.5	0.32	5.4	O&U
All sites	1161	0	43	78	29	77	331	340	197	109	50.7	-	7.24	99.8	ALL
All sites but C44	1121	0	42	78	29	74	320	327	188	105	49.0	100.0	6.94	96.0	ALLbC44
Average annual population				250782	109336	93152	62963	30064	18015	7810					

Table 1. Guinea, Conakry (1996-1999)

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	14	0	79	-	1	2	5	2	3	1	0.6	1.0	0.10	1.3	C00-06
Salivary gland	4	0	75	-	-	1	1	2	-	-	0.2	0.3	0.02	0.3	C07-08
Nasopharynx	1	0	100	-	-	-	1	-	-	-	0.0	0.1	0.00	0.1	C11
Other pharynx	5	0	20	-	-	1	3	1	-	-	0.2	0.3	0.02	0.3	C09-10,C12-14
Oesophagus	5	0	40	-	-	-	1	3	1	-	0.2	0.3	0.05	0.5	C15
Stomach	34	0	56	-	-	3	7	13	7	4	1.5	2.3	0.26	3.6	C16
Colon, rectum and anus	30	0	87	-	1	8	5	5	5	6	1.4	2.1	0.16	3.2	C18-21
Liver	144	0	15	3	2	11	58	36	27	7	6.5	9.9	1.02	12.1	C22
Gallbladder etc.	1	0	100	-	-	-	1	-	-	-	0.0	0.1	0.00	0.1	C23-24
Pancreas	5	0	60	-	-	-	1	4	-	-	0.2	0.3	0.04	0.4	C25
Larynx	1	0	0	-	-	-	-	1	-	-	0.0	0.1	0.01	0.1	C32
Trachea, bronchus and lung	20	0	20	-	-	1	10	5	3	1	0.9	1.4	0.14	1.7	C33-34
Bone	10	0	80	2	1	2	1	1	2	1	0.5	0.7	0.05	0.8	C40-41
Melanoma of skin	14	0	100	-	-	-	5	6	1	2	0.6	1.0	0.09	1.5	C43
Other skin	33	0	70	-	1	3	11	7	8	3	1.5	0.6	0.26	3.2	C44
Mesothelioma	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C45
Kaposi sarcoma	1	0	100	-	-	1	-	-	-	-	0.0	0.1	0.00	0.0	C46
Peripheral nerves	2	0	100	-	-	-	-	1	1	-	0.1	0.1	0.03	0.3	C47
Connective and soft tissue	11	0	82	2	1	1	1	3	2	1	0.5	0.8	0.08	1.0	C49
Breast	188	0	74	-	5	21	69	51	34	8	8.5	12.9	1.33	15.5	C50
Vulva	8	0	88	-	-	-	2	1	2	3	0.4	0.6	0.04	1.2	C51
Vagina	9	0	100	-	2	-	1	3	3	-	0.4	0.6	0.10	0.9	C52
Cervix uteri	659	0	54	-	3	103	265	202	62	24	29.7	45.4	4.03	49.6	C53
Uterus	44	0	36	-	-	2	14	12	12	4	2.0	3.0	0.36	4.5	C54-55
Ovary	51	0	88	1	8	8	10	13	7	4	2.3	3.5	0.32	4.4	C56
Placenta	9	0	100	-	5	4	-	-	-	-	0.4	0.6	0.02	0.4	C58
Kidney	14	0	43	7	1	2	-	1	3	-	0.6	1.0	0.08	0.8	C64
Renal pelvis, ureter and other urinary	1	0	100	-	-	-	1	-	-	-	0.0	0.1	0.00	0.0	C65-66,C68
Bladder	13	0	38	-	-	1	-	3	6	3	0.6	0.9	0.13	1.9	C67
Eye	10	0	10	6	2	-	1	1	-	-	0.5	0.7	0.02	0.4	C69
Brain, nervous system	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C70-72
Thyroid	17	0	47	-	-	3	5	5	4	-	0.8	1.2	0.13	1.3	C73
Hodgkin disease	10	0	100	2	1	1	5	1	-	-	0.5	0.7	0.03	0.4	C81
Non-Hodgkin lymphoma	44	0	100	17	4	9	6	5	2	1	2.0	3.0	0.17	2.4	C82-85,C96
Multiple myeloma	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C90
Lymphoid leukaemia	10	0	100	1	1	1	3	2	-	2	0.5	0.7	0.03	1.0	C91
Myeloid leukaemia	11	0	100	-	3	3	2	3	-	-	0.5	0.8	0.05	0.6	C92-94
Leukaemia, unspecified	3	0	100	-	-	-	-	2	1	-	0.1	0.2	0.04	0.3	C95
Other and unspecified	50	0	80	1	3	5	15	14	4	8	2.3	3.4	0.26	5.0	O&U
All sites	1486	0	59	42	45	197	510	409	200	83	67.0	100.0	9.49	121.0	ALL
All sites but C44	1453	0	58	42	44	194	499	402	192	80	65.5	100.0	9.23	117.7	ALLbC44
Average annual population				245143	106017	88641	62420	31151	14583	6635					

Table 2. Childhood cancer, Guinea, Conakry (1993-1999)

	NUMBER OF CASES				<i>M/F</i>	REL. FREQ.(%)	RATES PER MILLION					
	0-4	5-9	10-14	All		Overall	0-4	5-9	10-14	Crude	ASR	%MV
Leukaemia	5	3	3	11	<i>1.8</i>	5.7	3.5	2.8	4.2	3.4	3.5	80.0
Acute lymphoid leukaemia	4	1	1	6	<i>1.0</i>	3.1	2.8	0.9	1.4	1.9	1.8	100.0
Lymphoma	9	24	31	64	<i>1.1</i>	33.2	6.4	22.4	43.4	20.0	22.3	87.5
Hodgkin disease	1	6	7	14	<i>3.7</i>	7.3	0.7	5.6	9.8	4.4	4.9	100.0
Burkitt lymphoma	6	11	17	34	<i>0.9</i>	17.6	4.2	10.3	23.8	10.6	11.9	100.0
Brain and spinal neoplasms	0	0	1	1	-	0.5	-	-	1.4	0.3	0.4	100.0
Neuroblastoma	0	0	0	0	-	-	-	-	-	-	-	-
Retinoblastoma	25	6	0	31	<i>2.1</i>	16.1	17.7	5.6	-	9.7	8.6	-
Wilms tumour	6	6	7	19	<i>2.8</i>	9.8	4.2	5.6	9.8	5.9	6.3	68.4
Bone tumours	3	3	8	14	<i>3.7</i>	7.3	2.1	2.8	11.2	4.4	5.0	85.7
Soft tissue sarcomas	1	2	5	8	<i>3.0</i>	4.1	0.7	1.9	7.0	2.5	2.9	50.0
Kaposi sarcoma	0	0	0	0	-	-	-	-	-	-	-	-
Germ cell tumours	2	0	0	2	<i>1.0</i>	1.0	1.4	-	-	0.6	0.5	100.0
Other	12	13	18	43	<i>1.4</i>	22.3	8.5	12.1	25.2	13.4	14.5	30.2
All	63	57	73	193	<i>1.6</i>	100.0	44.5	53.2	102.1	60.3	64.0	60.6

3.2.8 Guinea-Bissau

Background

Climate: Tropical; generally hot and humid; monsoonal-type rainy season (June to November) with southwesterly winds; dry season (December to May) with northeasterly harmattan winds

Terrain: Mostly low coastal plain rising to savanna in east

Ethnic groups: African 99% (Balanta 30%, Fula 20%, Manjaca 14%, Mandinga 13%, Papel 7%), European and mulatto less than 1%

Religions: Indigenous beliefs 50%, Muslim 45%, Christian 5%

Economy—overview: Guinea-Bissau depends mainly on farming and fishing. The country ranks sixth in cashew production. Guinea-Bissau

exports fish and seafood along with small amounts of peanuts, palm kernels, and timber. Rice is the major crop and staple food.

Industries: Agricultural products processing, beer, soft drinks

Agriculture—products: Rice, corn, beans, cassava (tapioca), cashew nuts, peanuts, palm kernels, cotton; fishing and forest potential not fully exploited

Cancer registration

There has been no cancer registry in Guinea-Bissau.

Review of data

There is no published material on the cancer profile in the country.

3.2.9 Liberia

Background

Climate: Tropical; hot, humid; dry winters with hot days and cool to cold nights; wet, cloudy summers with frequent heavy showers

Terrain: Mostly flat to rolling coastal plains rising to rolling plateau and low mountains in north-east

Ethnic groups: Indigenous African tribes 95% (including Kpelle, Bassa, Gio, Kru, Grebo, Mano, Krahn, Gola, Gbandi, Loma, Kissi, Vai, and Bella), Americo-Liberians 2.5% (descendants of immigrants from the United States who had been slaves)

Religions: Traditional 70%, Muslim 20%, Christian 10%

Economy—overview: Civil war since 1990 has destroyed much of Liberia's economy, especially the infrastructure in and around Monrovia. Many businessmen have fled the country, taking capital and expertise with them, although some have returned. Richly endowed with water, mineral resources, forests, and a climate favourable to agriculture, Liberia used to be a producer and exporter of basic products, while local manufacturing, mainly foreign owned, was small in scope.

Industries: Rubber processing, food processing, construction materials, furniture, palm-oil processing, iron ore, diamonds

Agriculture—products: Rubber, coffee, cocoa, rice, cassava (tapioca), palm oil, sugar-cane, bananas; sheep, goats; timber

Cancer registration

There is no active cancer registration in the country.

Review of data

A cancer registry functioned in Liberia for around 10 years, from 1973–82. It was located in the Department of Radiotherapy of the J.F. Kennedy Memorial Hospital in the capital, Monrovia. The registry attempted national cancer registration, achieved by personal visits of the Director to all 34 hospitals throughout the country. The only pathology service in the country (in the J.F. Kennedy Memorial Hospital) was another important source of information (although a few biopsies, especially from 'concession' hospitals belonging to private companies, were sent overseas). Registration was believed to be relatively complete for cancer cases from whom a biopsy was taken or receiving hospital inpatient care. However, these must have been a minority of cases, since the crude incidence rates were very low (15.6 per 100 000 for males and 21.2 per 100 000 for females in 1976–80).

The registry produced two reports, and the results for 1973–77 were published by Sobo (1982) and for 1976–80 by Sobo (1986). Although the periods overlap, the two sets of results are shown in Table 1. During these two periods, an average 300 cases of cancer were recorded by the registry each year.

In 1973–77, liver (16.2 %) and prostate (11.0 %) cancers were the most common in men. Bladder cancers constituted 7.7% of all male cancers, about the same frequency as Burkitt lymphoma and Hodgkin disease. The ranking was somewhat different in the period 1976–80, when non-Hodgkin lymphomas (14.9%) and prostate (11.3 %) and liver (10.9 %) cancers were the commonest.

In females, cervix (28.2%), breast (11.1%) and ovary (10.4%) cancers were the most common malignancies in 1973–77. The ranking was similar in 1976–80, with these three sites accounting for 30.0%, 15.0% and 8.9% of cancers, respectively.

The fluctuations in proportions probably relate to variations in diagnosis, rather than any change in incidence. Thus, it was noted that in 1973–77, 63.7% of two cancers had a histological diagnosis; this is a very high proportion and implies that liver cancers were almost certainly under-diagnosed or under-registered. Several studies have confirmed a high rate of infection with hepatitis B virus in the Liberian population (Frentzel-Beyme *et al.*, 1977; Skinhoj, 1979; Prince *et al.*, 1981). The relatively high frequency of bladder cancer and the high percentage among them of squamous-cell carcinomas (75% of histologically diagnosed cases) are consistent with the presence of endemic schistosomiasis (Sobo, 1982).

No data are available on the frequency of Kaposi sarcoma in these time periods. Wendler *et al.* (1986) found no antibody to HIV in 935 serum samples obtained in Liberia between 1976 and 1984.

Childhood cancer

Burkitt lymphoma was by far the most common cancer of children, accounting for 49.6% of cancers in boys and 59.2% of cancers in girls in 1973–77, and 44% of cancers in boys and 41.9% of cancers in girls in 1976–80. Hodgkin disease also appears to be relatively frequent in childhood.

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Table 1. Liberia: case series

Site	Liberia 1973-77 (Sobo, 1982)			Liberia 1976-80 (Sobo, 1986)					
	Male		Female	%HV	Male		Female		%HV
	No.	%	No.		%	No.	%	No.	
Oral cavity	29	3.8%	15	1.7%	63.7	30	4.5%	17	1.9%
Nasopharynx						0	0.0%	1	0.1%
Other pharynx						4	0.6%	0	0.0%
Oesophagus	10	1.3%	1	0.1%		7	1.1%	0	0.0%
Stomach	14	1.8%	9	1.0%		23	3.5%	12	1.3%
Colon/rectum	21	2.7%	23	2.7%		26	3.9%	22	2.5%
Liver ^a	125	16.2%	47	5.4%		72	10.9%	35	3.9%
Pancreas ^b	9	1.2%	8	0.9%		4	0.6%	7	0.8%
Lung	30	3.9%	11	1.3%		10	1.5%	5	0.6%
Melanoma	25	3.3%	26	3.0%		15	2.3%	24	2.7%
Other skin	30	3.9%	22	2.5%		20	3.0%	11	1.2%
Kaposi sarcoma									
Breast			96	11.1%	68.8	4	0.6%	133	15.0%
Cervix uteri			244	28.2%	75.8			267	30.0%
Corpus uteri			22	2.5%				37	4.2%
Ovary etc.			90	10.4%	82.2			79	8.9%
Prostate	84	11.0%			82.1	75	11.3%		
Penis	9	1.2%				10	1.5%		
Bladder	59	7.7%	18	2.1%	100	35	5.3%	23	2.6%
Kidney etc.	18	2.3%	9	1.0%		7	1.1%	8	0.9%
Eye	3	0.4%	6	0.7%		5	0.8%	7	0.8%
Brain, nervous system	7	0.9%	1	0.1%		3	0.5%	2	0.2%
Thyroid	12	1.6%	18	2.1%		15	2.3%	18	2.0%
Non-Hodgkin lymphoma	80	10.4%	46	5.3%	86.3	99	14.9%	45	5.1%
Hodgkin disease	65	8.5%	16	1.8%	73.8 ^c	43	6.5%	22	2.5%
Myeloma						4	0.6%	1	0.1%
Leukaemia	26	3.4%	16	1.8%		11	1.7%	8	0.9%
ALL SITES	766	100.0%	866	100.0%		663	100.0%	889	100.0%

^a Includes gallbladder

^b Includes retroperitoneum

^c Males only

3.2.10 Mali

Background

Climate: Subtropical to arid; hot and dry March to June; rainy, humid and mild June to November; cool and dry November to February

Terrain: Mostly flat to rolling northern plains covered by sand; savanna in south, rugged hills in north-east

Ethnic groups: Mande 50% (Bambara, Malinke, Sarakole), Peul 17%, Mowsi 12%, Songhvi 6%, Tuareg and Moor 10%, other 5%

Religions: Muslim 90%, indigenous beliefs 9%, Christian 1%

Economy—overview: 65% of the land area of Mali is desert or semi-desert. Economic activity is largely confined to the riverine area irrigated by the Niger. About 10% of the population is nomadic and some 80% of the labour force is engaged in farming and fishing. Industrial activity is concentrated on processing farm commodities. Mali is heavily dependent on foreign aid and vulnerable to fluctuations in world prices for cotton and gold, its main export.

Industries: Minor local consumer goods production and food processing; construction; phosphate and gold mining

Agriculture—products: Cotton, millet, rice, corn, vegetables, peanuts; cattle, sheep, goats

Cancer registration

The Cancer Registry of Mali started operations in 1986. It is located in the Department of Pathology of the National Institute of Public Health Research in the capital city, Bamako. This department provides the basic source of information for the registry, and is the only histopathology service in the country.

The registry was from the start conceived as population-based covering the District of Bamako, which includes the population of the capital city and its immediate surroundings. In 1987, the population was 646 163. As in most developing countries, the health care system in Mali is far from adequate. Hospitals, clinics and other health facilities are concentrated in the capital city of Bamako. Two major hospitals provide tertiary care services: Hôpital Gabriel Touré, and Hôpital de Point G.

Active case-finding is carried out by a cancer registrar who regularly visits these two public hospitals and Kati hospital, 15 km distant. Visits are also made to two specialized institutes (dermatology and ophthalmology) and to two centres of maternal and child health staffed by gynaecologists. In each service, there is a contact person for the registry, usually the head nurse who, under the supervision of the consulting physician, records information on all cancer diagnoses using a form provided by the registry. During his regular visits, the technician checks these forms for completeness and verifies the information contained from other sources (e.g., ward books, operation lists), as well as with the medical and nursing staff. The frequency of visits is determined by the number of the cases detected.

Death registration is incomplete in Mali and covers only the city of Bamako, where a death certificate is required in order to obtain a burial permit. Copies of death certificates are obtained and the death register is scanned by the registry as a source of information.

Registration is confined to 'usual residents', defined as having lived for at least six months in Bamako or having the intention to

stay for six months. For data management, the registry uses the CANREG software.

Review of data

Cancer Registry

The results from the cancer registry have been published for 1988–82 (Parkin *et al.*, 1997) and for 1993–97 (Parkin *et al.*, 2002). An error was present in the population at risk data in the former, and for this reason, both sets of data are published together here, which allows a comparison between them. In the "Summary Tables" that accompany the site-specific chapters, the data are presented for the full ten-year period 1988–97.

In the more recent period (Table 2), the most common cancers of men are liver (ASR 33.4 per 100 000; 36.2%), stomach (ASR 17.3; 15.8%) and bladder (ASR 9.6; 9.6%). Only 3% of the liver malignancies in men were confirmed by histology. In females, cervix (ASR 32.0 per 100 000; 27.1%), breast (ASR 17.2, 15.2%), stomach (ASR 16.6; 13.1%) and liver (ASR 15.1; 12.0%) are the most frequent cancer sites. Age-specific incidence for cervix cancer rises rapidly after age 15 years, reaching a peak after age 45. Over 60% of the malignancies occurring in the cervix uteri were based on histology.

Comparison with the earlier data for 1988–1992 (Table 1) suggests some decline in the incidence of liver cancer (–23% in men and –20% in women) and an increase in the incidence of prostate cancer (+81%), and breast cancer (+38%). The incidence of stomach cancer and cervix cancer is much the same. Kaposi sarcoma remains quite rare (2–3% of cancers in men, 0.5–1% cancers in women) with little change in the incidence.

An interesting feature of these data is the moderately high incidence of stomach cancer in both sexes, which is in contrast with series from neighbouring countries. Whether this is artificial (inclusion of non-residents, increasing availability of gastroscopy) or related to local diets rich in nitrosamines as suggested in an earlier review (see Bayo *et al.*, 1990) remains to be investigated further.

Childhood cancer

Table 3 presents the neoplasms occurring in the childhood population (age 0–14 years) of Bamako. Out of a total of 133 cases, 67.7% had a histological diagnosis. The most frequent childhood cancers were lymphomas (32 cases, 24.1% of the total, of which only three were Burkitt lymphoma), and retinoblastoma (19.5% of the total, corresponding to an ASR of 7.7 per million). Some underdiagnosis of childhood cancers is likely, as witnessed by the low rates, the absence of any central nervous system tumours, and small number of leukaemia cases (of which none was diagnosed as acute lymphocytic).

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Table 1. Mali, Bamako (1988-1992)

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	10	0	70	-	-	1	2	1	5	1	0.6	1.0	0.11	1.2	C00-06
Salivary gland	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C07-08
Nasopharynx	1	0	0	-	-	-	-	1	-	-	0.1	0.1	0.01	0.1	C11
Other pharynx	6	0	33	-	-	-	3	2	-	1	0.3	0.6	0.03	0.6	C09-10, C12-14
Oesophagus	12	0	42	-	-	-	2	5	3	2	0.7	1.2	0.12	1.5	C15
Stomach	143	0	50	1	3	10	20	47	31	31	7.9	14.5	1.22	17.3	C16
Colon, rectum and anus	48	0	40	-	3	6	14	6	10	9	2.6	4.9	0.37	5.3	C18-21
Liver	416	0	3	2	22	61	97	95	79	60	22.9	42.1	3.26	43.5	C22
Gallbladder etc.	1	0	100	-	-	-	-	-	-	1	0.1	0.1	0.00	0.2	C23-24
Pancreas	17	0	35	-	1	1	2	4	4	5	0.9	1.7	0.13	2.2	C25
Larynx	15	0	0	-	1	-	1	4	5	4	0.8	1.5	0.16	2.1	C32
Trachea, bronchus and lung	38	0	18	-	-	3	6	12	9	8	2.1	3.8	0.33	4.6	C33-34
Bone	8	0	88	2	3	-	1	-	1	1	0.4	0.8	0.04	0.7	C40-41
Melanoma of skin	5	0	100	-	1	2	-	-	1	1	0.3	0.5	0.03	0.4	C43
Other skin	36	0	78	1	1	1	8	8	8	9	2.0	0.0	0.29	4.5	C44
Mesothelioma	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C45
Kaposi sarcoma	19	0	100	-	1	7	1	6	1	3	1.0	1.9	0.11	1.7	C46
Peripheral nerves	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C47
Connective and soft tissue	4	0	75	-	2	1	-	1	-	-	0.2	0.4	0.02	0.3	C49
Breast	3	0	33	-	-	-	-	1	1	1	0.2	0.3	0.03	0.5	C50
Penis	2	0	50	-	-	-	-	1	-	1	0.1	0.2	0.01	0.3	C60
Prostate	33	0	21	-	-	3	1	1	7	21	1.8	3.3	0.17	5.3	C61
Testis	4	0	25	-	-	2	-	1	1	-	0.2	0.4	0.03	0.3	C62
Kidney	17	0	29	8	1	1	1	3	2	1	0.9	1.7	0.09	1.2	C64
Renal pelvis, ureter and other urinary	2	0	100	2	-	-	-	-	-	-	0.1	0.2	0.00	0.1	C65-66, C68
Bladder	71	0	8	-	3	4	10	14	15	25	3.9	7.2	0.51	9.5	C67
Eye	16	0	50	9	2	-	1	2	1	1	0.9	1.6	0.06	1.1	C69
Brain, nervous system	3	0	0	-	1	-	1	-	1	-	0.2	0.3	0.03	0.3	C70-72
Thyroid	3	0	100	1	-	1	1	-	-	-	0.2	0.3	0.01	0.1	C73
Hodgkin disease	19	0	95	7	7	4	1	-	-	-	1.0	1.9	0.05	0.8	C81
Non-Hodgkin lymphoma	24	0	100	3	3	6	3	1	3	5	1.3	2.4	0.12	2.2	C82-85, C96
Multiple myeloma	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C90
Lymphoid leukaemia	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C91
Myeloid leukaemia	2	0	100	-	-	1	1	-	-	-	0.1	0.2	0.01	0.1	C92-94
Leukaemia, unspecified	9	0	44	1	2	1	4	1	-	-	0.5	0.9	0.04	0.5	C95
Other and unspecified	38	0	37	1	5	1	7	4	8	12	2.1	3.8	0.26	4.7	O&U
All sites	1025	0	28	38	62	117	188	221	196	203	56.4		7.68	113.2	ALL
All sites but C44	989	0	26	37	61	116	180	213	188	194	54.4	100.0	7.38	108.7	ALLbC44
Average annual population				153211	74059	59718	36556	21415	10737	7662					

Table 1. Mali, Bamako (1988-1992)

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	8	0	63	-	1	2	2	-	-	3	0.5	0.9	0.03	0.9	C00-06
Salivary gland	3	0	100	-	-	-	1	1	-	1	0.2	0.3	0.02	0.4	C07-08
Nasopharynx	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C11
Other pharynx	1	0	0	-	-	-	1	-	-	-	0.1	0.1	0.01	0.1	C09-10, C12-14
Oesophagus	7	0	86	-	-	2	3	-	-	2	0.4	0.8	0.03	0.7	C15
Stomach	87	0	45	-	2	6	12	24	26	17	5.1	9.8	1.01	12.5	C16
Colon, rectum and anus	21	0	38	-	2	5	2	5	3	4	1.2	2.4	0.17	2.5	C18-21
Liver	165	0	4	2	10	22	35	32	33	31	9.6	18.6	1.51	20.7	C22
Gallbladder etc.	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C23-24
Pancreas	6	0	50	-	-	-	-	3	1	2	0.3	0.7	0.06	1.0	C25
Larynx	5	0	0	-	-	1	1	-	-	3	0.3	0.6	0.01	0.7	C32
Trachea, bronchus and lung	13	0	15	-	-	2	1	3	6	1	0.8	1.5	0.18	1.8	C33-34
Bone	10	0	30	2	1	2	-	1	4	-	0.6	1.1	0.13	1.2	C40-41
Melanoma of skin	8	0	100	1	-	-	-	2	5	-	0.5	0.9	0.14	1.2	C43
Other skin	21	0	90	-	-	4	2	4	7	4	1.2	0.0	0.24	3.0	C44
Mesothelioma	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C45
Kaposi sarcoma	4	0	100	-	1	1	1	-	1	-	0.2	0.4	0.04	0.4	C46
Peripheral nerves	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C47
Connective and soft tissue	3	0	67	-	-	1	-	-	2	-	0.2	0.3	0.05	0.5	C49
Breast	100	0	48	-	1	16	28	20	21	14	5.8	11.2	0.99	12.5	C50
Vulva	5	0	80	-	-	-	3	2	-	-	0.3	0.6	0.04	0.5	C51
Vagina	4	0	75	-	-	3	1	-	-	-	0.2	0.4	0.02	0.3	C52
Cervix uteri	250	0	64	-	-	47	79	60	38	26	14.6	28.1	2.38	29.5	C53
Uterus	33	0	36	-	2	3	8	13	4	3	1.9	3.7	0.34	4.0	C54-55
Ovary	10	0	70	1	1	-	5	3	-	-	0.6	1.1	0.08	0.9	C56
Placenta	4	0	100	-	1	1	2	-	-	-	0.2	0.4	0.02	0.3	C58
Kidney	19	0	26	5	2	2	1	2	7	-	1.1	2.1	0.20	1.9	C64
Renal pelvis, ureter and other urinary	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C65-66, C68
Bladder	26	0	12	-	2	1	13	4	5	1	1.5	2.9	0.26	3.0	C67
Eye	13	0	38	5	-	1	2	3	1	1	0.8	1.5	0.08	1.2	C69
Brain, nervous system	4	0	0	1	1	1	1	-	-	-	0.2	0.4	0.02	0.2	C70-72
Thyroid	18	0	56	-	1	1	9	3	-	4	1.0	2.0	0.12	2.1	C73
Hodgkin disease	5	0	100	1	2	1	-	-	-	1	0.3	0.6	0.01	0.4	C81
Non-Hodgkin lymphoma	9	0	100	-	2	3	1	-	-	2	0.5	1.0	0.05	0.9	C82-85, C96
Multiple myeloma	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C90
Lymphoid leukaemia	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C91
Myeloid leukaemia	11	0	82	-	-	3	1	3	2	2	0.6	1.2	0.10	1.4	C92-94
Leukaemia, unspecified	11	0	55	5	1	-	1	3	-	1	0.6	1.2	0.05	0.9	C95
Other and unspecified	26	0	15	1	-	4	4	5	3	9	1.5	2.9	0.19	3.5	O&U
All sites	910	0	44	24	33	135	220	196	170	132	53.0		8.59	111.0	ALL
All sites but C44	889	0	43	24	33	131	218	192	163	128	51.8	100.0	8.35	108.1	ALLbC44
Average annual population				163114	75709	43852	27171	16504	9206	7711					

Table 2. Mali, Bamako (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	4	0	75	-	1	-	-	-	1	2	0.2	0.4	0.02	0.5	C00-06
Salivary gland	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C07-08
Nasopharynx	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C11
Other pharynx	4	0	75	-	-	1	-	-	1	2	0.2	0.4	0.02	0.5	C09-10,C12-14
Oesophagus	22	0	55	-	1	1	1	10	8	1	1.1	2.4	0.24	2.4	C15
Stomach	147	0	49	-	3	9	13	44	44	34	7.1	15.8	1.29	17.3	C16
Colon, rectum and anus	49	0	43	-	2	7	11	9	9	11	2.4	5.3	0.31	4.8	C18-21
Liver	336	0	3	1	6	40	77	83	71	58	16.3	36.2	2.48	33.4	C22
Gallbladder etc.	2	0	50	-	-	-	1	-	1	-	0.1	0.2	0.03	0.2	C23-24
Pancreas	12	0	8	-	-	-	-	1	5	6	0.6	1.3	0.09	1.7	C25
Larynx	6	0	50	-	-	-	-	2	2	2	0.3	0.6	0.05	0.8	C32
Trachea, bronchus and lung	22	0	32	-	-	1	1	2	11	7	1.1	2.4	0.22	2.9	C33-34
Bone	6	0	100	1	4	-	-	-	-	1	0.3	0.6	0.01	0.4	C40-41
Melanoma of skin	4	0	100	-	-	-	-	1	3	-	0.2	0.4	0.05	0.4	C43
Other skin	27	0	93	-	1	4	6	7	9	-	1.3	2.9	0.24	2.3	C44
Mesothelioma	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C45
Kaposi sarcoma	27	0	100	-	3	9	8	3	-	4	1.3	2.9	0.10	1.8	C46
Peripheral nerves	1	0	100	-	-	-	-	-	1	-	0.0	0.1	0.02	0.2	C47
Connective and soft tissue	10	0	100	1	1	2	1	1	1	3	0.5	1.1	0.04	0.9	C49
Breast	7	0	43	-	-	1	1	4	-	1	0.3	0.8	0.04	0.6	C50
Penis	1	0	100	-	-	1	-	-	-	-	0.0	0.1	0.00	0.0	C60
Prostate	40	0	45	-	-	-	-	4	11	25	1.9	4.3	0.27	6.2	C61
Testis	4	0	0	-	-	1	1	-	1	1	0.2	0.4	0.02	0.4	C62
Kidney	16	0	63	12	-	-	1	1	2	-	0.8	1.7	0.07	0.9	C64
Renal pelvis, ureter and other urinary	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C65-66,C68
Bladder	89	0	16	-	5	9	9	23	20	23	4.3	9.6	0.63	9.6	C67
Eye	12	0	67	4	1	2	1	1	1	2	0.6	1.3	0.04	0.8	C69
Brain, nervous system	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C70-72
Thyroid	1	0	100	-	-	-	1	-	-	-	0.0	0.1	0.01	0.1	C73
Hodgkin disease	14	0	93	4	3	3	2	2	-	-	0.7	1.5	0.05	0.7	C81
Non-Hodgkin lymphoma	27	0	100	8	3	5	5	4	-	2	1.3	2.9	0.09	1.6	C82-85,C96
Multiple myeloma	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C90
Lymphoid leukaemia	1	0	100	-	1	-	-	-	-	-	0.0	0.1	0.00	0.0	C91
Myeloid leukaemia	28	0	89	-	1	12	7	5	2	1	1.4	3.0	0.15	1.8	C92-94
Leukaemia, unspecified	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C95
Other and unspecified	36	0	33	5	6	6	5	9	2	3	1.7	3.9	0.17	2.5	O&U
All sites	955	0	36	36	42	114	152	216	206	189	46.3		6.76	95.9	ALL
All sites but C44	928	0	34	36	41	110	146	209	197	189	45.0	100.0	6.51	93.5	ALLbC44
Average annual population				172458	87026	66594	42156	24341	11482	8817					

Table 2. Mali, Bamako (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	3	0	100	1	-	-	-	1	-	1	0.2	0.3	0.01	0.3	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	0.00	0.0	C11
Other pharynx	1	0	100	-	-	1	-	-	-	-	0.1	0.1	0.01	0.1	C09-10,C12-14
Oesophagus	10	0	50	-	-	-	4	5	1	-	0.5	1.0	0.10	1.1	C15
Stomach	129	0	52	-	3	12	25	29	35	25	6.8	13.1	1.31	16.6	C16
Colon, rectum and anus	38	0	45	-	1	6	6	15	5	5	2.0	3.9	0.36	4.5	C18-21
Liver	118	0	3	1	2	17	19	25	23	31	6.2	12.0	1.02	15.1	C22
Gallbladder etc.	2	0	50	-	-	-	-	-	2	-	0.1	0.2	0.05	0.4	C23-24
Pancreas	5	0	0	-	-	-	2	1	1	1	0.3	0.5	0.05	0.6	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	0.01	0.1	C33-34
Bone	4	0	100	1	3	-	-	-	-	-	0.2	0.4	0.01	0.1	C40-41
Melanoma of skin	8	0	100	-	-	-	2	2	3	1	0.4	0.8	0.11	1.2	C43
Other skin	21	0	100	2	-	2	4	5	3	5	1.1	0.0	0.17	2.5	C44
Mesothelioma	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C45
Kaposi sarcoma	12	0	100	-	3	5	1	3	-	-	0.6	1.2	0.08	0.9	C46
Peripheral nerves	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C47
Connective and soft tissue	8	0	75	2	1	2	1	2	-	-	0.4	0.8	0.05	0.6	C49
Breast	149	0	42	1	8	21	41	34	29	15	7.8	15.2	1.46	17.2	C50
Vulva	2	0	0	1	-	-	-	1	-	-	0.1	0.2	0.01	0.2	C51
Vagina	3	0	67	1	-	-	2	-	-	-	0.2	0.3	0.02	0.2	C52
Cervix uteri	266	0	64	-	12	32	64	65	57	36	14.0	27.1	2.62	32.0	C53
Uterus	31	0	61	-	1	4	4	10	6	6	1.6	3.2	0.30	3.9	C54-55
Ovary	26	0	62	2	3	3	3	8	3	4	1.4	2.6	0.21	2.8	C56
Placenta	7	0	100	-	1	2	1	3	-	-	0.4	0.7	0.05	0.6	C58
Kidney	13	0	38	5	1	-	2	1	2	2	0.7	1.3	0.08	1.2	C64
Renal pelvis, ureter and other urinary	1	0	100	-	-	-	-	1	-	-	0.1	0.1	0.01	0.1	C65-66,C68
Bladder	35	0	23	-	2	2	6	8	10	7	1.8	3.6	0.35	4.5	C67
Eye	12	0	83	8	-	-	-	-	-	4	0.6	1.2	0.01	0.9	C69
Brain, nervous system	2	0	0	1	-	1	-	-	-	-	0.1	0.2	0.01	0.1	C70-72
Thyroid	10	0	70	-	2	3	3	-	2	-	0.5	1.0	0.08	0.9	C73
Hodgkin disease	11	0	91	2	3	-	2	1	3	-	0.6	1.1	0.09	0.9	C81
Non-Hodgkin lymphoma	30	0	100	7	8	4	2	5	4	-	1.6	3.1	0.20	2.3	C82-85,C96
Multiple myeloma	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C90
Lymphoid leukaemia	2	0	100	-	-	1	-	-	-	1	0.1	0.2	0.00	0.2	C91
Myeloid leukaemia	13	0	92	-	-	1	3	5	4	-	0.7	1.3	0.17	1.7	C92-94
Leukaemia, unspecified	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C95
Other and unspecified	30	0	37	-	3	4	5	6	5	7	1.6	3.1	0.24	3.6	O&U
All sites	1004	0	52	35	58	123	203	236	198	151	52.7	100.0	9.23	117.6	ALL
All sites but C44	983	0	51	33	58	121	199	231	195	146	51.6	100.0	9.06	115.0	ALLbC44
Average annual population				188820	87445	42056	26528	17430	9789	8710					

Table 3. Childhood cancer, Mali, Bamako (1988-1997)

	NUMBER OF CASES				M/F	REL. FREQ.(%)	RATES PER MILLION					ASR	%MV
	0-4	5-9	10-14	All		Overall	0-4	5-9	10-14	Crude			
Leukaemia	2	2	2	6	0.2	4.5	1.5	1.9	1.9	1.8	1.8	33.3	
Acute lymphoid leukaemia	0	0	0	0	-	-	-	-	-	-	-	-	
Lymphoma	4	16	12	32	2.2	24.1	3.0	15.3	11.7	9.4	9.5	100.0	
Hodgkin disease	1	7	6	14	3.7	10.5	0.8	6.7	5.8	4.1	4.1	100.0	
Burkitt lymphoma	0	2	1	3	2.0	2.3	-	1.9	1.0	0.9	0.9	100.0	
Brain and spinal neoplasms	0	2	0	2	-	1.5	-	1.9	-	0.6	0.6	-	
Neuroblastoma	0	0	0	0	-	-	-	-	-	-	-	-	
Retinoblastoma	20	5	1	26	1.0	19.5	15.2	4.8	1.0	7.7	7.7	80.8	
Wilms tumour	8	4	2	14	2.5	10.5	6.1	3.8	1.9	4.1	4.2	100.0	
Bone tumours	1	2	3	6	1.0	4.5	0.8	1.9	2.9	1.8	1.8	66.7	
Soft tissue sarcomas	2	1	0	3	0.5	2.3	1.5	1.0	-	0.9	0.9	100.0	
Kaposi sarcoma	0	0	0	0	-	-	-	-	-	-	-	-	
Germ cell tumours	0	0	0	0	-	-	-	-	-	-	-	-	
Other	13	15	16	44	1.2	33.1	9.9	14.4	15.5	13.0	13.0	31.8	
All	50	47	36	133	1.3	100.0	38.0	45.0	35.0	39.3	39.4	67.7	

3.2.11 Mauritania

Background

Climate: Desert; constantly hot, dry, dusty

Terrain: Mostly barren, flat plains of the Sahara; some central hills

Ethnic groups: Mixed Maur/black 40%, Maur 30%, black 30%

Religions: Muslim 100%

Economy—overview: A majority of the population still depends on agriculture and livestock for a livelihood, even though most of the nomads and many subsistence farmers were forced into the cities by recurrent droughts in the 1970s and 1980s. Mauritania has extensive deposits of iron ore, which account for almost 50% of total exports. The decline in world demand for this ore, however, has led

to cutbacks in production. The coastal waters are among the richest fishing areas in the world, but overexploitation by foreigners threatens this key resource. The country's first deep-water port opened near Nouakchott in 1986.

Industries: Fish processing, mining of iron ore and gypsum

Agriculture—products: Dates, millet, sorghum, root crops; cattle, sheep; fish products

Cancer registration

There has been no cancer registration in the country

Review of data

There has been no publication on the cancer profile of the country.

3.2.12 Niger

Background

Climate: Desert; mostly hot, dry, dusty; tropical in extreme south

Terrain: Predominantly desert plains and sand dunes; flat or rolling plains in south; hills in north

Ethnic groups: Hausa 56%, Djerma 22%, Fula 8.5%, Tuareg 8%, Beri Beri (Kanouri) 4.3%, Arab, Toubou, and Gourmantche 1.2%, about 1200 French expatriates

Religions: Muslim 90%, remainder indigenous beliefs and Christians

Economy—overview: Niger is a poor, landlocked sub-Saharan nation, whose economy centres on subsistence agriculture, animal husbandry, re-export trade, and decreasingly on uranium, its major export since the 1970s, of which prices have fallen dramatically. Other exports, primarily to Nigeria, to the south, include livestock, onions and the products of Niger's small cotton industry.

Industries: Cement, brick, textiles, food processing, chemicals, slaughterhouses, and a few other small light industries; uranium mining, gold mining. A search for petroleum in the north is promising.

Agriculture—products: Cowpeas, cotton, peanuts, millet, sorghum, cassava (tapioca), rice; cattle, sheep, goats, camels, donkeys, horses, poultry

Cancer registration

The Cancer Registry of Niger was founded in 1992, in the Faculté des Sciences de la Santé of the University of Niamey. It is located in the Department of Pathology at the University Hospital. This department is a referral centre for pathology services for the whole country. Nevertheless, the registry was designed to be population-based with complete recording of all cancer cases diagnosed among the population of the capital city, Niamey. Niger comprises eight administrative subdivisions, three in the capital city. In 1995 the population of Niamey was estimated to be 521 000.

Case finding was carried out by a cancer registry clerk during the first six years of operation and later by medical students as well, through active searching for cases in the hospital services in the city where cancer might be diagnosed. These include, especially, the National Hospital, the University Hospital and the main maternity hospital. Visits are made to the major services (surgery, urology, medicine, gynaecology, paediatrics and biology laboratory) once every two weeks, and the charge nurses are encouraged to make a note of cancer cases admitted, which can be collected by the registrar. Otherwise, the clerk examines sources such as the ward admission books, consultation registers, medical records in the departments (though information is often missing from this source) to obtain details of cancer cases, their diagnosis and place of residence. Other clinics visited include maternal and child health clinics and occasionally some private clinics with clinicians to collect biopsies.

An important source of information is the department of pathology, which provides histopathology and cytology services for the whole country. Although some specimens are sent out of the country, the registry receives copies of reports of all cancer cases diagnosed by the pathology services in the city, including biochemical tests such as human chorionic gonadotrophin (HCG), prostate-specific antigen (PSA) and alpha-fetoprotein.

Since no cause of death is recorded on death certificates in Niger, they cannot be used for cancer registration.

The definition of 'usual resident' of Niamey is six months' residence in the city. The registration process is carried out with a microcomputer using the CANREG software.

Review of data

Cancer Registry

For the seven-year period considered (1993–99), a total of 1527 cases were registered among residents of Niamey. Table 1 shows the numbers of cases by sex, site and age group, as well as the percentage frequencies and crude and age-standardized rates (ASRs).

The incidence rates, as calculated based on the estimated resident population, are a little low, and in any case must be considered approximate, because of the uncertainty of the estimate of the population at risk based on the 1988 census.

In men, liver cancer (22.5% of cases, ASR 16.9 per 100 000) ranks first, followed by non-Hodgkin lymphoma (7.5%).

In women, the most important cancers are breast (19.9%), cervix (19.0%), liver (7.4%), ovary (5.7%), other uterus (5.2%) and non-Hodgkin lymphoma (4.3%).

Table 1 also shows the percentage of cases with a morphological diagnosis. 49% had been diagnosed on the basis of microscopic examination of tissue. The percentage is lowest for liver (7%) and highest for the leukaemias (> 80%).

Previous studies

A three-year study (1989–91) of the relative frequency of cancer in Niger using records of the Faculté des Sciences de la Santé in Niamey showed that primary carcinoma of the liver (15.5%), skin cancer (14.2%), non-Hodgkin lymphoma (10.0%) and cancer of the prostate (7.3%) were the most common cancers in males. In females, cancers of the cervix (20.2%), breast (13.9%), liver (9.6%) and skin (7.7%) were most common (Nouhou *et al.*, 1994).

Childhood cancer

119 cases of childhood cancers were recorded by the registry in 1993–99 (Table 2). The overall incidence is low (ASR 71.7 per million). Lymphomas were the most commonly recorded tumour; one third of the cases were Burkitt lymphoma.

References

- Nouhou, H., Mahamadou, O., Ramatou & Akehossi, E. (1994) Cancer au Niger: Etude de fréquence relative sur une période de 3 ans (1989–1991). *Médecine d'Afrique Noire*, **41**, 171–178

Table 1. Niger, Niamey (1993-1999)
 NUMBER OF CASES BY AGE GROUP AND SUMMARY RATES OF INCIDENCE - MALE

S I T E	ALL AGES	AGE UNK	MV (%)	0-	15-	25-	35-	45-	55-	65+	CRUDE RATE	%	CR 64	ASR (W)	ICD (10th)
Mouth	10	0	90	-	1	2	-	2	2	3	0.5	1.7	0.09	1.8	C00-06
Salivary gland	5	0	60	1	-	-	1	1	1	1	0.3	0.8	0.04	0.7	C07-08
Nasopharynx	1	0	0	-	-	-	-	-	-	1	0.1	0.2	0.00	0.3	C11
Other pharynx	7	0	57	-	1	-	1	4	-	1	0.4	1.2	0.05	0.9	C09-10, C12-14
Oesophagus	7	0	43	-	-	-	-	4	3	-	0.4	1.2	0.12	1.0	C15
Stomach	13	1	62	-	-	-	-	4	7	1	0.7	2.2	0.28	2.7	C16
Colon, rectum and anus	37	0	78	2	1	5	10	6	8	5	2.0	6.2	0.35	4.8	C18-21
Liver	135	1	7	-	2	14	39	42	24	13	7.3	22.5	1.30	16.9	C22
Gallbladder etc.	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C23-24
Pancreas	7	0	29	-	-	-	1	1	3	2	0.4	1.2	0.10	1.5	C25
Larynx	11	1	18	-	-	-	3	3	4	-	0.6	1.8	0.17	1.6	C32
Trachea, bronchus and lung	23	2	17	-	-	1	3	3	5	9	1.2	3.8	0.22	4.9	C33-34
Bone	37	1	59	10	6	8	6	2	3	1	2.0	6.2	0.20	2.7	C40-41
Melanoma of skin	3	0	100	-	-	-	-	1	-	2	0.2	0.5	0.01	0.7	C43
Other skin	30	0	57	-	5	3	4	5	10	3	1.6	5.0	0.38	4.4	C44
Mesothelioma	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C45
Kaposi sarcoma	5	0	100	-	-	1	3	1	-	-	0.3	0.8	0.03	0.3	C46
Peripheral nerves	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C47
Connective and soft tissue	20	0	70	3	6	4	1	2	1	3	1.1	3.3	0.09	2.1	C49
Breast	7	0	86	-	-	-	1	3	3	-	0.4	1.2	0.13	1.1	C50
Penis	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C60
Prostate	41	0	34	-	-	-	-	2	12	27	2.2	6.8	0.33	10.8	C61
Testis	1	0	0	-	-	-	-	-	1	-	0.1	0.2	0.02	0.2	C62
Kidney	14	0	29	3	1	3	2	1	4	-	0.8	2.3	0.17	1.6	C64
Renal pelvis, ureter and other urinary	1	0	100	-	-	-	1	-	-	-	0.1	0.2	0.00	0.1	C65-66, C68
Bladder	30	0	23	-	-	2	5	10	8	5	1.6	5.0	0.35	4.8	C67
Eye	15	0	47	7	1	1	2	-	4	-	0.8	2.5	0.11	1.1	C69
Brain, nervous system	5	0	80	2	1	1	-	-	1	-	0.3	0.8	0.03	0.3	C70-72
Thyroid	3	0	33	-	-	1	-	1	1	-	0.2	0.5	0.03	0.3	C73
Hodgkin disease	10	0	70	4	3	-	1	2	-	-	0.5	1.7	0.04	0.6	C81
Non-Hodgkin lymphoma	45	0	98	16	5	8	5	6	3	2	2.4	7.5	0.27	3.7	C82-85, C96
Multiple myeloma	3	0	100	-	-	1	1	1	-	-	0.2	0.5	0.02	0.2	C90
Lymphoid leukaemia	18	2	100	4	4	1	3	2	1	1	1.0	3.0	0.11	1.6	C91
Myeloid leukaemia	10	1	100	-	1	2	3	3	-	-	0.5	1.7	0.07	0.8	C92-94
Leukaemia, unspecified	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C95
Other and unspecified	75	1	55	9	8	10	13	17	7	10	4.1	12.5	0.53	8.8	O&U
All sites	629	10	48	61	46	68	109	129	116	90	34.1	100.0	5.63	83.2	ALL
All sites but C44	599	10	47	61	41	65	105	124	106	87	32.5	100.0	5.25	78.8	ALLbC44
Average annual population				122454	50066	39128	26064	13737	5730	3316					

Table 1. Niger, Niamey (1993-1999)

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	9	0	67	2	-	2	3	2	-	-	0.5	1.0	0.07	0.8	C00-06
Salivary gland	3	0	33	1	1	-	-	1	-	-	0.2	0.3	0.02	0.3	C07-08
Nasopharynx	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C11
Other pharynx	2	0	50	1	-	-	-	1	-	-	0.1	0.2	0.02	0.2	C09-10, C12-14
Oesophagus	7	0	86	-	-	1	1	2	2	1	0.4	0.8	0.11	1.3	C15
Stomach	15	0	73	-	-	2	-	2	9	2	0.8	1.7	0.34	3.3	C16
Colon, rectum and anus	24	0	67	-	4	4	3	5	3	5	1.3	2.7	0.23	3.6	C18-21
Liver	65	0	8	2	6	8	21	8	10	10	3.6	7.4	0.67	9.3	C22
Gallbladder etc.	1	0	0	-	-	-	-	-	1	-	0.1	0.1	0.04	0.3	C23-24
Pancreas	7	0	14	-	-	1	1	3	-	2	0.4	0.8	0.06	1.2	C25
Larynx	3	0	0	-	-	-	1	-	1	1	0.2	0.3	0.04	0.6	C32
Trachea, bronchus and lung	2	0	0	-	-	-	-	1	1	-	0.1	0.2	0.05	0.4	C33-34
Bone	23	2	52	5	10	1	1	2	2	-	1.3	2.6	0.17	1.9	C40-41
Melanoma of skin	4	0	100	-	-	-	1	1	2	-	0.2	0.5	0.09	0.8	C43
Other skin	24	0	79	-	-	5	2	7	8	2	1.3	-	0.42	4.4	C44
Mesothelioma	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C45
Kaposi sarcoma	4	0	100	-	1	3	-	-	-	-	0.2	0.5	0.02	0.2	C46
Peripheral nerves	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C47
Connective and soft tissue	24	0	96	1	4	4	3	8	1	3	1.3	2.7	0.21	3.1	C49
Breast	175	0	48	1	8	31	48	48	24	15	9.7	19.9	2.05	25.0	C50
Vulva	8	0	63	-	1	2	3	-	2	-	0.4	0.9	0.10	0.9	C51
Vagina	6	0	83	-	-	1	1	3	1	-	0.3	0.7	0.09	0.9	C52
Cervix uteri	167	1	47	-	1	37	71	42	8	7	9.3	19.0	1.60	19.6	C53
Uterus	46	1	63	1	3	5	7	13	11	5	2.6	5.2	0.69	7.8	C54-55
Ovary	50	0	50	2	5	8	15	7	11	2	2.8	5.7	0.64	6.7	C56
Placenta	4	0	25	-	2	-	1	1	-	-	0.2	0.5	0.03	0.3	C58
Kidney	10	0	20	3	-	4	1	-	2	-	0.6	1.1	0.10	0.9	C64
Renal pelvis, ureter and other urinary	1	0	100	-	-	-	-	-	1	-	0.1	0.1	0.03	0.2	C65-66, C68
Bladder	25	0	24	-	1	6	5	6	2	5	1.4	2.8	0.23	3.7	C67
Eye	7	0	71	4	-	1	-	1	-	1	0.4	0.8	0.03	0.6	C69
Brain, nervous system	3	0	0	1	1	1	-	-	-	-	0.2	0.3	0.01	0.1	C70-72
Thyroid	13	0	69	-	2	4	3	2	1	1	0.7	1.5	0.10	1.4	C73
Hodgkin disease	1	0	100	-	-	-	1	-	-	-	0.1	0.1	0.01	0.1	C81
Non-Hodgkin lymphoma	38	1	89	12	4	9	4	4	2	2	2.1	4.3	0.24	3.3	C82-85, C96
Multiple myeloma	1	0	100	-	-	-	1	-	-	-	0.1	0.1	0.01	0.1	C90
Lymphoid leukaemia	16	1	75	2	1	2	3	4	1	2	0.9	1.8	0.15	2.1	C91
Myeloid leukaemia	15	0	87	2	-	6	4	2	-	1	0.8	1.7	0.09	1.4	C92-94
Leukaemia, unspecified	3	0	100	2	-	1	-	-	-	-	0.2	0.3	0.01	0.1	C95
Other and unspecified	97	0	24	16	11	12	18	15	18	7	5.4	11.0	1.06	12.4	O&U
All sites	903	6	49	58	66	161	223	191	124	74	50.2	-	9.82	119.9	ALL
All sites but C44	879	6	49	58	66	156	221	184	116	72	48.8	100.0	9.39	115.5	ALLbC44
Average annual population				126763	52684	38584	19866	9043	4395	3832					

Table 2. Childhood cancer, Niger, Niamey (1993-1999)

	NUMBER OF CASES				<i>M/F</i>	REL. FREQ.(%)	RATES PER MILLION					
	0-4	5-9	10-14	All		Overall	0-4	5-9	10-14	Crude	ASR	%MV
Leukaemia	3	3	4	10	<i>0.7</i>	8.4	4.1	4.9	9.8	5.7	6.0	100.0
Acute lymphoid leukaemia	2	1	3	6	<i>2.0</i>	5.0	2.7	1.6	7.4	3.4	3.7	100.0
Lymphoma	4	11	17	32	<i>1.7</i>	26.9	5.5	18.1	41.7	18.3	20.1	100.0
Hodgkin disease	0	0	4	4	-	3.4	-	-	9.8	2.3	2.8	50.0
Burkitt lymphoma	1	6	4	11	<i>1.2</i>	9.2	1.4	9.9	9.8	6.3	6.6	81.8
Brain and spinal neoplasms	1	1	1	3	<i>2.0</i>	2.5	1.4	1.6	2.5	1.7	1.8	66.7
Neuroblastoma	1	0	1	2	-	1.7	1.4	-	2.5	1.1	1.2	50.0
Retinoblastoma	6	4	0	10	<i>1.5</i>	8.4	8.2	6.6	-	5.7	5.3	30.0
Wilms tumour	1	1	0	2	-	1.7	1.4	1.6	-	1.1	1.1	50.0
Bone tumours	2	6	6	14	<i>1.8</i>	11.8	2.7	9.9	14.7	8.0	8.5	64.3
Soft tissue sarcomas	1	1	2	4	<i>3.0</i>	3.4	1.4	1.6	4.9	2.3	2.5	75.0
Kaposi sarcoma	0	0	0	0	-	-	-	-	-	-	-	-
Germ cell tumours	1	0	0	1	-	0.8	1.4	-	-	0.6	0.5	100.0
Other	9	16	16	41	<i>0.5</i>	34.5	12.4	26.3	39.2	23.5	24.7	17.1
All	29	43	47	119	<i>1.1</i>	100.0	39.8	70.7	115.2	68.2	71.7	54.6

3.2.13 Nigeria

Background

Climate: Equatorial tropical to the south with dry savannah grassland to the north

Terrain: Southern lowlands merge into central hills and plateaux; plains in north

Ethnic groups: Hausa, Fulani, Yoruba, Ibo, Kanuri, Ibibio, Tiv, Ijaw

Religions: Muslim 50%, Christian 40%, indigenous beliefs 10%

Economy: Political instability, corruption and poor management have hobbled the oil-rich Nigerian economy. The oil sector provides 30% of GDP, 95% of foreign exchange earnings and about 80% of budgetary revenues. The largely subsistence agricultural sector has failed to keep up with rapid population growth, so that Nigeria, once a large net exporter of food, now must import food.

Industries: Crude oil, coal, tin, columbite, palm oil, peanuts, cotton, rubber, wood, hides and skins, textiles, cement and other construction materials, food products, footwear, chemicals, fertilizer, printing, ceramics, steel

Agriculture—products: Cocoa, peanuts, palm oil, corn, rice, sorghum, millet, cassava, yams, rubber, cattle, sheep, goats, pigs; fishing and forest resources extensively exploited

Cancer registration

There are several hospital-based cancer registries operating in Nigeria, but the only population-based registry has been, and remains, the one in Ibadan.

Ibadan Cancer Registry

One of the earliest population-based cancer registries in Africa, the Ibadan Cancer Registry was established in 1960 within the Pathology Department of the University College Hospital (UCH), Ibadan. Since its inception, the aim of the registry has been to monitor the incidence of cancer in the population of Ibadan and its environs, and to provide baseline data for use by health planners, physicians and research workers. For many years, it was the only active registry in Nigeria. It was population-based until 1994, when, as a result of staff shortage, data collection was limited to within the UCH. However, since 1997 the registry has been reactivated with assistance from IARC and data are actively collected from the population. The registry's defined population is the residents of the 70 km² area of the city of Ibadan, comprising five local government areas of Oyo state, with a total population of 1.22 million in 1991. Residents are defined as persons who have been living in the relevant area for at least one year.

The University College Hospital (UCH) is the major tertiary care facility serving the registry population, and it includes specialist cancer treatment services, including radiotherapy. In addition, there are two government state hospitals (Adeoyo Hospital and Ring Road Hospital) and several private and mission hospitals that provide general medical, gynaecological and paediatric services. Three pathology departments are present in the registry area, including the Pathology Department at UCH, which provides the bulk of the histology services and is a major source of information for the registry. The Haematology Department provides copies of reports of haematological malignancies for registration.

Case-finding is effected mainly through a schedule of regular visits by registry staff to the sources of data. Most of the registry's

data is collected from UCH, Adeoyo and Ring Road Hospitals where the search for cancer cases is conducted through scrutiny of clinics, wards, surgical pathology records, surgical operation lists and autopsy reports. Case-finding visits are also made to selected large mission and private clinics (about ten in total) that care for cancer cases. Registration of non-hospital deaths is very limited in Ibadan, and the quality of cause-of-death information is very poor; this source of data has not been used until very recently. Autopsy reports from the mortuaries at UCH and Ring Road Hospital allow detection of deaths due to cancer which may have escaped the registration process.

The CANREG computer system has been used for data recording and management since 1997; previously, registration of cases and analysis of the registry database was carried out manually, using an alphabetic name and site card index system.

National Headquarters for Cancer Registries in Nigeria (NHCRN)

In 1990, the NHCRN was established by the Federal Ministry of Health and located in the UCH, with the main objective of coordinating the establishment and development of cancer registries in Nigeria, and as part of its activities to organize training programmes in cancer registration, as well as programmes for cancer prevention and control. Within the last decade, this has led to increased awareness of the importance of cancer registration and to the development of cancer registries nationwide. Many hospital-based cancer registries have been established in teaching hospitals with the assistance and support of the NHCRN. Through its workshops and conferences, the NHCRN has created awareness and provided an avenue for sharing ideas, reviewing the problems of establishing registries in Nigeria and comparing data generated.

Ife-Ijesha Cancer Registry

Ife-Ijesha Cancer Registry was established in 1989 in the Department of Morbid Anatomy of the Obafemi Awolowo University Teaching Hospital (OAUTH). The registry was designed as a population-based cancer registry covering the Ife-Ijesha zone of Osun State in south-western Nigeria. This zone consists of about seven local government areas—Atakumosa, Ife-Central, Ife-North, Ife-South, Ilesa, Obokun and Oriade. The population of this area was 782 000 in 1991.

A registry clerk carries out active case-finding in OAUTH. This hospital is the major source of information, especially its outreach stations at Ile-Ife and Ilesa, which are the main tertiary care facilities in Ife-Ijesha zone. The registry clerk searches for records of possible cancer patients in the various wards, haematology, radiology and consultant outpatient departments. All histology, cytology and surgical pathology reports that are generated by the Department of Morbid Anatomy of OAUTH are checked for cancer diagnoses on a routine basis. There is a system of death registration at OAUTH, and all death certificates issued at the hospital are searched for deaths due to neoplasms, in addition to scrutiny of autopsy reports (routine hospital and coroner).

In addition to OAUTH, a total of nine hospitals (public and private) are visited fortnightly or monthly, depending upon the number of cancer patients treated. Admission books, clinic registers and hospital case records constitute the main sources of information. In addition, a few medical practitioners in the registry area complete and forward notification cards supplied by the registry.

Just nine 'essential' variables are collected on each case; site and histology are coded using ICD-O, and the CANREG system is used for data entry and management.

Zaria Cancer Registry

The Registry is based in the Department of Pathology, Ahmadu Bello University Hospital, Zaria, in northern Nigeria, and serves the university hospitals complex in Zaria and the nearby larger town of Kaduna. The registry started recording cases prospectively in 1982, but the data from a retrospective survey of cases recorded in the Department of Pathology for the years 1976–78 were published by Cederquist and Attah (1986).

Calabar Cancer Registry

This hospital-based registry was established in 1983, based in the Department of Pathology, University of Calabar Teaching Hospital, Calabar, in south-eastern Nigeria. The hospital provides services for the inhabitants of Cross River and Akwa Ibom states as well as neighbouring Abia State and the Republic of Cameroon. The Department of Pathology provides diagnostic services. Cancer cases were retrospectively recorded from 1979.

Review of data*Cancer registries***Ibadan Cancer Registry**

During the 40 years of its existence, various studies on the frequency and incidence of cancers have been published. The earliest publication from Ibadan was the report of a cancer rate survey for 1960–63 by Edington and MacLean (1965). Subsequently, cancer incidence data from the registry were published for the periods 1960–62, 1960–65 and 1960–69 in the first three volumes of *Cancer Incidence in Five Continents*. However problems in obtaining adequate denominator population data prevented subsequent results from appearing in later volumes. During the period 1960–69, 2420 cancer cases were registered (1206 males and 1214 females) among the residents of Ibadan and environs (Table 1). The age-standardized incidence (world) rates (ASR) for cancers at all sites were 78.0 and 105.1 per 100 000 for males and females respectively. Non-Hodgkin lymphoma (19.1%, ASR 9.8) and liver cancer (14.4%, ASR 10.0) were the commonest tumours among males. Prostate cancer (5.2%, ASR 9.5) showed high rates in the elderly population. In females, cancers of the cervix (15.6%, ASR 20.9) and breast (12.9%, ASR 14.4) were commonest.

Abioye (1981) and others subsequently reviewed cancer patterns derived from series of cases registered between 1970 and 1997. The profile remained broadly similar to that in 1960–69, with, in males, high frequencies of liver cancer and non-Hodgkin lymphoma, but with prostate cancer emerging as the third most common cancer. In females, cervix cancer remained the most common malignancy throughout the period, although its relative frequency declined. A comparison of the relative frequencies of the common cancer sites during two time periods (1960–80 and 1981–95) over the four decades of the existence of the Ibadan Cancer Registry is shown in Table 2. Breast cancer frequency increased two-fold, with only a minimal rise (1.2%) in cancer of the cervix. The percentage frequency of non-Hodgkin lymphoma including Burkitt lymphoma halved, but these cancers remained the most common malignancy in males. The frequency of prostate cancer increased 1.7 times, while that of choriocarcinoma decreased four-fold (from 8.5% to 2.8%). The frequency of colorectal, liver and lung cancers remained more or less unchanged.

Current data: Table 3 shows data from a recent two-year period, since the reactivation of the registry, with 496 and 652 cancers among males and females, respectively. The estimated age-adjusted incidence for all cancers is a little lower than in 1960–69 (63.9 per 100 000 in males, 74.5 per 100 000 in females). In men, the most common cancers are prostate (ASR 19.8; 23.8%), liver (ASR 7.7; 11.6%) and non-Hodgkin lymphoma (ASR 4.9; 10.3%). Only 32% of the liver malignancies in men were confirmed by

histology. In females, breast (ASR 25.3; 35.3%), cervix (ASR 19.9; 24.4%) and ovary (ASR 3.2; 4.7%) are the three most common sites of cancer. The age-specific incidence for breast cancer rises gradually after age 25 years to a peak at age 50. 80% of the malignancies occurring in the breast were verified by histology or cytology.

In spite of the epidemic of HIV/AIDS (with an estimated prevalence of infection of 5.1% in Nigeria at the end of 1999 (UNAIDS, 2000)), current data from Ibadan do not show similar marked increases in incidence of some HIV/AIDS-associated cancers to those reported from parts of eastern and southern Africa.

The registry has always been faced with the problem of case-finding and ascertainment, with suggestion of a reduction in recent years compared with the 1960s. Coverage may indeed have been better in the earlier years, because health care was virtually free and accessible to all, with free treatment of cancer cases. The UCH was the major referral centre in the region, providing most of the specialty services. In addition there was economic and political stability with little or no disruption in the provision of social services and hospital care. The cost of treatment and services is now borne by the patients, who are often unable to cope with the expense of cancer care and management. As a result many are lost to conventional medical care, seeking less expensive alternative traditional care.

Trends in incidence, 1960–99:

Breast cancer was the second commonest female cancer recorded in the earlier years (1960–69) but it is now the commonest female cancer, and in fact the commonest cancer among both sexes. The increase may be related in part to increasing awareness and campaigns about breast cancer, as well as the availability of fine-needle aspiration facilities for quick and easy diagnosis in the hospital. Nevertheless, about 80–85% of these cancers still present in advanced stages, with attendant poor outcome.

Uterine cancer. Cancer of the cervix used to be the commonest gynaecological cancer, but it has recently been overtaken by breast cancer. The incidence rates show little change (ASR 20.9 in 1960–69 and 19.9 in 1998–99) and a recent study of gynaecological malignancies over a period of two decades (1976–95) based on registry data revealed a steady increase in the frequency of new cases (Babarinsa *et al.*, 1998). This reflects the poor development of screening facilities and the lack of a national screening programme. A decline has occurred in the frequency of choriocarcinoma. Endometrial cancer remains uncommon.

Prostate cancer has become the most common cancer among males in Ibadan. Current data (ASR 19.8) indicate a doubling of the incidence rate since 1960–69 (ASR 9.5). The median age of occurrence is 67.5 years and the mean age 71.4 years. The explanation for the rising trend of prostate cancer is uncertain, but may be partly related to improvements in diagnosis and a greater awareness of the importance of this cancer in an increasing elderly population.

Colorectal cancer is considered uncommon in Africa, and this has been related to consumption of high-fibre diet. The early data (1960–69) showed that cancers of the colon and rectum were not frequent, but the results for the period 1998–99 suggest an increase in rectal cancer in males, although there has been no significant change in the ASR for colon cancers in either males or females. An analysis of relative frequencies of these cancers reported a statistically significant 81% increase in frequency of colorectal neoplasms over a 20-year period (Iliyasu *et al.*, 1996), attributed to changing dietary habits, increasing cancer awareness and possibly increased access to health-care facilities. **Liver cancer** has shown little change in incidence over the last four decades, with a male: female ratio of 3–4:1. Exposure to the risk factors, particularly hepatitis B virus and aflatoxins, remains widespread.

Table 1. Nigeria, Ibadan (1960-1969)

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

SITE	ALL AGES	AGE UNK	AGE GROUP						CRUDE RATE	%	ASR (W)	ICD (10th)
			0-	15-	25-	35-	45-	55-				
Mouth	51	3	1	2	10	8	10	13	4	1.4	4.0	C00-C08
Nasopharynx	11	0	-	1	1	4	3	2	-	0.3	0.7	C11
Other pharynx	1	0	-	-	-	-	-	1	-	0.0	0.1	C09-C10, C12-C14
Oesophagus	11	1	-	1	10	1	1	7	1	0.3	0.9	C15
Stomach	85	5	-	1	21	21	21	19	8	2.4	7.0	C16
Colon, rectum and anus	36	0	1	2	7	8	9	8	1	1.0	3.0	C18-C21
Liver	174	6	5	11	29	61	31	26	5	4.9	14.4	C22
Pancreas	25	0	-	1	3	6	10	5	-	0.7	2.1	C25
Larynx	13	0	-	-	-	2	2	5	1	0.4	1.1	C32
Trachea, bronchus and lung	13	1	-	1	-	3	7	1	-	0.4	1.1	C33-C34
Melanoma of skin	10	1	-	-	2	2	1	3	1	0.3	0.8	C43
Other skin	22	6	1	3	3	3	3	2	1	0.6	1.3	C44
Kaposi sarcoma												C46
Breast	1	0	-	-	-	-	-	-	1	0.0	0.1	C50
Penis	2	1	-	-	-	-	-	-	-	0.1	0.2	C60
Prostate	63	4	-	-	-	-	9	23	27	1.8	5.2	C61
Kidney etc.	23	0	17	1	1	2	2	1	1	0.6	1.9	C64-C66, C68
Bladder	34	1	1	1	1	5	5	13	7	0.9	2.8	C67
Eye	9	0	5	2	-	2	-	-	-	0.3	0.7	C69
Brain, nervous system	20	0	11	3	-	3	1	-	2	0.6	1.7	C70-C72
Thyroid	12	1	-	2	1	5	1	-	2	0.3	1.0	C73
Hodgkin disease	71	0	11	13	14	12	10	8	3	2.0	5.9	C81
Non-Hodgkin lymphoma	230	3	120	23	18	29	21	10	6	6.4	19.1	C82-C85, C96
Multiple myeloma	14	0	1	1	3	3	3	2	1	0.4	1.2	C90
Leukaemia	82	0	20	11	16	15	8	11	1	2.3	6.8	C91-C95
Other and unspecified	193	12	19	22	33	40	26	25	16	5.4	16.0	O&U
All sites	1206	45	213	100	151	235	188	185	89	33.7	100.0	ALL
All sites but C44	1184	39	212	97	148	232	185	183	88	33.0	98.2	ALLpC44
Average annual population	92370	109708	95147	36716	14924	5628	3820					

Table 1. Nigeria, Ibadan (1960-1969)

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	33	4	1	1	4	9	6	7	1	1.2	2.7	3.0	C00-C08
Nasopharynx	3	0	-	1	-	1	-	1	-	0.1	0.2	0.2	C11
Other pharynx	1	0	-	-	-	-	-	1	-	0.0	0.1	0.2	C09-C10,C12-C14
Oesophagus	8	1	-	-	-	3	1	1	2	0.3	0.7	1.0	C15
Stomach	56	5	-	-	-	6	21	14	3	2.1	4.6	6.2	C16
Colon, rectum and anus	32	0	-	-	5	8	11	5	3	1.2	2.6	3.1	C18-C21
Liver	43	2	2	1	8	6	17	6	1	1.6	3.5	3.7	C22
Pancreas	12	1	-	-	1	1	2	6	1	0.4	1.0	1.7	C25
Larynx	3	0	-	-	-	-	1	2	-	0.1	0.2	0.5	C32
Trachea, bronchus and lung	11	0	-	-	2	5	2	2	-	0.4	0.9	0.8	C33-C34
Melanoma of skin	18	3	-	2	1	-	7	3	2	0.7	1.5	2.1	C43
Other skin	17	2	-	2	2	4	4	1	2	0.6		1.5	C44
Kaposi sarcoma													C46
Breast	157	9	-	2	27	44	39	21	15	5.8	12.9	14.4	C50
Cervix uteri	189	6	-	-	10	48	66	43	16	7.0	15.6	20.9	C53
Uterus	14	0	-	1	-	4	5	3	1	0.5	1.2	1.5	C54-C55
Ovary etc.	82	3	2	4	15	21	20	15	2	3.0	6.8	6.9	C56-C57
Kidney etc.	11	1	5	1	2	1	-	-	1	0.4	0.9	0.5	C64-C66,C68
Bladder	19	0	1	1	2	3	4	6	2	0.7	1.6	2.1	C67
Eye	14	1	11	-	-	2	-	-	-	0.5	1.2	0.5	C69
Brain, nervous system	13	0	6	-	2	3	1	1	-	0.5	1.1	0.7	C70-C72
Thyroid	26	4	2	1	6	6	6	-	1	1.0	2.1	1.6	C73
Hodgkin disease	23	1	2	2	5	2	4	7	-	0.9	1.9	2.1	C81
Non-Hodgkin lymphoma	132	1	55	13	14	16	20	12	1	4.9	10.9	7.7	C82-C85,C96
Multiple myeloma	7	0	-	-	1	1	2	3	-	0.3	0.6	0.8	C90
Leukaemia	46	0	5	3	12	4	11	9	2	1.7	3.8	3.8	C91-C95
Other and unspecified	244	10	14	32	59	47	36	35	11	9.1	20.1	17.7	O&U
All sites	1214	54	106	67	185	245	286	204	67	45.1	100.0	105.1	ALL
All sites but C44	1197	52	106	65	183	241	282	203	65	44.5	98.6	103.7	ALLbC44
Average annual population			89214	68953	67858	24450	10669	4550	3372				

Source: Cancer Incidence in Five Continents volume 3

Lung cancer rates in Nigeria remain low (ASR 0.8 in both sexes in 1960–69; 0.7 in men in 1998–99). The prevalence of cigarette smoking, the major risk factor, does not seem to have significantly increased among the general population—it is likely that the dwindling economic resources and purchasing power of individuals have not favoured the habit.

Ife-Ijesha cancer registry

During the three-year period 1993–95 since active registration began in the zone, a total of 400 resident cases, 187 males and 213 females, were registered (Table 4). The overall crude incidence rates of 15.7 per 100 000 (ASR 29.3) in males and 17.3 per 100 000 (ASR 25.7) in females are low, indicating a significant degree of under-reporting of cancer cases. Among males, prostate cancer (25.7%), non-Hodgkin lymphoma (17.1%) and liver cancer (7.0%) were the commonest malignancies, as elsewhere in the region. In females, cancers of the breast (28.2%), cervix (13.6%) and non-Hodgkin lymphoma (7.0%) were commonest.

Zaria Cancer registry

A series from the Department of Pathology, Ahmadu Bello University Hospital, Zaria was published by Cederquist and Attah (1986). The cases represent cancers diagnosed in 1976–78 by histology, cytology or bone marrow examination (the latter information coming from the haematology department) (Table 5). The most frequently recorded tumours in this series were non-Hodgkin lymphomas (22.9% of tumours in males, 10.4 in females). About half the cases occurred in children aged under 15 years, the great majority of which were Burkitt lymphoma, but there were also a considerable number of adult cases. In females, the importance of carcinomas of the cervix, breast and ovary was similar to that seen elsewhere in West Africa. In males, liver was the most common site (excluding skin and lymphomas), with a cancer frequency (8.4%) similar to that in Ibadan. The cases of prostate cancer were noted to be young (only 12% were aged 55 years or more).

More recent data, for 1991–92, were reported by Afolayan (1992). Frequencies of liver, breast and prostate cancers were higher than in the earlier series (Table 5).

Calabar cancer registry

The review of frequency series of data from Calabar (1979–88) (Table 4) showed cervical cancer to be the commonest cancer (37.0% of cancers in females), followed by breast (29.8%). Among males, prostate cancer is the commonest (28.6%), followed by liver (16.5%).

Other registries: Eruwa and Enugu

Though data available are essentially hospital-based, similar interesting patterns have emerged (Table 4). Prostate and liver

cancers are the commonest among males in both centres. Cancer data from Eruwa, a more rural community, indicate that cervical cancer is still the commonest cancer in females (cervix 25%, breast 18%), while Enugu's report shows that breast cancer was more common (breast 44.5%, cervix 23%). Enugu Cancer Registry is located in a hospital that caters for an urban population.

Childhood cancer

An analysis of the relative frequencies of the principal types of childhood cancer during 1960–72 was published by Williams (1975). These relative frequencies were compared by Olisa *et al.* (1975) with those observed in a series of black children in the United States and with registry data from the United Kingdom and Uganda. Akang (1996) also compared the early series with the relative frequencies observed in 1973–90 and noted increased frequencies of intracranial neoplasms, leukaemias, renal neoplasms and retinoblastomas, with a relative decline in the frequencies of bone neoplasms and Burkitt lymphoma. The rising frequencies of retinoblastomas, renal and intracranial tumours were ascribed to the increased number of qualified physicians and improved diagnostic facilities.

Incidence rates for childhood cancers in Ibadan were published for 1960–69 (Junaid & Babalola, 1988) and for 1985–92 (Thomas & Aghadiuno, 1998) (Table 6). The most recent data from the registry, for 1993–99, are shown in Table 7.

Lymphomas, and specifically Burkitt lymphoma, have remained the commonest childhood cancer throughout the period. However, as suggested by the analysis of relative frequencies, there seems to have been a decline in incidence of Burkitt lymphoma between the 1960s and the 1990s. The recorded incidence decreased from 79.4 per million in 1960–69 to 18 per million in 1985–92 and 22.6 per million in 1993–99. The pattern of tumour presentation has also shown some changes, with fewer occurrences of the typical jaw tumour and more abdominal mass presentation. This declining trend has been associated with better hygiene and an improved standard of living. In support of this is the variation in frequency patterns between different parts of the country.

The most frequent solid tumour (excluding the lymphomas) throughout the period has been retinoblastoma (with an extremely high rate recorded in the most recent period). The great majority of cases are sporadic (non-familial) unilateral tumours, with a mean age of occurrence of 3.2 years \pm 20 months and a median of 2 years. Wilms tumour and soft-tissue sarcomas were also relatively frequent, but registration rates for all other diagnostic groups were lower than in western populations. The frequency (and incidence rate) of neuroblastomas is low, especially in the two more recent periods, while there has been an increase in the frequency of recorded central nervous system cancers, probably related to improved diagnostic facilities. No cases of Kaposi sarcoma were

Table 2. Relative frequencies of the six most common tumours in Ibadan in two time periods: 1960–80 and 1981–95

1960–80		1981–95	
Site	Frequency (%)	Site	Frequency (%)
Non-Hodgkin lymphoma (incl. Burkitt)	15.1	Breast	14.8
Cervix	10.3	Cervix	12.7
Liver	6.5	Non-Hodgkin lymphoma (incl. Burkitt)	7.4
Breast	6.0	Liver	6.4
Connective tissue	4.5	Prostate	4.7
Choriocarcinoma	4.4	Colorectal	3.8

registered in 1993–99, despite the moderately high prevalence of childhood HIV infection in Nigeria (0.24% at the end of 1999) and the reports of increased rates elsewhere in Africa.

Reviews of frequency series of childhood tumours from Jos, Plateau State (Obafunwa *et al.*, 1992) and Enugu, Eastern Nigeria (Obioha *et al.*, 1989) noted the predominance of lymphomas, with frequencies of 34% and 39.7% respectively. These frequencies are lower than that from Ibadan. Also significant are the comparatively higher frequencies of leukaemia (20% and 12.6%) observed in both centres, with overall lower frequencies of Burkitt lymphomas (11.4% and 26.5%). This difference in the Burkitt lymphoma/leukaemia ratio has been related to regional climatic differences and socioeconomic status. Jos, in the highland plateau region, has a lower ambient temperature and drier climate than Ibadan. Unpublished observations indicate that Burkitt lymphoma is less common in Lagos (a more urbanized area) than in Ibadan, although they are in the same geographical zone.

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Table 3. Nigeria, Ibadan (1998-1999)

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	9	0	78	-	2	1	-	3	-	3	0.6	1.9	0.05	1.1	C00-06
Salivary gland	5	0	80	-	1	1	1	-	2	-	0.3	1.0	0.06	0.6	C07-08
Nasopharynx	12	0	83	-	1	3	3	5	-	-	0.8	2.5	0.10	1.1	C11
Other pharynx	3	0	100	-	-	1	-	-	2	-	0.2	0.6	0.05	0.4	C09-10,C12-14
Oesophagus	7	0	29	-	-	1	1	-	1	4	0.5	1.4	0.03	1.1	C15
Stomach	9	0	56	-	-	-	3	2	2	2	0.6	1.9	0.09	1.2	C16
Colon, rectum and anus	29	0	72	1	1	-	7	7	10	3	2.0	6.0	0.35	3.8	C18-21
Liver	56	0	32	1	1	5	10	10	10	19	3.8	11.6	0.43	7.7	C22
Gallbladder etc.	1	0	0	-	-	-	-	-	-	1	0.1	0.2	0.00	0.2	C23-24
Pancreas	6	0	33	-	-	1	-	-	3	2	0.4	1.2	0.07	0.9	C25
Larynx	11	0	82	-	1	1	1	2	3	3	0.7	2.3	0.10	1.5	C32
Trachea, bronchus and lung	5	0	60	-	-	1	-	2	1	1	0.3	1.0	0.05	0.7	C33-34
Bone	19	0	74	2	6	4	2	1	4	-	1.3	3.9	0.15	1.6	C40-41
Melanoma of skin	5	0	80	-	-	-	-	3	-	2	0.3	1.0	0.03	0.7	C43
Other skin	12	0	92	-	1	1	5	3	1	1	0.8	0.0	0.10	1.3	C44
Mesothelioma	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C45
Kaposi sarcoma	3	0	67	-	-	1	2	-	-	-	0.2	0.6	0.02	0.2	C46
Peripheral nerves	4	0	100	1	-	-	-	-	2	1	0.3	0.8	0.05	0.6	C47
Connective and soft tissue	18	0	72	3	2	5	5	2	-	1	1.2	3.7	0.10	1.4	C49
Breast	7	0	71	-	-	-	-	-	2	5	0.5	1.4	0.04	1.3	C50
Penis	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C60
Prostate	115	0	70	-	-	-	1	11	33	70	7.7	23.8	0.84	19.8	C61
Testis	3	0	100	1	-	1	-	-	1	-	0.2	0.6	0.03	0.3	C62
Kidney	3	0	67	2	-	-	-	1	-	-	0.2	0.6	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	75	1	-	2	1	2	6	4	1.1	3.3	0.17	2.3	C67
Eye	15	0	60	11	1	-	-	-	-	3	1.0	3.1	0.03	1.3	C69
Brain, nervous system	7	0	43	2	2	1	-	2	-	-	0.5	1.4	0.04	0.5	C70-72
Thyroid	6	0	100	-	-	1	-	3	-	2	0.4	1.2	0.04	0.8	C73
Hodgkin disease	7	0	57	1	4	-	-	-	2	-	0.5	1.4	0.06	0.6	C81
Non-Hodgkin lymphoma	50	0	46	15	4	5	6	6	8	6	3.4	10.3	0.35	4.9	C82-85,C96
Multiple myeloma	1	0	0	-	-	-	-	-	-	1	0.1	0.2	0.00	0.2	C90
Lymphoid leukaemia	2	0	0	-	2	-	-	-	-	-	0.1	0.4	0.01	0.1	C91
Myeloid leukaemia	9	0	22	2	2	2	1	1	-	1	0.6	1.9	0.04	0.7	C92-94
Leukaemia, unspecified	3	0	0	1	-	-	1	-	1	-	0.2	0.6	0.03	0.3	C95
Other and unspecified	38	0	58	4	3	3	5	7	10	6	2.6	7.9	0.36	4.6	O&U
All sites	496	0	61	48	34	41	55	73	104	141	33.4		3.87	63.9	ALL
All sites but C44	484	0	60	48	33	40	50	70	103	140	32.6	100.0	3.77	62.6	ALLbC44
Average annual population				312528	162347	108462	71599	45666	23425	19159					

Table 3. Nigeria, Ibadan (1998-1999)
NUMBER OF CASES BY AGE GROUP AND SUMMARY RATES OF INCIDENCE - FEMALE

S I T E	ALL AGES	AGE UNK	MV (%)	0-	15-	25-	35-	45-	55-	65+	CRUDE RATE	%	CR 64	ASR (W)	ICD (10th)
Mouth	2	0	50	-	-	-	-	-	1	1	0.1	0.3	0.02	0.3	C00-06
Salivary gland	4	0	75	-	-	-	-	-	1	-	0.3	0.6	0.04	0.4	C07-08
Nasopharynx	6	0	83	1	1	-	1	1	1	1	0.4	0.9	0.04	0.6	C11
Other pharynx	1	0	0	-	-	-	-	-	-	1	0.1	0.2	0.00	0.1	C09-10,C12-14
Oesophagus	2	0	0	-	-	-	-	-	1	-	0.1	0.3	0.03	0.3	C15
Stomach	11	0	55	-	-	1	1	1	6	2	0.7	1.7	0.13	1.4	C16
Colon, rectum and anus	24	0	75	-	2	3	4	4	6	5	1.6	3.7	0.22	2.8	C18-21
Liver	19	0	32	1	1	2	3	3	3	6	1.3	3.0	0.13	2.1	C22
Gallbladder etc.	1	0	100	-	-	-	-	-	1	-	0.1	0.2	0.02	0.2	C23-24
Pancreas	7	0	14	-	-	1	-	-	3	3	0.5	1.1	0.07	1.0	C25
Larynx	2	0	0	-	-	-	-	-	-	2	0.1	0.3	0.00	0.3	C32
Trachea, bronchus and lung	2	0	100	-	-	-	-	1	1	-	0.1	0.3	0.04	0.3	C33-34
Bone	7	0	57	-	3	-	1	2	-	1	0.5	1.1	0.04	0.6	C40-41
Melanoma of skin	4	0	75	-	-	1	-	2	1	-	0.3	0.6	0.04	0.4	C43
Other skin	9	0	100	1	-	-	-	3	2	3	0.6	0.7	0.07	1.1	C44
Mesothelioma	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C45
Kaposi sarcoma	1	0	100	-	-	1	-	-	-	-	0.1	0.2	0.00	0.1	C46
Peripheral nerves	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C47
Connective and soft tissue	7	0	100	3	-	1	1	1	1	-	0.5	1.1	0.05	0.6	C49
Breast	227	0	80	-	1	32	60	68	41	25	15.0	35.3	2.19	25.3	C50
Vulva	7	0	71	-	2	-	2	1	1	1	0.5	1.1	0.05	0.7	C51
Vagina	4	0	100	-	-	-	-	1	1	2	0.3	0.6	0.03	0.5	C52
Cervix uteri	157	0	75	-	1	7	27	42	42	38	10.4	24.4	1.53	19.9	C53
Uterus	17	0	76	-	1	2	1	5	5	3	1.1	2.6	0.17	2.0	C54-55
Ovary	30	0	73	1	1	2	8	8	5	5	2.0	4.7	0.24	3.2	C56
Placenta	4	0	50	-	-	1	3	-	-	-	0.3	0.6	0.02	0.3	C58
Kidney	9	0	67	2	2	1	1	-	2	1	0.6	1.4	0.07	0.9	C64
Renal pelvis, ureter and other urinary	0	0	-	-	-	-	-	-	-	-	0.0	0.0	0.00	0.0	C65-66,C68
Bladder	3	0	67	-	-	-	1	2	-	-	0.2	0.5	0.03	0.3	C67
Eye	7	0	71	6	-	-	-	1	-	-	0.5	1.1	0.03	0.5	C69
Brain, nervous system	10	0	40	2	1	2	-	3	1	1	0.7	1.6	0.08	1.0	C70-72
Thyroid	9	0	78	-	-	1	2	1	1	4	0.6	1.4	0.04	1.0	C73
Hodgkin disease	1	0	100	-	-	-	-	1	-	-	0.1	0.2	0.01	0.1	C81
Non-Hodgkin lymphoma	26	0	69	3	2	4	2	4	7	4	1.7	4.0	0.22	2.7	C82-85,C96
Multiple myeloma	5	0	20	-	-	-	1	1	2	1	0.3	0.8	0.05	0.6	C90
Lymphoid leukaemia	2	0	0	-	-	-	-	1	1	-	0.1	0.3	0.03	0.2	C91
Myeloid leukaemia	3	0	0	1	-	-	1	-	-	1	0.2	0.5	0.01	0.3	C92-94
Leukaemia, unspecified	2	0	0	-	1	-	1	-	-	-	0.1	0.3	0.01	0.1	C95
Other and unspecified	20	0	85	1	1	1	6	4	5	2	1.3	3.1	0.20	2.2	O&U
All sites	652	0	73	22	20	64	129	162	142	113	43.2	100.0	5.95	74.5	ALL
All sites but C44	643	0	72	21	20	64	129	159	140	110	42.6	100.0	5.88	73.4	ALLbC44
Average annual population				301303	165688	118256	74698	43593	25271	25848					

Table 4. Nigeria: cancer registry data

Site	Ife-Ijesha, 1993-95 (Ojo, 1996)			Eruwa, Oyo State, 1986-95 (Awojobi, 1996)			Calabar Cancer Registry, 1979-88 (Enakem, 1996)			Enugu Cancer Registry, 1988-92 (Obianyo, 1992)					
	No.	%	%HV	Male No.	Female No.	%	Male No.	Female No.	%	Male No.	Female No.	%	Male No.	Female No.	%
Oral cavity	9	4.8%	1.4%	2	1.2	3	1.4	20							
Nasopharynx															
Other pharynx															
Oesophagus	2	1.1%	0.9%	5	3.0%	6	2.9%	0					8.9%		
Stomach	9	4.8%	3.3%	3	1.8%	3	1.4%	33.3	38	14.9%	31	5.4%			
Colon/rectum	8	4.3%	4.7%	12	7.3%	11	5.3%	26.1							
Liver	13	7.0%	6.1%	28	17.0%	22	10.5%	22	42	16.5%	28	4.9%	19.7%	6.2%	
Pancreas	1	0.5%		6	3.6%	1	0.5%	28.6							
Lung	3	1.6%	0.9%												
Melanoma	4	2.1%	1.4%						22	8.6%	15	2.6%			
Other skin	2	1.1%	1.9%	4	2.4%			100	33	12.9%	29	5.1%	9.2%	4.6%	
Kaposi sarcoma															
Breast				4	2.4%	2	1.0%	33.3							
Cervix uteri				4	2.4%	37	17.7%	52.6							
Corpus uteri				1	0.6%	52	24.9%	7.7							
Ovary etc.				60	28.2%										
Prostate				29	13.6%										
Penis				1	0.5%										
Bladder				4	1.9%										
Kidney etc.				4	1.9%										
Eye				48	25.7%										
Brain, nervous system				32	19.4%										
Thyroid				11	5.3%										
Non-Hodgkin lymphoma				14	8.5%										
Hodgkin disease				1	0.5%										
Myeloma				4	2.4%										
Leukaemia				5	3.0%										
ALL SITES				18	10.9%										
				3	1.8%										
				165	100.0%										
				209	100.0%										
				255	100.0%										
				570	100.0%										
				255	100.0%										
				570	100.0%										

Table 5. Nigeria: Zaria Cancer Registry

Site	Zaria Cancer Registry, 1976–78 (Cederquist & Attah, 1986)					Zaria Cancer Registry, 1991–92 (Afolayan, 1992)				
	Male		Female		%HV	Male		Female		%HV
	No.	%	No.	%		No.	%	No.	%	
Oral cavity ¹	57	6.9%	30	4.0%	100					
Nasopharynx	3	0.4%	0	0.0%	100					
Other pharynx		0.0%	8	1.1%	100					
Oesophagus	2	0.2%	0	0.0%	100					
Stomach	12	1.5%	8	1.1%	100					
Colon/rectum	18	2.2%	16	2.1%	100	8	3.5%	7	2.3%	
Liver	69	8.4%	16	2.1%	100	45	19.9%	19	6.3%	
Pancreas	2	0.2%	0	0.0%	100					
Lung	1	0.1%	1	0.1%	100					
Melanoma	22	2.7%	14	1.9%	100					
Other skin	72	8.7%	39	5.2%	100					
Kaposi sarcoma	16	1.9%	0	0.0%	100					
Breast	2	0.2%	80	10.7%	100			62	20.5%	
Cervix uteri			148	19.7%	100			75	24.8%	
Corpus uteri			13	1.7%	100			10	3.3%	
Ovary etc.			61	8.1%	100					
Prostate	22	2.7%			100	17	7.5%			
Penis	2	0.2%			100					
Bladder	47	5.7%	7	0.9%	100	21	9.3%			
Kidney etc.	11	1.3%	12	1.6%	100					
Eye	47	5.7%	25	3.3%	100					
Brain,nervous system	1	0.1%	0	0.0%	100					
Thyroid	14	1.7%	33	4.4%	100					
Non-Hodgkin lymphoma	189	22.9%	78	10.4%	100	36	15.9%	24	7.9%	
Hodgkin disease	51	6.2%	20	2.7%	100	12	5.3%			
Myeloma	3	0.4%	4	0.5%	100					
Leukaemia	71	8.6%	51	6.8%	100					
ALL SITES	825	100.0%	750	100.0%	100	226	100.0%	302	100.0%	

¹ Includes salivary gland tumours

Table 6. Nigeria, Ibadan Cancer Registry: childhood cancers, 1960–92

Cancer	1960–84 (Junaid & Babalola, 1988)			1985–92 (Thomas & Aghadiuno, 1998)		
	No.	%	ASR*	No.	%	ASR
Leukaemia	86	9.0%	11.8	46	12.0%	8.3
Acute lymphocytic leukaemia	33	3.4%	3.9	15	3.9%	2.6
Lymphoma	539	56.3%	96.8	152	39.7%	27.1
Burkitt lymphoma	446	46.6%	79.4	102	26.6%	18.0
Hodgkin disease	35	3.7%	6.7	18	4.7%	3.3
Brain and spinal neoplasms	47	4.9%	4.9	61	15.9%	11.1
Neuroblastoma	41	4.3%	6.0	1	0.3%	0.2
Retinoblastoma	67	7.0%	7.6	37	9.7%	7.4
Wilms tumour	67	7.0%	10.3	24	6.3%	4.7
Bone tumours	7	0.7%	2.8	11	2.9%	2.1
Soft-tissue sarcomas	46	4.8%	8.7	29	7.6%	5.4
Kaposi sarcoma	1	0.1%	0.6	0	0.0%	0
Other	57	6.0%	6.7	22	5.7%	4.2
Total	957	100.0%	155.6	383	100.0%	70.5

* ASR based on 282 cases registered in 1960–69

Table 7. Childhood cancer, Nigeria, Ibadan (1993-1999)

	NUMBER OF CASES				<i>M/F</i>	REL. FREQ.(%) Overall	RATES PER MILLION					ASR	%MV
	0-4	5-9	10-14	All			0-4	5-9	10-14	Crude			
Leukaemia	1	2	2	5	1.5	2.8	2.0	3.6	3.6	3.1	3.0	20.0	
Acute lymphoid leukaemia	0	0	0	0	-	-	-	-	-	-	-	-	
Lymphoma	10	24	25	59	1.7	33.5	20.3	42.7	44.9	36.6	34.7	6.7	
Hodgkin disease	0	1	4	5	-	2.8	-	1.8	7.2	3.1	2.7	-	
Burkitt lymphoma	5	19	15	39	1.8	22.2	10.2	33.8	27.0	24.2	22.6	10.3	
Brain and spinal neoplasms	7	7	4	18	2.6	10.2	14.2	12.4	7.2	11.2	11.6	11.1	
Neuroblastoma	2	1	0	3	2.0	1.7	4.1	1.8	-	1.9	2.1	100.0	
Retinoblastoma	22	3	0	25	1.5	14.2	44.7	5.3	-	15.5	19.0	40.0	
Wilms tumour	3	1	1	5	0.7	2.8	6.1	1.8	1.8	3.1	3.5	40.0	
Bone tumours	1	1	2	4	3.0	2.3	2.0	1.8	3.6	2.5	2.4	25.0	
Soft tissue sarcomas	2	2	5	9	0.8	5.1	4.1	3.6	9.0	5.6	5.3	44.4	
Kaposi sarcoma	0	0	0	0	-	-	-	-	-	-	-	-	
Germ cell tumours	2	1	2	5	1.5	2.8	4.1	1.8	3.6	3.1	3.2	20.0	
Other	21	7	15	43	1.9	24.4	42.6	12.4	27.0	26.7	28.3	20.9	
All	71	49	56	176	1.7	100.0	144.1	87.1	100.7	109.2	113.1	21.6	

3.2.14 Senegal

Background

Climate: Tropical; hot, humid; rainy season (May to November) with strong south-east winds; dry season (December to April) dominated by hot, dry, harmattan wind

Terrain: Generally low, rolling, plains rising to foothills in south-east

Ethnic groups: Wolof 36%, Fulani 17%, Serer 17%, Toucouleur 9%, Diola 9%, Mandingo 9%, European and Lebanese 1%, other 2%

Religions: Muslim 92%, indigenous beliefs 6%, Christian 2% (mostly Roman Catholic)

Economy—overview: Private activity accounts for 82% of GDP and in recent years information technology-based services have become important. However, Senegal faces deep-seated urban problems of chronic unemployment, juvenile delinquency and drug addiction.

Industries: Agricultural and fish processing, phosphate mining, fertilizer production, petroleum refining, construction materials

Agriculture—products: Peanuts, millet, corn, sorghum, rice, cotton, tomatoes, green vegetables; cattle, poultry, pigs; fish

Cancer registration

In 1968, a cancer registry was set up in the capital, Dakar, as a joint undertaking between IARC and the Pathology Department of the Hôpital Dantec in Dakar (Tuyns & Quenum, 1982). The registry was designed as population-based, covering the region of Cap Vert. The majority of the educational and medical services were concentrated in the Dakar area, serving the former French colony, but considerable expansion of specialized medical facilities subsequently took place in other regions of Senegal.

Four pathology departments in Dakar acted as the major diagnostic units at the time, for the entire country. It was stated that most of the cases of cancer diagnosed in Dakar were likely to be confirmed by histology. The pathology departments contributed most of the data recorded in the cancer registry. Data on clinically diagnosed malignancies obtained from the various departments of the hospitals serving the population were included as well. Registration of cancer was conducted for the period 1968–73 by one of the principal investigators, assisted by a secretary and a registry clerk, who checked the data for duplicate registrations based on patient identification parameters which included residence, mainly obtained from the patients themselves. To determine usual residence in the registration area, use was made of the national identity card. During the period of data collection by the registry (1968–73), there was no systematic registration of deaths in place in Cap Vert province.

The data items recorded included patient names, sex, age, usual residence, site and histology. These were transcribed onto a list and forwarded to IARC. After consistency checks conducted at the registry in Dakar, the data were subjected to a further systematic check for errors and duplicates at IARC. Such procedures resulted in the elimination of about 12% of the registrations. Furthermore, efforts to thoroughly check eligibility in terms residence in the Cap Vert Province left only 48% of the registrations for analysis.

Population: The figures obtained during the 1970–71 census were used in the calculation of population at risk. For the Cap Vert Province, the census was conducted based on sampling. Population estimates noted a total of 349 247 males and 349 700 females.

Review of data

Cancer registry

The available report on cancer incidence in Senegal is that from the registry of Dakar (Cap Vert) for the years 1969–74 (Tuyns & Quenum, 1982). The population at risk was estimated from the 1970–71 census. Table 1 shows that a total of 1893 malignant tumours were recorded.

The pattern of tumours in males was similar to those of neighbouring West African countries. Liver cancer (ASR 25.6 per 100 000) was the most common cancer in the male population, followed by skin cancers other than melanomas (ASR 10.3), prostate cancer (ASR 4.3), lymphomas and malignancies of the stomach.

In females, cervix cancer ranked first (ASR 17.2); followed by breast (ASR 11.8), liver (ASR 9.0), skin (excluding melanomas) (ASR 7.9) and ovarian cancers (ASR 4.3).

Since these data were essentially derived from four pathology laboratories, care is needed in interpretation. Although the quality of the data in terms of the proportion with histology is high, there is the possibility of over-representation of some easily accessible tumours and under-reporting of deep-sited ones.

Unlike recent series from neighbouring countries, the data from Senegal exhibit an unusually high incidence of non-melanoma skin cancers for the male population (ASR 10.3). Whether this is a reflection of a difference in registration practices for multiple skin tumours or a real difference due to an underlying carcinogenic exposure is unclear (Camain *et al.*, 1972).

References

- Camain, R., Tuyns, A.J., Sarret, H., Quenum, C. & Faye, I. (1972) Cutaneous cancer in Dakar. *J. Natl Cancer Inst.*, **48**, 33–49
- Tuyns, A.J. & Quenum, C. (1982) Senegal, Dakar. In: Waterhouse, J., Muir, C.S., Shanmugaratnam, K. & Powell, J. eds *Cancer Incidence in Five Continents*, Vol. IV (IARC Scientific Publications No. 42), Lyon, IARC, pp. 210–213

Table 1. Senegal, Dakar (1969–74)

Site	Male	(%)	ASR(w)	Female	(%)	ASR(w)
Lip	3	0.3	0.2	4	0.5	0.4
Tongue	10	1.0	0.9	4	0.5	0.3
Salivary gland	4	0.4	0.5	0	0.0	0
Mouth	12	1.2	1	11	1.3	1.3
Pharynx	8	0.8	0.6	0	0.0	0
Oesophagus	3	0.3	0.2	2	0.2	0.2
Stomach	44	4.3	3.7	19	2.2	2
Small intestine	0	0.0	0	3	0.3	0.3
Colon	8	0.8	0.6	10	1.2	0.7
Rectum	17	1.7	1.5	11	1.3	1
Liver and intrahepatic bile ducts, primary	378	36.8	25.6	116	13.4	9
Gallbladder and bile ducts	0	0.0	0	2	0.2	0.2
Pancreas	12	1.2	1	9	1.0	1
Nose, sinuses etc.	3	0.3	0.3	3	0.3	0.3
Larynx	12	1.2	1.3	2	0.2	0.1
Trachea, bronchus, lung	15	1.5	1.1	1	0.1	0.1
Bone	4	0.4	0.2	5	0.6	0.3
Connective tissue	39	3.8	2.7	19	2.2	1.5
Melanoma of skin	13	1.3	1.2	11	1.3	1.3
Other skin	127	12.4	10.3	88	10.2	7.9
Breast	7	0.7	0.7	127	14.7	11.8
Cervix uteri	0	0.0	0	182	21.0	17.2
Chorionepithelioma	0	0.0	0	16	1.8	0.9
Corpus uteri	0	0.0	0	13	1.5	1.5
Ovary etc.	0	0.0	0	52	6.0	4.3
Prostate	36	3.5	4.3	0	0.0	0
Testis	4	0.4	0.2	0	0.0	0
Penis	5	0.5	0.4	0	0.0	0
Bladder	36	3.5	3	17	2.0	1.7
Kidney, other urinary	13	1.3	0.5	10	1.2	0.6
Eye	22	2.1	1.5	11	1.3	0.9
Brain, central nervous system	34	3.3	2	18	2.1	1.3
Thyroid	6	0.6	0.6	13	1.5	1.1
Other endocrine	1	0.1	0.1	0	0.0	0
Hodgkin disease	23	2.2	1.4	13	1.5	0.7
Non-Hodgkin lymphoma	59	5.7	3.5	23	2.7	1.2
Multiple myeloma	3	0.3	0.2	2	0.2	0.2
Leukaemia	10	1.0	0.7	4	0.5	0.2
Other and unspecified sites	57	5.5	4.4	44	5.1	4.6
All sites	1028	100.0	76.3	865	100.0	75.8

3.2.15 Sierra Leone

Background

Climate: Tropical; hot, humid; summer rainy season (May to December); winter dry season (December to April)

Terrain: Coastal belt of mangrove swamps, wooded hill country, upland plateau, mountains in east

Ethnic groups: 20 native African tribes 90% (Temne 30%, Mende 30%, other 30%), Creole 10% (descendants of freed Jamaican slaves who were settled in the Freetown area in the late eighteenth century), refugees from Liberia's recent civil war, small numbers of Europeans, Lebanese, Pakistanis and Indians

Religions: Muslim 60%, indigenous beliefs 30%, Christian 10%

Economy—overview: Sierra Leone has substantial mineral, agricultural and fishery resources. However, the economic and social infrastructure is not well developed, and the continuing civil war has totally arrested economic development. About two thirds of

the working-age population engages in subsistence agriculture. Manufacturing consists mainly of the processing of raw materials and of light manufacturing for the domestic market. Bauxite and rutile mines have been shut down by civil strife. The major source of hard currency is the mining of diamonds, the large majority of which are smuggled out of the country.

Industries: Mining (diamonds); small-scale manufacturing (beverages, textiles, cigarettes, footwear); petroleum refining

Agriculture—products: Rice, coffee, cocoa, palm kernels, palm oil, peanuts; poultry, cattle, sheep, pigs; fish

Cancer registration

There has been no cancer registration in the country.

Review of data

There are no published accounts of the cancer profile in the country.

3.2.16 Togo

Background

Climate: Tropical; hot, humid in south; semi-arid in north

Terrain: Gently rolling savanna in north; central hills; southern plateau; low coastal plain with extensive lagoons and marshes

Ethnic groups: Native African (37 tribes; largest and most important are Ewe, Mina and Kabre) 99%, European and Syrian-Lebanese less than 1%

Religions: Indigenous beliefs 70%, Christian 20%, Muslim 10%

Economy—overview: The economy is heavily dependent on both commercial and subsistence agriculture, which provides employment for more than 60% of the labour force. Cocoa, coffee and cotton together generate about 30% of export earnings. Togo is self-sufficient in basic foodstuffs when harvests are normal, with occasional regional supply difficulties. In the industrial sector,

phosphate mining is by far the most important activity, but has suffered from the collapse of world phosphate prices and increased foreign competition. Togo serves as a regional commercial and trade centre.

Industries: Phosphate mining, agricultural processing, cement; handicrafts, textiles, beverages

Agriculture—products: Coffee, cocoa, cotton, yams, cassava (tapioca), corn, beans, rice, millet, sorghum; meat; annual fish catch of 10 000–14 000 tons

Cancer registration

There has been no cancer registration in Togo.

Review of data

We have identified no publication on the cancer profile in the country.