

Cancer in Southern Ethiopia

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Summary

A retrospective study of biopsies taken at three hospitals in Southern Ethiopia has been carried out to describe the cancer pattern in the Sidamo and Gamu Gofa regions. A histologically verified cancer diagnosis was recorded in 1154 patients. The bias that appear in the data are discussed. This includes aspects of hospital coverage, age and sex distribution and bias that arise from a lack of diagnostic facilities, especially to diagnose deep seated tumours. Taking these bias into consideration, the cancer pattern in Southern Ethiopia is outlined. Among men, hepatic carcinoma, lymphomas and superficial malignancies (skin cancers including melanomas and superficial soft tissue sarcomas) are the most common malignancies while among women, cervical, breast and ovarian cancers predominate. It is noted that most of the Kaposi's sarcomas recorded are from the Sidamo area. Hodgkin's disease and Burkitt's lymphoma are most common among childhood lymphomas, whereas non-Hodgkin lymphomas of other types dominate among adults. Cancer of the stomach is the second most common internal malignancy among both men and women.

Introduction

The incidence of cancers in the tropics is less than half that recorded in temperate zones (Edington & Gilles 1976). The cancer pattern differs, however, within different geographical areas in the tropics. This difference in tumour incidence is probably associated with factors in

the social, cultural and geographical environment (Edington & Gilles 1976). Comparative studies on tumour incidences have given some clues as to aetiological factors involved in the pathogenesis of certain tumours (e.g., Burkitt's lymphoma, Kaposi's sarcoma).

Apart from a few studies (Tsega 1977; Lester 1981; Sudarsanam *et al.* 1972; Lindtjørn 1980, 1985; Schaller & Kuls 1972; Pavlich & Samuel 1970; de Wit 1982) little is known about the pattern of malignant diseases in Ethiopia in general and from Southern Ethiopia in particular.

The objectives of this paper are to describe the cancer pattern in the Sidamo and Gamu Gofa Regions in Southern Ethiopia as it appears from a retrospective analysis of biopsy proven malignancies in the period 1963 to 1984. Attempts have also been made to estimate the bias that are hidden in the data.

GENERAL BACKGROUND

The Sidamo (population 3.8 million) and Gamu Gofa (population 1.3 million) regions are located in Southern Ethiopia, both bordering Kenya. The climate varies with altitude: the southern rangelands have medium hot temperature and annual rainfall of 400–500 mm. In the northern parts, with altitudes above 1800 m, rainfall is usually abundant and temperature is rather cool.

The people are mainly subsistence farmers, however, the people living in the southern rangelands are semi-nomadic pastoralists. In general the disease pattern is similar in both regions with infectious diseases and malnutrition the two predominate health problems.

Until recently the illiteracy rate was more than 90%. There is no compulsory registration

Table 1. Service profile of hospitals

	Size of hospital	Annual no. of patients	Main service area (population)	(%)	U/R ratio
Sidamo Regional Hospital	120 beds	60 000	Sidamo Awraja (1 445 830)	75	50:50
Arba Minch Hospital	80 beds	50 000	Gamu Awraja (420 000)	67	82:18
Gidole Hospital	55 beds	38 000	Gardulla Awraja (330 000)	100	16:84

(%), Percentage of total patients from main service area.
U/R ratio, Urban to rural ratio of outpatients.

of births or deaths. The urban to rural ratio is 6:94. Information on health service utilization is very limited, but, a registration of outpatients at the three hospitals indicates the main service areas as well as urban:rural ratios (Table 1) (Møgedal *et al.* 1984). Table 1 also shows the main characteristics of the hospitals. Sidamo Regional Hospital is located in Yirga Alem, Sidamo region, whereas the other two hospitals are situated in the Gamu Gofa region. It is apparent that the main service areas of the hospitals cover about one third of the population in Gamu Gofa and Sidamo. However, patients come from all the main areas in Southern Ethiopia, including the adjacent regions Bale and Shoa.

Patients and methods

PATIENTS

Formalin fixed biopsy material was studied either at the Department of Pathology, The Norwegian Radium Hospital, Oslo or at the Laboratorium for Patologi, Oslo, Norway.

All reports on biopsies taken at three hospitals (Sidamo Regional Hospital, Yirga Alem, Sidamo, 1963–1982; Arba Minch Hospital, Arba Minch, Gamu Gofa, 1973–1984; Gidole Hospital, Gamu Gofa, 1969–1984) were reviewed. For each case of malignant neoplasm patient age, sex, card number, hospital, year of diagnosis, and diagnosis were recorded. Tumours were classified by site using the Ninth Revision of The International Classification of Diseases (ICD 1975) (WHO 1975). All patients were Ethiopian citizens.

Since accurate vital statistics are lacking and since health service coverage has been low, the relative ratio frequency of cancers (i.e., percentage of tumour-type related to the total numbers of tumours diagnosed) was calculated. This method, although having its well defined fallacies (Edington & Maclear 1965; Templeton & Bianchi 1972), has, from previous studies in Africa, proved useful and relatively accurate in defining the cancer pattern (Edington & Gilles 1976; Edington & Maclean 1965; Templeton & Bianchi 1972).

ESTIMATION OF REGISTRATION BIAS

There is well known bias in using the relative ratio method: Edington and Maclean (1965) showed (Nigeria) that the relative ratio frequencies give an overestimation of superficial tumours as compared to deep ones. This has also been demonstrated from the Kampala Cancer Registry (Templeton & Bianchi 1972). Likewise, bias in age and sex distribution has been identified in proportional rate surveys (Templeton & Bianchi 1972). In our study the ratio of superficial to deep tumours (Table 2) was calculated for each region at different time periods using the methods described by Templeton and Bianchi (1972). Cancers of the lips, mouth, rectum, breast, cervix, vulva, penis, skin (including malignant melanomas and Kaposi's sarcomas) and eye were classified as superficial. Cancers of the oesophagus, stomach, colon, liver, pancreas, nasopharynx, lung, uterus, ovary, kidney, bladder and brain were classified as deep. All other cancers (nose, prostate, connective tissue, bone, lymphoma

Table 2. Characteristics of study population and their tumours over time

	1963-1969	1970-1974	1975-1979	1980-1984	Total
Ratio superficial to deep tumours					
Gamu Gofa	—	5.0	2.8	1.2	1.7
Sidamo	3.1	1.8	3.6	1.5	2.5
Total	3.1	2.0	3.3	1.3	2.1
Per cent female cases					
Gamu Gofa	—	40	30	27	29
Sidamo	28	33	37	29	33
Total	28	34	34	28	32
Per cent aged over 45 years					
Gamu Gofa	—	48	43	41	43
Sidamo	39	48	48	37	45
Total	39	48	46	40	44

and leukaemia) were considered neither superficial nor deep, and were excluded from this calculation. The sex ratio (Table 2) was calculated after excluding tumours of breast and genitalia. The percentage of patients over the age of 45 years is also shown.

Templeton and Bianchi (1972) have estimated (Uganda) the factor by which deep seated tumours are under-represented. The ratio for superficial to deep seated tumours was found to be 1:1 in two incidence studies, whereas it varies between 1.6 and 13.3 in proportional cancer rate studies. Based on an assumption that the true ratio of superficial to deep seated tumours is 1:1, a calculated relative ratio of cancer frequencies has been estimated using a correction factor of 2.1 (Table 2). Table 5 shows the recorded and estimated (expected) frequencies.

DETERMINATION OF AGE

The accurate determination of age poses a difficulty. The age registered on each patientcard was recorded. When analysing the results, however, the following age groups were used to reduce errors in age determination: 0-4, 5-14, 15-44, over 45.

Results

The ratio of superficial to deep tumours, the percentage of female cases and the percentage of patients over 45 years of age are shown in Table 2.

Tables 3 and 4 give age distribution and relative ratio frequencies for males and females,

respectively. A comparison of the eleven most common recorded and calculated frequencies is shown in Table 5.

The relative ratio frequencies in the Sidamo and Gamu Gofa regions were mainly corresponding. A discrepancy was noted for Kaposi's sarcoma, where 10 of 12 patients came from Sidamo.

Discussion

BIAS IN DATA

The extent of the bias involved can only be assessed if the true distribution of cancers in southern Ethiopia were known. As seen from Tables 1 and 2 our data probably does not give the true picture of the distribution of cancer and cancer types. The hospitals' main service areas cover only one third of the population and hospital services are available mainly for the urban population. Furthermore, males predominate (Table 2), indicating a cultural selection process in the use of hospital services.

In many other African countries there is a flattening of the age specific incidence curve, whereas among the older Caucasians this curve shows an ever increasing tendency (Edington & Gilles 1976). Whether this is due to a deficiency of cancer among the older Africans has been debated (Edington & Gilles 1976). If social factors are accountable for this phenomena, our study would indicate that a long time would be needed for changes in the social section pattern of hospital attendance to occur. Table 2

Table 3. Southern Ethiopia: age distribution and relative frequencies for cancer sites, males

ICD	Site	Age/groups				NR	Total	Per cent
		0-4	5-14	15-44	≥45			
140-145	Buccal cavity			10	13	1	24	3.9
146-147	Oro/nasophar.			3	4		7	1.1
151	Stomach	1		9	11	2	23	3.8
153	Colon				5	1	6	1.0
154	Rectum			9	9		18	2.9
155	Liver	1	1	24	33	1	60	9.8
156	Gall bladder & bile			1	2		3	0.5
157	Pancreas				3		3	0.5
160-162	Nasal cavity, larynx & lungs			4	6	1	11	1.8
170	Bone		1	12	3		16	2.6
171	Soft tissue sarcoma	2	6	28	20	1	57	9.3
172	Melanoma		1	12	23	4	40	6.5
173	Other skin cancers			35	49	1	85	13.9
174	Breast			4	7		11	1.8
185	Prostata				7		7	1.1
186	Testes	1	1	5	1		8	1.3
187	Other male		1	4	21		26	4.2
188	Bladder	1	1		4		6	1.0
189	Kidney	4		2	3		9	1.5
190	Eye	16	3	8	4	2	33	5.4
193	Thyroid			8	4		12	2.0
195	Malignant neoplasms of undefined sites	1	2	9	7		19	3.1
196-199	Secondary deposits		1	15	19	4	39	6.4
200	Lymphosarcoma	2	2	25	16	1	46	7.5
200.2	Burkitt's lymphoma	2	8	2			12	2.0
201	Hodgkins	6	10	6	3	1	26	4.2
203-209	Blood		2	2	3		7	1.1
Total		37	40	238	280	20	614	100.0

NR, age not recorded.

indicates a slight reduction in the attendance rate of the older age-groups during the observation period.

Due to the evident presence of bias in our data, only general conclusions can be drawn from the relative ratio frequencies. One would expect deep seated tumours to have a higher incidence than indicated in Tables 3 and 4. Table 5 shows a comparison between the recorded and calculated frequencies as they appear after a $\times 2.1$ adjustment for under-representation of deep seated tumours. This latter estimate may give a more realistic picture of the cancer incidence in Southern Ethiopia. The finding that the calculated ovarian cancer rate is higher than that for breast cancer is unexpected as in other countries breast cancer has the higher incidence rate (Edington & Gilles

1976; Edington & Maclean 1965; Parkin & Muir 1985). This demonstrates a weakness in the methodology used, and underlines that the degree of under-registration remains unknown and probably varies from one type of cancer to the other.

SOME COMMON MALIGNANT TUMOURS

Primary liver carcinoma (PLC)

This study confirms earlier reports (Tsega 1977; Pavlichia & Samuel 1970) from Addis-Ababa that PLC is among the most frequent malignancies in Ethiopia. It has been demonstrated that PLC in Ethiopia occurs in cirrhotic livers, mainly of the macronodular type (Pavlichia & Samuel 1970). Studies from Dakar, Senegal and Taiwan (Beasley *et al.* 1981; Larouze *et al.* 1976) have established that the carrier state of

Table 4. Southern Ethiopia: age distribution and relative frequencies for cancer sites, females

ICD	Site	Age/groups				NR	Total	Per cent
		0-4	5-14	15-44	≥45			
140-145	Buccal cavity		1	8	11	2	22	4.1
146-147	Oro/nasophar.			2			2	0.4
151	Stomach			6	7		13	2.4
153	Colon		1	1	3		5	0.9
154	Rectum			2	3		5	0.9
155	Liver			2	5		7	1.3
156	Gall bladder & bile							
157	Pancreas				2		2	0.4
160-162	Nasal cavity, larynx & lungs			2	4		6	1.1
170	Bone		1	9			10	1.9
171	Soft tissue sarcoma	1	1	18	5		25	4.6
172	Melanoma			10	18	1	29	5.4
173	Other skin cancers			17	15	1	33	6.1
174	Breast			41	34	2	77	14.3
180	Cervix uteri			66	49	3	118	21.9
182	Uterus	1		4	3		8	1.5
183	Ovary			34	19	1	54	10.0
184	Other female			17	7	1	25	4.6
188	Bladder		1		1		2	0.4
189	Kidney	4		2			6	1.1
190	Eye	11	4	2	3		20	3.7
193	Thyroid			4	3		7	1.3
195	Malignant neoplasms of undefined sites	1	1	5	4		11	2.0
196-199	Secondary deposits	2	1	12	9	2	26	4.8
200	Lymphosarcoma	1		11	4		16	3.0
200.2	Burkitt's lymphoma	1	3				4	0.7
201	Hodgkins		1	1	2	1	5	0.9
203-209	Blood			2			2	0.4
Total		22	15	278	211	13	540	100.0

NR Age not recorded.

Table 5. The recorded relative frequency of the 11 most commonly diagnosed cancer types compared to their calculated frequency using a correction factor of $\times 2.1$ for deeply situated cancers (see text)

Recorded		Calculated	
Skin	10.4	Liver	10.2
Cervix	10.3	Skin	8.5
Lymphoma	9.4	Cervix	8.5
Breast	7.6	Ovary	8.2
Soft tissue	7.1	Lymphoma	7.9
Melanoma	6.0	Breast	6.4
Liver	5.8	Soft tissue	5.9
Ovary	4.7	Stomach	5.5
Eye	4.6	Melanoma	5.0
Buccal cavity	4.0	Eye	3.8
Stomach	3.1	Buccal cavity	3.3

Hepatitis B surface Antigen (HbsAg) commonly precedes the development of PLC. Tsega (1977) demonstrated that 52% of PLC-patients in Addis-Ababa were HbsAg positive. Two studies from Southern Ethiopia estimated the prevalence rate of HbsAg to be 3.8% and 5%, respectively (Henriksen 1984; Tsega *et al.* 1984).

Female genital system

As in most developing countries cancer of the cervix uteri was the most commonly recorded malignant tumour among women, with highest frequencies in the 15–44 age group. This is in agreement with reports from other African countries (Edington & Maclean 1965; Sobo 1982).

Lymphomas

Lymphomas account for 9.4% of the recorded tumours. Hodgkin's disease and Burkitt's lymphoma predominate among children, while non-Hodgkin lymphomas are most common among adults. This is in agreement with other reports from Africa (Edington & Gilles 1976). The clinical presentation of Burkitt's lymphoma in Southern Ethiopia resembles that in non-endemic countries with an incidence between that for the endemic and non-endemic countries (Lindtjørn 1985).

Kaposi's sarcoma

Twelve patients had Kaposi's sarcoma, representing 1.0% of the cancer patients. The relative ratio differs in the two regions; 1.8% in Sidamo and 0.4% in Gamu Gofa. The rates from Southern Ethiopia are comparable to those of Botswana, South Africa and Mozambique, but less than in the high frequency areas of eastern Zaire and adjacent countries; where the tumour accounts for 4.2 to 10% of all malignancies (Hutt 1984). Local differences, as seen in the present study, have previously been reported from East Africa (Taylor *et al.* 1972; Bland *et al.* 1977; Kungu *et al.* 1981) and from Sudan (Hutt 1981).

Cutaneous cancer

This study confirms that skin cancers are common in southern Ethiopia. Cutaneous

cancer in southern Ethiopia is often associated with existing skin disease (Lindtjørn 1980); on the lower extremities this type of cancer is often associated with longstanding tropical ulcers, and on other parts of the body with old burn scars (Lindtjørn 1980). Most of the skin cancers are squamous cell carcinomas, whereas basal cell carcinomas are rare. The same distribution of skin cancer types has been described from Uganda (Iversen & Iversen 1973).

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