Singapore Cancer Registry
Annual Registry Report 2015

National Registry of Diseases Office
(NRDO)

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Acknowledgement

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1 GLOSSARY

Crude Rate (CR): Crude incidence or mortality rate is the number of cancer cases or deaths divided by the mid-year Singapore resident population respectively.

Age-Standardised Rate (ASR): Age-standardised incidence (ASIR) or mortality rate (ASMR) is the rate that would be observed if the general population had the age structure of an external world standard population. Age standardisation facilitates the comparison of rates across time and also across countries. In this report, Segi's world population is used in direct age-standardisation[1].

The CR and ASR figures in this report are stated as per 100,000 Singapore resident population (Singapore citizens and permanent residents).

Observed Survival: Percentage of patients who are still alive after a specified period of time following diagnosis. This estimate includes death from cancer and also from other causes. The five-year survival estimates are used in this report.

Relative Survival: Obtained by dividing the observed survival of cancer patients by the survival of a presumably cancer-free population, matched by gender and age. This provides an estimate of survival if the risks of death other than the cancer are removed. In the computation of relative survival, the International Cancer Survival Standard (ICSS) weights are used to account for the differing patterns of incidence by age across cancers[2].

[1] Bray, F. 2002. Chapter 8: Age Standardization, in Cancer Incidence in Five Continents Vol VIII. [Retrieved 18 November 2016]; Available from: https://www.iarc.fr/en/publications/pdfs-online/epi/sp155/ci5v8-chap8.pdf
[2] Surveillance, Epidemiology, and End Results Program. Age Standards for Survival. [Retrieved 18 November 2016]; Available from: https://seer.cancer.gov/stdpopulations/survival.html

2 EXECUTIVE SUMMARY

A total of 64,341 incident cancer cases were diagnosed among the resident population during the period 2011 – 2015 **(Table 5.1.1)**. Of these, 31,284 (48.6%) were males and 33,057 (51.4%) were females **(Table 5.2.1)**.

The crude incidence rates for cancer diagnoses in males and females for the period 2011 – 2015 were 330.7 and 338.5 per 100,000 person-years respectively. The corresponding age-standardised incidence rates were 230.9 and 219.4 per 100,000 resident population **(Table 5.2.1)**.

In both males and females, the crude and age-standardised incidence rates were highest in the Chinese followed by the Malays and Indians **(Table 5.2.2)**.

Colorectal, lung and prostate cancers were the three leading cancers diagnosed among the male resident population **(Table 5.3.1)**. Among females, breast, colorectal and lung cancers were the most common cancers **(Table 5.3.2)**.

From 1976-2015, changes in the incidence rates of cancer are generally not significant after accounting for the effects of age. Hence, population ageing partly accounts for the rise in the incidence of cancer among Singapore residents **(Figure 5.5.1 & Table 5.5.1)**.

Lung cancer and breast cancer had the highest mortality rates in males and females respectively **(Tables 5.6.1 & 5.6.2)**.

3 INTRODUCTION

Cancer is currently the leading cause of death in Singapore, accounting for 29.7% of deaths in 2015[3]. It was estimated that the lifetime risk for developing cancer in the Singapore population is approximately 1 for every 4-5 people[4]. As the risk of cancer increases with age, with an ageing population, the number of people being diagnosed and living with cancer is likely to continue to rise. However, as medical technology and cancer care improve, the number of cancer survivors will also increase. Screening can also improve survival rates as early detection allows for more timely and efficacious treatment.

Over time, the rankings of the most common cancers, as well as the direction and magnitude of change in incidence rates, have varied among the different cancers. For example, the age-standardised incidence rate of breast cancer has jumped almost threefold since the 1970s, while cervical cancer has fallen from being the 4th most common incident cancer to its current 9th place among females. Among men, although the incidence of lung and stomach cancers have declined dramatically over 40 years, prostate cancer has become increasingly common. These trends are likely a result of an array of factors such as lifestyle changes, population ageing, and a declining fertility rate.

Lifestyle and behavioural factors such as obesity, physical inactivity, and smoking increases an individual's risk of developing cancer. As such, it is important to encourage healthful behaviour in individuals to minimise the impact of these risk factors on health. Screening for common cancers such as breast, cervical and colorectal cancers is encouraged, especially for individuals with a family history of the cancer in question.

[3] Ministry of Health, Singapore. 2016. Principal Causes of Death. [Retrieved 18 November 2016]; Available from: https://www.moh.gov.sg/content/moh_web/home/statistics/Health_Facts_Singapore/Principal_Causes_of_Death.html
[4] Singapore Cancer Registry. 2016. Annual Registry Report: Trends in Cancer Incidence in Singapore 2010-2014. [Retrieved 18 November 2016]; Available from: https://www.nrdo.gov.sg/docs/librariesprovider3/default-document-library/cancer-trends-report-2010---2014_web.pdf?sfvrsn=0

4 METHODOLOGY

Data Sources

Comprehensive cancer registration was achieved through data obtained from a combination of sources, viz., (a) notifications by the medical profession, (b) pathology records, (c) hospital records, and (d) mortality data from the Registry of Births and Deaths (RBD), Ministry of Home Affairs (MHA). Notification of cancer cases has been mandatory since 2009.

For cancer cases obtained from sources other than physician notification, the data were checked against known registered cases in the registry.

Data Processing

Data were captured both manually (from case notes) and through electronic transfer of data from relevant institutions. All relevant information of new cases would be entered into a computerised system and checked for duplication against a master index. The clinical data would then be verified by NRDO staff and a visiting consultant pathologist.

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

The Singapore 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 year 2003 onwards, diagnosed cases of cancer were classified using the International Classification of Diseases for Oncology, 3rd Edition (ICD-O-3).

Cases of carcinoma-in-situ were captured in the database but not included in the computation of incidence and survival rates. Those which progressed to be invasive at a

later stage would be registered again in the year they were diagnosed as invasive carcinomas.

This report is based primarily on cancers registered in Singapore which were diagnosed within the period 1st January, 2011 to 31st December, 2015 (inclusive). The data in the report are accurate as of 31st July 2016.

All the results refer only to the resident population of Singapore.

Population Denominators

In this report, population denominators obtained from the Department of Statistics (DOS) were used to compute the rates [5]. Segi's World Population was used for direct standardisation to calculate age-standardised rates.

Survival

Calculation of survival follows the methodology in 'Cancer Survival in Singapore, 1968 – 2007', except that the life table used to generate expected survival for 2006 – 2015 was obtained from DOS.

In addition, the Brenner method is used for age-standardisation[6]. This was done so that age-standardised survival could still be obtained even if none of the patients within one or more age strata was followed up over the entire period of interest. Furthermore, this method also assures that age-adjustment using the study's population own age-distribution yields exactly the same result as obtained in the crude analysis.

[5] Department of Statistics, Singapore. 2016. Yearbook of Statistics 2016. [Retrieved 17 August 2016]; Available from: http://www.singstat.gov.sg/docs/default-source/default-document-library/publications/publications_and_papers/reference/yearbook_2016/yos2016.pdf

[6] H. Brenner et al. An alternative approach to age adjustment of cancer survival rates. *European Journal of Cancer* 40 (2004), 2317–2322.

The site-specific age groups in the distribution tables were based on the International Cancer Survival Standards (ICSS) age categories for weights used to obtain age-standardised survival.

5 OVERALL FINDINGS

5.1 Notifications by Year of Diagnosis

For the period 2011 to 2015, the number of cancer registrations had increased year on year (Table 5.1.1).

Table 5.1.1: Number of Incident Cancers by Year of Diagnosis, 2011 – 2015

Year of diagnosis	2011	2012	2013	2014	2015	2011-2015
No. of registrations	11,758	12,342	12,881	13,212	14,148	64,341

5.2 Incidence of Cancers for the Period 2011 – 2015

A total number of 64,341 incident cases of cancer were diagnosed among the resident population during the period 2011 – 2015. Of these, 31,284 (48.6%) occurred in males and the other 33,057 (51.4%) in females. The crude incidence rates for the total number of male and female cancer patients for the period 2011 – 2015 were 330.7 and 338.5 per 100,000 person-years respectively. The corresponding age-standardised incidence rates were 230.9 and 219.4 per 100,000 person-years (Table 5.2.1).

Table 5.2.1: Incidence of Cancers by Gender, 2011 – 2015

Gender	Number	%	CR (95% CI)	ASR (95% CI)
Male	31,284	48.6	330.7 (327.1-334.4)	230.9 (228.3-233.5)
Female	33,057	51.4	338.5 (334.8-342.1)	219.4 (216.9-221.9)

For both males and females, the highest crude and age-standardised incidence rates were observed in the Chinese, followed by the Malays and Indians (Table 5.2.2). This implies that the Chinese had highest risk for cancer among the three ethnic groups.

Table 5.2.2: Age-Standardised Incidence Rates for All Cancers by Gender and Ethnicity, 2011 – 2015

Gender	Race	Number	CR (95% CI)	ASR (95% CI)
Male	Chinese	26,250	376.3 (371.8-380.9)	240.1 (237.1-243.1)
	Malay	2,717	212.8 (204.8-220.8)	195.0 (187.5-202.6)
	Indian	1,409	155.5 (147.4-163.7)	146.5 (138.5-154.6)
	Others	908	302.5 (282.8-322.1)	318.3 (296.0-340.6)
	All	**31,284**	**330.7 (327.1-334.4)**	**230.9 (228.3-233.5)**
Female	Chinese	27,165	372.5 (368.1-376.9)	223.4 (220.6-226.2)
	Malay	3,423	265.5 (256.6-274.4)	212.2 (204.9-219.6)
	Indian	1,730	202.7 (193.2-212.3)	175.8 (167.3-184.4)
	Others	739	223.3 (207.2-239.4)	232.4 (213.0-251.7)
	All	**33,057**	**338.5 (334.8-342.1)**	**219.4 (216.9-221.9)**

5.3 Ten Most Frequent Cancers by Gender, 2011 – 2015

Males

For the period 2011 – 2015, colorectal, lung and prostate cancers were the three most frequent cancers diagnosed among males (Table 5.3.1, Figure 5.3.1). Colorectal cancer accounted for approximately 1 in 6 cancer diagnoses (17.2%) among males, and lung and prostate cancers each accounted for about 1 in 7 cancer diagnoses. Together, colorectal, lung, and prostate cancers accounted for almost half (45%) of all cases of cancer among Singapore men.

Females

Among the females, breast, colorectal and lung cancers were the three most frequently diagnosed cancers (Table 5.3.2, Figure 5.3.2). Breast cancer alone accounted for almost 1 in 3 (29.1%) cancer diagnoses among Singapore women, while colorectal and lung cancers accounted for approximately 1 in 7 and 1 in 13 cases of cancer respectively. In total, breast, colorectal and lung cancers accounted for half (50%) of all cancer diagnoses among Singapore women for the period 2011 - 2015.

Table 5.3.1: Ten Most Frequent Cancers in Males, 2011 – 2015

Rank	Site	Number	%	CR (95% CI)	ASR (95% CI)
1	Colo-rectum	5,383	17.2	56.9 (55.4-58.4)	38.6 (37.6-39.7)
2	Lung	4,632	14.8	49.0 (47.6-50.4)	33.2 (32.2-34.1)
3	Prostate	4,053	13.0	42.8 (41.5-44.2)	29.7 (28.8-30.6)
4	Liver	2,346	7.5	24.8 (23.8-25.8)	16.8 (16.1-17.5)
5	Lymphoid neoplasms*	2,115	6.8	22.4 (21.4-23.3)	17.6 (16.8-18.4)
6	Skin, including melanoma	1,822	5.8	19.3 (18.4-20.1)	13.1 (12.5-13.7)
7	Stomach	1,483	4.7	15.7 (14.9-16.5)	10.6 (10.1-11.2)
8	Kidney & Other Urinary[#]	1,193	3.8	12.6 (11.9-13.3)	8.7 (8.2-9.2)
9	Nasopharynx	1,073	3.4	11.3 (10.7-12.0)	7.7 (7.3-8.2)
10	Myeloid neoplasms^	995	3.2	10.5 (9.9-11.2)	7.8 (7.3-8.3)
	Others	6,189	19.8		
	All	**31,284**	**100.0**	**330.7 (327.1-334.4)**	**230.9 (228.3-233.5)**

* Lymphoid neoplasms include Non-Hodgkin Lymphoma (e.g. Precursor Lymphoid, B-Cell & T-Cell neoplasms) and Hodgkin Lymphoma
^ Myeloid neoplasms - includes Acute Myeloid Leukaemia; Myelodysplastic syndromes (MDS); Myeloproliferative neoplasms (MPN); Myelodysplastic and Myeloproliferative (MDS/MPN) neoplasms; and Myeloid neoplasms associated with eosinophilia and abnormalities of growth factor receptors
[#] Other urinary refers to renal pelvis, ureter, urethra etc.

Figure 5.3.1: Ten Most Frequent Cancers in Males (%), 2011 – 2015

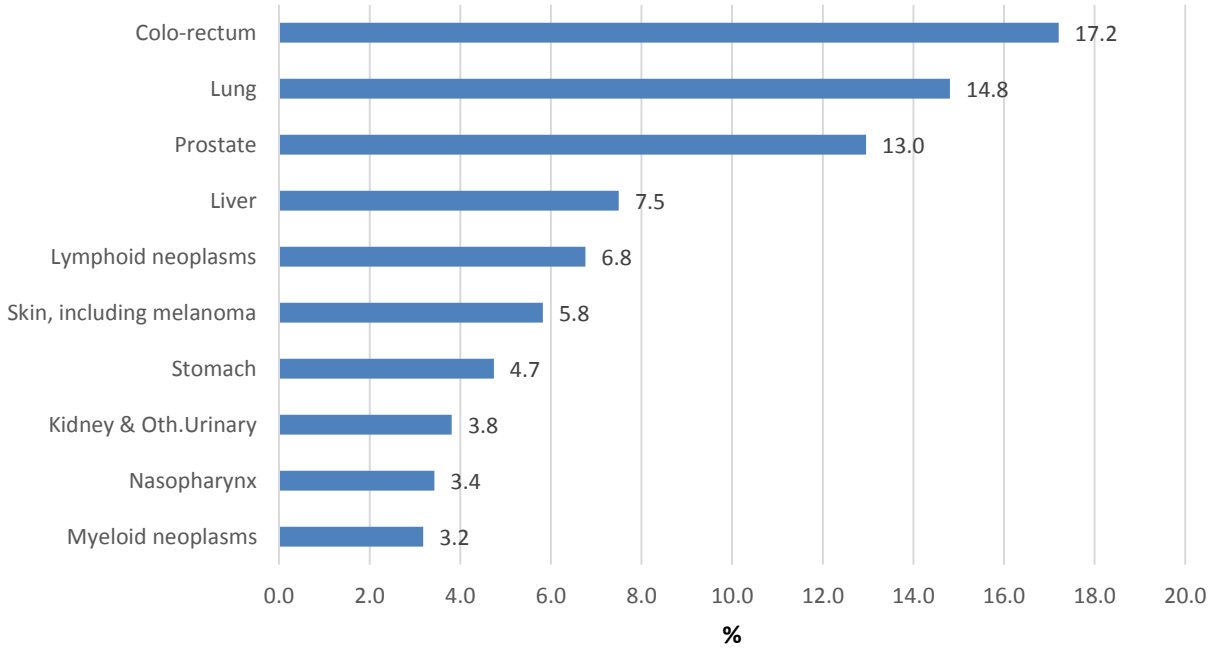
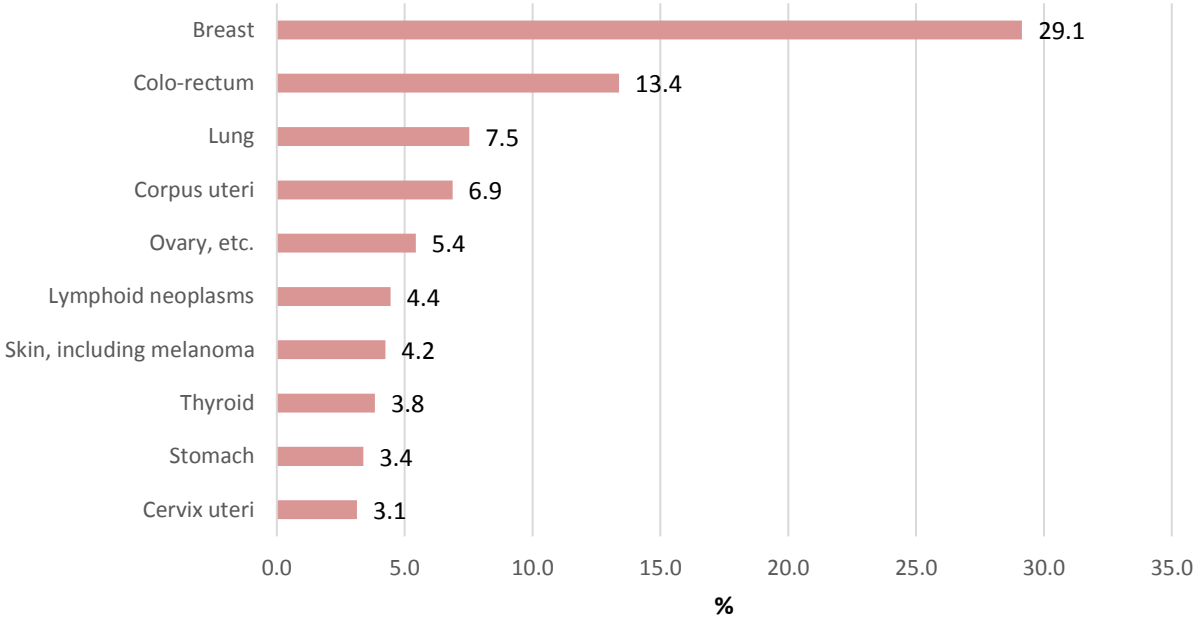


Table 5.3.2: Ten Most Frequent Cancers in Females, 2011 – 2015

Rank	Site	Number	%	CR (95% CI)	ASR (95% CI)
1	Breast	9,634	29.1	98.6 (96.7-100.6)	65.3 (64.0-66.6)
2	Colo-rectum	4,424	13.4	45.3 (44.0-46.6)	27.0 (26.2-27.8)
3	Lung	2,489	7.5	25.5 (24.5-26.5)	15.0 (14.4-15.6)
4	Corpus uteri	2,271	6.9	23.3 (22.3-24.2)	15.5 (14.8-16.1)
5	Ovary, etc.	1,797	5.4	18.4 (17.5-19.2)	13.0 (12.4-13.6)
6	Lymphoid neoplasms*	1,470	4.4	15.1 (14.3-15.8)	11.2 (10.6-11.9)
7	Skin, including melanoma	1,404	4.2	14.4 (13.6-15.1)	8.2 (7.7-8.7)
8	Thyroid	1,269	3.8	13.0 (12.3-13.7)	9.5 (8.9-10.0)
9	Stomach	1,117	3.4	11.4 (10.8-12.1)	6.5 (6.1-6.9)
10	Cervix uteri	1,037	3.1	10.6 (10.0-11.3)	7.1 (6.7-7.6)
	Others	6,145	18.6		
	All	**33,057**	**100.0**	**338.5 (334.8-342.1)**	**219.4 (216.9-221.9)**

* Lymphoid neoplasms include Non-Hodgkin Lymphoma (e.g. Precursor Lymphoid, B-Cell & T-Cell neoplasms) and Hodgkin Lymphoma

Figure 5.3.2: Ten Most Frequent Cancers in Females (%), 2011 – 2015



5.4 Ten Most Frequent Cancers by Ethnicity, 2011 – 2015

From 2011 – 2015, colorectal, lung and prostate cancers were the three most common cancers diagnosed among Chinese and Indian males. Among Malay males, lung cancer, colorectal cancer and lymphoid neoplasms were the three most frequent cancer diagnoses (Tables 5.4.1.1 – 5.4.3.2).

Breast and colorectal cancers were consistently ranked among the three leading female cancers regardless of ethnicity. Lung cancer was among the top three cancers for Chinese females, while uterine cancer was among the top three cancers for Malay and Indian females (Tables 5.4.1.1 – 5.4.3.2).

Table 5.4.1.1: Ten Most Frequent Cancers among Chinese Males, 2011 – 2015

Male	Site	Number	%	CR (95% CI)	ASR (95% CI)
1	Colo-rectum	4,694	17.9	67.3 (65.4-69.2)	41.7 (40.5-42.9)
2	Lung	3,903	14.9	56.0 (54.2-57.7)	34.3 (33.2-35.4)
3	Prostate	3,493	13.3	50.1 (48.4-51.7)	31.1 (30.0-32.1)
4	Liver	2,026	7.7	29.0 (27.8-30.3)	18.0 (17.2-18.8)
5	Lymphoid neoplasms*	1,559	5.9	22.3 (21.2-23.5)	16.5 (15.6-17.4)
6	Skin, including melanoma	1,446	5.5	20.7 (19.7-21.8)	12.8 (12.2-13.5)
7	Stomach	1,318	5.0	18.9 (17.9-19.9)	11.6 (11.0-12.3)
8	Kidney & Other Urinary^	1,020	3.9	14.6 (13.7-15.5)	9.2 (8.7-9.8)
9	Nasopharynx	959	3.7	13.7 (12.9-14.6)	9.0 (8.4-9.5)
10	Pancreas	796	3.0	11.4 (10.6-12.2)	7.0 (6.5-7.5)
	Others	5,036	19.2		
	All	26,250	100.0	376.3 (371.8-380.9)	240.1 (237.1-243.1)

* Lymphoid neoplasms include Non-Hodgkin Lymphoma (e.g. Precursor Lymphoid, B-Cell & T-Cell neoplasms) and Hodgkin Lymphoma
^ Other urinary refers to renal pelvis, ureter, urethra etc.

Table 5.4.1.2: Ten Most Frequent Cancers among Chinese Females, 2011 – 2015

Female	Site	Number	%	CR (95% CI)	ASR (95% CI)
1	Female Breast	7,749	28.5	106.3 (103.9-108.6)	66.5 (65.0-68.0)
2	Colo-rectum	3,827	14.1	52.5 (50.8-54.1)	28.4 (27.4-29.3)
3	Lung	2,180	8.0	29.9 (28.6-31.1)	15.9 (15.2-16.6)
4	Corpus uteri	1,793	6.6	24.6 (23.4-25.7)	15.5 (14.8-16.2)
5	Ovary, etc.	1,393	5.1	19.1 (18.1-20.1)	12.8 (12.1-13.5)
6	Skin, including melanoma	1,240	4.6	17.0 (16.1-17.9)	8.7 (8.2-9.2)
7	Lymphoid neoplasms*	1,095	4.0	15.0 (14.1-15.9)	10.4 (9.7-11.1)
8	Thyroid	1,000	3.7	13.7 (12.9-14.6)	9.6 (9.0-10.2)
9	Stomach	991	3.6	13.6 (12.7-14.4)	6.9 (6.5-7.4)
10	Cervix uteri	816	3.0	11.2 (10.4-12.0)	7.1 (6.6-7.6)
	Others	5,081	18.7		
	All	27,165	100.0	372.5 (368.1-376.9)	223.4 (220.6-226.2)

* Lymphoid neoplasms include Non-Hodgkin Lymphoma (e.g. Precursor Lymphoid, B-Cell & T-Cell neoplasms) and Hodgkin Lymphoma

Table 5.4.2.1: Ten Most Frequent Cancers among Malay Males, 2011 – 2015

Male	Site	Number	%	CR (95% CI)	ASR (95% CI)
1	Lung	477	17.6	37.4 (34.0-40.7)	34.7 (31.5-38.0)
2	Colo-rectum	406	14.9	31.8 (28.7-34.9)	28.1 (25.3-31.0)
3	Lymphoid neoplasms*	349	12.8	27.3 (24.5-30.2)	25.3 (22.5-28.0)
4	Prostate	259	9.5	20.3 (17.8-22.8)	19.9 (17.4-22.4)
5	Liver	201	7.4	15.7 (13.6-17.9)	13.8 (11.8-15.8)
6	Myeloid neoplasms^	133	4.9	10.4 (8.6-12.2)	9.7 (8.0-11.5)
7	Kidney & Other Urinary[#]	95	3.5	7.4 (5.9-8.9)	6.6 (5.2-7.9)
8	Nasopharynx	88	3.2	6.9 (5.5-8.3)	5.5 (4.3-6.7)
9	Bladder	83	3.1	6.5 (5.1-7.9)	6.1 (4.8-7.5)
10	Stomach	78	2.9	6.1 (4.8-7.5)	5.4 (4.2-6.7)
	Others	548	20.2		
	All	2,717	100.0	212.8 (204.8-220.8)	195.0 (187.5-202.6)

* Lymphoid neoplasms include Non-Hodgkin Lymphoma (e.g. Precursor Lymphoid, B-Cell & T-Cell neoplasms) and Hodgkin Lymphoma
^ Myeloid neoplasms - includes Acute Myeloid Leukemia; Myelodysplastic syndromes (MDS); Myeloproliferative neoplasms (MPN); Myelodysplastic and Myeloproliferative (MDS/MPN) neoplasms; and Myeloid neoplasms associated with eosinophilia and abnormalities of growth factor receptors
[#] Other urinary refers to renal pelvis, ureter, urethra etc.

Table 5.4.2.2: Ten Most Frequent Cancers among Malay Females, 2011 – 2015

Female	Site	Number	%	CR (95% CI)	ASR (95% CI)
1	Female Breast	1,032	30.1	80.0 (75.2-84.9)	61.9 (58.0-65.8)
2	Colo-rectum	379	11.1	29.4 (26.4-32.4)	23.1 (20.7-25.5)
3	Corpus uteri	264	7.7	20.5 (18.0-22.9)	15.6 (13.7-17.5)
4	Ovary, etc.	264	7.7	20.5 (18.0-22.9)	16.3 (14.3-18.3)
5	Lymphoid neoplasms*	253	7.4	19.6 (17.2-22.0)	17.3 (15.1-19.6)
6	Lung	206	6.0	16.0 (13.8-18.2)	12.2 (10.5-14.0)
7	Cervix uteri	143	4.2	11.1 (9.3-12.9)	9.1 (7.6-10.6)
8	Thyroid	139	4.1	10.8 (9.0-12.6)	8.9 (7.4-10.5)
9	Myeloid neoplasms^	97	2.8	7.5 (6.0-9.0)	6.3 (5.0-7.6)
10	Liver	69	2.0	5.4 (4.1-6.6)	4.4 (3.3-5.5)
	Others	577	16.9		
	All	3,423	100.0	265.5 (256.6-274.4)	212.2 (204.9-219.6)

* Lymphoid neoplasms include Non-Hodgkin Lymphoma (e.g. Precursor Lymphoid, B-Cell & T-Cell neoplasms) and Hodgkin Lymphoma
^ Myeloid neoplasms - includes Acute Myeloid Leukemia; Myelodysplastic syndromes (MDS); Myeloproliferative neoplasms (MPN); Myelodysplastic and Myeloproliferative (MDS/MPN) neoplasms; and Myeloid neoplasms associated with eosinophilia and abnormalities of growth factor receptors

Table 5.4.3.1: Ten Most Frequent Cancers among Indian Males, 2011 – 2015

Male	Site	Number	%	CR (95% CI)	ASR (95% CI)
1	Colo-rectum	189	13.4	20.9 (17.9-23.8)	19.0 (16.1-21.8)
2	Prostate	183	13.0	20.2 (17.3-23.1)	21.0 (17.8-24.1)
3	Lung	178	12.6	19.6 (16.8-22.5)	19.0 (16.1-21.9)
4	Lymphoid neoplasms*	143	10.1	15.8 (13.2-18.4)	15.8 (12.9-18.6)
5	Liver	89	6.3	9.8 (7.8-11.9)	9.5 (7.5-11.6)
6	Stomach	71	5.0	7.8 (6.0-9.7)	6.9 (5.2-8.6)
7	Myeloid neoplasms^	63	4.5	7.0 (5.2-8.7)	5.8 (4.3-7.4)
8	Kidney & Oth.Urinary[#]	55	3.9	6.1 (4.5-7.7)	5.4 (3.9-6.9)
9	Brain, nervous system	39	2.8	4.3 (3.0-5.7)	3.8 (2.5-5.2)
10	Bladder	36	2.6	4.0 (2.7-5.3)	3.8 (2.5-5.1)
	Others	363	25.8		
	All	1,409	100.0	155.5 (147.4-163.7)	146.5 (138.5-154.6)

* Lymphoid neoplasms include Non-Hodgkin Lymphoma (e.g. Precursor Lymphoid, B-Cell & T-Cell neoplasms) and Hodgkin Lymphoma
^ Myeloid neoplasms - includes Acute Myeloid Leukemia; Myelodysplastic syndromes (MDS); Myeloproliferative neoplasms (MPN); Myelodysplastic and Myeloproliferative (MDS/MPN) neoplasms; and Myeloid neoplasms associated with eosinophilia and abnormalities of growth factor receptors
[#] Other urinary refers to renal pelvis, ureter, urethra etc.

Table 5.4.3.2: Ten Most Frequent Cancers among Indian Females, 2011 – 2015

Female	Site	Number	%	CR (95% CI)	ASR (95% CI)
1	Female Breast	615	35.5	72.1 (66.4-77.8)	60.3 (55.4-65.1)
2	Corpus uteri	179	10.3	21.0 (17.9-24.0)	17.8 (15.1-20.4)
3	Colo-rectum	138	8.0	16.2 (13.5-18.9)	14.0 (11.6-16.4)
4	Ovary, etc.	105	6.1	12.3 (10.0-14.7)	10.4 (8.4-12.5)
5	Lymphoid neoplasms*	87	5.0	10.2 (8.1-12.3)	10.1 (7.9-12.4)
6	Thyroid	81	4.7	9.5 (7.4-11.6)	7.8 (6.1-9.6)
7	Lung	66	3.8	7.7 (5.9-9.6)	7.0 (5.3-8.8)
8	Pancreas	43	2.5	5.0 (3.5-6.5)	4.4 (3.1-5.8)
9	Cervix uteri	43	2.5	5.0 (3.5-6.5)	4.3 (3.0-5.6)
10	Stomach	42	2.4	4.9 (3.4-6.4)	4.2 (2.9-5.5)
	Others	331	19.1		
	All	1,730	100.0	202.7 (193.2-212.3)	175.8 (167.3-184.4)

* Lymphoid neoplasms include Non-Hodgkin Lymphoma (e.g. Precursor Lymphoid, B-Cell & T-Cell neoplasms) and Hodgkin Lymphoma

5.5 Trends in the Incidence of Cancer, 1976-2015

Over a period of 40 years, the rise in the crude incidence rate (CR) of cancer from one period to the next was significant for males, females, as well as both genders combined. However, for the most part, the corresponding change in the age-standardised rate (ASR) was not significant. This implies that the ageing population partly accounts for the increase in the incidence of cancer among the Singapore resident population. (Figure 5.5.1, Table 5.5.1).

Figure 5.5.1: Crude and Age-Standardised Incidence Rates of Cancer by Gender, 1976-2015

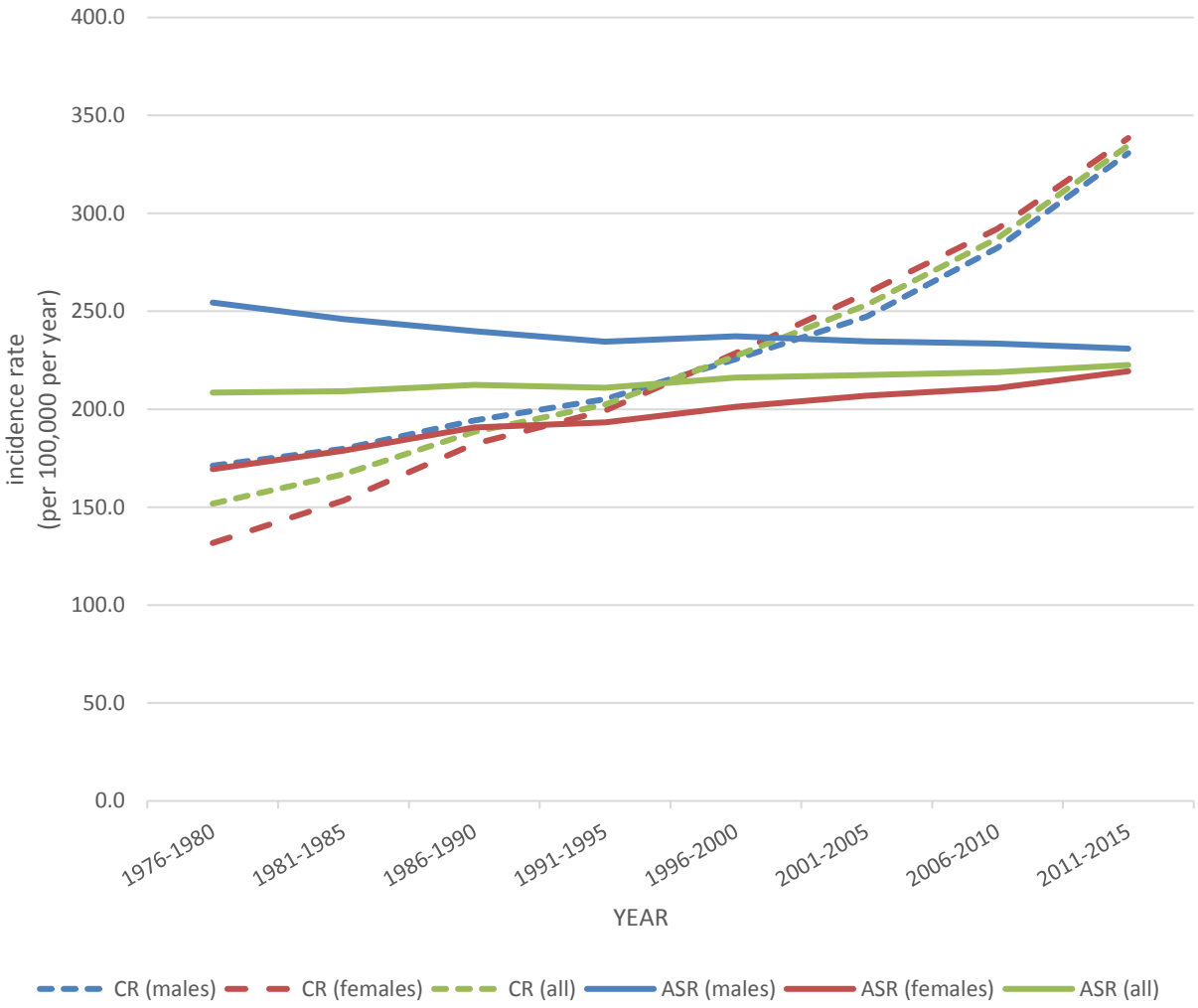


Table 5.5.1: Crude and Age-Standardised Incidence Rates of Cancer by Gender, 1976-2015

		No. of cases	CR (95% CI)	ASR (95% CI)
Males	1976-1980	9,637	171.2 (167.8-174.6)	254.5 (249.2-259.7)
	1981-1985	10,969	179.9 (176.5-183.2)	246.0 (241.4-250.7)
	1986-1990	12,852	194.3 (190.9-197.6)	239.9 (235.7-244.1)
	1991-1995	15,020	205.2 (201.9-208.5)	234.5 (230.7-238.3)
	1996-2000	17,928	225.6 (222.3-228.9)	237.2 (233.7-240.7)
	2001-2005	20,852	247.3 (243.9-250.6)	234.6 (231.4-237.9)
	2006-2010	25,504	282.4 (278.9-285.8)	233.5 (230.5-236.4)
	2011-2015	31,284	330.7 (327.1-334.4)	230.9 (228.3-233.5)
Females	1976-1980	7,160	131.7 (128.6-134.7)	169.4 (165.4-173.4)
	1981-1985	9,082	153.3 (150.1-156.4)	178.8 (175.0-182.5)
	1986-1990	11,738	182.3 (179.0-185.6)	190.6 (187.1-194.1)
	1991-1995	14,356	199.4 (196.1-202.6)	193.3 (190.0-196.5)
	1996-2000	18,129	228.7 (225.3-232.0)	201.2 (198.2-204.2)
	2001-2005	22,098	259.2 (255.8-262.7)	207.0 (204.2-209.8)
	2006-2010	26,939	292.0 (288.5-295.5)	210.8 (208.2-213.4)
	2011-2015	33,057	338.5 (334.8-342.1)	219.4 (216.9-221.9)
All	1976-1980	16,797	151.8 (149.5-154.1)	208.5 (205.3-211.7)
	1981-1985	20,051	166.8 (164.5-169.1)	209.2 (206.2-212.1)
	1986-1990	24,590	188.4 (186.0-190.7)	212.4 (209.7-215.1)
	1991-1995	29,376	202.3 (200.0-204.6)	210.9 (208.5-213.4)
	1996-2000	36,057	227.1 (224.8-229.5)	216.2 (213.9-218.5)
	2001-2005	42,950	253.3 (250.9-255.7)	217.5 (215.4-219.6)
	2006-2010	52,443	287.2 (284.8-289.7)	219.0 (217.1-220.9)
	2011-2015	64,341	334.7 (332.1-337.2)	222.6 (220.8-224.3)

Although the crude incidence rates of cancer by ethnicity had climbed steadily over four decades for all three major ethnic groups, the age-standardised incidence rates have remained stable among the Chinese. However, the ASR among the Malays has increased continuously while that of the Indians saw an initial decline from 1976-1995, before rising steadily thereafter. The trends of crude and age-standardised rates show that population ageing can partly account for the rise in incidence of cancer in Singapore among all three ethnic groups as the changes in incidence rates from one period to the next are not statistically significant after taking age into account.

Figure 5.5.2: Crude and Age-Standardised Incidence Rates of Cancer by Ethnicity, 1976-2015

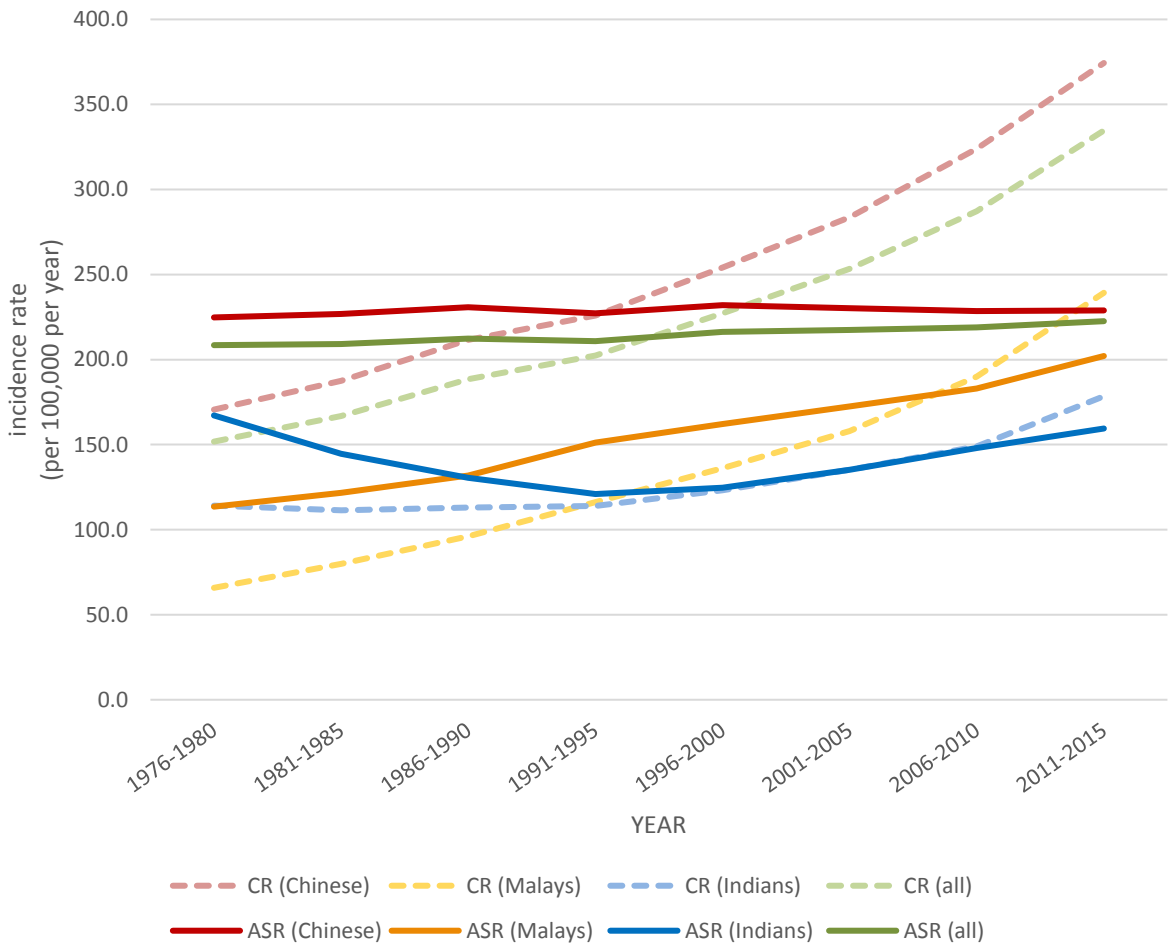


Table 5.5.2: Crude and Age-Standardised Incidence Rates of Cancer by Ethnicity, 1976-2015

		No of cases	CR	ASR
Chinese	1976-1980	14,746	170.6 (167.9-173.4)	224.8 (221.1-228.4)
	1981-1985	17,615	187.4 (184.6-190.2)	226.9 (223.5-230.3)
	1986-1990	21,501	211.6 (208.8-214.5)	230.7 (227.6-233.8)
	1991-1995	25,442	225.9 (223.1-228.6)	227.3 (224.4-230.1)
	1996-2000	31,071	254.1 (251.3-256.9)	232.0 (229.4-234.6)
	2001-2005	36,699	283.6 (280.7-286.5)	230.1 (227.7-232.5)
	2006-2010	44,149	323.9 (320.9-327.0)	228.4 (226.2-230.6)
	2011-2015	53,415	374.4 (371.2-377.5)	228.9 (226.8-230.9)
Malay	1976-1980	1,049	65.8 (61.8-69.8)	113.5 (106.1-121.0)
	1981-1985	1,369	79.9 (75.6-84.1)	121.6 (114.8-128.5)
	1986-1990	1,777	96.1 (91.6-100.5)	131.8 (125.4-138.1)
	1991-1995	2,372	116.3 (111.6-120.9)	151.1 (144.8-157.4)
	1996-2000	3,014	136.1 (131.2-140.9)	162.1 (156.1-168.0)
	2001-2005	3,724	158.0 (153.0-163.1)	172.4 (166.6-178.2)
	2006-2010	4,701	189.9 (184.5-195.3)	183.0 (177.6-188.4)
	2011-2015	6,140	239.3 (233.3-245.3)	202.1 (196.9-207.3)
Indian	1976-1980	805	114.2 (106.3-122.1)	167.2 (153.9-180.4)
	1981-1985	879	111.4 (104.0-118.7)	144.6 (134.1-155.1)
	1986-1990	1,025	112.9 (106.0-119.8)	130.6 (122.2-139.0)
	1991-1995	1,191	114.0 (107.5-120.4)	120.9 (113.8-128.0)
	1996-2000	1,505	123.2 (117.0-129.4)	124.7 (118.2-131.2)
	2001-2005	1,857	135.2 (129.0-141.3)	135.2 (128.8-141.6)
	2006-2010	2,428	148.8 (142.9-154.8)	148.0 (141.9-154.2)
	2011-2015	3,139	178.4 (172.2-184.7)	159.4 (153.6-165.2)
All	1976-1980	16,797	151.8 (149.5-154.1)	208.5 (205.3-211.7)
	1981-1985	20,051	166.8 (164.5-169.1)	209.2 (206.2-212.1)
	1986-1990	24,590	188.4 (186.0-190.7)	212.4 (209.7-215.1)
	1991-1995	29,376	202.3 (200.0-204.6)	210.9 (208.5-213.4)
	1996-2000	36,057	227.1 (224.8-229.5)	216.2 (213.9-218.5)
	2001-2005	42,950	253.3 (250.9-255.7)	217.5 (215.4-219.6)

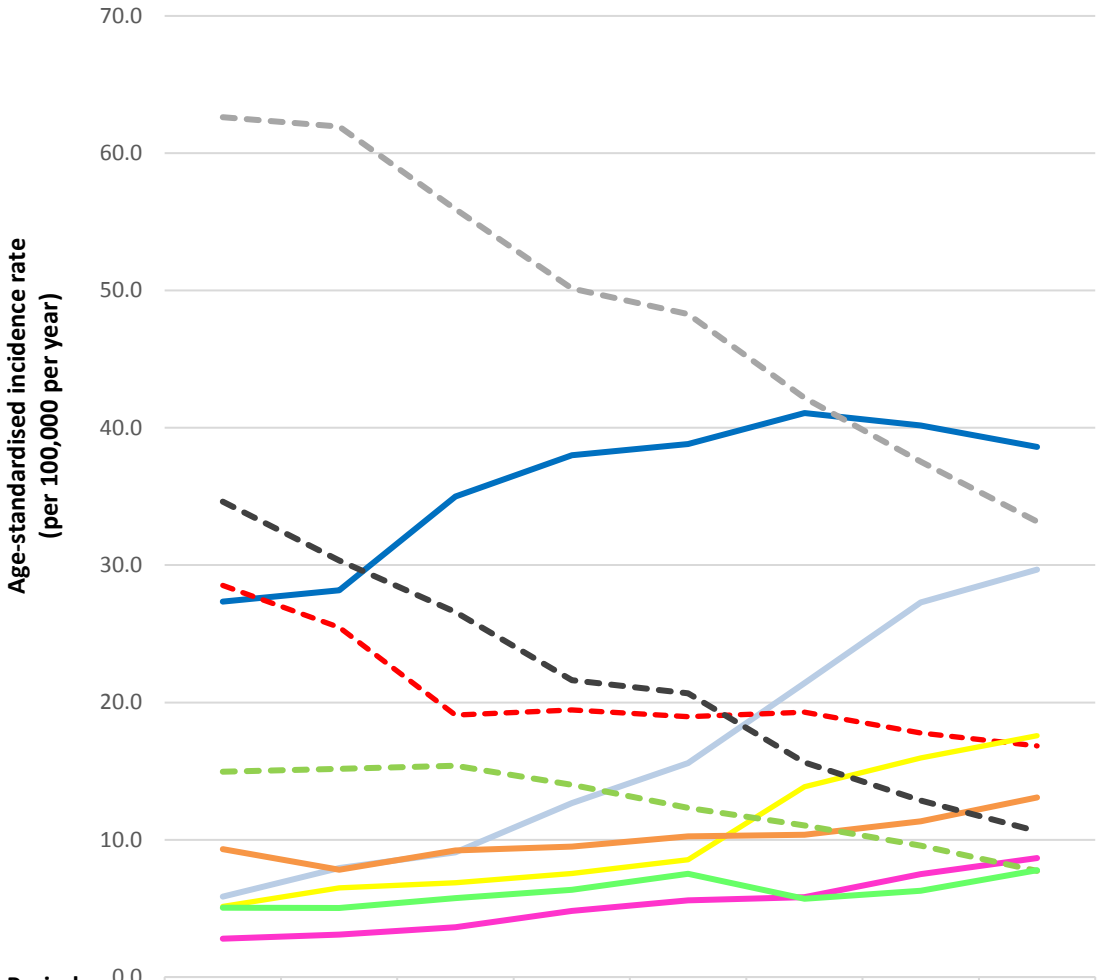
	2006-2010	52,443	287.2 (284.8-289.7)	219.0 (217.1-220.9)
	2011-2015	64,341	334.7 (332.1-337.2)	222.6 (220.8-224.3)

The rankings of the age-standardised rate of the ten most frequent cancers (according to the ranking for 2011-2015) have also changed over time.

Four decades ago, lung cancer had the highest age-standardised incidence rate among males, but the age-standardised rate has since dropped by nearly half to put it in second place since 2006-2010. This could be due to smoking control measures. On the contrary, the age-standardised rates of colorectal and prostate cancers rose from fourth to first place and seventh to third place respectively among men (Figure 5.5.2).

Among women, breast, colorectal and lung cancers had consistently been the top three ranking cancers in terms of ASR, until uterine cancer overtook lung cancer in 2011-2015. Notably, the ASR of breast cancer has jumped more than 2.5 times over the 40-year period, while that of cervical cancer has fallen from fourth to its current ninth place (Figure 5.5.3).

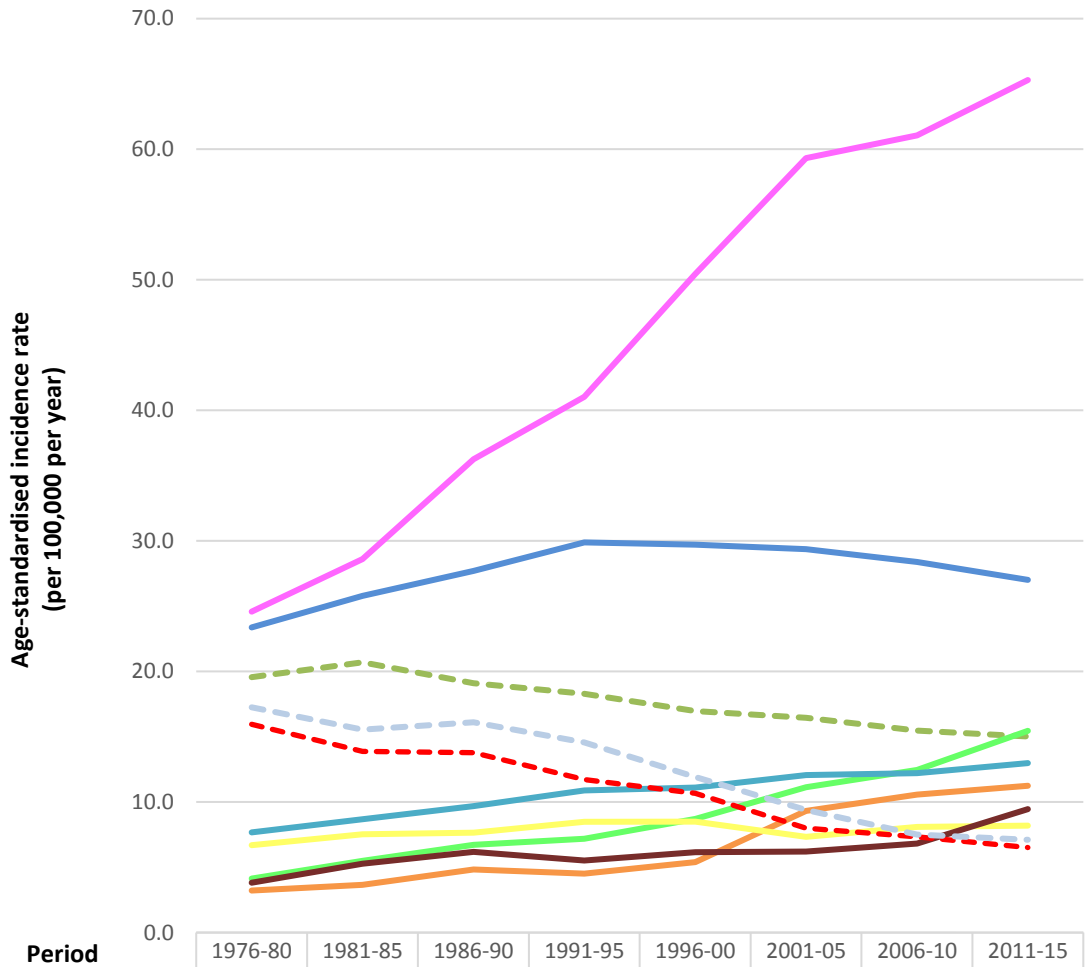
Figure 5.5.3: Ten Most Frequent Cancers^ in Males, 1976-2015*



Period	1976-80	1981-85	1986-90	1991-95	1996-00	2001-05	2006-10	2011-15
Colo-rectum	27.3	28.2	35.0	38.0	38.8	41.1	40.2	38.6
Lung	62.6	61.9	55.9	50.1	48.3	42.2	37.5	33.2
Prostate	5.9	7.9	9.1	12.7	15.6	21.4	27.3	29.7
Liver	28.5	25.5	19.1	19.5	19.0	19.3	17.8	16.8
Lymphoid neoplasms	5.1	6.5	6.9	7.5	8.5	13.9	16.0	17.6
Skin, including melanoma	9.3	7.8	9.2	9.5	10.2	10.4	11.3	13.1
Stomach	34.6	30.3	26.6	21.6	20.7	15.6	12.9	10.6
Kidney & Oth.Urinary	2.8	3.1	3.6	4.8	5.6	5.8	7.5	8.7
Nasopharynx	14.9	15.2	15.4	14.0	12.3	11.0	9.6	7.7
Myeloid neoplasms	5.1	5.0	5.7	6.3	7.5	5.7	6.3	7.8

^ Based on 2011-2015 ranking.
*Cancers with overall decreases in ASR have been visualised with dotted lines.

Figure 5.5.4: Ten Most Frequent Cancers^ in Females, 1976-2015*



Period	1976-80	1981-85	1986-90	1991-95	1996-00	2001-05	2006-10	2011-15
Breast	24.6	28.6	36.3	41.0	50.5	59.3	61.0	65.3
Colo-rectum	23.4	25.8	27.7	29.9	29.7	29.4	28.4	27.0
Lung	19.6	20.7	19.1	18.3	17.0	16.5	15.5	15.0
Corpus uteri	4.1	5.5	6.7	7.2	8.7	11.1	12.5	15.5
Ovary, etc.	7.7	8.7	9.7	10.9	11.1	12.1	12.2	13.0
Lymphoid neoplasms	3.2	3.7	4.8	4.5	5.4	9.3	10.6	11.2
Skin, including melanoma	6.7	7.5	7.7	8.5	8.5	7.3	8.1	8.2
Thyroid	3.8	5.3	6.2	5.5	6.2	6.2	6.8	9.5
Stomach	16.0	13.9	13.8	11.7	10.7	8.0	7.3	6.5
Cervix uteri	17.3	15.6	16.1	14.6	11.9	9.4	7.5	7.1

^ Based on 2011-2015 ranking.
*Cancers with overall decreases in ASR have been visualised with dotted lines.

5.6 Mortality Rates by Gender, 2011 – 2015

For the period 2011-2015, the three leading causes of cancer deaths in males were lung, colorectal and liver cancers; while those for females were breast, lung and colorectal cancers. These accounted for about half of the cancer deaths in both males (53.6%) and females (49.5%) [Registry of Births and Deaths (RBD), Ministry of Home Affairs (MHA)] (Tables 5.6.1 & 5.6.2).

Table 5.6.1: Ten Most Frequent Cancer Deaths in Males, 2011 – 2015

Rank	Site	Number	%	CR (95% CI)	ASR (95% CI)
1	Lung	3,934	27.1	41.6 (40.3-42.9)	28.0 (27.1-28.9)
2	Colo-rectum	2,017	13.9	21.3 (20.4-22.3)	14.5 (13.9-15.2)
3	Liver	1,836	12.6	19.4 (18.5-20.3)	13.0 (12.4-13.6)
4	Stomach	867	6.0	9.2 (8.6-9.8)	6.1 (5.7-6.5)
5	Pancreas	806	5.5	8.5 (7.9-9.1)	5.7 (5.3-6.1)
6	Prostate	795	5.5	8.4 (7.8-9.0)	5.7 (5.3-6.1)
7	Nasopharynx	588	4.0	6.2 (5.7-6.7)	4.2 (3.8-4.5)
8	Lymphomas	478	3.3	5.1 (4.6-5.5)	3.5 (3.2-3.8)
9	Kidney & Oth.Urinary	430	3.0	4.5 (4.1-5.0)	3.0 (2.8-3.3)
10	Leukaemias	378	2.6	4.0 (3.6-4.4)	2.9 (2.6-3.2)
	Others	2,395	16.5		
	All	14,524	100.0	153.6 (151.1-156.1)	104.4 (102.7-106.1)

Table 5.6.2: Ten Most Frequent Cancer Deaths in Females, 2011 – 2015

Rank	Site	Number	%	CR (95% CI)	ASR (95% CI)
1	Female Breast	2,105	17.3	21.6 (20.6-22.5)	13.5 (13.0-14.1)
2	Lung	2,015	16.6	20.6 (19.7-21.5)	11.5 (11.0-12.0)
3	Colo-rectum	1,889	15.6	19.3 (18.5-20.2)	10.5 (10.1-11.0)
4	Liver	778	6.4	8.0 (7.4-8.5)	4.3 (4.0-4.6)
5	Stomach	719	5.9	7.4 (6.8-7.9)	4.0 (3.7-4.3)
6	Pancreas	709	5.8	7.3 (6.7-7.8)	4.1 (3.8-4.4)
7	Ovary, etc.	634	5.2	6.5 (6.0-7.0)	4.0 (3.7-4.3)
8	Cervix uteri	361	3.0	3.7 (3.3-4.1)	2.3 (2.0-2.5)
9	Lymphomas	308	2.5	3.2 (2.8-3.5)	1.9 (1.7-2.1)
10	Leukaemias	290	2.4	3.0 (2.6-3.3)	1.9 (1.7-2.1)
	Others	2,329	19.2		
	All	12,137	100.0	124.3 (122.1-126.5)	72.0 (70.7-73.3)

6 COMMENTARY ON SELECTED CANCER SITES

6.1 Breast Cancer (ICD 9: 174)

Incidence

A total of 9,634 new cases of breast cancer were diagnosed in the period 2011 – 2015, accounting for nearly 1 in 3 incident cancers in females and making it the most common cancer diagnosis among women. The age-standardised incidence rate of newly diagnosed breast cancer in females has been increasing since 1976. It has risen almost threefold from 24.6 per 100,000 person-years in 1976 – 1980 to 65.3 per 100,000 person-years in 2011 – 2015 (Figure 6.1.1).

Chinese women were at higher risk of developing breast cancer in comparison to their Malay and Indian counterparts (Table 6.1.1).

In 2011-2015, almost three-quarters (71.2%) of cases of breast cancer were diagnosed at stages I and II (Table 6.1.2) and more than half (57.3%) between the ages of 45 and 64 (Table 6.1.4).

Figure 6.1.1: Age-Standardised Incidence Rates (ASIR) for Breast Cancer, 1976 – 2015

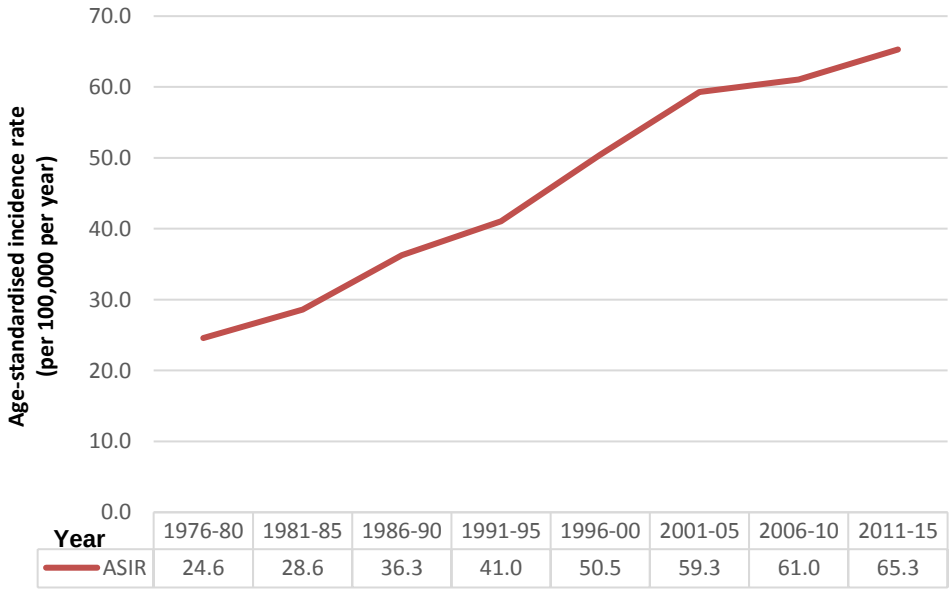


Table 6.1.1: Crude and Age-standardised Incidence Rates for Breast Cancer by Ethnicity, 2011 – 2015

Ethnic group	No.	CIR (95% CI)	ASIR (95% CI)
Chinese	7,749	106.3 (103.9-108.6)	66.5 (65.0-68.0)
Malay	1,032	80.0 (75.2-84.9)	61.9 (58.0-65.8)
Indian	615	72.1 (66.4-77.8)	60.3 (55.4-65.1)
Others	238	71.9 (62.8-81.0)	67.3 (57.3-77.3)
Total	9,634	98.6 (96.7-100.6)	65.3 (64.0-66.6)

Table 6.1.2: Stage Distribution of Breast Cancer Patients, 2006 – 2015

Stage	2006-2010		2011-2015	
	No. of cases	%	No. of cases	%
I	2,440	33.2	2,868	32.7
II	2,804	38.2	3,375	38.5
III	1,403	19.1	1,620	18.5
IV	697	9.5	910	10.4

* Cancers of unknown stage were excluded.

Table 6.1.3: Ethnic Distribution of Breast Cancer Patients, 2006 – 2015

Ethnic group	2006-2010		2011-2015	
	No. of cases	%	No. of cases	%
Chinese	6,324	80.7	7,749	80.4
Malay	860	11.0	1,032	10.7
Indian	473	6.0	615	6.4
Others	178	2.3	238	2.5
Total	7,835	100.0	9,634	100.0

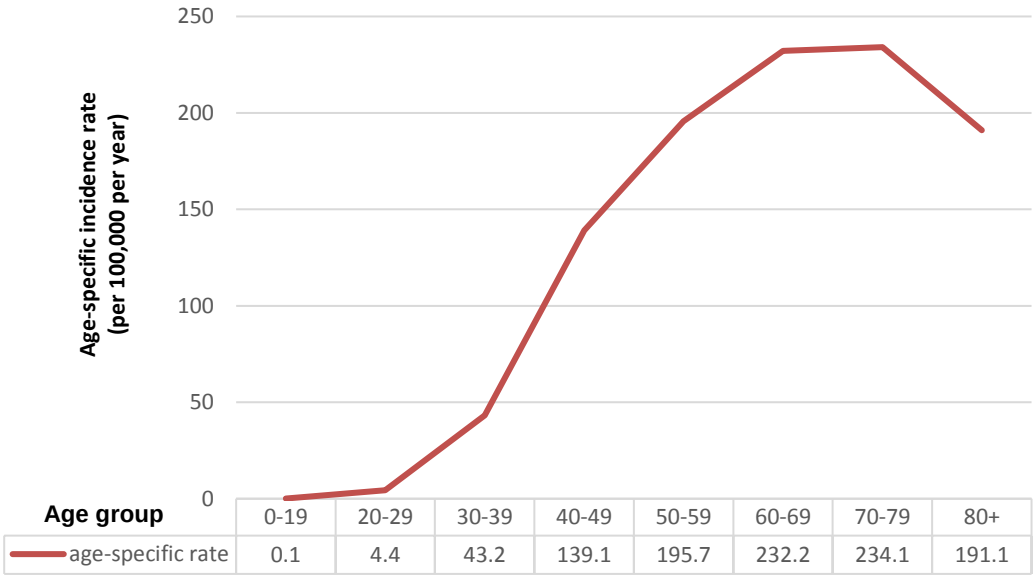
Table 6.1.4: Age Distribution of Breast Cancer Patients, 2006 – 2015

Age group	2006-2010		2011-2015	
	No. of cases	%	No. of cases	%
0-44	1,928	24.6	1,838	19.1
45-54	2,649	33.8	2,778	28.8
55-64	1,765	22.5	2,747	28.5
65-74	922	11.8	1,419	14.7
75+	571	7.3	852	8.8
Total	7,835	100.0	9,634	100.0

Age at Diagnosis

In 2011 – 2015, the age-specific incidence rate rose sharply from 43.2 per 100,000 women in the 30 – 39 age group to reach 232.2 per 100,000 women in the 60 – 69 age group, before plateauing and declining gradually for those aged 80 years and beyond (Figure 6.1.2).

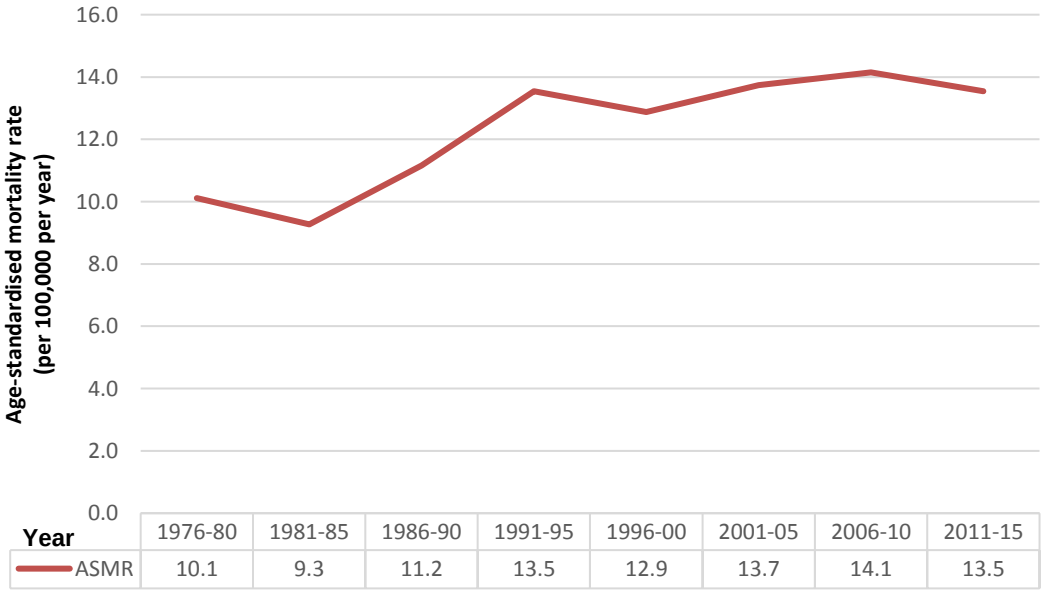
Figure 6.1.2: Age-Specific Incidence Rates for Breast Cancer, 2011 – 2015



Mortality Rates

Breast cancer has consistently accounted for the greatest number of fatalities among all cancers diagnosed in women. A total of 2,105 women died from breast cancer in the period 2011 – 2015 (Table 5.6.2). Even though the incidence of breast cancer has been on the rise, the age-standardised mortality rate has remained relatively stable since 1991, reflecting the improvement in the corresponding survival rates (Figure 6.1.3).

Figure 6.1.3: Age-Standardised Mortality Rates for Breast Cancer, 1976 – 2015



Survival

There was a significant increase in the survival of breast cancer patients from the period 2006 – 2010 to 2011 – 2015, likely due to improvements in treatment regimens. Survival was noticeably better among the Chinese, and was observed to decrease with age. The survival rate of women with breast cancer at stage IV was much lower as compared to those diagnosed at earlier stages (Table 6.1.5).

Table 6.1.5: 5-year Age-Standardised Observed and Relative Survival (%) of Breast Cancer by Ethnicity, Age Group, and Stage, 2006 – 2015

	2006-2010		2011-2015	
Ethnicity	**ASOS (95% CI)**	**ASRS (95% CI)**	**ASOS (95% CI)**	**ASRS (95% CI)**
Chinese	70.19 (69.06, 71.28)	80.06 (78.78, 81.31)	73.10 (72.12, 74.05)	82.56 (81.45, 83.63)
Malay	54.63 (51.21, 57.91)	61.08 (57.26, 64.75)	54.05 (50.98, 57.00)	59.88 (56.49, 63.16)
Indian	67.53 (62.64, 71.93)	75.58 (70.11, 80.50)	65.22 (61.35, 68.81)	72.28 (67.99, 76.26)
Age group (years)^				
15-44	88.18 (86.45, 89.70)	88.55 (86.82, 90.08)	88.64 (86.98, 90.11)	88.96 (87.29, 90.43)
45-54	84.54 (83.03, 85.93)	85.48 (83.95, 86.88)	86.92 (85.57, 88.15)	87.78 (86.42, 89.02)
55-64	79.64 (77.57, 81.54)	81.92 (79.79, 83.87)	81.87 (80.26, 83.37)	83.89 (82.23, 85.42)
65-74	75.32 (72.23, 78.11)	81.93 (78.57, 84.97)	73.57 (70.97, 75.99)	79.01 (76.21, 81.60)
75+	48.90 (44.53, 53.11)	67.73 (61.68, 73.57)	54.77 (51.07, 58.31)	73.52 (68.55, 78.28)
Stage				
I	90.98 (89.52, 92.24)	100.73 (99.11, 102.12)	90.59 (89.44, 91.63)	100.08 (98.81, 101.22)
II	81.07 (79.34, 82.66)	90.21 (88.30, 91.99)	80.05 (78.62, 81.40)	89.12 (87.52, 90.62)
III	58.94 (56.01, 61.74)	66.24 (62.95, 69.39)	64.88 (62.42, 67.22)	72.25 (69.51, 74.86)
IV	20.20 (16.70, 23.94)	22.53 (18.63, 26.71)	20.97 (18.19, 23.90)	23.04 (19.98, 26.25)
All	**68.66 (67.63, 69.67)**	**78.09 (76.91, 79.24)**	**70.84 (69.93, 71.72)**	**79.73 (78.71, 80.72)**

* Cancers of unknown stage were excluded.
^ Age-specific survival

6.2 Cervical Cancer (ICD 9: 180)

Incidence

From 2011 – 2015, cervical cancer was the 10th most common cancer occurring among women (Table 5.3.2). A total of 1,037 new cases of cervical cancer were diagnosed in the period 2011 – 2015. The age-standardised incidence rate of newly diagnosed cervical cancer in females has been decreasing since 1976. It has dropped by more than half from 17.3 per 100,000 person-years in the period 1976 – 1980 to 7.1 per 100,000 person-years in the period 2011 – 2015 (Figure 6.2.1). It has dropped from being the 4th most common cancer in the 1970s to its current 10th position.

Malay women were at significantly higher risk of developing cervical cancer compared to Chinese and Indian women (Table 6.2.1).

The about two-thirds of the cervical cancer cases were diagnosed at stage I and II (Table 6.2.2) and half at the age of 54 or below (Table 6.2.4).

Figure 6.2.1: Age-Standardised Incidence Rates (ASIR) for Cervical Cancer, 1976 – 2015

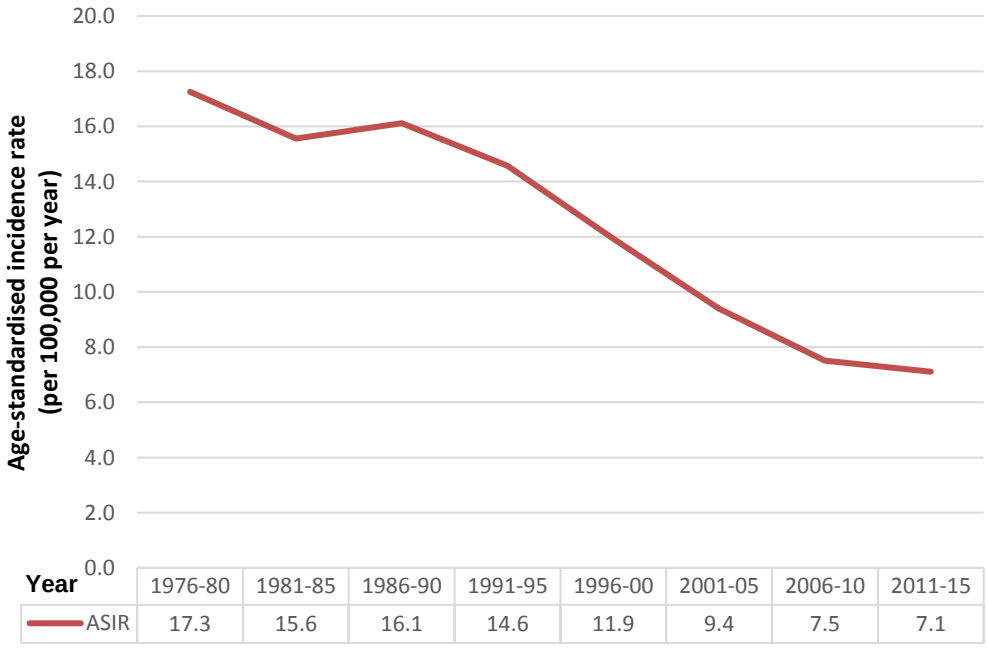


Table 6.2.1: Crude and Age-standardised Incidence Rates for Cervical Cancer by Ethnicity, 2011 – 2015

Ethnic group	No.	CIR (95% CI)	ASIR (95% CI)
Chinese	816	11.2 (10.4-12.0)	7.1 (6.6-7.6)
Malay	143	11.1 (9.3-12.9)	9.1 (7.6-10.6)
Indian	43	5.0 (3.5-6.5)	4.3 (3.0-5.6)
Others	35	10.6 (7.1-14.1)	7.7 (4.9-10.5)
Total	1,037	10.6 (10.0-11.3)	7.1 (6.7-7.6)

Table 6.2.2: Stage Distribution of Cervical Cancer Patients, 2006 – 2015

Stage	2006-2010		2011-2015	
	No. of cases	%	No. of cases	%
I	404	47.0	392	42.0
II	228	26.5	229	24.5
III	129	15.0	155	16.6
IV	98	11.4	157	16.8

* Cancers of unknown stage were excluded.

Table 6.2.3: Ethnic Distribution of Cervical Cancer Patients, 2006 – 2015

Ethnic group	2006-2010		2011-2015	
	No. of cases	%	No. of cases	%
Chinese	812	84.5	816	78.7
Malay	97	10.1	143	13.8
Indian	22	2.3	43	4.1
Others	30	3.1	35	3.4
Total	961	100.0	1,037	100.0

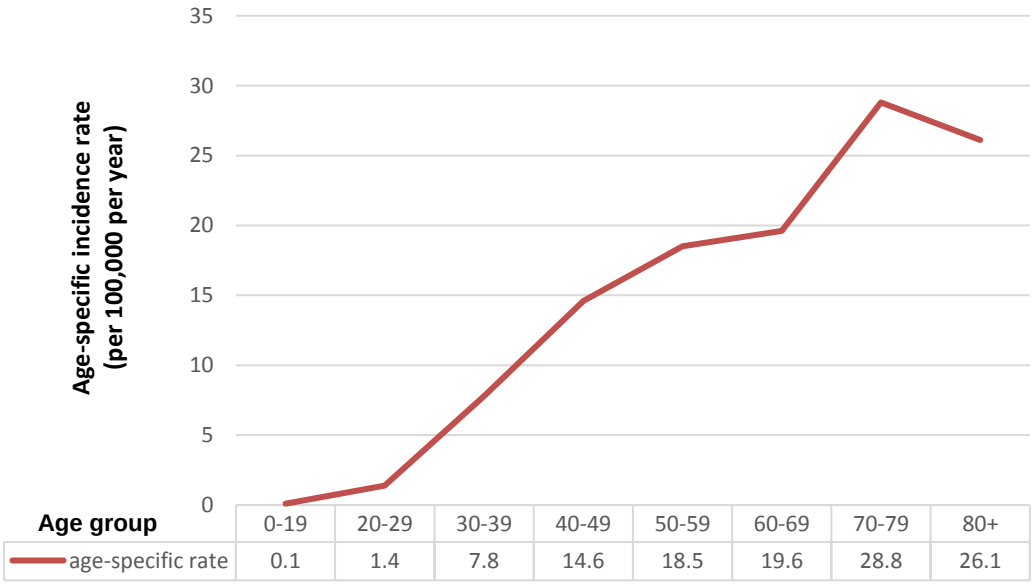
Table 6.2.4: Age Distribution of Cervical Cancer Patients, 2006 – 2015

Age group	2006-2010		2011-2015	
	No. of cases	%	No. of cases	%
0-44	247	25.7	278	26.8
45-54	222	23.1	260	25.1
55-64	184	19.1	228	22.0
65-74	179	18.6	161	15.5
75+	129	13.4	110	10.6
Total	961	100.0	1,037	100.0

Age at Diagnosis

From 2011 – 2015, the age-specific incidence rate for cervical cancer increased steadily with age from 0.1 per 100,000 person-years for women aged 0 – 19 to 26.1 per 100,000 person-years for women aged 80 or above (Figure 6.2.2).

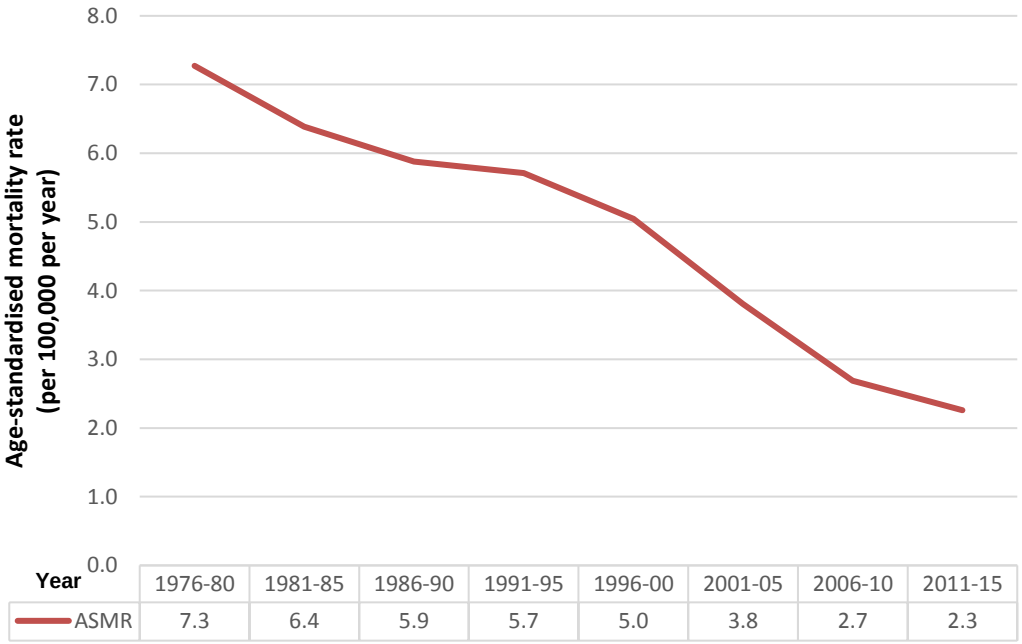
Figure 6.2.2: Age-Specific Incidence Rates for Cervical Cancer, 2011 – 2015



Mortality Rates

A total of 361 women died from cervical cancer in 2011 – 2015 (Table 5.6.2). The age-standardised mortality rate was 7.3 per 100,000 person-years in the period 1976 – 1980 and it decreased progressively to 2.3 per 100,000 person-years in the period 2011 – 2015 (Figure 6.2.3).

Figure 6.2.3: Age-Standardised Mortality Rates (ASMR) for Cervical Cancer, 1976 – 2015



Year	1976-80	1981-85	1986-90	1991-95	1996-00	2001-05	2006-10	2011-15
ASMR	7.3	6.4	5.9	5.7	5.0	3.8	2.7	2.3

Survival

There was an overall decrease in the survival of cervical cancer patients, particularly for Indian women, although this decrease is not statistically significant (Table 6.2.5). The decrease was also observed in all age groups, except those aged 65 – 74. On the contrary, the survival rates of stage III and IV cervical cancer patients improved markedly over the two time periods, especially the latter.

Table 6.2.5: 5-year Age-Standardised Observed and Relative Survival (%) of Cervical Cancer by Ethnicity, Age Group, and Stage, 2006 – 2015

	2006-2010		2011-2015	
Ethnicity	**ASOS (95% CI)**	**ASRS (95% CI)**	**ASOS (95% CI)**	**ASRS (95% CI)**
Chinese	58.46 (55.31, 61.47)	63.73 (60.29, 67.01)	56.21 (52.98, 59.30)	61.28 (57.77, 64.65)
Malay	41.97 (33.17, 50.51)	44.64 (35.28, 53.72)	41.52 (32.91, 49.89)	43.97 (34.86, 52.83)
Indian	62.77 (42.35, 77.70)	69.14 (46.64, 85.59)	34.68 (20.01, 49.81)	37.08 (21.39, 53.26)
Age group (years)^				
15-44	79.37 (73.30, 84.20)	79.68 (73.59, 84.53)	77.97 (71.96, 82.84)	78.22 (72.19, 83.10)
45-54	70.78 (64.79, 75.95)	71.57 (65.51, 76.79)	70.02 (63.72, 75.43)	70.71 (64.53, 76.18)
55-64	67.37 (60.08, 73.61)	69.38 (61.88, 75.82)	64.48 (57.56, 70.57)	66.06 (58.97, 72.29)
65-74	51.08 (43.78, 57.90)	55.67 (47.71, 63.11)	55.47 (47.49, 62.72)	59.56 (50.99, 67.35)
75+	37.49 (29.03, 45.93)	50.37 (39.00, 61.70)	23.99 (17.27, 31.32)	32.35 (23.30, 42.24)
Stage				
I	82.93 (78.78, 86.34)	87.69 (83.30, 91.30)	77.83 (73.40, 81.61)	82.38 (77.70, 86.39)
II	61.23 (54.50, 67.27)	65.04 (57.89, 71.46)	58.00 (51.20, 64.20)	62.03 (54.75, 68.65)
III	41.11 (33.11, 48.93)	43.65 (35.15, 51.95)	48.41 (39.31, 56.92)	50.99 (41.40, 59.95)
IV	6.65 (1.88, 15.72)	6.94 (1.97, 16.42)	22.04 (15.49, 29.34)	23.11 (16.24, 30.76)
All	**57.12 (54.22, 59.92)**	**62.13 (58.97, 65.16)**	**54.02 (51.10, 56.85)**	**58.68 (55.51, 61.76)**

* Cancers of unknown stage were excluded.
^ Age-specific survival

6.3 Colorectal Cancer (ICD 9: 153 – 154)

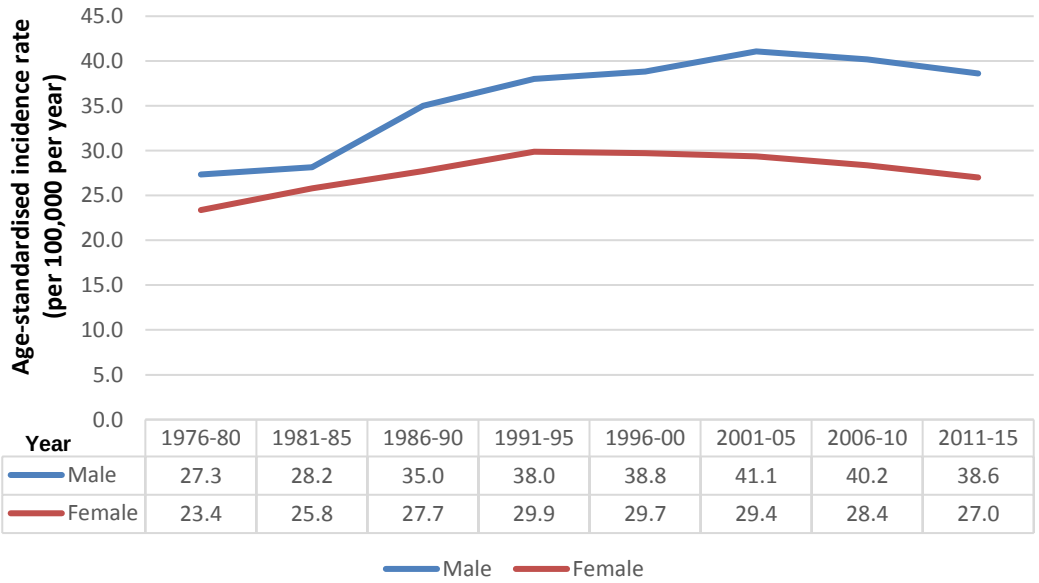
Incidence

A total of 9,807 new cases of colorectal cancer were diagnosed in 2011 – 2015, making it the most common cancer diagnosed in the Singapore resident population as a whole (Tables 5.3.1 & 5.3.2). The age-standardised incidence rate of newly diagnosed colorectal cancer for both genders rose for about two decades from 1976 – 1995, before plateauing and then gradually decreasing from 2001 onwards (Figure 6.3.1).

Chinese men and women had significantly higher risk of developing colorectal cancer compared to their Malay and Indian counterparts (Table 6.3.1). Men had consistently higher age-standardised incidence rates of colorectal cancer (Figure 6.3.1).

Compared to breast and cervical cancers, colorectal cancer tended to be diagnosed at later stages, with about one-third of cases diagnosed at Stage III and a further one-quarter at Stage IV, for both males and females (Table 6.3.2). For both 2006-2010 and 2011-2015, more than 3 in 4 colorectal cancer patients were diagnosed above the age of 55 (Table 6.3.4).

Figure 6.3.1: Age-Standardised Incidence Rates (ASIR) for Colorectal Cancer, 1976 – 2015



Year	1976-80	1981-85	1986-90	1991-95	1996-00	2001-05	2006-10	2011-15
Male	27.3	28.2	35.0	38.0	38.8	41.1	40.2	38.6
Female	23.4	25.8	27.7	29.9	29.7	29.4	28.4	27.0

Table 6.3.1: Crude and Age-Standardised Incidence Rates for Colorectal Cancer by Gender and Ethnicity, 2011 – 2015

	Ethnic group	No.	CIR (95% CI)	ASIR (95% CI)
Male	Chinese	4,694	67.3 (65.4-69.2)	41.7 (40.5-42.9)
	Malay	406	31.8 (28.7-34.9)	28.1 (25.3-31.0)
	Indian	189	20.9 (17.9-23.8)	19.0 (16.1-21.8)
	Others	94	31.3 (25.0-37.6)	33.5 (26.2-40.8)
	Total	5,383	56.9 (55.4-58.4)	38.6 (37.6-39.7)
Female	**Ethnic group**	**No.**	**CIR (95% CI)**	**ASIR (95% CI)**
	Chinese	3,827	52.5 (50.8-54.1)	28.4 (27.4-29.3)
	Malay	379	29.4 (26.4-32.4)	23.1 (20.7-25.5)
	Indian	138	16.2 (13.5-18.9)	14.0 (11.6-16.4)
	Others	80	24.2 (18.9-29.5)	29.4 (22.1-36.6)
	Total	4,424	45.3 (44.0-46.6)	27.0 (26.2-27.8)

Table 6.3.2: Stage Distribution of Colorectal Cancer Patients, 2006 – 2015

		2006-2010		2011-2015	
	Stage	**No. of cases**	**%**	**No. of cases**	**%**
Male	I	617	15.1	805	16.6
	II	1,114	27.3	1,254	25.8
	III	1,402	34.4	1,610	33.1
	IV	946	23.2	1,190	24.5
		2006-2010		**2011-2015**	
	Stage	**No. of cases**	**%**	**No. of cases**	**%**
Female	I	485	14.5	613	15.7
	II	890	26.6	959	24.6
	III	1,224	36.5	1,313	33.6
	IV	753	22.5	1,019	26.1

* Cancers of unknown stage were excluded.

Table 6.3.3: Ethnic Distribution of Colorectal Cancer Patients, 2006 – 2015

		2006-2010		2011-2015	
	Ethnic group	No. of cases	%	No. of cases	%
Male	Chinese	3,928	87.7	4,694	87.2
	Malay	318	7.1	406	7.5
	Indian	169	3.8	189	3.5
	Others	62	1.4	94	1.7
	Total	4,477	100.0	5,383	100.0
		2006-2010		2011-2015	
	Ethnic group	No. of cases	%	No. of cases	%
Female	Chinese	3,374	89.3	3,827	86.5
	Malay	256	6.8	379	8.6
	Indian	100	2.6	138	3.1
	Others	49	1.3	80	1.8
	Total	3,779	100.0	4,424	100.0

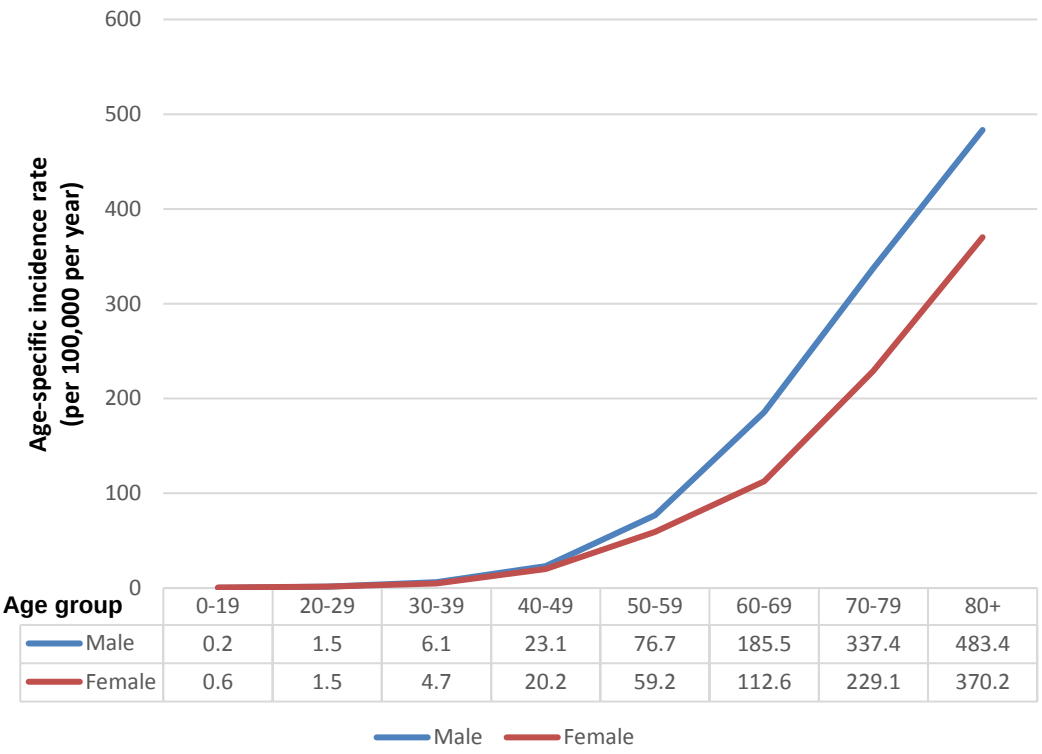
Table 6.3.4: Age Distribution of Colorectal Cancer Patients, 2006 – 2015

		2006-2010		2011-2015	
	Age group	No. of cases	%	No. of cases	%
Male	0-44	237	5.3	284	5.3
	45-54	794	17.7	755	14.0
	55-64	1,214	27.1	1,640	30.5
	65-74	1,255	28.0	1,527	28.4
	75+	977	21.8	1,177	21.9
	Total	4,477	100.0	5,383	100.0
		2006-2010		2011-2015	
	Age group	No. of cases	%	No. of cases	%
Female	0-44	251	6.6	245	5.5
	45-54	537	14.2	664	15.0
	55-64	834	22.1	1,062	24.0
	65-74	942	24.9	1,056	23.9
	75+	1,215	32.2	1,397	31.6
	Total	3,779	100.0	4,424	100.0

Age at Diagnosis

In 2011 – 2015, the age-specific incidence rate rose steeply with age past the age of 50 years, regardless of gender. The age-specific incidence rate for males rose from 23.1 per 100,000 person-years for men aged 40 – 49 to 483.4 per 100,000 person-years for men aged 80 or above, while the rate for females rose from 20.2 per 100,000 person-years for women aged 40 – 49 to 370.2 for women aged 80 or above (Figure 6.3.2).

Figure 6.3.2: Age-Specific Incidence Rates for Colorectal Cancer, 2010 – 2015

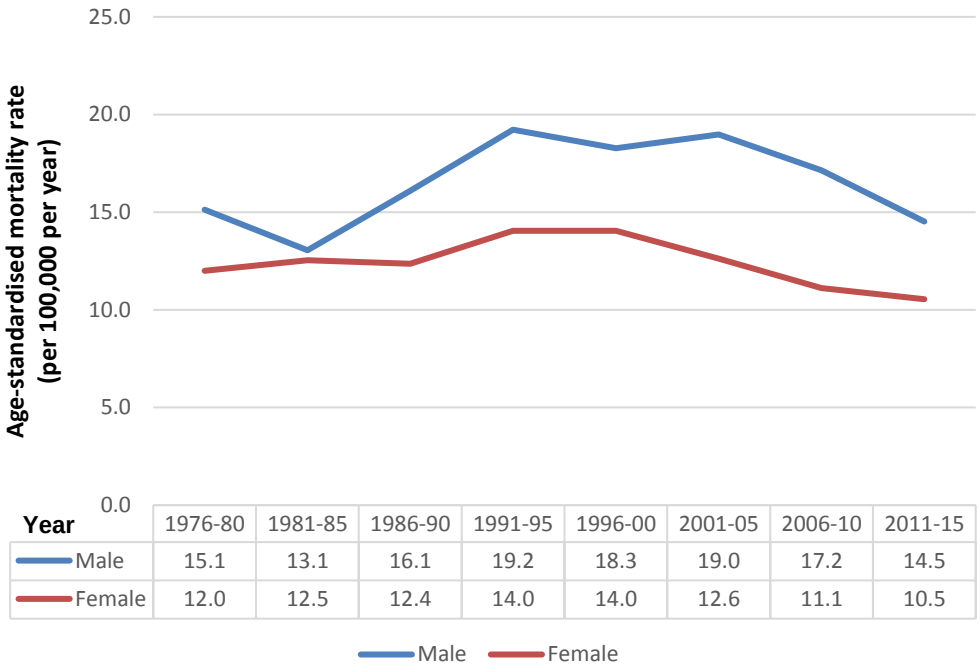


Age group	0-19	20-29	30-39	40-49	50-59	60-69	70-79	80+
Male	0.2	1.5	6.1	23.1	76.7	185.5	337.4	483.4
Female	0.6	1.5	4.7	20.2	59.2	112.6	229.1	370.2

Mortality Rates

A total of 3,906 people died from colorectal cancer in 2011 – 2015 (Tables 5.6.1 – 5.6.2). The age-standardised mortality rate for both genders decreased gradually from 2001 onwards. This is mainly due to advances in treatment, such as adjuvant therapy combining chemotherapy, radiotherapy and total mesorectal excision, as well as efforts at encouraging screening for colorectal cancer, thus allowing earlier detection and more timely treatment of the cancer (Figure 6.3.3), thereby improving survival rates.

Figure 6.3.3: Age-Standardised Mortality Rates for Colorectal Cancer, 1976 – 2015



Year	1976-80	1981-85	1986-90	1991-95	1996-00	2001-05	2006-10	2011-15
Male	15.1	13.1	16.1	19.2	18.3	19.0	17.2	14.5
Female	12.0	12.5	12.4	14.0	14.0	12.6	11.1	10.5

Survival

There was an overall increase in the survival of colorectal cancer for both genders. This was seen across the board for all ethnicities, age bands, as well as stages of the disease, with the exception of women above the age of 75 years. However, this increase was only statistically significant in men. Females and younger individuals exhibited better survival. Survival decreased dramatically at stage IV of the disease compared to earlier stages for both genders.

Table 6.3.5.1: 5-year Age-Standardised Observed and Relative Survival (%) of Colorectal Cancer by Ethnicity, Age Group, and Stage for Males, 2006 – 2015

	2006-2010		2011-2015	
Ethnicity	**ASOS (95% CI)**	**ASRS (95% CI)**	**ASOS (95% CI)**	**ASRS (95% CI)**
Chinese	46.98 (45.34, 48.59)	56.92 (54.93, 58.88)	51.52 (50.02, 53.00)	61.28 (59.50, 63.04)
Malay	37.32 (31.78, 42.85)	44.33 (37.75, 50.90)	41.74 (36.61, 46.77)	48.32 (42.38, 54.15)
Indian	53.34 (45.05, 60.94)	67.39 (56.92, 76.98)	55.42 (48.21, 62.03)	66.78 (58.09, 74.75)
Age group (years)^				
15-44	58.68 (51.71, 64.99)	59.09 (52.07, 65.45)	66.81 (59.77, 72.90)	67.21 (60.13, 73.33)
45-54	63.54 (59.60, 67.20)	64.94 (60.91, 68.68)	68.10 (64.46, 71.45)	69.41 (65.70, 72.83)
55-64	58.03 (54.90, 61.02)	61.35 (58.04, 64.51)	62.79 (60.16, 65.30)	65.82 (63.06, 68.45)
65-74	50.00 (47.03, 52.89)	58.09 (54.64, 61.45)	54.14 (51.44, 56.75)	61.62 (58.55, 64.60)
75+	31.64 (28.72, 34.59)	49.66 (45.08, 54.29)	35.39 (32.64, 38.15)	52.90 (48.79, 57.03)
Stage				
I	79.95 (75.75, 83.50)	95.39 (90.38, 99.63)	82.77 (79.76, 85.38)	97.18 (93.64, 100.23)
II	69.55 (66.41, 72.45)	82.52 (78.80, 85.96)	70.72 (68.03, 73.24)	83.72 (80.53, 86.70)
III	49.38 (46.37, 52.32)	58.18 (54.63, 61.64)	56.02 (53.41, 58.54)	64.81 (61.79, 67.73)
IV	6.94 (5.31, 8.85)	8.02 (6.14, 10.22)	10.30 (8.48, 12.33)	11.59 (9.54, 13.87)
All	**46.70 (45.16, 48.21)**	**56.58 (54.72, 58.42)**	**50.98 (49.58, 52.36)**	**60.56 (58.90, 62.20)**

* Cancers of unknown stage were excluded.
^ Age-specific survival

Table 6.3.5.2: 5-year Age-Standardised Observed Survival of Colorectal Cancer by Ethnicity, Age Group, and Stage for Females, 2006 – 2015

	2006-2010		2011-2015	
Ethnicity	**ASOS (95% CI)**	**ASRS (95% CI)**	**ASOS (95% CI)**	**ASRS (95% CI)**
Chinese	52.68 (50.89, 54.43)	60.64 (58.58, 62.65)	53.29 (51.63, 54.92)	60.49 (58.61, 62.34)
Malay	40.95 (34.49, 47.29)	45.67 (38.47, 52.74)	41.95 (36.79, 47.02)	46.18 (40.49, 51.76)
Indian	44.08 (34.15, 53.54)	48.78 (37.79, 59.27)	56.85 (47.27, 65.34)	62.38 (51.87, 71.70)
Age group (years)^				
15-44	63.73 (56.00, 70.46)	63.99 (56.23, 70.75)	65.46 (58.37, 71.64)	65.68 (58.57, 71.88)
45-54	63.38 (58.95, 67.46)	64.16 (59.68, 68.30)	66.14 (61.94, 70.00)	66.85 (62.60, 70.75)
55-64	64.11 (60.47, 67.52)	66.01 (62.25, 69.51)	65.06 (61.94, 68.00)	66.74 (63.53, 69.75)
65-74	56.90 (53.50, 60.15)	62.39 (58.66, 65.96)	59.29 (56.09, 62.34)	63.96 (60.51, 67.25)
75+	37.04 (34.21, 39.86)	52.44 (48.43, 56.44)	35.99 (33.46, 38.53)	49.23 (45.77, 52.70)
Stage				
I	83.06 (78.43, 86.78)	94.25 (89.00, 98.47)	85.32 (81.98, 88.08)	95.00 (91.28, 98.08)
II	73.37 (70.08, 76.35)	83.02 (79.31, 86.40)	77.71 (74.88, 80.26)	87.10 (83.93, 89.96)
III	56.88 (53.70, 59.92)	63.65 (60.10, 67.06)	61.71 (58.95, 64.35)	68.80 (65.72, 71.73)
IV	8.96 (6.73, 11.56)	9.86 (7.41, 12.73)	10.26 (8.38, 12.35)	11.18 (9.14, 13.46)
All	**52.06 (50.36, 53.72)**	**59.82 (57.88, 61.73)**	**52.76 (51.21, 54.28)**	**59.73 (57.98, 61.45)**

* Cancers of unknown stage were excluded.
^ Age-specific survival