

Histologically diagnosed cancers in South Africa, 1988

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Abstract The National Cancer Registry (NCR) collects information on cancer diagnoses via a nation-wide network of public and private pathology laboratories. In 1988, 45 570 new laboratory-diagnosed cancer cases were reported to the NCR. Minimal age-standardised registration rates for black, white, coloured and Asian males were 112,2, 229,9, 192,2 and 91,6 /100 000, respectively, and those for females 107,2, 201,3 148,1 and 118,0. About 40% of cancers in females and 31,3% in males occurred in potentially economically active adults aged 15 - 54 years. The top five cancers in males were: (i) basal cell skin cancer; (ii) cancer of the prostate gland; (iii) cancer of the oesophagus; (iv) lung cancer; and (v) squamous cell skin cancer. In females they were: (i) cancer of the cervix; (ii) breast cancer; (iii) basal cell skin cancer; (iv) squamous cell skin cancer; and (v) cancer of the oesophagus. Despite under-reporting, a number of cancers, especially those of the oesophagus and cervix in blacks and skin cancers in whites, rank among the highest in the world. Moreover, 40,4% of the cancers in adult males (15 - 64 years) and 15,2% of those in adult females were associated with tobacco use. It is recommended that: (i) regional cancer registries be set up in a number of regions to provide information on the true burden of cancer and to monitor interventions; (ii) a national screening programme for cancer of the cervix be established; (iii) detailed studies on lifestyle and dietary causes, especially of cancers related to tobacco consumption and cancers of the oesophagus, cervix and skin, be undertaken; and (iv) the impact of HIV on virus-related cancers be monitored.

S Afr Med J 1994; 84: 344-348.

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Accepted 2 Mar 1994.

In order to assist in the planning and evaluation of cancer control programmes, the National Cancer Registry (NCR) was established in 1986 to record the incidence of histologically diagnosed cancer in South Africa. This is a summary of cancer registrations for 1988.

Methods

Subjects

Methods of data collection and coding of cancers are described elsewhere.^{1,2} Briefly, the NCR collects information on incident cases of cancer from a network of most (85) private and public histopathology and haematology laboratories throughout South Africa (including Transkei, Ciskei, Bophuthatswana and Venda (TBVC)). From 1988 onwards, data from cytology laboratories were also included.

Population

Population denominator data were obtained from extrapolations of the 1985 census to 1988 by the Central Statistical Services. Estimates of the total population of the TBVC homelands for 1988 were obtained from the Epidemiology Directorate of the Department of Health and Population Development (R. Swanenvelder) and added to the South African population data, in proportion to the age structure of the South African population data.

Cancer registration rates

Age- and sex-specific frequencies of cancer are shown in Tables I and II. Age-standardised registration rates (ASR) were calculated using the direct method of standardisation and the 'world standard population'. Cumulative lifetime risks (LR) of developing cancer were calculated using standard procedures.³ Calculations of crude rates, ASR and LR exclude basal and

TABLE I.
Frequency of histologically diagnosed cancer by age group, 1988

	Age group (yrs)								Total
	Unknown	0 - 14	15 - 24	25 - 34	35 - 44	45 - 54	55 - 64	≥ 65	
Asian	44	30	45	41	108	164	179	138	749
Female	17	14	27	27	88	94	106	74	447
Male	18	16	17	13	20	67	72	62	285
Unknown	9	0	1	1	0	3	1	2	17
Black	1 785	477	722	1 118	2 193	3 175	3 918	4 047	17 435
Female	841	214	360	699	1 287	1 554	1 753	1 793	8 501
Male	825	250	355	417	896	1 604	2 137	2 238	8 722
Unknown	119	13	7	2	10	17	28	16	212
Coloured	184	101	148	209	458	717	856	922	3 595
Female	91	50	75	142	308	380	340	419	1 805
Male	92	50	73	67	150	337	516	502	1 787
Unknown	1	1	0	0	0	0	0	1	3
White	2 891	223	692	764	2 054	2 919	4 361	8 725	22 629
Female	1 081	98	259	431	1 096	1 416	1 860	3 865	10 106
Male	1 556	123	425	331	946	1 476	2 461	4 816	12 134
Unknown	254	2	8	2	12	27	40	44	389
All	5 193	846	1 668	2 167	4 906	7 122	9 515	14 153	45 570
Female	2 092	384	741	1 317	2 830	3 515	4 136	6 279	21 294
Male	2 556	442	897	844	2 050	3 557	5 299	7 800	23 445
Unknown	545	20	30	6	26	50	80	74	831

Population unknown — 1 162.

squamous cell skin cancers. LR and ASR are also adjusted for the proportion of people in the 'age unknown' category for each site. Frequencies, crude rates, ASR and LR for the top 10 cancers were calculated for each sex (Table II), and for each population group and sex (Table III). Cancers are ranked according to their ASR.

Cancers associated with various causes

Over 80% of cancers are caused by external (non-inherited) factors.⁴ An attempt was therefore made to apportion the cancer pattern in South Africa to a number of factors relevant to South African conditions. Inhalation of tobacco smoke or tobacco chewing, for example, is associated with cancers of the oral cavity, larynx, nasopharynx, lung, oesophagus, pancreas, bladder, kidney and stomach.³ Cancer of the nasopharynx, cervix, liver, stomach and anogenital region, Kaposi's sarcoma, non-Hodgkin's lymphoma and some leukaemias are associated with infection by viruses and bacteria. Of concern is whether the rate of any of these cancers will increase because the HIV epidemic is increasing the numbers of immunosuppressed individuals.⁶ Cancers of the female breast and those of the oesophagus, stomach, intestine, colon, rectum, prostate, ovary and endometrium are more common in societies with a high consumption of saturated fats and/or low consumption of fruits and vegetables.⁷ Basal cell and squamous cell cancers and melanomas are associated with exposure to solar ultraviolet radiation.⁸

Results

Contributing centres

About 85 public and private histology, haematology and cytology laboratories throughout South Africa, the TBVC states and other regions reported 45 570 new cancer cases to the NCR, of which 96,1% had complete information on sex and population group (Table I).

TABLE II.
Top 10 histologically diagnosed cancers, by sex, 1988

Site	No.	%	Crude*	ASR†	Risk‡
Females					
Cervix	3 507	16,47	19,65	28,29	31,66
Breast	3 324	15,61	18,62	27,60	31,95
BCC	2 475	11,62	13,87	20,32	44,17
SCC	1 006	4,72	5,64	8,43	99,51
Oesophagus	844	3,96	4,73	7,38	110,39
Uterus	850	3,99	4,76	7,34	109,20
Colon	666	3,13	3,73	5,65	147,56
Lung	622	2,92	3,48	5,56	139,39
Ovary	584	2,74	3,27	4,79	185,69
Non-Hodg. lymphoma	519	2,44	2,91	4,19	208,83
Other	5 693	26,74			
Total	21 294	100,00	99,79	145,95	6,8
Males					
BCC	3 865	16,49	21,72	36,37	24,37
Prostate	1 800	7,68	10,11	19,11	43,79
Oesophagus	1 973	8,42	11,09	18,15	44,75
Lung	1 844	7,87	10,36	17,38	44,55
SCC	1 708	7,29	9,60	16,52	53,41
Bladder	1 040	4,44	5,84	10,35	78,02
Stomach	798	3,40	4,48	7,43	114,14
Liver	727	3,10	4,08	6,23	127,08
Non-Hodg. lymphoma	708	3,02	3,98	6,00	143,36
Colon	611	2,61	3,43	5,91	147,56
Other	8 291	35,36			
Total	23 445	100,00	100,42	163,23	6,8
Sex unknown	831				
Total cancer cases	45 570				

* , †: per 100 000.

‡: risk is expressed as 1 in X number of people.

†, ‡: adjusted for age unknown.

BCC = basal cell carcinoma; SCC = squamous cell carcinoma.

South African population: females — 17 850 422; males — 17 797 905.

Age and sex distribution

A total of 21 294 new female and 23 445 new male cancer cases were recorded in 1988; in 831 (1,8%) the sex was unknown, and 5 193 (11,3%) had no information on age. The age-specific frequency of all cancers for males and females is shown in Table I. It is noteworthy that 39,5% of cancers in females and 31,3% in males occurred in potentially economically active adults aged 15 - 54 years. Cancers in children (0 - 14 years) comprised less than 2% of all cancers.

South African population

The total South African population (including TBVC) was estimated at 35 648 327 persons, 17 850 422 females and 17 797 905 males (Tables II and III).

Histologically diagnosed cancer registration

Histologically diagnosed cancer registration data for the top 10 cancer sites are shown in Tables II and III. The ASR for females was 145,95/100 000 and that for males 163,23. LR for both sexes were similar, 1/7. ASRs for black, white, coloured and Asian males were 112,2, 229,9, 192,2 and 91,6/100 000, respectively, and those for females 107,2, 201,3, 148,1 and 118,0. The minimal LR of developing cancer (excluding basal and squamous cell cancers) was at least 1/7,5 for black males and at least 1/8 for black females. Of white males and white females at least 1/4,3 and 1/5, respectively, developed cancer. Among coloureds the LR was at least 1/5 for males and at least 1/6,6 for females, and among Asians it was 1/9,6 for males and 1/8,4 for females.

Ranking of cancers

Age-specific frequency and incidence tabulations of histologically diagnosed cancer are presented elsewhere.¹ Crude and ASR per 100 000 for the top 10 cancer sites, the percent contribution and the LR of developing each cancer are summarised in Tables II and III. Cancers are ranked according to their ASR, so in some cases there is a discrepancy between the relative frequency of a cancer and its ASR ranking. In females, the top 10 cancers were: (i) cervix (16,47%); (ii) breast (15,61%); (iii) basal cell skin cancer (11,62%); (iv) squamous cell skin cancer (4,72%); (v) oesophagus (3,96%); (vi) uterus (corpus uteri) (3,99%); (vii) colon (3,13%); (viii) lung (2,92%); (ix) ovary (2,74%); and (x) non-Hodgkin's lymphoma (2,44%). In males, the top 10 cancers were: (i) basal cell skin cancer (16,49%); (ii) prostate (7,68%); (iii) oesophagus (8,42%); (iv) lung (7,87%); (v) squamous cell skin cancer (7,29%); (vi) bladder (4,44%); (vii) stomach (3,4%); (viii) liver (3,1%); (ix) non-Hodgkin's lymphoma (3,02%); and (x) colon (2,61%).

The top 10 cancer sites by population group and sex are set out in Table III. Cancer of the cervix was the commonest cancer in black and coloured females (ASR 39,28 and 31,03/100 000, respectively), the 3rd most common in Asians (ASR 11,49) and the 9th most common in whites (ASR 8,86). Cancer of the cervix comprises 2,65% of all cancers in white females and 32,74% in black females. Overall, cancer of the cervix comprises 16,47% of all female cancers. One in 21,25 black females will develop cancer of the cervix in their lifetime (0 - 74 years) if current patterns persist. In contrast, 1/108,03 white females will develop cancer of the cervix in their lifetime, corresponding to a relative registration rate (age-adjusted 0 - 74 years) between black and white of 5,1.

Causes of cancer (15 - 64 years)

In the age group 15 - 64 years, 5 166 cancers in males and 1 958 in females were associated with tobacco use (see 'Methods' for list), comprising 40,9% of cancers in adult males and 15,6% of those in females. A total of 3 922 women (31,3%) and 2 204 men (17,4%) aged 15 - 64 years developed cancers associated with infectious agents. A total of 4 640 cancers in women (37,0%) and 3 274 in men (25,9%) were associated with other dietary, reproductive and lifestyle factors. Exposure to solar radiation was associated with 1 738 (skin) cancers in women (13,9%) and 2 833 (22,7%) in men, albeit that 84,8% of skin cancers in females and 91,6% of those in males are basal and squamous cell carcinomas, which are rarely fatal.

Discussion

Almost all private laboratories and all public pathology laboratories send data to the NCR. The majority of all laboratory-diagnosed cancers are therefore recorded. The total of 45 570 cases recorded in 1988 is higher than the number of cancers recorded in previous years. In 1986, 34 590 and in 1987, 34 393 cancer cases were recorded. The increase of 24,5% between 1987 and 1988 is attributed to cytology laboratories sending their data from 1988 onwards and to a more efficient reporting system among all laboratories. Comparisons of rates between calendar years would therefore be misleading. The 1987 total of 34 393 is lower than the 38 027 cases previously recorded.² This is because a more sensitive method has since been applied to search for duplicate entries. This led to the exclusion of 3 634 cases from the 1987 data.

Cancer would bring most people to the attention of a medical doctor.³ However, if entry to a register were to be restricted to laboratory-confirmed cases alone, variations in registration would in part reflect access to diagnostic facilities rather than the underlying morbidity (incidence) rate. In The Gambia, for example, 30% of cancers are histologically verified,¹⁰ and in Mali, 50%.¹¹ In the UK histological verification varies; for example, the figure for males in Trent is 45% and that in east Scotland 97%.¹² In a pilot population-based cancer registry established in a South African black rural area, 42% of all cancers were diagnosed without laboratory verification (unpublished data). In a study of cancer of the oesophagus in Transkei, 48% of all cases were histologically verified.¹³ One of the reasons for a low biopsy rate is obviously relative ease of access to pathology laboratories, but also doctors are often reluctant to put patients presenting with advanced cancer through additional painful diagnostic procedures. These results therefore represent minimal cancer incidence rates for the country.

The ASRs for 1988, ranging from 91,6/100 000 in black males (LR 1/9,6) to 229,9 (LR 1/4,3) in white males, and an average LR for the whole South African population of at least 1/7 people, illustrate that cancer is an important public health problem in this country. Furthermore, 39,5% of cancers in females and 31,3% of those in males occur in adult breadwinners aged 15 - 54 years, with potential catastrophic consequences on dependants.

Rates for cancers of the oesophagus, cervix and skin rank among the highest in the world.² Mesothelioma rates, presented elsewhere,^{1,2} also rank among the highest world-wide.

South African cancer patterns vary considerably from those observed in developed countries, and from those in other African countries. For example, cancer of the

TABLE III.
Top 10 histologically diagnosed cancers, by sex and population group, 1988

Site	No.	%	Crude*	ASR†	Risk‡	Site	No.	%	Crude*	ASR†	Risk‡
White females						Coloured females					
BCC	2 293	22,69	87,43	67,34	14,11	Cervix	370	20,50	23,31	31,03	32,15
Breast	1 834	18,15	69,93	58,76	15,96	Breast	317	17,56	19,97	29,13	30,62
SCC	772	7,64	29,44	19,97	43,06	Uterus	102	5,65	6,43	9,82	87,46
Colon	486	4,81	18,53	14,04	60,74	Stomach	97	5,37	6,11	9,15	100,50
Melanoma	387	3,83	14,76	12,06	82,47	Lung	84	4,65	5,29	7,99	97,59
Lung	307	3,04	11,71	10,10	81,15	Ovary	68	3,77	4,28	5,65	167,17
Uterus	319	3,16	12,16	10,05	81,15	Oesophagus	47	2,60	2,96	4,62	172,91
Non-Hodg. lymphoma	300	2,97	11,44	9,18	98,54	Colon	46	2,55	2,90	4,45	182,32
Ovary	258	2,55	9,84	8,92	105,76	Non-Hodg. lymphoma	50	2,77	3,15	4,40	222,72
Cervix	268	2,65	10,22	8,86	108,03	Rectum	39	2,16	2,46	3,67	208,83
Other	2 882	28,52				Other	585	32,41			
Total§	10 106	100,00	287,5	201,3	5,0	Total§	1 805	100,00	109,9	148,1	6,6
White males						Coloured males					
BCC	3 612	29,77	140,90	129,08	7,34	Lung	228	12,76	15,01	27,73	27,98
SCC	1 366	11,26	53,29	48,15	18,59	Prostate	163	9,12	10,73	22,98	37,54
Prostate	863	7,11	33,66	27,12	32,15	Stomach	174	9,74	11,45	20,41	40,50
Bladder	736	6,07	28,71	25,82	31,85	Oesophagus	153	8,56	10,07	18,91	42,52
Lung	594	4,90	23,17	22,72	33,29	Larynx	90	5,04	5,92	11,19	78,63
Colon	431	3,55	16,81	15,11	58,30	Bladder	67	3,75	4,41	8,62	89,00
Leukaemia	354	2,92	13,81	13,40	81,80	Naso/oro/phx	63	3,55	4,15	7,41	133,83
Non-Hodg. lymphoma	362	2,98	14,12	12,53	70,92	Mouth	56	3,13	3,69	6,57	135,64
Melanoma	333	2,74	12,99	11,71	82,47	Tongue	51	2,85	3,36	5,88	154,35
Stomach	323	2,66	12,60	11,44	78,63	BCC	41	2,29	2,70	5,44	167,17
Other	3 160	26,04				Other	701	39,23			
Total§	12 134	100,00	279,2	229,9	4,3	Total§	1 787	100,00	112,8	192,2	5,0
Sex unknown	389					Sex unknown	3				
Total whites	22 629					Total coloureds	3 595				
Black females						Asian females					
Cervix	2 783	32,74	21,12	39,28	21,25	Breast	104	23,27	22,53	26,45	37,96
Breast	998	11,74	7,57	14,35	56,37	Uterus	44	9,84	9,53	13,23	65,44
Oesophagus	728	8,56	5,52	11,55	66,29	Cervix	44	9,84	9,53	11,49	76,26
Uterus	370	4,35	2,81	5,87	125,50	Colon	21	4,70	4,55	6,41	123,96
Liver	225	2,65	1,71	3,58	204,58	Rectum	16	3,58	3,47	5,60	128,71
Lung	215	2,53	1,63	3,49	222,72	Stomach	17	3,80	3,68	5,56	196,58
Ovary	220	2,59	1,67	3,09	263,66	Ovary	19	4,25	4,12	4,91	182,32
SCC	174	2,05	1,32	2,75	270,77	Bladder	11	2,46	2,38	3,69	227,77
Stomach	155	1,82	1,18	2,38	313,00	Mouth	11	2,46	2,38	3,39	227,77
Leukaemia	201	2,36	1,53	2,13	435,28	Leukaemia	14	3,13	3,03	2,91	625,50
Other	2 432	28,61				Other	146				
Total§	8 501	100,00	62,7	107,2	8,0	Total§	447	100,00	95,8	118,0	8,4
Black males						Asian males					
Oesophagus	1 662	19,06	12,53	24,93	31,75	Lung	35	12,28	7,67	12,36	73,49
Prostate	698	8,00	5,26	14,44	52,32	Bladder	28	9,83	6,14	9,71	75,69
Lung	959	11,00	7,23	13,96	56,68	Stomach	24	8,42	5,26	9,56	72,44
Liver	530	6,08	4,00	7,22	108,03	Prostate	13	4,56	2,85	6,47	172,91
Larynx	342	3,92	2,58	5,28	137,49	Non-Hodg. lymphoma	19	6,68	4,16	5,96	120,98
Mouth	303	3,47	2,29	4,82	147,56	Liver	15	5,26	3,29	5,41	141,35
SCC	271	3,11	2,04	4,09	217,89	Colon	12	4,21	2,63	5,06	127,08
Stomach	260	2,98	1,96	3,84	204,58	Rectum	12	4,21	2,63	4,86	208,83
Naso/oro/phx	246	2,82	1,86	3,78	200,50	Leukaemia	17	5,97	3,73	3,81	333,83
Tongue	220	2,52	1,66	3,44	213,27	Larynx	11	3,86	2,41	3,49	263,66
Other	3 231	37,04				Other	99				
Total§	8 722	100,00	63,2	112,2	7,5	Total§	285	100,00	61,4	91,6	9,6
Sex unknown	212					Sex unknown	17				
Total blacks	17 435					Total Asians	749				
Females, pop. unknown			435								
Males, pop. unknown			517								
Pop. unknown, sex unknown			210								
Total cancer cases			45 570								

*: †: per 100 000.

‡: lifetime risk, expressed as 1 in X number of people.

†: ‡: adjusted for age unknown.

§: total incidence rates and lifetime risks exclude BCC and SCC.

BCC = basal cell carcinoma; SCC = squamous cell carcinoma.

South African population: Asian females — 461 533; Asian males — 456 187; black females — 13 179 019; black males — 13 258 992; coloured females — 1 587 225; coloured males — 1 519 202; white females — 2 622 645; white males — 2 563 524; total 35 648 327.

oesophagus is common in South Africa but virtually absent in Mali (1,3/100 000 for males and 0,4 for females¹¹) and in The Gambia (< 1/100 000).¹⁰ Kaposi's sarcoma, rare in South Africa (0,06% of all cancers in females and 0,4% in males), comprises 48% of all cancers in males and 17% in females in Uganda (probably because of the HIV epidemic).¹⁴

Cancer of the cervix is the commonest cancer in South African females (16,5% of cancers in all races, but 32,7% in blacks) and in females from other African countries, but ranges in relative importance from 13,4% in Uganda to 51,5% in Swaziland.¹⁵ Analysis of figures from 27 current and past cancer registries in Africa (24 reported in Parkin,¹⁶ and the Gambian, Mali and South African registries) shows that cancer of the cervix comprised less than 20% of all cancers in females in 6, between 21% and 30% in 11, and 30% in 10. Rates for cancer of the cervix in South African black and coloured women (ASR 39,28 and 31,03/100 000 respectively) and in other African countries are among the highest in the world.¹ In contrast, rates of cancer of the cervix (1976 - 1980) in developed countries such as the Nordic countries range from 6/100 000 in Finland to 19,4/100 000 in Denmark.¹⁶ National mass screening programmes have been shown to be effective in reducing the incidence of this cancer.¹⁶ In the Nordic countries, for example, a 21 - 56% reduction in the incidence of cancer of the cervix has been reported in Denmark, Finland, Iceland and Sweden, countries with mass screening programmes. In contrast Norway, which has no organised mass screening service, experienced a 14% increase in the incidence of cancer of the cervix between the 1950s and 1980s.¹⁷ A national screening programme for cancer of the cervix should be implemented to assist in curbing this important epidemic.

Much is known about the effects of smoking on cancer and other diseases in developed countries.^{5,18} However, quantitative data are lacking in developing (especially African) countries,¹⁸ and this relationship ought to be investigated locally. Having said this, there is no doubt that a reduction in cigarette consumption would be an obvious step in reducing the incidence of smoking-related cancers,³ which in South Africa comprise 40,4% of cancers in adult males (15 - 64 years) and 15,2% of those in adult females. Studies on the lifestyle and dietary causes of cancer, especially cancers associated with tobacco and cancers of the oesophagus, cervix and skin, should be important priorities for epidemiological research in South Africa. The impact of HIV on the incidence of virus-related cancers is another of the many areas in cancer research that deserves urgent attention.

Above all, permanent regional registries where cancer is diagnosed irrespective of laboratory confirmation³ ought to be set up in a number of regions to provide information on baseline incidence rates, geographical distribution and trends. Such population-based cancer registries are an important source of unambiguous information on the burden of cancer and the effectiveness of cancer control programmes.

The National Cancer Registry is funded by the South African Institute for Medical Research, the Cancer Association of South Africa and the Department of National Health and Population Development. Additional funding was received from Anglo and De Beers Group Chairman's Fund, the Medical Research Council and the estates of the late Mrs B. Reddy and Mrs F. M. Maisels. UNIDATA Open Systems Division, OASIS Technology and Edgetech Holdings donated hardware and software to the NCR. The Executive Committee of the NCR comprises Professors I. Simson (Chairman), C. J. Uys, J. van den Ende, F. G. Geldenhuys and M. Isaacs, and Drs R. J. Cohn and F. Sitas.

The assistance of Mrs G. Gaum (Cancer Registrar), Miss S. Letsoalo (Secretary), and Ms M. Arnold, Mr J. M. Kale, Mr I. K. Mokgethi, Ms A. Nkosi, Mr M. Orrai, Mr L. Ramaala and Ms A. Thompson (University of the Witwatersrand Bursars) is gratefully acknowledged, as is the voluntary contribution of all the laboratories that provided cancer diagnoses to the NCR for 1988.

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