



**Singapore Cancer Registry
Interim Report
Trends in Cancer Incidence in Singapore
2004-2008**

**National Registry of Diseases Office
(NRDO)**

Acknowledgement

This report was produced with joint efforts from the following:

Singapore Cancer Registry

Prof Lee Hin Peng Chairman
Epidemiology and Public Health, NUS

Health Promotion Board

Dr Chew Ling Director
Research & Strategic Planning Division (R&SP)

National Registry Of Diseases Office, R&SP

Dr Chow Khuan Yew Deputy Director
Dr Jin Aizhen Senior Executive (Epidemiology)
Ms Loy En Yun Epidemiologist on attachment
Mr William Ho Senior Executive (Data Management)

Honorary Consultants

Prof Chia Kee Seng Head, Epidemiology and Public Health, NUS
A/Prof Adeline Seow Epidemiology and Public Health, NUS
A/Prof Koh Woon Puay Epidemiology and Public Health, NUS

TABLE OF CONTENTS

1	INTRODUCTION.....	4
2	SOURCE OF DATA AND DATA PROCESSING	4
3	FINDINGS	6
3.1	NOTIFICATIONS BY YEAR OF DIAGNOSIS	6
TABLE 1:	NOTIFICATIONS OF NEW CASES BY YEAR OF DIAGNOSIS 2004 - 2008	6
3.2	INCIDENCE OF CANCERS FOR THE PERIOD, 2004-2008.....	6
TABLE 2:	INCIDENCE OF CANCERS BY GENDER 2004 - 2008	6
TABLE 3:	AGE-STANDARDISED INCIDENCE RATES FOR ALL CANCERS BY ETHNIC GROUPS AND GENDER, 2004-2008	7
3.3	TEN MOST FREQUENT CANCERS, 2004-2008.....	8
TABLE 4:	TEN MOST FREQUENT CANCERS IN SINGAPORE MALES, 2004-2008	8
FIGURE 1:	TEN MOST FREQUENT CANCERS IN SINGAPORE MALES (%), 2004 – 2008	9
TABLE 5:	TEN MOST FREQUENT CANCERS IN SINGAPORE FEMALES, 2004-2008.....	9
FIGURE 2:	TEN MOST FREQUENT CANCERS IN SINGAPORE FEMALES (%), 2004 – 2008.....	10
3.4	HIGHEST RANKING CANCERS IN DIFFERENT ETHNIC GROUPS, 2004-2008.....	10
TABLE 6:	HIGHEST RANKING CANCERS AMONG CHINESE RESIDENTS, 2004-2008	10
TABLE 7:	HIGHEST RANKING CANCERS AMONG MALAY RESIDENTS, 2004-2008	11
TABLE 8:	HIGHEST RANKING CANCERS AMONG INDIAN RESIDENTS, 2004-2008.....	12
3.5	MORTALITY RATES BY GENDER, 2004-2008	13
TABLE 9:	TEN MOST FREQUENT CANCER DEATHS IN SINGAPORE MALES, 2004-2008 (SOURCE: RBD, MHA).....	14
TABLE 10:	TEN MOST FREQUENT CANCER DEATHS IN SINGAPORE FEMALES, 2004-2008 (SOURCE: RBD, MHA).....	14

CANCER REGISTRY REPORT FOR THE YEARS 2004 – 2008

1 INTRODUCTION

The Singapore Cancer Registry provides information on cancer patterns and trends in Singapore. The comprehensive population-based cancer registration in Singapore began in January 1968. In April 2001, the Cancer Registry came under the auspices of the National Disease Registries Office (NDRO).

MOH has enacted the National Registry of Diseases Act in 2007 to enable the disease registries to access medical information while safeguarding data confidentiality. Cancer was the first disease to be covered by the Act. The Act and the subsidiary legislation for cancer were put into effect in August 2008. When the NRD Act was put in place, NDRO was renamed NRDO.

2 SOURCE OF DATA AND DATA PROCESSING

Comprehensive cancer registration was achieved through data obtained from a combination of sources, viz., (a) notifications by the medical profession (mandated legally since 2008), (b) pathology records, (c) hospital records, and (d) death certificates.

For cancer cases obtained from sources other than physician's notifications, the data were checked against known registered cases in the registry. For missed notifications, doctors-in-charge would be informed and reminded to notify.

Data Processing

Data were captured both manually (from case notes) and through electronic transfer of data from relevant institutions. Information on diagnosis was obtained

through hospital, pathology records and official death records. All relevant information of new cases would be entered into a computerised system and checked for possible duplication against a master index. The clinical data would then be verified by NDRO's doctors and visiting consultant pathologist.

NDRO staff do not have personal contact with the patients and are not involved in the clinical management of the patients.

The Cancer Registry adopted the International Classification of Diseases for Oncology, 2nd Edition (ICD-O-2) for the classification of primary sites and morphology during the period 1993 to 2002. From 2003 onwards, cases of cancer diagnosed were classified using the International Classification of Diseases for Oncology, 3rd Edition (ICD-O-3). In this report, the registry adopted the WHO classification of tumours of haematopoietic and lymphoid tissues 4th edition for the classification of incident cases of these tumours; this is in line with the Surveillance, Epidemiology and End Results (SEER) Registry and the North American Association of Central Cancer Registries (NAACCR).

Cases of carcinoma-in-situ were registered but not included in the derivation of incidence rates. Those which progressed to be invasive at a later stage would be re-registered in the year they were diagnosed as invasive carcinomas.

This report is based primarily on cancers registered in Singapore with the date of diagnosis falling within the period 1/1/2004-31/12/2008. The data reported in the report are as they stood on 30 September 2009.

All the results refer only to the resident population (citizens and permanent residents) only.

Population Denominators

Population denominators were derived using Department of Statistics mid- year population estimates. Crude rates were computed using these denominators. Segi World Population was used for direct standardisation to calculate age-standardised rates.

3 FINDINGS

3.1 Notifications by Year of Diagnosis

For the period 2004 to 2008, the number of notifications by year of diagnosis showed an upward trend (Table 1).

Table 1: Notifications of New Cases by Year of Diagnosis 2004 - 2008

Year of diagnosis	2004	2005	2006	2007	2008	2004-2008
No. of notifications	9,004	9,037	9,359	9,863	10,316	47,579

3.2 Incidence of Cancers for the Period, 2004-2008

A total number of 47,579 incident cases were diagnosed among the resident population during the period 2004-2008. Of these 23,081 (48.5%) were reported in males and 24,498 (51.5%) cases in females (Table 2).

Table 2: Incidence of Cancers by Gender 2004 - 2008

Gender	Number	%	CR (95% CI)*	ASR (95% CI)**
Male	23,081	48.5	264.0 (260.6-267.4)	231.1 (228.2-234.0)
Female	24,498	51.5	275.6 (272.1-279.0)	206.7 (204.1-209.4)

* CR Crude rate per 100,000 per year

** ASR Age-standardised rate per 100,000 per year. ASR derived by the direct method using the "World Population".

The crude incidence rates for total male and female cancer patients for the period 2004-2008 were 264.0 and 275.6 per 100,000 Singapore resident population per year respectively. The corresponding age-standardised incidence rates were 231.1 and 206.7 per 100,000 person-years. 95% Confidence Interval (CI) was calculated assumed that the cancer counts have poisson distribution.

Among the males, the crude and age-standardised rates were highest in Chinese males followed by Malays and Indians. Likewise, crude and age-standardised rates were highest in Chinese females followed by Malay and Indian females (Table 3).

Table 3: Age-Standardised Incidence Rates for All Cancers by Ethnic Groups and Gender, 2004-2008

Variables	No	CR (95% CI)*	ASR (95% CI)**
<i>Males:</i>			
Chinese	19,744	301.0 (296.8-305.2)	247.7 (244.4-251.0)
Malay	1,840	151.6 (144.7-158.6)	170.9 (163.0-178.7)
Indians	1,032	132.8 (124.7-140.9)	135.4 (127.0-143.9)
All groups	23,081	264.0 (260.6-267.4)	231.1 (228.2-234.0)
<i>Females:</i>			
Chinese	20,737	308.0 (303.8-312.2)	215.1 (212.1-218.1)
Malay	2,317	190.8 (183.0-198.5)	180.1 (172.7-187.5)
Indian	1,052	143.8 (135.1-152.4)	142.5 (133.9-151.2)
All groups	24,498	275.6 (272.1-279.0)	206.7 (204.1-209.4)

* CR Crude rate per 100,000 per year

** ASR Age-standardised rate per 100,000 per year. ASR derived by the direct method using the "World Population".

3.3 Ten Most Frequent Cancers, 2004-2008

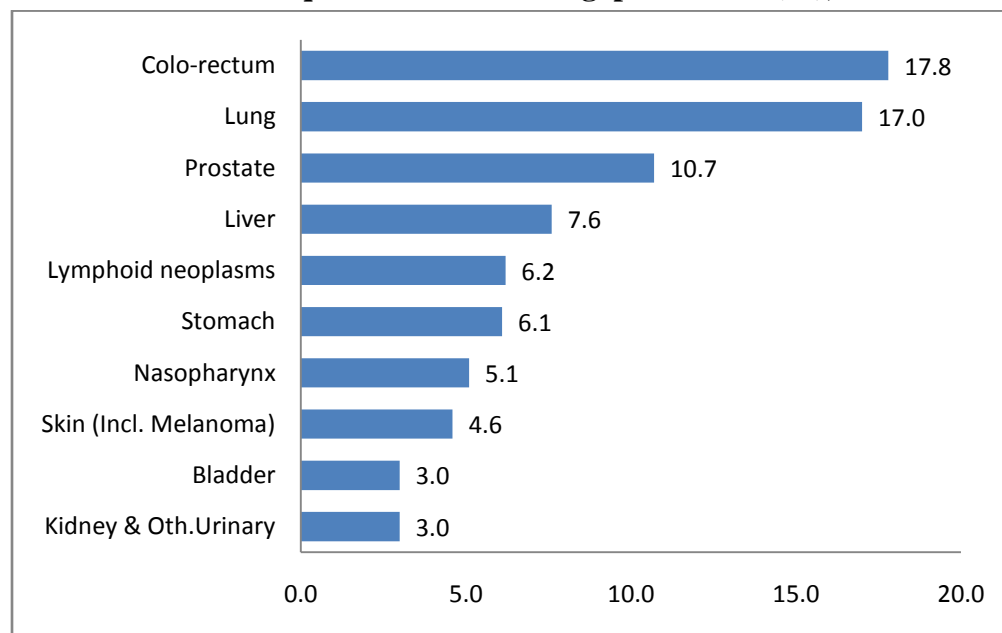
Consistent with the findings of the trend report for the period 2003-2007, colorectal, lung and prostate cancer were the top ranked cancers among the male resident population. (Table 4, Figure 1).

Table 4: Ten Most Frequent Cancers in Singapore Males, 2004-2008

Rank	Site	No.	%	CR (95% CI)*	ASR (95% CI)***
1	Colo-rectum	4,103	17.8	46.9 (45.5-48.4)	40.5 (39.3-41.7)
2	Lung	3,934	17.0	45.0 (43.6-46.4)	39.9 (38.7-41.1)
3	Prostate	2,469	10.7	28.2 (27.1-29.4)	25.9 (25.0-26.9)
4	Liver	1,758	7.6	20.1 (19.2-21.0)	17.4 (16.6-18.2)
5	Lymphoid neoplasms	1,420	6.2	16.2 (15.4-17.1)	15.0 (14.2-15.8)
6	Stomach	1,411	6.1	16.1 (15.3-17.0)	14.2 (13.5-14.9)
7	Nasopharynx	1,187	5.1	13.6 (12.8-14.3)	10.3 (9.7-10.9)
8	Skin (Incl. Melanoma)	1,065	4.6	12.2 (11.4-12.9)	10.5 (9.9-11.1)
9	Bladder	700	3.0	8.0 (7.4-8.6)	6.9 (6.4-7.4)
10	Kidney & Oth.Urinary	684	3.0	7.8 (7.2-8.4)	6.5 (6.0-7.0)
	Others	4,350	18.8		
	All Sites	23,081	100	264.0 (260.6-267.4)	231.1 (228.2-234.0)

*CR Crude rate per 100,000 per year

** ASR Age-standardised rate per 100,000 per year. ASR derived by the direct method using the "World Population".

Figure 1: Ten Most Frequent Cancers in Singapore Males (%), 2004 – 2008

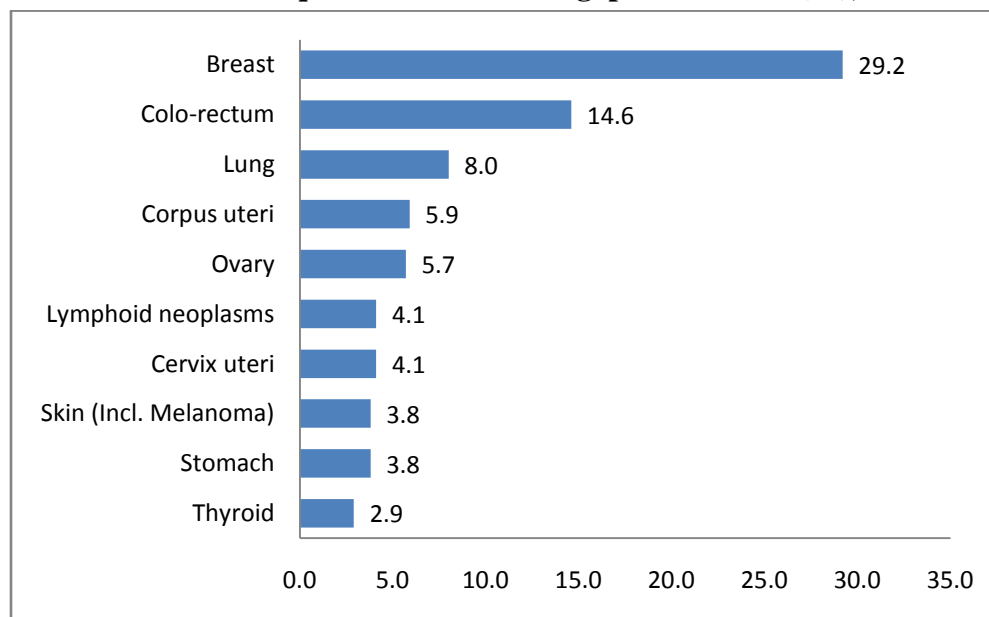
Among female residents, breast colorectal and lung cancer were the top ranked cancers (Table 5, Figure 2); this was similar to the earlier 2003-2007 report.

Table 5: Ten Most Frequent Cancers in Singapore Females, 2004-2008

Rank	Site	No.	%	CR (95% CI)*	ASR (95% CI)**
1	Breast	7,160	29.2	80.5 (78.7-82.4)	59.5 (58.1-60.8)
2	Colo-rectum	3,579	14.6	40.3 (38.9-41.6)	29.3 (28.4-30.3)
3	Lung	1,948	8.0	21.9 (20.9-22.9)	16.0 (15.3-16.7)
4	Corpus uteri	1,434	5.9	16.1 (15.3-17.0)	12.2 (11.5-12.8)
5	Ovary	1,403	5.7	15.8 (15.0-16.6)	12.3 (11.7-13.0)
6	Lymphoid neoplasms	1,012	4.1	11.4 (10.7-12.1)	10.0 (9.4-10.7)
7	Cervix uteri	1,001	4.1	11.3 (10.6-12.0)	8.5 (7.9-9.0)
8	Skin (Incl. Melanoma)	941	3.8	10.6 (9.9-11.3)	7.5 (7.1-8.0)
9	Stomach	932	3.8	10.5 (9.8-11.2)	7.4 (7.0-7.9)
10	Thyroid	703	2.9	7.9 (7.3-8.5)	6.2 (5.7-6.7)
		4,385	17.9		
	All Sites	24,498	100	275.6 (272.1-279.0)	206.7 (204.1-209.4)

*CR Crude rate per 100,000 per year

** ASR Age-standardised rate per 100,000 per year. ASR derived by the direct method using the "World Population".

Figure 2: Ten Most Frequent Cancers in Singapore Females (%), 2004 – 2008

3.4 Highest Ranking Cancers in Different Ethnic Groups, 2004-2008

During the period 2004-2008, colorectal cancer, lung cancer and prostate cancer were the three most common male cancers among the three major ethnic groups (Tables 6, 7 and 8).

Table 6: Highest Ranking Cancers among Chinese Residents, 2004-2008

Males					
Rank	Site	Number	%	CR (95% CI)*	ASR (95% CI)**
1	Colo-Rectum	3,608	18.3	55.0 (53.2-56.8)	44.3 (42.9-45.7)
2	Lung	3,405	17.2	51.9 (50.2-53.7)	43.1 (41.8-44.5)
3	Prostrate	2,091	10.6	31.9 (30.5-33.2)	27.2 (26.1-28.3)
4	Liver	1,529	7.7	23.3 (22.1-24.5)	19.0 (18.0-19.9)
5	Stomach	1,263	6.4	19.3 (18.2-20.3)	15.9 (15.0-16.7)
6	Lymphoid neoplasms	1,112	5.6	17.0 (16.0-18.0)	15.2 (14.3-16.1)
7	Nasopharynx	1,087	5.5	16.6 (15.6-17.6)	11.9 (11.2-12.7)
8	Skin (Incl. Melanoma)	869	4.4	13.2 (12.4-14.1)	10.8 (10.2-11.5)
9	Kidney & Oth. Urinary	570	2.9	8.7 (8.0-9.4)	6.8 (6.2-7.3)
10	Bladder	562	2.8	8.6 (7.9-9.3)	7.0 (6.4-7.5)
	Other sites	3,648	18.5		
	All Sites	19,744	100	301.0 (296.8-305.2)	247.7 (244.4-251.0)

Females					
1	Breast	5,868	28.3	87.2 (84.9-89.4)	60.9 (59.3-62.5)
2	Colo-rectum	3,225	15.6	47.9 (46.2-49.6)	31.8 (30.7-32.9)
3	Lung	1,751	8.4	26.0 (24.8-27.2)	17.3 (16.5-18.1)
4	Corpus Uteri	1,181	5.7	17.5 (16.5-18.5)	12.4 (11.7-13.2)
5	Ovary	1,131	5.5	16.8 (15.8-17.8)	12.4 (11.7-13.2)
6	Stomach	855	4.1	12.7 (11.8-13.6)	8.2 (7.7-8.8)
7	Cervix Uteri	845	4.1	12.6 (11.7-13.4)	8.8 (8.2-9.4)
8	Skin (Incl. Melanoma)	834	4.0	12.4 (11.5-13.2)	8.0 (7.4-8.5)
9	Lymphoid neoplasms	764	3.7	11.3 (10.5-12.2)	9.5 (8.8-10.3)
10	Thyroid	536	2.6	8.0 (7.3-8.6)	6.0 (5.4-6.5)
	Other sites	3,747	18.1		
	All Sites	20,737	100	308.0 (303.8-312.2)	215.1 (212.1-218.1)

* CR Crude rate per 100,000 per year

** ASR Age-standardised rate per 100,000 per year. ASR derived by the direct method using the "World Population".

Table 7: Highest Ranking Cancers among Malay Residents, 2004-2008

Males					
Rank	Site	Number	%	CR (95% CI)*	ASR (95% CI)**
1	Lung	362	19.7	29.8 (26.8-32.9)	34.6 (31.1-38.1)
2	Colo-rectum	297	16.1	24.5 (21.7-27.3)	28.0 (24.8-31.2)
3	Lymphoid neoplasms	191	10.4	15.7 (13.5-18.0)	17.3 (14.8-19.8)
4	Prostrate	186	10.1	15.3 (13.1-17.5)	19.1 (16.4-21.8)
5	Liver	148	8.0	12.2 (10.2-14.2)	13.2 (11.1-15.4)
6	Nasopharynx	82	4.5	6.8 (5.3-8.2)	6.3 (4.8-7.7)
7	Bladder	70	3.8	5.8 (4.4-7.1)	6.5 (5.0-8.0)
8	Stomach	63	3.4	5.2 (3.9-6.5)	6.0 (4.6-7.5)
9	Myeloid neoplasms	61	3.3	5.0 (3.8-6.3)	5.6 (4.2-7.0)
10	Kidney & Oth. Urinary	53	2.9	4.4 (3.2-5.5)	4.9 (3.5-6.3)
	Other sites	327	17.8		
	All Sites	1,840	100	151.6 (144.7-158.6)	170.9 (163.0-178.7)

Females					
1	Breast	779	33.6	64.1 (59.5-68.6)	56.2 (52.1-60.2)
2	Colo-rectum	231	10.0	19.0 (16.6-21.5)	20.0 (17.5-22.6)
3	Ovary	168	7.3	13.8 (11.7-15.9)	12.7 (10.8-14.7)
4	Lymphoid neoplasms	163	7.0	13.4 (11.4-15.5)	13.5 (11.4-15.6)
5	Lung	152	6.6	12.5 (10.5-14.5)	12.7 (10.7-14.8)
6	Corpus uteri	144	6.2	11.9 (9.9-13.8)	11.1 (9.3-13.0)
7	Cervix uteri	110	4.7	9.1 (7.4-10.7)	8.8 (7.1-10.5)
8	Thyroid	106	4.6	8.7 (7.1-10.4)	8.1 (6.5-9.6)
9	Myeloid neoplasms	54	2.3	4.4 (3.3-5.6)	4.2 (3.1-5.3)
10	Pancreas	48	2.1	4.0 (2.8-5.1)	3.9 (2.8-5.0)
	Other sites	362	15.6		
	All Sites	2,317	100	190.8 (183.0-198.5)	180.1 (172.7-187.5)

* CR Crude rate per 100,000 per year

** ASR Age-standardised rate per 100,000 per year. ASR derived by the direct method using the "World Population".

Table 8: Highest Ranking Cancers among Indian Residents, 2004-2008

Males					
Rank	Site	Number	%	CR (95% CI)*	ASR (95% CI)**
1	Colo-rectum	146	14.1	18.8 (15.7-21.8)	18.9 (15.8-22.0)
2	Lung	133	12.9	17.1 (14.2-20.0)	17.6 (14.5-20.6)
3	Prostrate	132	12.8	17.0 (14.1-19.9)	17.8 (14.8-20.9)
4	Lymphoid neoplasms	94	9.1	12.1 (9.7-14.5)	12.5 (9.9-15.1)
5	Liver	69	6.7	8.9 (6.8-11.0)	8.9 (6.8-11.1)
6	Stomach	68	6.6	8.8 (6.7-10.8)	8.9 (6.7-11.0)
7	Bladder	43	4.2	5.5 (3.9-7.2)	5.5 (3.8-7.1)
8	Kidney & Oth. Urinary	39	3.8	5.0 (3.4-6.6)	5.2 (3.5-6.9)
9	Pancreas	37	3.6	4.8 (3.2-6.3)	4.4 (3.0-5.9)
10	Myeloid neoplasms	30	2.9	3.9 (2.5-5.2)	3.9 (2.4-5.3)
	Other sites	241	23.4		
	All Sites	1,032	100	132.8 (124.7-140.9)	135.4 (127.0-143.9)

Females					
1	Breast	390	37.1	53.3 (48.0-58.6)	49.6 (44.6-54.6)
2	Corpus uteri	96	9.1	13.1 (10.5-15.7)	12.9 (10.2-15.5)
3	Colo-rectum	89	8.5	12.2 (9.6-14.7)	12.5 (9.9-15.2)
4	Ovary	81	7.7	11.1 (8.7-13.5)	10.1 (7.9-12.3)
5	Lymphoid neoplasms	62	5.9	8.5 (6.4-10.6)	9.1 (6.8-11.4)
6	Thyroid	41	3.9	5.6 (3.9-7.3)	5.2 (3.6-6.9)
7	Stomach	33	3.1	4.5 (3.0-6.0)	4.7 (3.2-6.3)
8	Lung	25	2.4	3.4 (2.1-4.8)	3.7 (2.3-5.0)
9	Cervix uteri	25	2.4	3.4 (2.1-4.8)	3.8 (2.4-5.3)
10	Myeloid neoplasms	25	2.4	3.4 (2.1-4.8)	3.3 (2.0-4.7)
	Other sites	185	17.6		
	All Sites	1,052	100	143.8 (135.1-152.4)	142.5 (133.9-151.2)

* CR Crude rate per 100,000 per year

** ASR Age-standardized rate per 100,000 per year. ASR derived by the direct method using the "World Population".

Among Chinese and Malay females, breast cancer and colorectal cancer were the most common and second most common cancers respectively (Tables 6, 7 and 8). Colorectal cancer was the second most common cancer in Chinese and Malay females whereas it was ranked third in Indian females. Corpus-uteri cancer was the second most common cancer in Indian females. Lung cancer was the third most common cancer among Chinese females and ovarian cancer was the third most common cancer among Malay females.

Due to the smaller numbers of Indian residents, the confidence intervals of the incidence rates were wider, and hence, the ranking of cancers was less certain.

3.5 Mortality Rates by Gender, 2004-2008

Though colorectal cancer and breast cancer were the most common cancers respectively in the male and female resident population, lung cancer and breast

cancer had the highest mortality rates in males and females respectively (Tables 9 & 10).

Table 9: Ten Most Frequent Cancer Deaths in Singapore Males, 2004-2008
(Source: RBD, MHA)

Rank	Site	Number	%	CR (95% CI)*	ASR (95% CI)**
1	Lung	3509	29.2	40.1 (38.8-41.5)	35.7 (34.5-36.9)
2	Colo-rectum	1758	14.6	20.1 (19.2-21.0)	17.5 (16.7-18.4)
3	Liver	1510	12.6	17.3 (16.4-18.1)	15.1 (14.3-15.8)
4	Stomach	915	7.6	10.5 (9.8-11.1)	9.2 (8.6-9.8)
5	Pancreas	549	4.6	6.3 (5.8-6.8)	5.5 (5.0-6.0)
6	Nasopharynx	548	4.6	6.3 (5.7-6.8)	5.0 (4.5-5.4)
7	Prostate	902	7.5	5.7 (5.2-6.2)	5.2 (4.7-5.6)
8	Oesophagus	324	2.7	3.7 (3.3-4.1)	3.3 (2.9-3.7)
9	Lymphoma	318	2.6	3.6 (3.2-4.0)	3.2 (2.8-3.6)
10	Leukaemia	271	2.3	3.1 (2.7-3.5)	2.8 (2.5-3.2)
	All Sites	12029	100	137.6(135.5-140.0)	120.7(118.5-122.9)

* CR Crude rate per 100,000 per year

** ASR Age-standardised rate per 100,000 per year. ASR derived by the direct method using the "World Population".

Table 10: Ten Most Frequent Cancer Deaths in Singapore Females, 2004-2008
(Source: RBD, MHA)

Rank	Site	Number	%	CR (95% CI)*	ASR (95% CI)**
1	Breast	1649	17.1	18.5 (17.7-19.4)	13.7 (13.1-14.4)
2	Lung	1632	17.0	18.4 (17.5-19.2)	13.1 (12.5-13.8)
3	Colo-rectum	1549	16.1	17.4 (16.6-18.3)	12.1 (11.5-12.7)
4	Stomach	650	6.8	7.3 (6.7-7.9)	5.0 (4.6-5.4)
5	Liver	555	5.8	6.2 (5.7-6.8)	4.4 (4.0-4.8)
6	Ovary, etc.	474	4.9	5.3 (4.9-5.8)	3.9 (3.6-4.3)
7	Pancreas	457	4.7	5.1 (4.7-5.6)	3.9 (3.3-4.0)
8	Cervix Uteri	388	4.0	4.4 (3.9-4.8)	3.3 (2.9-3.6)
9	Lymphoma	235	2.4	2.6 (2.3-3.0)	2.0 (1.7-2.2)
10	Leukaemia	222	2.3	2.5 (2.2-2.8)	2.0 (1.8-2.3)
	All Sites	9623	100	108.3(106.1-110.4)	78.1(76.5-79.7)

* CR Crude rate per 100,000 per year

** ASR Age-standardised rate per 100,000 per year. ASR derived by the direct method using the "World Population".