



# **Singapore Cancer Registry Annual Report 2021**

**National Registry of Diseases Office  
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# TABLE OF CONTENTS

<b>THE SINGAPORE CANCER REGISTRY</b> .....	6
<b>STATISTICAL METHODS</b> .....	7
<b>EXECUTIVE SUMMARY</b> .....	8
<b>INTRODUCTION</b> .....	9
<b>(1) TRENDS IN CANCER INCIDENCE AND MORTALITY, 1968-2021</b> .....	10
<b>1.1 Gender trends</b> .....	10
<b>Figure 1.1.1</b> Age-standardised incidence and mortality rate (per 100,000 population) of cancer by gender, 1968-2021 .....	11
<b>Table 1.1.1</b> Incidence number and age-standardised incidence rate (per 100,000 population) of cancer by gender, 1968-2021 .....	11
<b>Table 1.1.2</b> Mortality number and age-standardised mortality rate (per 100,000 population) of cancer by gender, 1968-2021 .....	12
<b>Figure 1.1.2</b> Ten most frequent incident cancers and cancer deaths by gender, 2017-2021 .....	12
<b>Table 1.1.3</b> Ten most frequent incident cancers and cancer deaths by gender, 2017-2021 .....	13
<b>1.2 Ethnic trends</b> .....	14
<b>Figure 1.2.1(a)</b> Age-standardised incidence and mortality rate (per 100,000 population) of cancer in males by ethnicity, 1968-2021 .....	15
<b>Figure 1.2.1(b)</b> Age-standardised incidence and mortality rate (per 100,000 population) of cancer in females by ethnicity, 1968-2021 .....	15
<b>Figure 1.2.1(c)</b> Age-standardised incidence and mortality rate (per 100,000 population) of cancer by ethnicity, 1968-2021 .....	16
<b>Table 1.2.1(a)</b> Incidence number and age-standardised incidence rate (per 100,000 population) of cancer in males by ethnicity, 1968-2021 .....	16
<b>Table 1.2.1(b)</b> Incidence number and age-standardised incidence rate (per 100,000 population) of cancer in females by ethnicity, 1968-2021 .....	16
<b>Table 1.2.1(c)</b> Incidence number and age-standardised incidence rate (per 100,000 population) of cancer by ethnicity, 1968-2021 .....	17
<b>Table 1.2.2(a)</b> Mortality number and age-standardised mortality rate (per 100,000 population) of cancer in males by ethnicity, 1968-2021 .....	17
<b>Table 1.2.2(b)</b> Mortality number and age-standardised mortality rate (per 100,000 population) of cancer in females by ethnicity, 1968-2021 .....	17
<b>Table 1.2.2(c)</b> Mortality number and age-standardised mortality rate (per 100,000 population) of cancer by ethnicity, 1968-2021 .....	18
<b>Figure 1.2.2</b> Ten most frequent incident cancers by gender and ethnicity, 2017-2021 .....	18
<b>Table 1.2.3</b> Ten most frequent incident cancers by gender and ethnicity, 2017-2021 .....	19
<b>1.3 Age group trends</b> .....	21
<b>Figure 1.3.1(a)</b> Distribution of age at diagnosis (%) of cancer in males, 1968-2021 .....	22
<b>Figure 1.3.1(b)</b> Distribution of age at diagnosis (%) of cancer in females, 1968-2021 .....	22

<b>Figure 1.3.1(c)</b> Distribution of age at diagnosis (%) of cancer, 1968-2021 .....	23
<b>Table 1.3.1(a)</b> Distribution of age at diagnosis (%) of cancer in males, 1968-2021 .....	23
<b>Table 1.3.1(b)</b> Distribution of age at diagnosis (%) of cancer in females, 1968-2021 .....	24
<b>Table 1.3.1(c)</b> Distribution of age at diagnosis (%) of cancer, 1968-2021 .....	24
<b>Figure 1.3.2</b> Age-specific incidence and mortality rate (per 100,000 population) of cancer by gender, 2017-2021 .....	25
<b>Table 1.3.2(a)</b> Age-specific incidence and mortality number and rate (per 100,000 population) of cancer in males, 2017-2021 .....	25
<b>Table 1.3.2(b)</b> Age-specific incidence and mortality number and rate (per 100,000 population) of cancer in females, 2017-2021 .....	25
<b>Table 1.3.2(c)</b> Age-specific incidence and mortality number and rate (per 100,000 population) of cancer, 2017-2021 .....	25
<b>Figure 1.3.3</b> Ten most frequent incident cancers by gender and age group, 2017-2021.....	26
<b>Table 1.3.3</b> Ten most frequent incident cancers by gender and age group, 2017-2021 .....	28
<b>(2) TRENDS IN CANCER SURVIVAL, 1968-2021</b> .....	30
<b>2.1 Five-year age-standardised relative survival (ASRS) of cancer, 1968-2021</b> .....	30
<b>2.1.1 Gender trends</b> .....	30
<b>Figure 2.1.1</b> Five-year age-standardised relative survival rate (%) of cancer by gender, 1968-2021 .....	30
<b>Table 2.1.1</b> Five-year age-standardised relative survival rate (%) of cancer by gender, 1968-2021 .....	30
<b>2.1.2 Ethnic trends</b> .....	30
<b>Figure 2.1.2</b> Five-year age-standardised relative survival rate (%) of cancer by ethnicity, 1968-2021 .....	31
<b>Table 2.1.2</b> Five-year age-standardised relative survival rate (%) of cancer by ethnicity, 1968-2021 .....	31
<b>2.1.3 Age group trends</b> .....	31
<b>Figure 2.1.3(a)</b> Five-year age-specific relative survival rate (%) of cancer by age group, 1968-2021 .....	32
<b>Figure 2.1.3(b)</b> Five-year age-specific relative survival rate (%) of cancer by age group, 2017-2021 .....	32
<b>Table 2.1.3</b> Five-year age-specific relative survival rate (%) of cancer by age group, 1968-2021 .....	32
.....	33
<b>2.2 Five-year age-standardised relative survival rate (%) for ten most frequent incident cancers by gender, 2017-2021</b> .....	34
<b>Figure 2.2.1</b> Five-year age-standardised relative survival rate (%) for ten most frequent incident cancers in males, 2017-2021 .....	34
<b>Figure 2.2.2</b> Five-year age-standardised relative survival rate (%) for ten most frequent incident cancers in females, 2017-2021 .....	34

<b>2.3 Age-standardised relative survival rate (%) five years following diagnosis for ten most frequent incident cancers by gender, 2017-2021</b> .....	35
<b>Figure 2.3.1</b> Age-standardised relative survival rate (%) five years following diagnosis for ten most frequent incident cancers in males, 2017-2021 .....	36
<b>Figure 2.3.2</b> Age-standardised relative survival rate (%) five years following diagnosis for ten most frequent incident cancers in females, 2017-2021 .....	36
<b>Table 2.3.1</b> Age-standardised relative survival rate (%) five years following diagnosis for ten most frequent incident cancers in males, 2017-2021 .....	37
<b>Table 2.3.2</b> Age-standardised relative survival rate (%) five years following diagnosis for ten most frequent incident cancers in females, 2017-2021 .....	37
<b>(3) TRENDS IN INCIDENCE, MORTALITY AND SURVIVAL OF SELECTED CANCERS, 1968-2021</b> .....	38
<b>3.1 Age-standardised incidence, age-standardised mortality, and five-year age-standardised relative survival for selected cancers in males and females, 1968-2021</b> .....	38
<b>Figure 3.1.1</b> Age-standardised incidence rate (per 100,000 population), age-standardised mortality rate (per 100,000 population) and five-year age-standardised relative survival rate (%) of selected cancers in males, 1968-2021 .....	40
<b>Table 3.1.1</b> Incidence number and age-standardised incidence rate (per 100,000 population), age-standardised mortality rate (per 100,000 population) and five-year age-standardised relative survival rate (%) of selected cancers in males, 1968-2021 .....	41
<b>Figure 3.1.2</b> Incidence number and age-standardised incidence rate (per 100,000 population), age-standardised mortality rate (per 100,000 population) and five-year age-standardised relative survival rate (%) of selected cancers in females, 1968-2021 .....	43
<b>Table 3.1.2</b> Incidence number and age-standardised incidence rate (per 100,000 population), age-standardised mortality rate (per 100,000 population) and five-year age-standardised relative survival rate (%) of selected cancers in females, 1968-2021 .....	44
<b>3.2 Stage distribution for selected cancers, 2003-2021</b> .....	47
<b>Table 3.2.1</b> Stage distribution (%) of selected cancers in males, 2003-2021 <sup>^</sup> .....	47
<b>Table 3.2.2</b> Stage distribution (%) of selected cancers in females, 2003-2021 <sup>^</sup> .....	48
<b>Figure 3.2.1</b> Stage distribution (%) of selected cancers in males, 2018-2021 .....	48
<b>Figure 3.2.2</b> Stage distribution (%) of selected cancers in females, 2018-2021 .....	48
<b>CONCLUSION</b> .....	49
<b>APPENDIX 1</b> .....	50
<b>CANCER SITES AND GROUPS USED IN REPORT BY ICD-10 CODES</b> .....	50
<b>CLASSIFICATION OF NEOPLASMS OF HAEMATOPOETIC &amp; LYMPHOID TISSUES IN THIS REPORT (ICD10: C81-C96, D45-D47)</b> .....	50
<b>REFERENCES</b> .....	51

# THE SINGAPORE CANCER REGISTRY

The Singapore Cancer Registry (SCR) was first established in 1967 to collect information on all cancers diagnosed in Singapore from 1 January 1968 onwards. The key objective of setting up this registry was to obtain information on population-based cancer trends and patterns in Singapore.

## LEGISLATION

The National Registry of Diseases (including the Singapore Cancer Registry) is governed by the National Registry of Diseases Act which was enacted in 2007. The Act ensures comprehensive coverage of reportable diseases through the mandatory reporting and collection of information from healthcare providers and ensures appropriate use of the information while maintaining patient confidentiality. The National Registry of Diseases (Cancer Notification) Regulations 2009 has been operational since 1 August 2009.

## DATA SOURCES

Comprehensive cancer registration is achieved through data obtained via notifications received from (a) medical practitioners, (b) pathology laboratories, (c) haematology laboratories and departments, and (d) healthcare institutions.

## IDENTIFICATION KEY

The primary identification key for Singapore residents (consisting of Singapore citizens and permanent residents) is the National Registration Identity Card (NRIC) number. These unique numbers are used for updating existing records in the database and filtering duplicate records notified by multiple data sources.

## VERIFICATION OF INFORMATION

All notifications were corroborated with clinical medical records. Registry coordinators (RCs) would review medical records to verify discrepancies in information and collect data to complete the registration of case records. A visiting consultant pathologist would be consulted for complex cases. Regular internal audits to assess the quality of the data were conducted and results from the audits showed that the registry achieved high inter-rater reliability (above 95%) for all data items.

## CODING OF PRIMARY SITE AND HISTOLOGY

In this report, data on primary site was presented using the International Statistical Classification of Diseases and Related Health Problems, 10<sup>th</sup> Edition, Australian Modification (ICD-10-AM) (1). The referenced sites and respective ICD-10-AM codes can be found in [Appendix 1](#).

The Manual of Tumour Nomenclature and Coding (MOTNAC) (2) was used for histology coding up till 1992. Between 1993 and 2002, the SCR employed the International Classification of Diseases for Oncology, 2nd Edition (ICD-O-2) (3). From 2003 onwards, the International Classification of Diseases for Oncology, 3rd Edition (ICD-O-3) was adopted (4). In addition to ICD-O-3, the World Health Organisation (WHO) Classification of Tumours, 4<sup>th</sup> Edition volumes (also known as the Blue Books) were also used (5).

## CANCER STAGING

The registry adopted stage grouping guidelines from the American Joint Committee on Cancer (AJCC) Cancer Staging Manual, 6<sup>th</sup> edition for cases diagnosed between 2003 and 2009, 7<sup>th</sup> edition for cases diagnosed from 2010 to 2017, and 8<sup>th</sup> edition for cases diagnosed from 2018 onwards (6) (7) (8).

## STATISTICAL METHODS

This report is based on the analysis of anonymised data on all cases of malignant and some tumours with borderline malignant potential diagnosed among Singapore residents from 1 January 1968 through 31 December 2021 in Singapore, as they stood as of 28 February 2023. Mortality data were as they stood as of 30 November 2022.

### CANCER INCIDENCE AND MORTALITY

Computation of cancer incidence excludes benign and in-situ tumours (behaviour codes '0' and '2' respectively) (4).

Cancer incidence and mortality rates were calculated for all cancer sites combined, and for the most common cancer sites by gender, ethnicity, and age group. Incidence and mortality rates were age-standardised to adjust for differences in age structure in the Singapore resident population over time. Age-standardised incidence or mortality rates were calculated as the sum of the weighted age-specific incidence or mortality rates using the direct method based on the Segi-Doll World Standards. The age-specific incidence or mortality rates are defined as the number of new cancer cases or deaths, in the specified time period by the population at risk for that age stratum.

The population estimates were used as the denominators to calculate incidence and mortality rates. Population denominators from 1968 to 2021 were obtained from the Department of Statistics (DOS) (9).

### RELATIVE SURVIVAL

Single and multiple primary malignant tumours diagnosed in individuals aged 15 years and above were included for survival analysis in this report. Childhood cancer cases were not included in survival analysis because of their differences in biological characteristics, treatment protocols and survival outcomes. Multiple primary cases were included in accordance with the Eurocare-6 (European Cancer Registry) and CONCORD-3 study protocols (10) (11).

Cases based on Death Certificates Only (DCO i.e. cases which were registered based on mortality data) were excluded from the survival analysis since their survival time was unknown.

Relative survival is defined as the ratio of observed survival of the patients with the expected survival of a comparable group in the general population, matched according to factors believed to be associated with survival at baseline (gender, age and calendar year of diagnosis). In other words, it reflects the chances of survival assuming that cancer is the only possible cause of death.

The expected survival was estimated from the Singapore general population which included deaths from all causes. Population life tables for the period of 1968-2002 were constructed using the Mortpak software with deaths and population counts obtained from the DOS (9) (12). Complete life tables for the period of 2003-2021 were available from the DOS (13).

The Brenner method is used for age-standardisation (14). 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. Analysis of five-year relative survival for the earliest five-year period, 1968-1972 was omitted, as there were insufficient cases available for analysis in one or more age groups.

Age-standardisation was performed using the International Cancer Survival Standards (ICSS) age categories for weights (15).

## EXECUTIVE SUMMARY

This annual report presents data on trends for incidence, mortality, and survival of cancer in Singapore from 1968-2021, with additional site-specific trends for the ten most frequent cancers among males and females for the most recent 5-year period of 2017-2021.

Between 1968-1972 and 2017-2021, the age-standardised incidence rate (ASIR) of cancer increased for both males and females (from 228.3 to 236.6, and 155.0 to 237.8 per 100,000 population respectively), narrowing the gender gap. However, over the same period, cancer mortality rates declined for males but remained comparatively unchanged for females (from 121.8 to 87.1, and 67.5 and 62.1 per 100,000 population respectively). Over the years, there had been a shift towards an increase in the proportion of cancer diagnoses among the older age groups, with the median age at diagnosis rising from 58.7 years to 66.4 years.

In 2017-2021, prostate (16.8% of cancers in males), colorectal (16.3%) and lung (13.5%) cancers were the three most frequent incident cancers diagnosed in males, while breast (29.7% of cancers in females), colorectal, (12.9%) and lung (7.9%) cancers were the three most common cancer diagnoses in females. In terms of mortality, lung (24.8% of cancer deaths in males), colorectal (14.4%), and liver (12.5%) cancers were the three leading causes of cancer deaths in males, while breast (17.3% of cancer deaths in females), colorectal (15.6%), and lung (14.9%) cancers accounted for the most cancer deaths among females.

Cancer survival has improved drastically over the years – the 5-year age-standardised relative survival (ASRS) increased from 19.5% in 1973-1977 to 59.3% in 2017-2021. The 5-year ASRS was consistently better for females compared to males, as well as poorer for the Malays as compared to the Chinese and Indians.

Differing trends were observed for the incidence and mortality rates of the most common incident cancers in males and females. For example, among males, while the ASIR of prostate and colorectal cancers had risen, that for lung cancer had fallen instead. The ASMRs of these cancers had risen or fallen alongside the respective incidence rates. Similarly, among females, the ASIRs and ASMRs of breast and ovarian cancers had risen in tandem, whilst the incidence and mortality rates of cervical cancer had both declined drastically.

Cancer survival is linked in part to stage distribution, as cancers such as lung, pancreatic and stomach cancers were more like to be diagnosed at later stages and consequently exhibit lower survival rates.



## INTRODUCTION

Since its independence, Singapore has undergone an epidemiological transition, whereby the pattern of diseases in the society shifts from one rampant with infectious and vector-borne diseases like cholera and tuberculosis to one characterised by a predominance of chronic and non-communicable diseases such as cancer and heart disease (16) (17). In Singapore, the percentage of deaths caused by infective and parasitic diseases had fallen from 6.6% in 1969-1973 to 1.7% in 2017-2021. In contrast, the percentage of deaths caused by cancer had increased almost twofold from 15.2% in 1969-1973 to 28.2% in 2017-2021 (18).

As a result, Singapore's disease burden has undergone a similar shift. While the burden posed by infectious diseases had decreased, that caused by chronic and non-communicable diseases had increased correspondingly. In 1990, cancer accounted for 14.3% of all **disability-adjusted life-years (DALYs)** – a composite measure of health loss within a population that summarises the burden of early death and time spent with disability linked to ill health. This had gradually increased to 15.4% in 2019. DALYs are the sum of total **years of life lost (YLLs)** – which measure premature deaths – and **years lived with disability (YLDs)** – a measure of total years lived with disability or health loss due to non-fatal causes of disease or injury. The percentage of total YLLs attributable to cancer had also increased from 24.1% in 1990 to 34.3% in 2019 (19). In 2019, cancer was the leading contributor to both total DALYs and YLLs in Singapore (19).

# (1) TRENDS IN CANCER INCIDENCE AND MORTALITY, 1968-2021

## 1.1 Gender trends

### *Incidence and mortality of cancer by gender, 1968-2021*

Gender differences have been observed in the trends for cancer incidence over the last five decades (Figure 1.1.1, Table 1.1.1). In 1968-1972, the ASIR of cancer among males was 228.3 per 100,000 population, significantly higher than that for females (155.0 per 100,000 population). There was an initial rise in cancer incidence for both males and females in the 1970s-1980s, to 237.3 and 191.8 per 100,000 respectively in 1988-1992. The ASIR for males has plateaued thereafter, remaining similar at 236.6 per 100,000 population in 2017-2021. However, that for females had continued to rise and in 2017-2021, the ASIR was close to that for males, at 237.8 per 100,000 population.

Over the same period, a similar pattern of a narrowing gender gap was also observed for cancer mortality (Figure 1.1.1, Table 1.1.2). In 1968-1972, the ASMR of cancer was significantly higher among males, at 121.8 per 100,000 population, compared to 67.5 per 100,000 population among females. After an initial rise in ASMR to 165.1 and 96.3 per 100,000 population respectively in 1978-1982, the ASMR declined to 87.1 per 100,000 population for males and 62.1 per 100,000 population for females in 2017-2021. Nonetheless, both the ASIR and ASMR of cancer had remained consistently higher among males than females throughout the years.

### *Ten most frequent incident cancers and cancer deaths by gender, 2017-2021*

Cancer was the leading cause of death in Singapore, accounting for 28.2% of all deaths from 2017-2021 (18). For the latest five-year period of 2017-2021, a total of 41,126 males and 42,876 females were diagnosed with cancer while 16,103 males and 13,419 females had died from the disease (Figure 1.1.2, Table 1.1.3).

Prostate, colorectal and lung cancers were the three most frequent incident cancers among males, while breast, colorectal and lung cancers were the top three most frequent incident cancers among females. Prostate cancer, the most common cancer in males in 2017-2021, consisted almost 17% of cancer diagnoses among males with 6,912 cases; while breast cancer, the most common cancer among females with 12,735 diagnoses over the latest five years, alone accounted for about three in ten cancer diagnoses in females. The three leading incident cancers in males and females accounted for approximately 46% and 50% of total diagnoses respectively during this period.

The World Health Organisation (WHO) estimated that in 2020, prostate cancer was the leading cancer diagnosed in males in over 100 countries, while breast cancer was the most frequently diagnosed cancer among females in over 150 countries (20). As with Singapore, among high-income countries<sup>1</sup>, prostate cancer was the most common diagnosis in males (19% of all cancers in 2020), and breast cancer was the leading diagnosis in females, accounting for 24.6% of all diagnoses. However, while breast cancer was similarly the most common diagnosis in females in Southeast Asia<sup>2</sup> (27.7% of all cancers), lung cancer was instead the leading cancer in males in Southeast Asia (16.4% of all cancers) (21).

In Singapore, lung cancer was the leading cause of cancer deaths in males, accounting for 3,988 - about a quarter - of all cancer deaths among males in 2017-2021, while breast cancer was the leading cause of cancer mortality in females, contributing to 2,304 or about 1 in 6 cancer deaths among females. Colorectal, liver, and pancreatic cancers were also among the top contributors to cancer mortality for both genders.

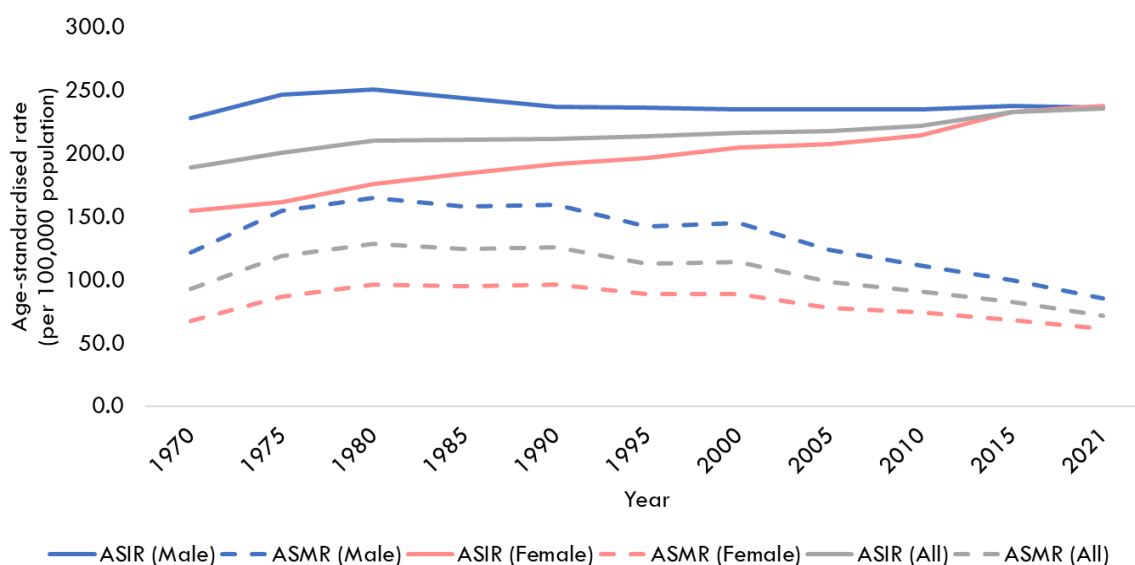
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<sup>1</sup> Populations included: Australia, Austria, Bahamas, Bahrain, Barbados, Belgium, Brunei Darussalam, Canada, Chile, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, France, New Caledonia, French Polynesia, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Republic of, Kuwait, Latvia, Lithuania, Luxembourg, Malta, Mauritius, New Zealand, Norway, Oman, Panama, Poland, Portugal, Puerto Rico, Qatar, Romania, Saudi Arabia, **Singapore**, Slovakia, Slovenia, Spain, Sweden, Switzerland, The Netherlands, Trinidad and Tobago, United Arab Emirates, United Kingdom, United States of America, Uruguay

<sup>2</sup> Populations included: Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, **Singapore**, Thailand, Timor-Leste, Vietnam

Similarly, lung cancer was estimated by the WHO to be the leading cause of cancer deaths among men in over 90 countries, including high-income countries and the Southeast Asian region (23.1% and 20.5% of all cancer deaths respectively). However, the mortality profile was more heterogenous among women – among high-income countries, lung cancer was the leading cause of cancer deaths (17.5%) while in Southeast Asia, breast cancer accounted for the most cancer deaths, at 18.6% (20) (21).

**Figure 1.1.1** Age-standardised incidence and mortality rate (per 100,000 population) of cancer by gender, 1968-2021



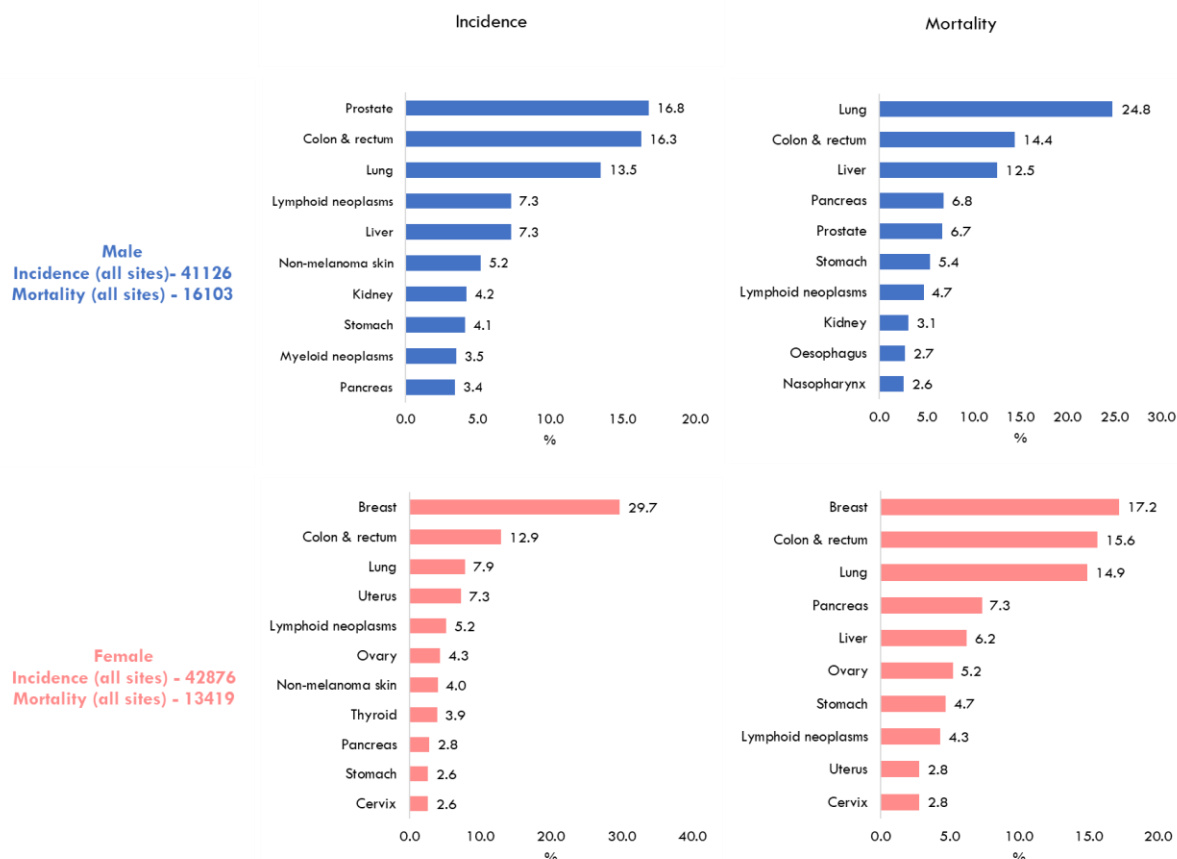
**Table 1.1.1** Incidence number and age-standardised incidence rate (per 100,000 population) of cancer by gender, 1968-2021

		1968-1972	1973-1977	1978-1982	1983-1987	1988-1992	1993-1997
Male	No.	6987	8559	10126	11686	13647	16255
	ASIR (95% CI)	228.3 (222.5-234.1)	246.4 (240.9-251.9)	250.8 (245.8-255.8)	244.1 (239.6-248.6)	237.3 (233.3-241.3)	236.7 (233.0-240.4)
Female	No.	5087	6192	7995	10079	12769	15767
	ASIR (95% CI)	155.0 (150.6-159.3)	161.3 (157.3-165.4)	175.9 (172.0-179.8)	183.9 (180.3-187.6)	191.8 (188.4-195.2)	196.3 (193.1-199.4)
All	No.	12074	14751	18121	21765	26416	32022
	ASIR (95% CI)	188.7 (185.2-192.2)	200.8 (197.5-204.1)	210.2 (207.1-213.3)	210.7 (207.8-213.5)	211.8 (209.2-214.4)	213.5 (211.1-215.8)
		1998-2002	2003-2007	2008-2012	2013-2017	2018-2021	2017-2021
Male	No.	19075	22412	27986	35043	33561	<b>41126</b>
	ASIR (95% CI)	235.1 (231.7-238.4)	235.3 (232.1-238.4)	235.2 (232.4-238.1)	237.8 (235.2-240.3)	236.5 (233.9-239.2)	<b>236.6 (234.2-239.0)</b>
Female	No.	19892	23640	29385	37365	34810	<b>42876</b>
	ASIR (95% CI)	204.6 (201.7-207.6)	207.3 (204.6-210.0)	214.4 (211.9-217.0)	232.9 (230.4-235.4)	237.8 (235.1-240.5)	<b>237.8 (235.4-240.2)</b>
All	No.	38967	46052	57371	72408	68371	<b>84002</b>
	ASIR (95% CI)	216.8 (214.7-219.0)	217.7 (215.7-219.8)	221.8 (220.0-223.7)	233.1 (231.3-234.8)	235.6 (233.7-237.5)	<b>235.5 (233.8-237.2)</b>

**Table 1.1.2** Mortality number and age-standardised mortality rate (per 100,000 population) of cancer by gender, 1968-2021

		1968-1972	1973-1977	1978-1982	1983-1987	1988-1992	1993-1997
Male	No.	3671	5330	6543	7448	9031	9598
	ASMR	121.8	155.0	165.1	157.9	159.4	142.3
	(95% CI)	(117.6-126.1)	(150.6-159.3)	(161.0-169.2)	(154.3-161.6)	(156.1-162.7)	(139.4-145.2)
Female	No.	2187	3224	4279	5104	6363	7054
	ASMR	67.5	86.4	96.3	95.1	96.4	88.7
	(95% CI)	(64.6-70.4)	(83.4-89.4)	(93.4-99.3)	(92.5-97.8)	(94.0-98.8)	(86.6-90.8)
All	No.	5858	8554	10822	12552	15394	16652
	ASMR	93.2	118.9	128.5	124.3	125.6	113.1
	(95% CI)	(90.8-95.7)	(116.3-121.4)	(126.1-131.0)	(122.1-126.5)	(123.6-127.6)	(111.4-114.9)
		1998-2002	2003-2007	2008-2012	2013-2017	2018-2021	2017-2021
Male	No.	11539	11690	13337	15185	12998	<b>16103</b>
	ASMR	145.0	123.9	111.4	99.7	85.6	<b>87.1</b>
	(95% CI)	(142.3-147.7)	(121.6-126.2)	(109.5-113.3)	(98.1-101.3)	(84.1-87.1)	<b>(85.8-88.5)</b>
Female	No.	8621	9181	11041	12539	10767	<b>13419</b>
	ASMR	89.1	78.1	74.7	68.5	61.0	<b>62.1</b>
	(95% CI)	(87.1-91.0)	(76.4-79.7)	(73.2-76.1)	(67.2-69.7)	(59.7-62.2)	<b>(60.9-63.2)</b>
All	No.	20160	20871	24378	27724	23765	<b>29522</b>
	ASMR	114.4	98.4	90.8	82.3	71.9	<b>73.2</b>
	(95% CI)	(112.8-116.0)	(97.0-99.7)	(89.6-92.0)	(81.3-83.3)	(70.9-72.8)	<b>(72.3-74.0)</b>

**Figure 1.1.2** Ten most frequent incident cancers and cancer deaths by gender, 2017-2021



**Table 1.1.3** Ten most frequent incident cancers and cancer deaths by gender, 2017-2021

Gender	Rank	Incidence			Mortality		
		Site	No.	%	Site	No.	%
Male	1	Prostate	6912	16.8	Lung	3988	24.8
	2	Colon & rectum	6697	16.3	Colon & rectum	2324	14.4
	3	Lung	5567	13.5	Liver	2019	12.5
	4	Lymphoid neoplasms	2986	7.3	Pancreas	1099	6.8
	5	Liver	2984	7.3	Prostate	1080	6.7
	6	Non-melanoma skin	2136	5.2	Stomach	869	5.4
	7	Kidney	1734	4.2	Lymphoid neoplasms	762	4.7
	8	Stomach	1684	4.1	Kidney	505	3.1
	9	Myeloid neoplasms	1430	3.5	Oesophagus	432	2.7
	10	Pancreas	1417	3.4	Nasopharynx	419	2.6
		<b>All sites</b>	<b>41126</b>	<b>100.0</b>	<b>All sites</b>	<b>16103</b>	<b>100.0</b>
Female	1	Breast	12735	29.7	Breast	2304	17.2
	2	Colon & rectum	5542	12.9	Colon & rectum	2091	15.6
	3	Lung	3388	7.9	Lung	2004	14.9
	4	Uterus	3133	7.3	Pancreas	975	7.3
	5	Lymphoid neoplasms	2221	5.2	Liver	828	6.2
	6	Ovary	1855	4.3	Ovary	703	5.2
	7	Non-melanoma skin	1713	4.0	Stomach	624	4.7
	8	Thyroid	1666	3.9	Lymphoid neoplasms	581	4.3
	9	Pancreas	1187	2.8	Uterus	370	2.8
	10	Stomach	1111	2.6	Cervix	336	2.8
		<b>All sites</b>	<b>42876</b>	<b>100.0</b>	<b>All sites</b>	<b>13419</b>	<b>100.0</b>

### 1.1 Gender trends for incidence and mortality of cancer, 1968-2021

#### KEY POINTS

- The age-standardised incidence rate of cancer had risen for both males (from 228.3 to 236.6 per 100,000 population) and females (from 155.0 to 237.8 per 100,000 population) during the period from 1968-1972 to 2017-2021.
- During this same period, while the age-standardised mortality rate of cancer for males decreased (from 121.8 to 87.1 per 100,000 population), that of females remained relatively unchanged (67.5 and 62.1 per 100,000 population).
- Over the years, there has been a narrowing of the gender gap for both cancer incidence and mortality. Nonetheless, both the ASIR and ASMR of cancer had remained consistently higher among males compared to females throughout the years.
- 41,126 males and 42,876 females were diagnosed with cancer in the latest 5-year period from 2017-2021, while 16,103 males and 13,419 females died from it.
- The three most frequent incident cancers (2017-2021):
  - Males – prostate (16.8% of all cancers diagnosed in males), colorectal (16.3%), lung (13.5%)
  - Females – breast (29.7% of all cancers diagnosed in females), colorectal (12.9%), lung (7.9%)
- The three leading causes of cancer deaths (2017-2021):
  - Males – lung (24.8% of cancer deaths in males), colorectal (14.4%), liver (12.5%)
  - Females – breast (17.2% of cancer deaths in females), colorectal (15.6%), lung (14.9%)

## 1.2 Ethnic trends

### *Incidence and mortality of cancer by gender and ethnicity, 1968-2021*

Over the years, differing trends were also observed among the three main ethnic groups in Singapore for both genders (Figure 1.2.1(a)-(c)). Ethnic differences in trends were apparent for both cancer incidence as well as mortality (Table 1.2.1(a)-(c), Table 1.2.2(a)-(c)).

While the ASIR of cancer among Chinese males had declined slightly from 258.1 per 100,000 population in 1968-1972 to 242.3 per 100,000 population in 2017-2021, it had risen among Malay and Indian males, doubling from 96.2 to 220.0 per 100,000 population for the former, and rising less drastically with some fluctuations over the years from 125.4 to 156.9 per 100,000 population for the latter (Figure 1.2.1(a), Table 1.2.1(a)).

The same pattern was not observed in females – an increase in the ASIR of cancer was observed for all three ethnic groups (Figure 1.2.1(b), Table 1.2.1(b)). Among Chinese females, the ASIR of cancer rose from 158.5 to 239.9 per 100,000 population. Similar to their male counterparts, the ASIR of cancer among Malay females more than doubled over the years, from 98.5 per 100,000 population in 1968-1972 to 235.6 per 100,000 population in 2017-2021. Among Indian females, the ASIR of cancer rose slightly from 181.9 to 196.1 per 100,000 population.

Overall, although the Chinese had the highest ASIR of cancer consistently throughout the years, there is evidence of a closing ethnic gap in cancer incidence, particularly between the Chinese and Malays (Table 1.2.1(c)). In 1968-1972, the Chinese had a significantly higher incidence of cancer compared to the Malays and Indians (202.8, 96.2, and 139.0 per 100,000 population respectively). In 2017-2021, however, ethnic disparities had become less apparent with the ASIR of cancer among the Chinese exhibiting a gradual increase over the years to 239.5 per 100,000 population, while that among the Malays and Indians had risen to 226.0 and 173.9 per 100,000 population respectively).

The trend for cancer mortality rates by ethnicity among males was similar to that observed for the incidence rates. Between 1968-1972 and 2017-2021, while cancer mortality had decreased from 140.1 to 87.9 per 100,000 population for Chinese males (Figure 1.2.1(a), Table 1.2.2(a)), it had risen among more than twofold among Malay males, from 45.8 to 103.6 for the former; and remained relatively unchanged among Indian males, at 57.8 and 60.0 per 100,000 population.

While an increase in ASIR of cancer among females was observed for all three ethnic groups, cancer mortality rates were found to have only increased for Malay females – rising from 46.6 to 82.3 per 100,000 population between 1968-1972 and 2017-2021, an almost twofold increase. In contrast, during the same period, cancer mortality rates among Chinese females dipped slightly from 68.2 to 60.3 per 100,000 population, while mortality rates among Indian females decreased from 82.6 to 51.6 per 100,000 population (Figure 1.2.1(b), Table 1.2.2(b)).

As with the ethnic trends for cancer incidence, that for cancer mortality had also seen a closing of the ethnic gap over the years (Table 1.2.2(c)). While the Chinese had the highest cancer mortality rate from 1968-1972 to 2008-2012, cancer mortality among the Malays surpassed that of the Chinese to become the highest from 2013-2017 onwards. In 2017-2021, cancer mortality among the Malays had risen to 91.3 per 100,000 population, while that of the Chinese and Indians had dipped to 72.5 and 55.1 per 100,000 population respectively.

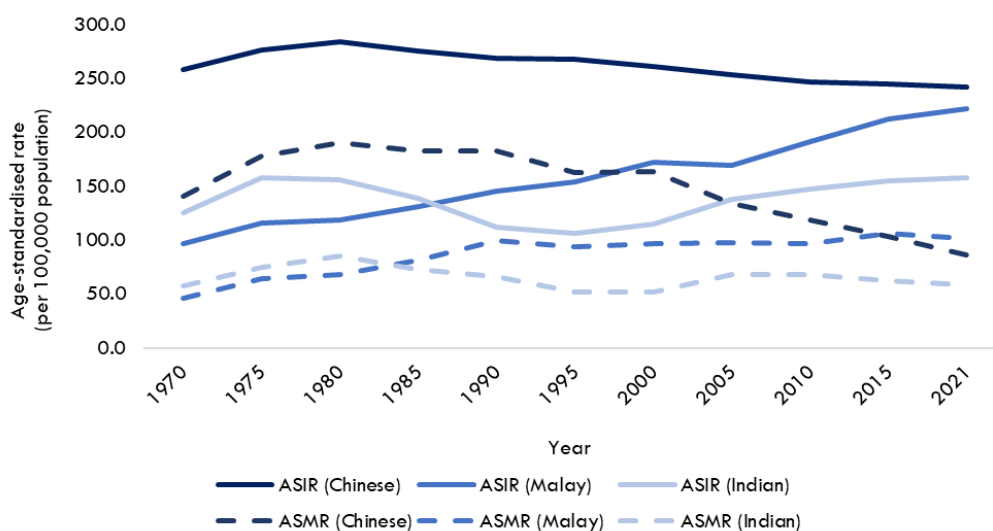
### *Ten most frequent incident cancers by gender and ethnicity, 2017-2021*

A total of 34,046 Chinese males and 34,778 Chinese females were diagnosed with cancer in 2017-2021. 3,865 Malay males and 4,492 Malay females were diagnosed with cancer; while 1,923 Indian males and 2,412 Indian females were diagnosed with cancer during this period (Figure 1.2.2, Table 1.2.3).

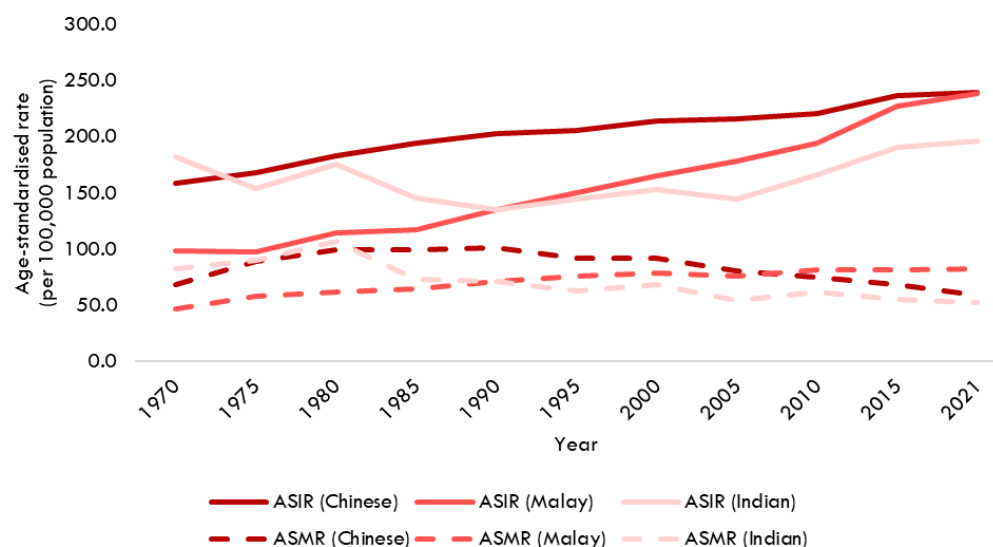
While prostate, colorectal, and lung cancers were the three most frequent incident cancers among Chinese and Indian males; lung and colorectal cancers, along with lymphoid neoplasms, were the three most frequent incident cancers among Malay males (Figure 1.2.2, Table 1.2.3). The three most frequent incident cancers among Chinese, Malay and Indian males accounted for approximately 41-48% of all diagnoses among each ethnicity.

Breast cancer was by far the most frequent incident cancer among females across all three ethnicities, accounting for about 30% of all cancer diagnoses among the Chinese and Malays, and over one-third of diagnoses among Indians (Figure 1.2.2, Table 1.2.3). While colorectal and lung cancers were the second and third most commonly diagnosed cancers in Chinese females, colorectal and uterine cancers were among the three most frequent incident cancers among Malays and Indians. Notably, while cervical cancer was tied with stomach cancer as the tenth most frequent incident cancer among the female resident population in 2017-2021 (Figure 1.1.2, Table 1.1.3), it was observed to be among the ten most frequent cancers among the Malays at eighth position; but was not among the ten most common incident cancers among both Chinese and Indian females during this period.

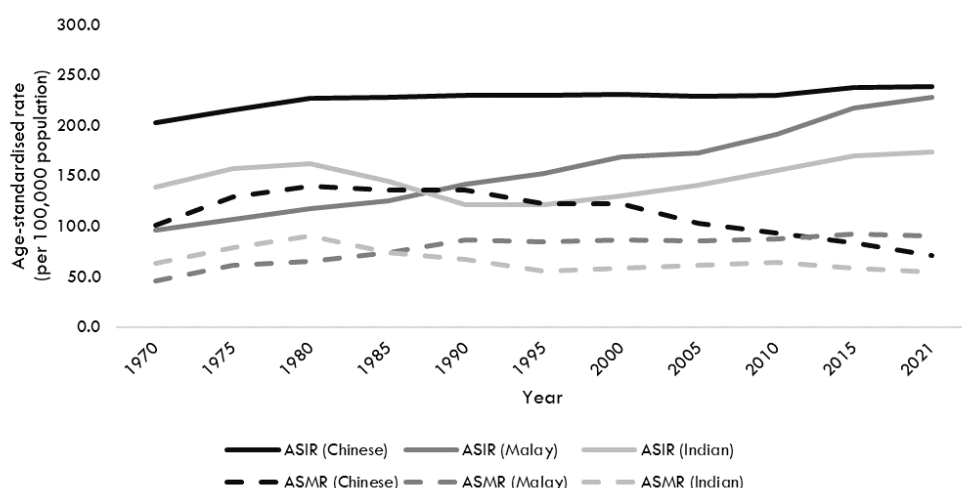
**Figure 1.2.1(a)** Age-standardised incidence and mortality rate (per 100,000 population) of cancer in males by ethnicity, 1968-2021



**Figure 1.2.1(b)** Age-standardised incidence and mortality rate (per 100,000 population) of cancer in females by ethnicity, 1968-2021



**Figure 1.2.1(c)** Age-standardised incidence and mortality rate (per 100,000 population) of cancer by ethnicity, 1968-2021



**Table 1.2.1(a)** Incidence number and age-standardised incidence rate (per 100,000 population) of cancer in males by ethnicity, 1968-2021

		1968-1972	1973-1977	1978-1982	1983-1987	1988-1992	1993-1997
Chinese	No.	6167	7467	8881	10158	11821	14090
	ASIR (95% CI)	258.1 (251.3-265.0)	276.2 (269.7-282.7)	283.7 (277.7-289.7)	275.6 (270.1-281.1)	268.7 (263.7-273.6)	267.6 (263.1-272.1)
Malay	No.	357	508	606	787	1013	1242
	ASIR (95% CI)	96.2 (84.5-107.9)	115.6 (104.6-126.6)	118.7 (108.6-128.9)	131.1 (121.5-140.8)	145.2 (136.0-154.4)	154.1 (145.2-163.0)
Indian	No.	398	499	537	622	624	696
	ASIR (95% CI)	125.4 (109.2-141.5)	157.3 (140.5-174.1)	155.9 (140.9-170.9)	139.0 (127.1-150.9)	112.1 (102.9-121.3)	105.7 (97.5-114.0)
		1998-2002	2003-2007	2008-2012	2013-2017	2018-2021	2017-2021
Chinese	No.	16358	19185	23557	29171	27741	<b>34046</b>
	ASIR (95% CI)	260.8 (256.7-264.8)	252.8 (249.2-256.4)	246.5 (243.3-249.8)	244.8 (241.8-247.7)	241.9 (238.8-244.9)	<b>242.3 (239.5-245.0)</b>
Malay	No.	1591	1780	2369	3191	3186	<b>3865</b>
	ASIR (95% CI)	172.0 (163.2-180.8)	169.4 (161.1-177.6)	190.8 (182.8-198.8)	212.1 (204.5-219.6)	222.0 (214.1-229.9)	<b>220.0 (212.8-227.1)</b>
Indian	No.	830	996	1285	1634	1576	<b>1923</b>
	ASIR (95% CI)	114.3 (106.1-122.5)	137.3 (128.3-146.2)	146.9 (138.4-155.4)	154.7 (146.8-162.6)	157.2 (149.2-165.2)	<b>156.9 (149.7-164.2)</b>

**Table 1.2.1(b)** Incidence number and age-standardised incidence rate (per 100,000 population) of cancer in females by ethnicity, 1968-2021

		1968-1972	1973-1977	1978-1982	1983-1987	1988-1992	1993-1997
Chinese	No.	4460	5471	7034	8893	11205	13635
	ASIR (95% CI)	158.5 (153.8-163.2)	167.7 (163.2-172.2)	183.3 (178.9-187.6)	194.1 (190.0-198.2)	202.4 (198.5-206.2)	205.4 (201.9-209.0)
Malay	No.	368	411	574	734	1009	1337
	ASIR (95% CI)	98.5 (87.0-110.0)	97.3 (86.9-107.6)	114.5 (104.3-124.7)	117.0 (108.0-126.1)	135.4 (126.7-144.2)	149.8 (141.4-158.1)
Indian	No.	168	223	298	346	429	609
	ASIR (95% CI)	181.9 (146.2-217.5)	153.6 (129.5-177.6)	175.7 (152.1-199.4)	145.2 (127.4-162.9)	135.4 (121.4-149.4)	144.5 (131.8-157.2)
		1998-2002	2003-2007	2008-2012	2013-2017	2018-2021	2017-2021
Chinese	No.	17040	20079	24363	30564	28191	<b>34778</b>
	ASIR (95% CI)	213.6 (210.3-216.9)	216.0 (212.9-219.1)	220.3 (217.4-223.2)	236.1 (233.3-238.9)	239.4 (236.3-242.4)	<b>239.9 (237.1-242.6)</b>
Malay	No.	1745	2208	2880	3864	3684	<b>4492</b>
	ASIR (95% CI)	165.0 (156.9-173.1)	178.0 (170.3-185.7)	194.1 (186.7-201.4)	226.8 (219.4-234.1)	238.5 (230.5-246.4)	<b>235.6 (228.5-242.7)</b>
Indian	No.	850	1013	1470	2021	1957	<b>2412</b>
	ASIR (95% CI)	152.4 (141.5-163.3)	143.9 (134.6-153.2)	166.4 (157.6-175.2)	190.1 (181.5-198.6)	196.2 (187.2-205.2)	<b>196.1 (188.0-204.2)</b>



**Table 1.2.1(c)** Incidence number and age-standardised incidence rate (per 100,000 population) of cancer by ethnicity, 1968-2021

		1968-1972	1973-1977	1978-1982	1983-1987	1988-1992	1993-1997
Chinese	No.	10627	12938	15915	19051	23026	27725
	ASMR	202.8	215.7	227.0	228.2	229.6	230.4
	(95% CI)	(198.8-206.7)	(212.0-219.5)	(223.4-230.6)	(224.9-231.5)	(226.5-232.6)	(227.6-233.2)
Malay	No.	725	919	1180	1521	2022	2579
	ASMR	96.2	107.3	117.6	125.6	141.4	152.6
	(95% CI)	(88.2-104.2)	(99.7-114.9)	(110.4-124.9)	(119.0-132.3)	(135.0-147.8)	(146.5-158.7)
Indian	No.	566	722	835	968	1053	1305
	ASMR	139.0	157.2	162.6	145.1	121.6	121.3
	(95% CI)	(123.7-154.3)	(143.4-170.9)	(150.0-175.1)	(135.1-155.0)	(113.9-129.3)	(114.5-128.2)
		1998-2002	2003-2007	2008-2012	2013-2017	2018-2021	2017-2021
Chinese	No.	33398	39264	47920	59735	55932	<b>68824</b>
	ASMR	231.5	229.4	229.8	238.1	239.2	<b>239.5</b>
	(95% CI)	(229.0-234.1)	(227.0-231.7)	(227.6-231.9)	(236.0-240.1)	(237.0-241.3)	<b>(237.6-241.5)</b>
Malay	No.	3336	3988	5249	7055	6870	<b>8357</b>
	ASMR	168.6	173.0	190.9	217.7	228.5	<b>226.0</b>
	(95% CI)	(162.7-174.6)	(167.3-178.6)	(185.5-196.2)	(212.5-222.9)	(222.9-234.0)	<b>(221.0-231.0)</b>
Indian	No.	1680	2009	2755	3654	3533	<b>4335</b>
	ASMR	130.4	140.4	155.1	170.2	174.0	<b>173.9</b>
	(95% CI)	(123.9-136.9)	(134.0-146.8)	(149.1-161.2)	(164.4-175.9)	(168.1-179.9)	<b>(168.5-179.2)</b>

**Table 1.2.2(a)** Mortality number and age-standardised mortality rate (per 100,000 population) of cancer in males by ethnicity, 1968-2021

		1968-1972	1973-1977	1978-1982	1983-1987	1988-1992	1993-1997
Chinese	No.	3315	4751	5869	6613	7896	8380
	ASMR	140.1	177.9	190.5	182.4	182.3	162.2
	(95% CI)	(135.0-145.2)	(172.6-183.1)	(185.6-195.5)	(177.9-186.8)	(178.2-186.3)	(158.6-165.7)
Malay	No.	164	300	343	476	686	730
	ASMR	45.8	63.9	68.3	80.9	99.7	93.6
	(95% CI)	(37.6-54.0)	(56.0-71.8)	(60.5-76.1)	(73.2-88.5)	(92.0-107.4)	(86.6-100.6)
Indian	No.	166	237	279	312	359	346
	ASMR	57.8	74.8	85.1	72.8	65.7	52.0
	(95% CI)	(45.6-70.0)	(63.9-85.6)	(73.6-96.6)	(64.0-81.7)	(58.5-72.9)	(46.3-57.7)
		1998-2002	2003-2007	2008-2012	2013-2017	2018-2021	2017-2021
Chinese	No.	10051	10066	11420	12726	10708	<b>13259</b>
	ASMR	163.8	134.0	118.2	102.8	86.3	<b>87.9</b>
	(95% CI)	(160.6-167.0)	(131.3-136.7)	(116.0-120.4)	(101.0-104.6)	(84.6-88.0)	<b>(86.3-89.4)</b>
Malay	No.	868	1004	1188	1605	1484	<b>1847</b>
	ASMR	96.3	97.7	97.0	106.2	101.5	<b>103.6</b>
	(95% CI)	(89.7-103.0)	(91.4-104.1)	(91.2-102.7)	(100.9-111.6)	(96.2-106.8)	<b>(98.8-108.4)</b>
Indian	No.	396	505	580	661	599	<b>749</b>
	ASMR	52.1	68.2	67.8	62.6	58.8	<b>60.0</b>
	(95% CI)	(46.6-57.5)	(62.0-74.5)	(62.0-73.6)	(57.6-67.6)	(54.0-63.5)	<b>(55.6-64.4)</b>

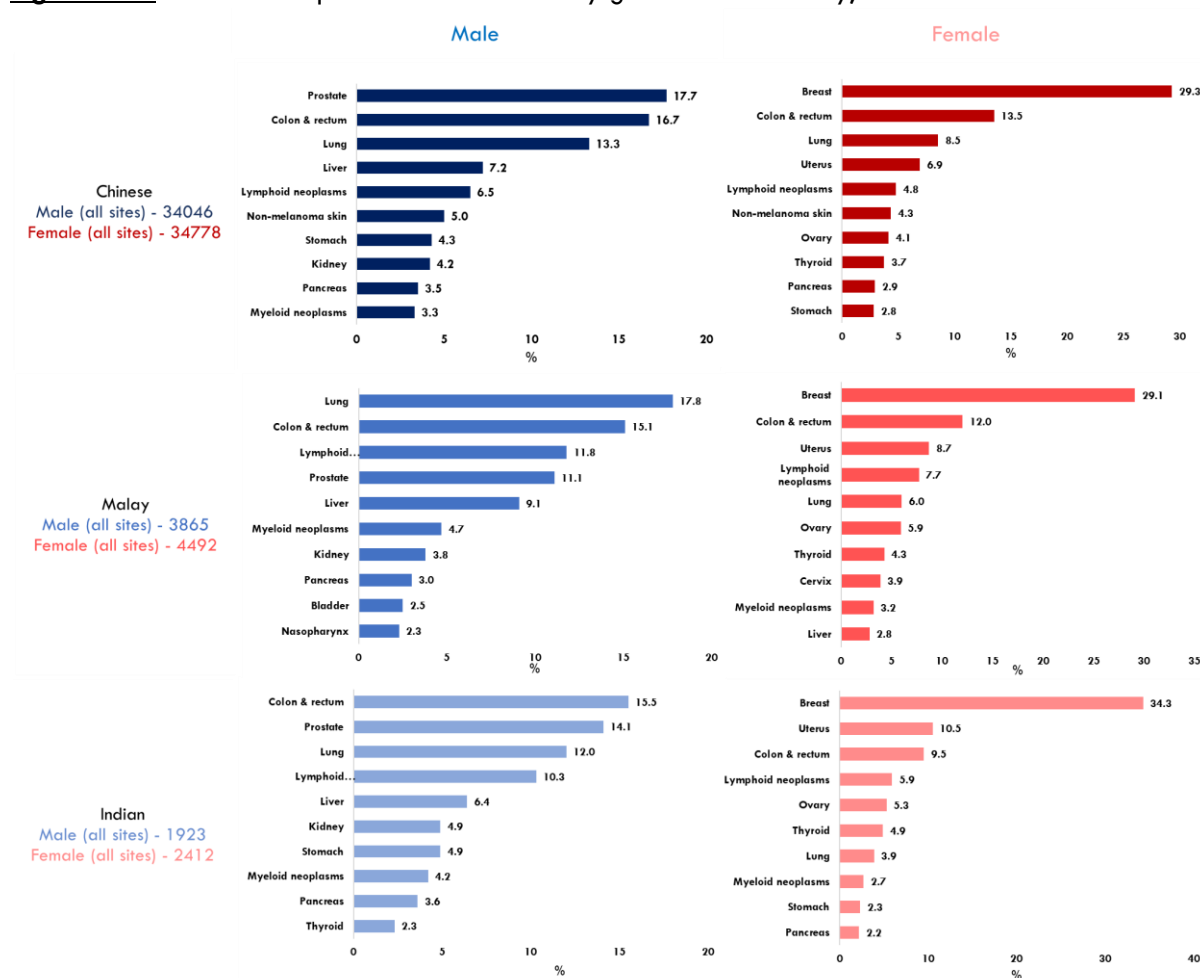
**Table 1.2.2(b)** Mortality number and age-standardised mortality rate (per 100,000 population) of cancer in females by ethnicity, 1968-2021

		1968-1972	1973-1977	1978-1982	1983-1987	1988-1992	1993-1997
Chinese	No.	1909	2843	3787	4531	5614	6131
	ASMR	68.2	88.9	99.7	99.6	100.8	91.9
	(95% CI)	(65.1-71.3)	(85.6-92.2)	(96.5-102.9)	(96.7-102.6)	(98.1-103.5)	(89.5-94.3)
Malay	No.	166	223	291	368	497	640
	ASMR	46.6	58.2	61.4	64.8	71.3	75.9
	(95% CI)	(38.6-54.5)	(49.8-66.6)	(53.7-69.0)	(57.8-71.8)	(64.8-77.8)	(69.8-82.0)
Indian	No.	75	113	151	156	198	228
	ASMR	82.6	90.0	106.6	73.4	71.3	62.4
	(95% CI)	(59.0-106.3)	(70.1-109.9)	(87.0-126.2)	(60.1-86.8)	(60.5-82.1)	(53.5-71.3)
		1998-2002	2003-2007	2008-2012	2013-2017	2018-2021	2017-2021
Chinese	No.	7404	7861	9237	10332	8685	<b>10858</b>
	ASMR	91.5	80.2	74.9	67.8	59.0	<b>60.3</b>
	(95% CI)	(89.3-93.7)	(78.3-82.0)	(73.3-76.5)	(66.4-69.2)	(57.7-60.4)	<b>(59.1-61.5)</b>
Malay	No.	779	887	1165	1447	1366	<b>1687</b>
	ASMR	78.4	75.4	81.0	81.6	82.3	<b>82.3</b>
	(95% CI)	(72.7-84.1)	(70.3-80.6)	(76.2-85.9)	(77.2-85.9)	(77.8-86.8)	<b>(78.3-86.4)</b>
Indian	No.	343	351	511	592	569	<b>690</b>
	ASMR	68.1	53.7	61.3	55.5	52.0	<b>51.6</b>
	(95% CI)	(60.4-75.8)	(47.8-59.5)	(55.8-66.8)	(50.9-60.1)	(47.6-56.3)	<b>(47.7-55.5)</b>

**Table 1.2.2(c)** Mortality number and age-standardised mortality rate (per 100,000 population) of cancer by ethnicity, 1968-2021

		1968-1972	1973-1977	1978-1982	1983-1987	1988-1992	1993-1997
Chinese	No.	5224	7594	9656	11144	13510	14511
	ASMR (95% CI)	100.9 (98.1-103.7)	129.0 (126.0-131.9)	140.2 (137.4-143.0)	136.1 (133.5-138.7)	136.5 (134.2-138.9)	122.3 (120.3-124.4)
Malay	No.	330	523	634	844	1183	1370
	ASMR (95% CI)	45.4 (39.8-50.9)	61.4 (55.6-67.1)	65.5 (60.0-71.0)	73.5 (68.3-78.7)	86.5 (81.5-91.6)	85.0 (80.4-89.6)
Indian	No.	241	350	430	468	557	574
	ASMR (95% CI)	63.2 (52.4-74.0)	78.6 (69.0-88.2)	90.7 (80.9-100.5)	73.8 (66.4-81.1)	67.2 (61.4-73.1)	55.7 (51.0-60.4)
		1998-2002	2003-2007	2008-2012	2013-2017	2018-2021	2017-2021
Chinese	No.	17455	17927	20657	23058	19393	24117
	ASMR (95% CI)	122.7 (120.8-124.5)	103.3 (101.7-104.8)	93.6 (92.3-95.0)	83.2 (82.0-84.3)	71.1 (70.0-72.2)	72.5 (71.5-73.5)
Malay	No.	1647	1891	2353	3052	2850	3534
	ASMR (95% CI)	87.0 (82.7-91.4)	85.9 (81.8-89.9)	88.0 (84.3-91.7)	92.4 (89.0-95.8)	90.3 (86.9-93.7)	91.3 (88.2-94.3)
Indian	No.	739	856	1091	1253	1168	1439
	ASMR (95% CI)	58.4 (54.0-62.8)	61.3 (57.0-65.5)	64.0 (60.0-67.9)	58.5 (55.1-61.8)	54.7 (51.5-57.9)	55.1 (52.2-58.0)

**Figure 1.2.2** Ten most frequent incident cancers by gender and ethnicity, 2017-2021



**Table 1.2.3** Ten most frequent incident cancers by gender and ethnicity, 2017-2021

Ethnicity	Rank	Male			Female		
		Site	No.	%	Site	No.	%
Chinese	1	Prostate	6020	17.7	Female breast	10191	29.3
	2	Colon & rectum	5697	16.7	Colon & rectum	4678	13.5
	3	Lung	4543	13.3	Lung	2952	8.5
	4	Liver	2456	7.2	Uterus	2389	6.9
	5	Lymphoid neoplasms	2224	6.5	Lymphoid neoplasms	1670	4.8
	6	Non-melanoma skin	1693	5.0	Non-melanoma skin	1483	4.3
	7	Stomach	1478	4.3	Ovary	1411	4.1
	8	Kidney	1443	4.2	Thyroid	1294	3.7
	9	Pancreas	1202	3.5	Pancreas	1009	2.9
	10	Myeloid neoplasms	1128	3.3	Stomach	987	2.8
			<b>All sites</b>	<b>34046</b>	<b>100.0</b>	<b>All sites</b>	<b>34778</b>
Malay	1	Lung	688	17.8	Female breast	1309	29.1
	2	Colon & rectum	584	15.1	Colon & rectum	541	12.0
	3	Lymphoid neoplasms	458	11.8	Uterus	391	8.7
	4	Prostate	428	11.1	Lymphoid neoplasms	347	7.7
	5	Liver	352	9.1	Lung	268	6.0
	6	Myeloid neoplasms	180	4.7	Ovary	266	5.9
	7	Kidney	146	3.8	Thyroid	191	4.3
	8	Pancreas	116	3.0	Cervix	175	3.9
	9	Bladder	95	2.5	Myeloid neoplasms	145	3.2
	10	Nasopharynx	90	2.3	Liver	125	2.8
			<b>All sites</b>	<b>3865</b>	<b>100.0</b>	<b>All sites</b>	<b>4492</b>
Indian	1	Colon & rectum	298	15.5	Female breast	827	34.3
	2	Prostate	271	14.1	Uterus	254	10.5
	3	Lung	230	12.0	Colon & rectum	229	9.5
	4	Lymphoid neoplasms	198	10.3	Lymphoid neoplasms	143	5.9
	5	Liver	124	6.4	Ovary	127	5.3
	6	Kidney	95	4.9	Thyroid	119	4.9
	7	Stomach	94	4.9	Lung	95	3.9
	8	Myeloid neoplasms	80	4.2	Myeloid neoplasms	65	2.7
	9	Pancreas	70	3.6	Stomach	55	2.3
	10	Thyroid	45	2.3	Pancreas	54	2.2
			<b>All sites</b>	<b>1923</b>	<b>100.0</b>	<b>All sites</b>	<b>2412</b>

## 1.2 Ethnic trends for incidence and mortality of cancer, 1968-2021

### KEY POINTS

- The age-standardised incidence rate of cancer had decreased for Chinese males (from 258.1 to 242.3 per 100,000 population), but it increased for Malay and Indian males (from 96.2 to 220.0 per 100,000 population, and from 125.4 to 156.9 per 100,000 population respectively) between 1968-1972 and 2017-2021.
- The age-standardised incidence rate of cancer had increased for females from all three ethnic groups between 1968-1972 and 2017-2021 (Chinese: 158.5 to 239.9; Malays: 98.5 to 235.6; Indians: 181.9 to 196.1 per 100,000 population respectively).
- From 1968-1972 to 2017-2021, the age-standardised mortality rate of cancer decreased among Chinese males (from 140.1 to 87.9 per 100,000 population), increased from 45.8 to 103.6 for Malay males, and remained relatively unchanged at 57.8 and 60.0 per 100,000 population for Indian males.
- From 1968-1972 to 2017-2021, the age-standardised mortality rate of cancer fell for Chinese and Indian females (from 68.2 to 60.3 and 82.6 to 51.6 per 100,000 respectively) but increased nearly twofold for Malay females (from 46.6 to 82.3 per 100,000 population).
- Overall, there had been a closing of the ethnic gap for both cancer incidence and mortality, particularly between the Chinese and Malays. It is worth noting that while the Chinese had the highest cancer mortality rate from 1968-1972 to 2008-2012, cancer mortality among the Malays surpassed that of the Chinese to become the highest from 2013-2017 onwards.
- In 2017-2021, among males, colorectal and lung cancers were among the three most frequent incident cancers in all ethnic groups, each accounting for approximately 12-18% of all diagnoses within each ethnic group.
- In 2017-2021, breast cancer was by far the leading cancer diagnosed among females across all three ethnic groups, accounting for about 29-35% of all diagnoses within each ethnic group.

## 1.3 Age group trends

### *Incidence and mortality of cancer by gender and age group, 1968-2021*

Between 1968-1972 and 2017-2021, the proportion of all cancer diagnoses among the younger age groups had fallen; while that among the older age groups had correspondingly increased (Figure 1.3.1(a)-(c)). This pattern was observed for both males and females, resulting in an increase in the median age at cancer diagnosis for both genders (Table 1.3.1(a)-(c)). This observed trend is linked to an increase in life expectancy over the years as more individuals live past their 80s, when age-specific incidence rate of cancer is at its highest (Table 1.3.2(a)-(c)) (22) (23).

Among males, the proportion of individuals diagnosed with cancer under 40 years old had fallen from 12.1% in 1968-1972 to 4.2% in 2017-2021 (Table 1.3.1(a)). In contrast, the proportion of diagnoses at ages 70 years and above had risen from 15.7% to 44.3% over the same period. Across the years, individuals aged 60-69 years made up the largest proportion of newly diagnosed cancer patients in almost every five-year period. The median age at diagnosis for males had risen from 59.6 years in 1968-1972 to 68.4 years in 2017-2021.

Among females, 16.9% of all cancer diagnoses occurred under the age of 40 years in 1968-1972, and this had fallen to 7.2% in 2017-2021 (Table 1.3.1(b)). Correspondingly, the proportion of diagnoses among those aged 70 years and above had risen from 17% to 34.3% over the same period. Similar to the trends observed for their male counterparts, the 60-69 years age band was also generally the largest age group among females diagnosed with cancer across most five-year periods from 1968-2021. The median age at diagnosis for females had also risen from 57.3 years in 1968-1972 to 63.7 years in 2017-2021. However, the median age at diagnosis for females remained lower than that of males for every five-year period.

Overall, the proportion of individuals diagnosed with cancer at the age of 70 years and above had doubled from 16.3% in 1968-1972 to 39.2% in 2017-2021, and the median age at diagnosis had thus increased from 58.7 years to 66.4 years during this period (Table 1.3.1(c)).

The risk of developing and dying from cancer increases with age, as shown by the increase in both the age-specific incidence and mortality rates of cancer for both genders (Figure 1.3.2). In 2017-2021, while females had higher age-specific incidence rates of cancer for individuals below 60 years old as compared to males, the age-specific incidence rates of cancer among males increased sharply after 60 years of age and overtook those of females (Table 1.3.2(a), Table 1.3.2(b)).

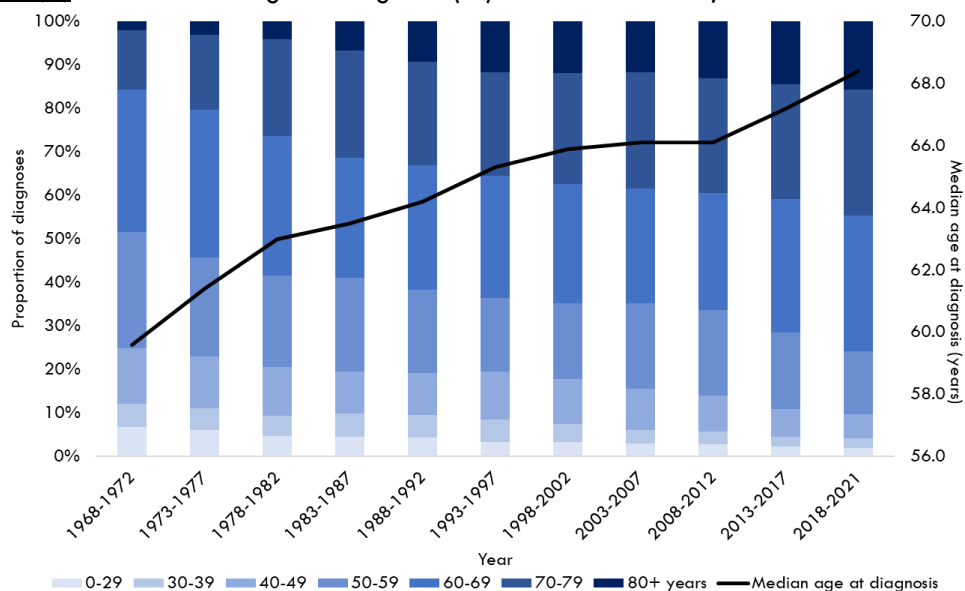
In 2017-2021, the age-specific incidence rate of cancer among males under 30 years old was 24.1 per 100,000 population, and this rose to 2883.5 per 100,000 population among the oldest age group of 80 years and above (Table 1.3.2(a)). Similarly, the age-specific incidence rate of cancer among females also rose from 29.5 per 100,000 for those below 30 years old to 1773.9 per 100,000 population from those aged 80 and above (Table 1.3.2(b)). Like the age-specific incidence trends, the age-specific cancer mortality rates increased from 2.7 and 2.1 per 100,000 population for males and females under 30 years old to 1872.1 and 1153.9 per 100,000 population respectively for males and females aged 80 years and above. While the age-specific mortality rates of cancer in males and females were similar before 60 years of age, like the age-specific incidence trends, the age-specific mortality rates of cancer among males also surpassed those of females thereafter.

### *Ten most frequent incident cancers by gender and age group, 2017-2021*

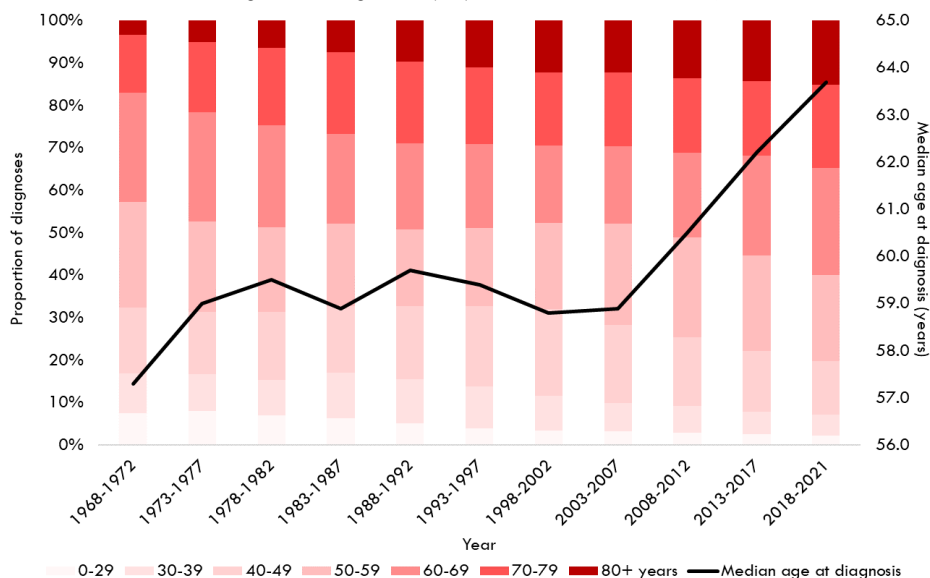
The pattern of the ten most frequent incident cancers for males and females also differed by age group (Figure 1.3.3, Table 1.3.3). In the period 2017-2021, lymphoid neoplasms were the most common diagnosis in males below 30 years old, accounting for about one in three cancer diagnoses in this age group. Lung cancer, while less common in younger males, was the most common diagnosis in males aged 80 years and above, accounting for about one in six incident cancers among males in that age group. The two other most common cancers diagnosed in males 50 years and above were colorectal and prostate cancers.

Among females, lymphoid neoplasms were also the most common diagnosis for those below 30 years old, accounting for about one-fifth of all incident cases of cancer in that age group. Between the ages of 30 to 79 years, breast cancer was the most common diagnosis and accounted for nearly half of all cancer diagnoses within the 40-49 years age band. As with males, colorectal and lung cancers were also more common among older females.

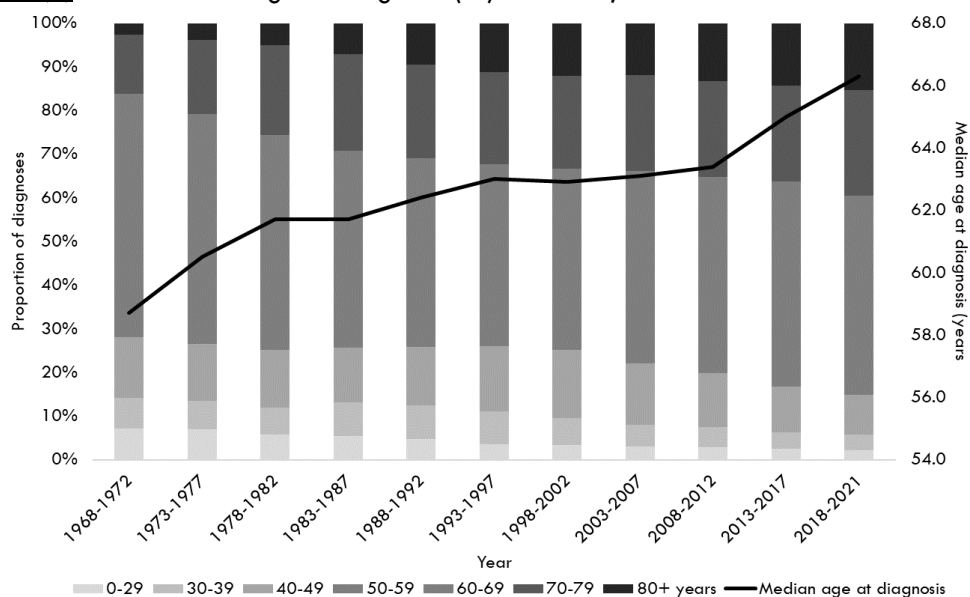
**Figure 1.3.1(a)** Distribution of age at diagnosis (%) of cancer in males, 1968-2021



**Figure 1.3.1(b)** Distribution of age at diagnosis (%) of cancer in females, 1968-2021



**Figure 1.3.1(c)** Distribution of age at diagnosis (%) of cancer, 1968-2021



**Table 1.3.1(a)** Distribution of age at diagnosis (%) of cancer in males, 1968-2021

Age group	1968-1972	1973-1977	1978-1982	1983-1987	1988-1992	1993-1997
0-29 years	6.8	6.0	4.7	4.6	4.3	3.3
30-39 years	5.3	5.0	4.7	5.3	5.2	5.2
40-49 years	12.7	12.0	11.1	9.7	9.7	11.0
50-59 years	26.8	22.6	21.1	21.4	19.0	17.0
60-69 years	32.7	34.0	32.1	27.7	28.7	28.0
70-79 years	13.7	17.3	22.2	24.6	23.7	23.9
80+ years	2.0	3.0	4.1	6.7	9.3	11.7
<b>Median age at diagnosis (years)</b>	<b>59.6</b>	<b>61.4</b>	<b>63.0</b>	<b>63.5</b>	<b>64.1</b>	<b>65.3</b>
Age group	1998-2002	2003-2007	2008-2012	2013-2017	2018-2021	2017-2021
0-29 years	3.3	2.9	2.8	2.3	2.0	<b>2.0</b>
30-39 years	4.2	3.1	3.0	2.3	2.2	<b>2.2</b>
40-49 years	10.3	9.5	8.2	6.3	5.5	<b>5.5</b>
50-59 years	17.4	19.7	19.7	17.6	14.4	<b>14.7</b>
60-69 years	27.4	26.4	26.8	30.6	31.3	<b>31.3</b>
70-79 years	25.4	26.6	26.4	26.4	28.9	<b>28.6</b>
80+ years	11.9	11.7	13.0	14.5	15.7	<b>15.7</b>
<b>Median age at diagnosis (years)</b>	<b>65.9</b>	<b>66.1</b>	<b>66.1</b>	<b>67.2</b>	<b>68.5</b>	<b>68.4</b>

**Table 1.3.1(b)** Distribution of age at diagnosis (%) of cancer in females, 1968-2021

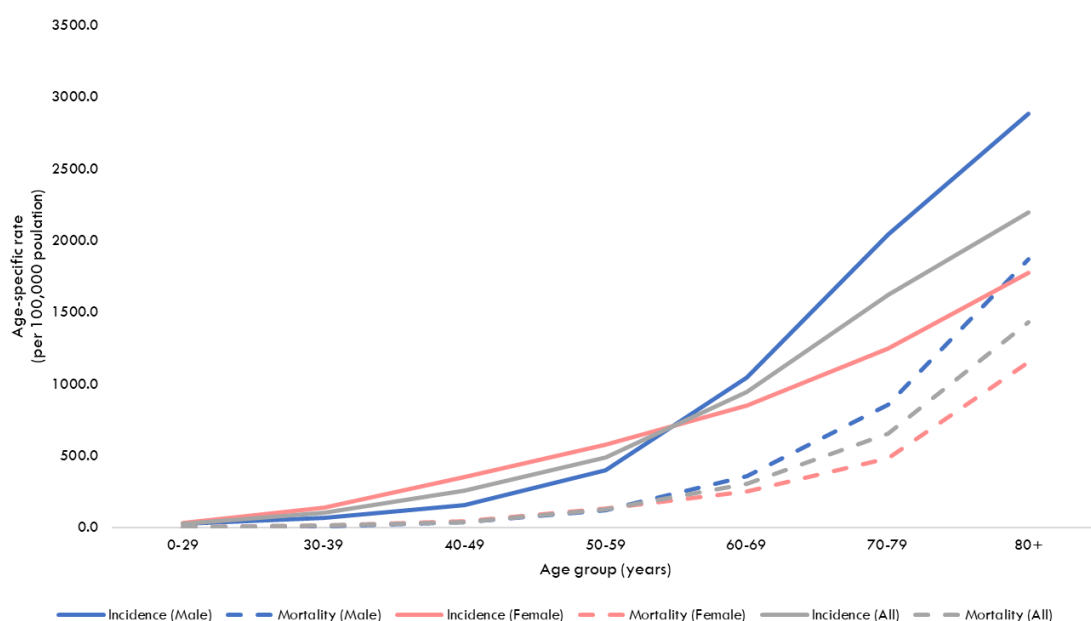
Age group	1968-1972	1973-1977	1978-1982	1983-1987	1988-1992	1993-1997
0-29 years	7.6	8.1	7.0	6.4	5.1	3.9
30-39 years	9.3	8.7	8.4	10.7	10.5	9.9
40-49 years	15.5	14.6	15.9	15.7	17.1	18.9
50-59 years	24.8	21.4	19.9	19.3	18.2	18.4
60-69 years	25.7	25.7	24.0	21.2	20.3	19.8
70-79 years	13.7	16.5	18.3	19.2	19.2	18.1
80+ years	3.3	5.1	6.4	7.4	9.7	11.0
<b>Median age at diagnosis (years)</b>	<b>57.3</b>	<b>59.0</b>	<b>59.5</b>	<b>58.9</b>	<b>59.7</b>	<b>59.4</b>
Age group	1998-2002	2003-2007	2008-2012	2013-2017	2018-2021	2017-2021
0-29 years	3.5	3.3	3.0	2.6	2.2	<b>2.3</b>
30-39 years	8.1	6.7	6.2	5.2	4.9	<b>4.9</b>
40-49 years	20.5	18.4	16.3	14.3	12.7	<b>12.9</b>
50-59 years	20.3	23.9	23.5	22.5	20.2	<b>20.6</b>
60-69 years	18.2	18.2	19.8	23.5	25.2	<b>25.0</b>
70-79 years	17.2	17.4	17.6	17.6	19.6	<b>19.4</b>
80+ years	12.3	12.2	13.6	14.2	15.1	<b>14.9</b>
<b>Median age at diagnosis (years)</b>	<b>58.8</b>	<b>58.9</b>	<b>60.5</b>	<b>62.2</b>	<b>63.9</b>	<b>63.7</b>

**Table 1.3.1(c)** Distribution of age at diagnosis (%) of cancer, 1968-2021

Age group	1968-1972	1973-1977	1978-1982	1983-1987	1988-1992	1993-1997
0-29 years	7.2	6.9	5.7	5.4	4.7	3.6
30-39 years	7.0	6.5	6.3	7.8	7.8	7.5
40-49 years	13.9	13.1	13.2	12.5	13.3	14.9
50-59 years	25.9	22.1	20.6	20.4	18.6	17.7
60-69 years	29.8	30.5	28.5	24.7	24.7	24.0
70-79 years	13.7	17.0	20.5	22.1	21.5	21.0
80+ years	2.6	3.9	5.1	7.1	9.5	11.3
<b>Median age at diagnosis (years)</b>	<b>58.7</b>	<b>60.5</b>	<b>61.7</b>	<b>61.7</b>	<b>62.4</b>	<b>63.0</b>
Age group	1998-2002	2003-2007	2008-2012	2013-2017	2018-2021	2017-2021
0-29 years	3.4	3.1	2.9	2.5	2.1	<b>2.1</b>
30-39 years	6.2	4.9	4.6	3.8	3.6	<b>3.6</b>
40-49 years	15.5	14.1	12.4	10.4	9.2	<b>9.3</b>
50-59 years	18.9	21.9	21.7	20.1	17.4	<b>17.7</b>
60-69 years	22.7	22.2	23.2	27.0	28.2	<b>28.1</b>
70-79 years	21.2	21.8	21.9	21.8	24.2	<b>23.9</b>
80+ years	12.1	12.0	13.3	14.4	15.4	<b>15.3</b>
<b>Median age at diagnosis (years)</b>	<b>62.9</b>	<b>63.1</b>	<b>63.4</b>	<b>65.0</b>	<b>66.5</b>	<b>66.4</b>



**Figure 1.3.2** Age-specific incidence and mortality rate (per 100,000 population) of cancer by gender, 2017-2021



**Table 1.3.2(a)** Age-specific incidence and mortality number and rate (per 100,000 population) of cancer in males, 2017-2021

		0-29 years	30-39 years	40-49 years	50-59 years	60-69 years	70-79 years	80+ years
Incidence	No.	821	901	2259	6052	12889	11761	6443
	Age-specific rate (95% CI)	24.1 (22.4-25.7)	63.9 (59.7-68.1)	153.2 (146.9-159.5)	401.6 (391.5-411.7)	1043.7 (1025.7-1061.7)	2043.4 (2006.4-2080.3)	2883.5 (2813.1-2953.9)
Mortality	No.	93	126	505	1844	4444	4908	4183
	Age-specific rate (95% CI)	2.7 (2.2-3.3)	8.9 (7.4-10.5)	34.3 (31.3-37.2)	122.4 (116.8-128.0)	359.9 (349.3-370.4)	852.7 (828.9-876.6)	1872.1 (1815.3-1928.8)

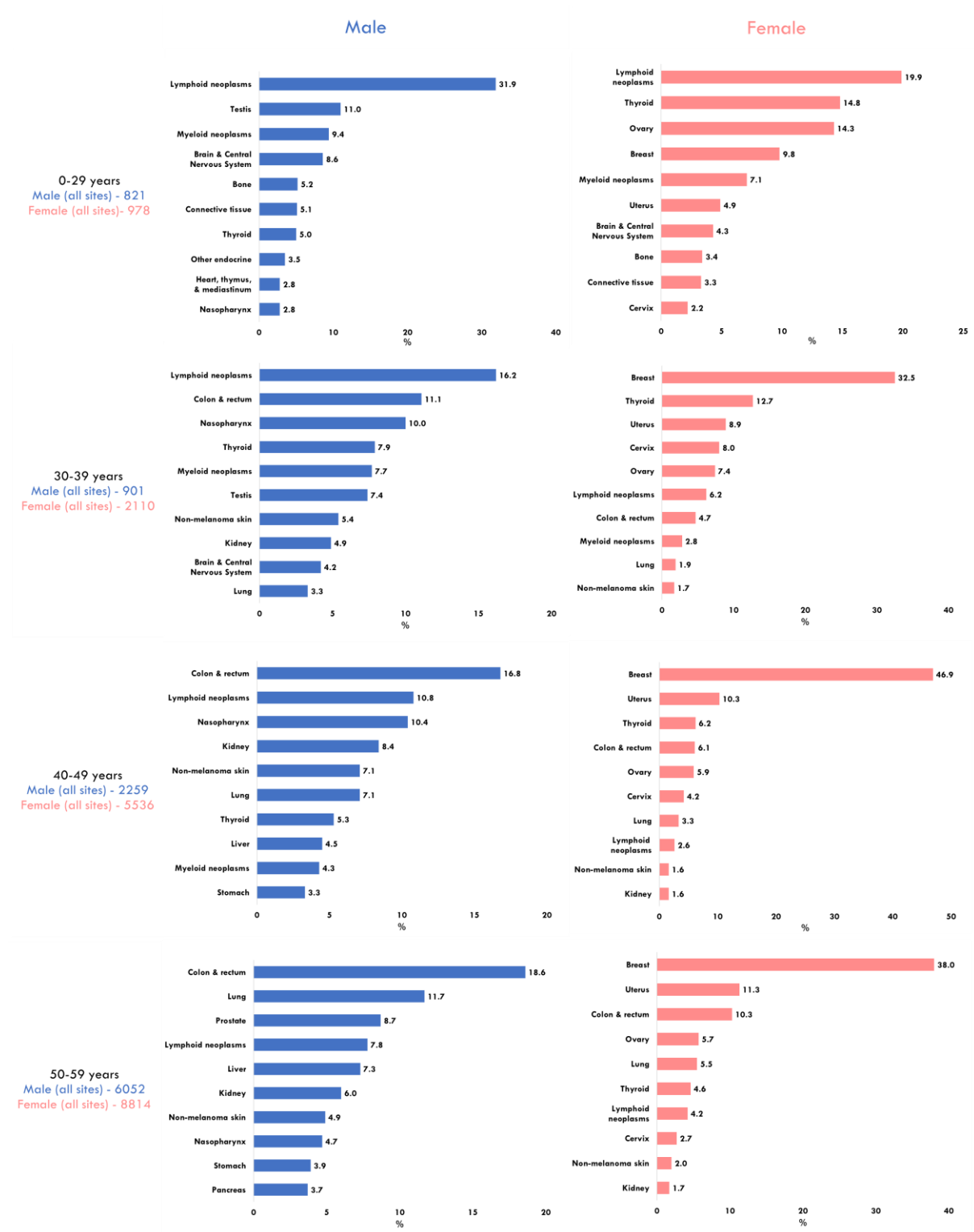
**Table 1.3.2(b)** Age-specific incidence and mortality number and rate (per 100,000 population) of cancer in females, 2017-2021

		0-29 years	30-39 years	40-49 years	50-59 years	60-69 years	70-79 years	80+ years
Incidence	No.	978	2110	5536	8814	10740	8309	6389
	Age-specific rate (95% CI)	29.5 (27.6-31.3)	135.7 (129.9-141.5)	350.5 (341.2-359.7)	578.3 (566.2-590.4)	848.6 (832.6-864.7)	1249.8 (1222.9-1276.6)	1773.9 (1730.4-1817.4)
Mortality	No.	69	185	645	2009	3133	3222	4156
	Age-specific rate (95% CI)	2.1 (1.6-2.6)	11.9 (10.2-13.6)	40.8 (37.7-44.0)	131.8 (126.0-137.6)	247.6 (238.9-256.2)	484.6 (467.9-501.4)	1153.9 (1118.8-1189.0)

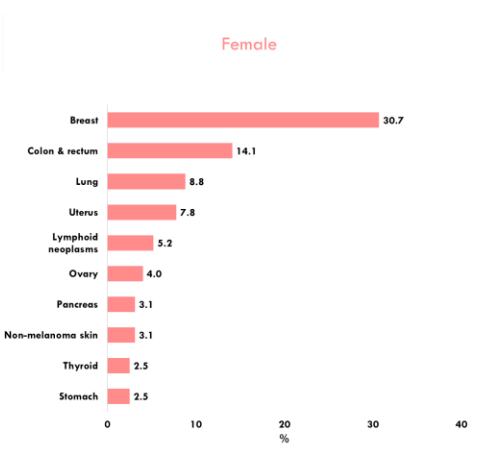
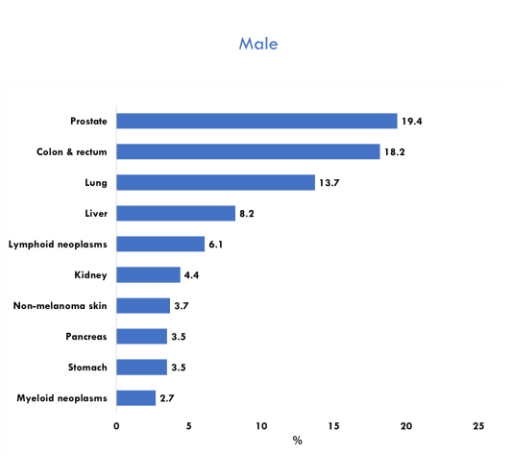
**Table 1.3.2(c)** Age-specific incidence and mortality number and rate (per 100,000 population) of cancer, 2017-2021

		0-29 years	30-39 years	40-49 years	50-59 years	60-69 years	70-79 years	80+ years
Incidence	No.	1799	3011	7795	14866	23629	20070	12832
	Age-specific rate (95% CI)	26.7 (25.5-28.0)	101.5 (97.9-105.2)	255.2 (249.6-260.9)	490.5 (482.6-498.3)	945.0 (932.9-957.0)	1618.0 (1595.6-1640.4)	2198.7 (2160.7-2236.8)
Mortality	No.	162	311	1150	3853	7577	8130	8339
	Age-specific rate (95% CI)	2.4 (2.0-2.8)	10.5 (9.3-11.7)	37.7 (35.5-39.8)	127.1 (123.1-131.1)	303.0 (296.2-309.8)	655.4 (641.2-669.7)	1428.9 (1398.2-1459.5)

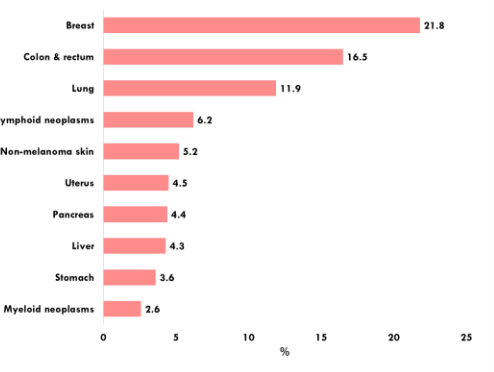
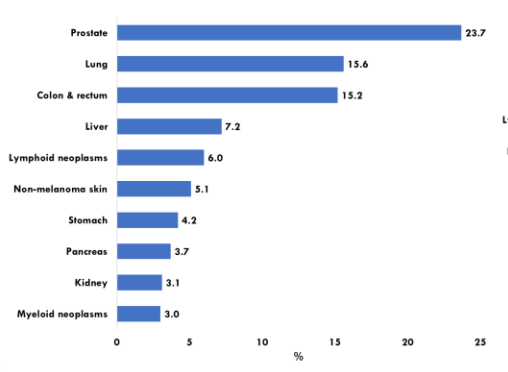
**Figure 1.3.3** Ten most frequent incident cancers by gender and age group, 2017-2021



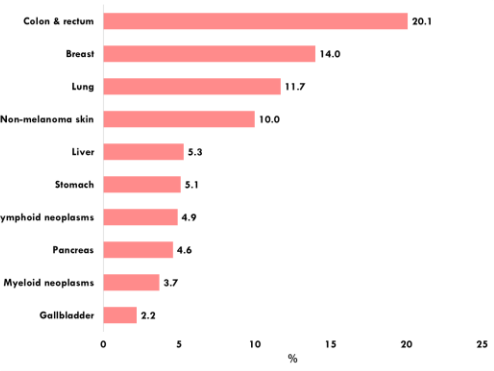
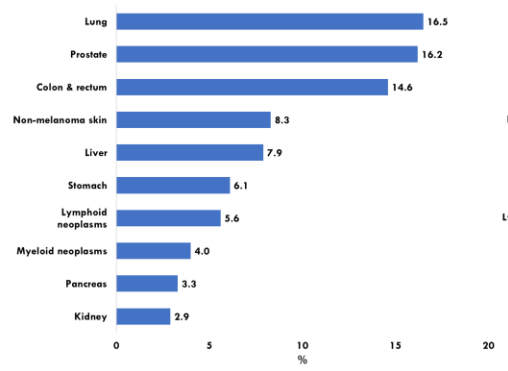
60-69 years  
 Male (all sites) - 12889  
 Female (all sites) - 10740



70-79 years  
 Male (all sites) - 11761  
 Female (all sites) - 8309



80 years+  
 Male (all sites) - 6443  
 Female (all sites) - 6389



**Table 1.3.3** Ten most frequent incident cancers by gender and age group, 2017-2021

Age group	Rank	Male			Female		
		Site	No.	%	Site	No.	%
0-29 years	1	Lymphoid neoplasms	262	31.9	Lymphoid neoplasms	195	19.9
	2	Testis	90	11.0	Thyroid	145	14.8
	3	Myeloid neoplasms	77	9.4	Ovary	140	14.3
	4	Brain & Central Nervous System	71	8.6	Breast	96	9.8
	5	Bone	43	5.2	Myeloid neoplasms	69	7.1
	6	Connective tissue	42	5.1	Uterus	48	4.9
	7	Thyroid	41	5.0	Brain & Central Nervous System	42	4.3
	8	Other endocrine	29	3.5	Bone	33	3.4
	9	Nasopharynx	23	2.8	Connective tissue	32	3.3
	10	Heart, thymus, & mediastinum	23	2.8	Cervix	22	2.2
		<b>All sites</b>	<b>821</b>	<b>100.0</b>	<b>All sites</b>	<b>978</b>	<b>100.0</b>
30-39 years	1	Lymphoid neoplasms	146	16.2	Breast	686	32.5
	2	Colon & rectum	100	11.1	Thyroid	269	12.7
	3	Nasopharynx	90	10.0	Uterus	187	8.9
	4	Thyroid	71	7.9	Cervix	169	8.0
	5	Myeloid neoplasms	69	7.7	Ovary	157	7.4
	6	Testis	67	7.4	Lymphoid neoplasms	131	6.2
	7	Non-melanoma skin	49	5.4	Colon & rectum	100	4.7
	8	Kidney	44	4.9	Myeloid neoplasms	60	2.8
	9	Brain & Central Nervous System	38	4.2	Lung	40	1.9
	10	Lung	30	3.3	Non-melanoma skin	35	1.7
		<b>All sites</b>	<b>901</b>	<b>100.0</b>	<b>All sites</b>	<b>2110</b>	<b>100.0</b>
40-49 years	1	Colon & rectum	380	16.8	Breast	2597	46.9
	2	Lymphoid neoplasms	244	10.8	Uterus	568	10.3
	3	Nasopharynx	235	10.4	Thyroid	343	6.2
	4	Kidney	189	8.4	Colon & rectum	340	6.1
	5	Lung	161	7.1	Ovary	328	5.9
	6	Non-melanoma skin	161	7.1	Cervix	233	4.2
	7	Thyroid	120	5.3	Lung	180	3.3
	8	Liver	102	4.5	Lymphoid neoplasms	142	2.6
	9	Myeloid neoplasms	98	4.3	Non-melanoma skin	87	1.6
	10	Stomach	74	3.3	Kidney	86	1.6
		<b>All sites</b>	<b>2259</b>	<b>100.0</b>	<b>All sites</b>	<b>5536</b>	<b>100.0</b>
50-59 years	1	Colon & rectum	1124	18.6	Breast	3352	38.0
	2	Lung	707	11.7	Uterus	996	11.3
	3	Prostate	526	8.7	Colon & rectum	910	10.3
	4	Lymphoid neoplasms	473	7.8	Ovary	502	5.7
	5	Liver	443	7.3	Lung	481	5.5
	6	Kidney	363	6.0	Thyroid	409	4.6
	7	Non-melanoma skin	295	4.9	Lymphoid neoplasms	371	4.2
	8	Nasopharynx	286	4.7	Cervix	235	2.7
	9	Stomach	236	3.9	Non-melanoma skin	173	2.0
	10	Pancreas	224	3.7	Kidney	153	1.7
		<b>All sites</b>	<b>6052</b>	<b>100.0</b>	<b>All sites</b>	<b>8814</b>	<b>100.0</b>
60-69 years	1	Prostate	2506	19.4	Breast	3292	30.7
	2	Colon & rectum	2346	18.2	Colon & rectum	1517	14.1
	3	Lung	1765	13.7	Lung	945	8.8
	4	Liver	1061	8.2	Uterus	837	7.8
	5	Lymphoid neoplasms	791	6.1	Lymphoid neoplasms	557	5.2
	6	Kidney	568	4.4	Ovary	428	4.0
	7	Non-melanoma skin	481	3.7	Pancreas	334	3.1
	8	Stomach	455	3.5	Non-melanoma skin	333	3.1
	9	Pancreas	455	3.5	Thyroid	271	2.5
	10	Myeloid neoplasms	352	2.7	Stomach	268	2.5
		<b>All sites</b>	<b>12889</b>	<b>100.0</b>	<b>All sites</b>	<b>10740</b>	<b>100.0</b>
70-79 years	1	Prostate	2790	23.7	Breast	1815	21.8
	2	Lung	1832	15.6	Colon & rectum	1373	16.5
	3	Colon & rectum	1784	15.2	Lung	991	11.9
	4	Liver	847	7.2	Lymphoid neoplasms	514	6.2
	5	Lymphoid neoplasms	710	6.0	Non-melanoma skin	436	5.2
	6	Non-melanoma skin	601	5.1	Uterus	370	4.5
	7	Stomach	495	4.2	Pancreas	369	4.4
	8	Pancreas	441	3.7	Liver	358	4.3
	9	Kidney	369	3.1	Stomach	296	3.6
	10	Myeloid neoplasms	358	3.0	Myeloid neoplasms	217	2.6
		<b>All sites</b>	<b>11761</b>	<b>100.0</b>	<b>All sites</b>	<b>8309</b>	<b>100.0</b>
80+ years	1	Lung	1064	16.5	Colon & rectum	1285	20.1
	2	Prostate	1044	16.2	Breast	897	14.0
	3	Colon & rectum	942	14.6	Lung	745	11.7
	4	Non-melanoma skin	537	8.3	Non-melanoma skin	641	10.0
	5	Liver	511	7.9	Liver	338	5.3
	6	Stomach	394	6.1	Stomach	329	5.1
	7	Lymphoid neoplasms	360	5.6	Lymphoid neoplasms	311	4.9
	8	Myeloid neoplasms	256	4.0	Pancreas	292	4.6
	9	Pancreas	214	3.3	Myeloid neoplasms	234	3.7
	10	Kidney	188	2.9	Gallbladder	139	2.2
		<b>All sites</b>	<b>6443</b>	<b>100.0</b>	<b>All sites</b>	<b>6389</b>	<b>100.0</b>

### 1.3 Age group trends for incidence and mortality of cancer, 1968-2021

#### KEY POINTS

- There had been a shift towards a greater proportion of cancer diagnoses among the older age groups. The proportion of diagnoses at the age of 70 years and above had risen from 15.7% in 1968-1972 to 44.3% in 2017-2021 for males, and from 17% to 34.3% in females during this period.
- From 1968-1972 to 2017-2021, while the median age at diagnosis for cancer had risen for both genders (males: 59.6 to 68.4 years; females: 57.3 to 63.7 years), it was observed to be consistently higher for males than females for every five-year period.
- Individuals aged 60-69 years made up the largest age group among all cancer diagnoses for both males and females for most of the five-year periods.
- Age-specific incidence and mortality rates rose with age.
- In 2017-2021, lymphoid neoplasms was the most common diagnosis in younger males while lung, colorectal, and prostate cancers were more common among older males.
- In 2017-2021, breast cancer was the most common diagnosis in females aged 30 – 79 years; colorectal and lung cancers were also common among older females.

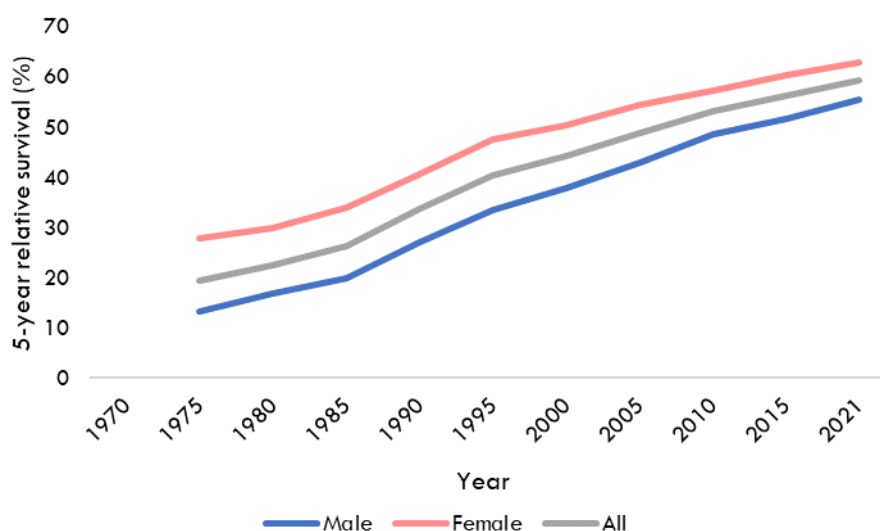
## (2) TRENDS IN CANCER SURVIVAL, 1968-2021

### 2.1 Five-year age-standardised relative survival (ASRS) of cancer, 1968-2021

#### 2.1.1 Gender trends

The five-year age-standardised relative survival (ASRS) of all cancers had improved for males and females over the years (Figure 2.1.1, Table 2.1.1). The five-year ASRS increased from 13.2% to 55.4% for males from 1973-1977 to 2017-2021 and rose from 28% to 63% for females over the same period. Notably, the five-year ASRS in every five-year period was higher for females than for males.

**Figure 2.1.1** Five-year age-standardised relative survival rate (%) of cancer by gender, 1968-2021



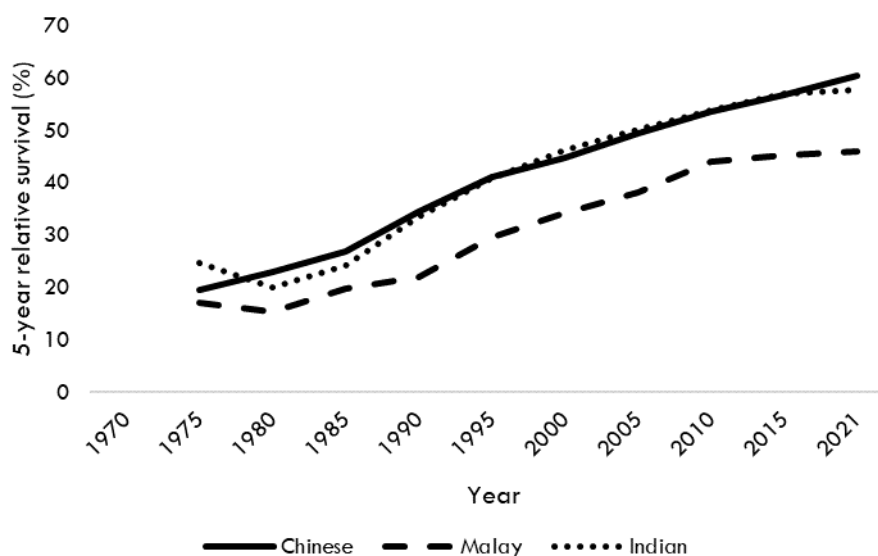
**Table 2.1.1** Five-year age-standardised relative survival rate (%) of cancer by gender, 1968-2021

		1968-1972	1973-1977	1978-1982	1983-1987	1988-1992	1993-1997
Male	5-year ASRS	-	13.2	16.8	19.9	27.1	33.4
	(95% CI)	-	(12.3-14.1)	(15.9-17.7)	(19.0-20.8)	(26.2-28.1)	(32.5-34.3)
Female	5-year ASRS	-	28.0	30.0	34.1	40.8	47.7
	(95% CI)	-	(26.6-29.5)	(28.7-31.3)	(32.9-35.2)	(39.8-41.9)	(46.7-48.6)
All	5-year ASRS	-	19.5	22.5	26.4	33.8	40.4
	(95% CI)	-	(18.7-20.3)	(21.8-23.3)	(25.7-27.2)	(33.0-34.5)	(39.8-41.1)
		1998-2002	2003-2007	2008-2012	2013-2017	2018-2021	2017-2021
Male	5-year ASRS	38.0	43.0	48.7	51.6	55.5	55.4
	(95% CI)	(37.2-38.9)	(42.2-43.8)	(48.0-49.4)	(50.9-52.2)	(54.9-56.2)	(54.8-56.0)
Female	5-year ASRS	50.5	54.5	57.4	60.5	62.9	63.0
	(95% CI)	(49.7-51.3)	(53.8-55.3)	(56.8-58.1)	(59.9-61.1)	(62.4-63.5)	(62.5-63.5)
All	5-year ASRS	44.4	48.9	53.2	56.2	59.3	59.3
	(95% CI)	(43.8-45.0)	(48.4-49.5)	(52.7-53.7)	(55.8-56.6)	(58.9-59.8)	(59.0-59.7)

#### 2.1.2 Ethnic trends

From 1973-1977 onwards, the five-year ASRS of cancer has increased for all three ethnic groups (Figure 2.1.2, Table 2.1.2). From 1973-1977 to 2017-2021, the five-year ASRS of cancer rose from 19.6% to 60.5%, 17.0% to 46.0%, and 24.6% to 57.9% for the Chinese, Malays and Indians respectively. Aside from some fluctuation in the five-year ASRS during the earlier time periods, the survival rates of cancer for the Chinese and Indians remained fairly similar. However, the Malays consistently had the lowest five-year ASRS throughout the years.

**Figure 2.1.2** Five-year age-standardised relative survival rate (%) of cancer by ethnicity, 1968-2021



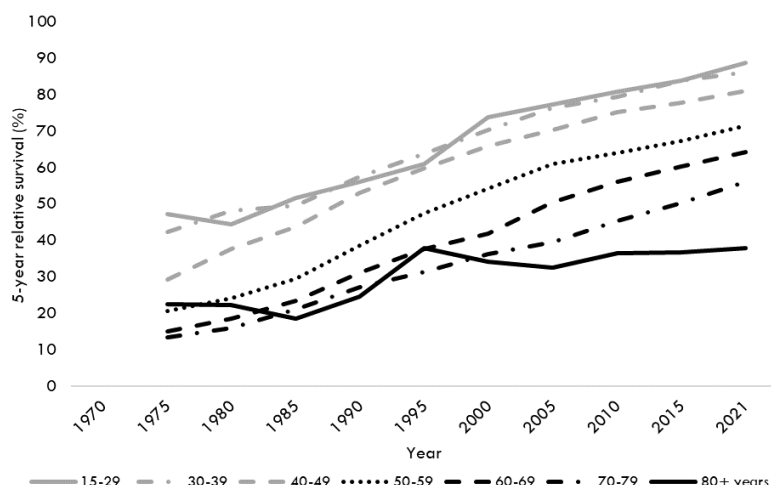
**Table 2.1.2** Five-year age-standardised relative survival rate (%) of cancer by ethnicity, 1968-2021

		1968-1972	1973-1977	1978-1982	1983-1987	1988-1992	1993-1997
Chinese	5-year ASRS	-	19.6	23.0	26.8	34.4	41.2
	(95% CI)	-	(18.7-20.5)	(22.1-23.8)	(26.0-27.6)	(33.7-35.2)	(40.4-41.9)
Malay	5-year ASRS	-	17.0	15.4	19.7	22.1	29.5
	(95% CI)	-	(13.8-20.6)	(12.9-18.2)	(17.3-22.3)	(19.8-24.5)	(27.4-31.6)
Indian	5-year ASRS	-	24.6	20.1	24.3	33.4	40.8
	(95% CI)	-	(19.9-29.6)	(16.7-23.7)	(20.7-28.1)	(29.7-37.2)	(37.4-44.2)
		1998-2002	2003-2007	2008-2012	2013-2017	2018-2021	2017-2021
Chinese	5-year ASRS	44.9	49.5	53.5	56.9	60.5	<b>60.5</b>
	(95% CI)	(44.3-45.6)	(49.0-50.1)	(53.0-54.1)	(56.4-57.4)	(60.0-61.0)	<b>(60.1-61.0)</b>
Malay	5-year ASRS	34.3	38.2	44.1	45.2	46.1	<b>46.0</b>
	(95% CI)	(32.4-36.2)	(36.5-39.9)	(42.5-45.6)	(43.9-46.6)	(44.8-47.4)	<b>(44.8-47.2)</b>
Indian	5-year ASRS	46.3	50.1	53.8	57.1	57.8	<b>57.9</b>
	(95% CI)	(43.4-49.2)	(47.4-52.7)	(51.6-56.0)	(55.2-59.0)	(55.9-59.7)	<b>(56.2-59.6)</b>

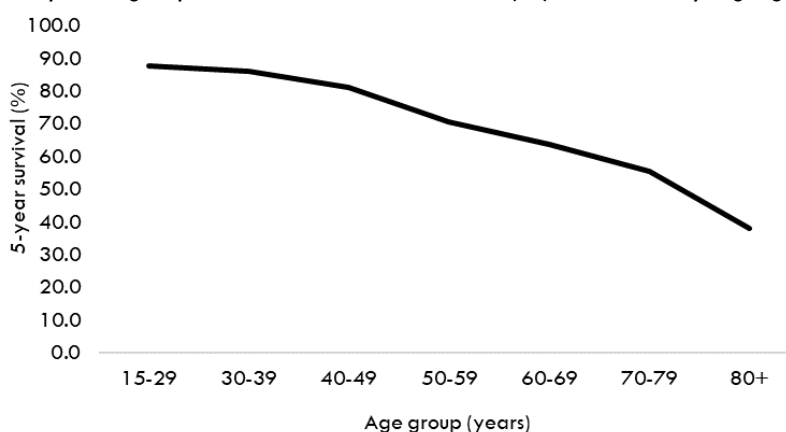
### 2.1.3 Age group trends

The five-year ASRS of cancer had seen an overall increase across all the different age groups. This was so even among the oldest age groups (70-79 years and 80 years and above), where relative survival rose from 13.3% in 1973-1977 to 55.5% in 2017-2021 for the former and from 22.4% to 37.9% over the same period for the latter (Figure 2.1.3(a), Table 2.1.3). In the 2017-2021 period, the five-year ASRS of cancer was observed to decrease with age, particularly after the age of 49 years, dropping from 87.7% among individuals under 30 years of age to 70.6% for those aged 50-59 years, and further dropping to 37.9% in those aged 80 years and above (Figure 2.1.3(b), Table 2.1.3).

**Figure 2.1.3(a)** Five-year age-specific relative survival rate (%) of cancer by age group, 1968-2021



**Figure 2.1.3(b)** Five-year age-specific relative survival rate (%) of cancer by age group, 2017-2021



**Table 2.1.3** Five-year age-specific relative survival rate (%) of cancer by age group, 1968-2021

		15-29 years	30-39 years	40-49 years	50-59 years	60-69 years	70-79 years	80+ years
1968-1972	5-year ASRS	-	-	-	-	-	-	-
	(95% CI)	-	-	-	-	-	-	-
1973-1977	5-year ASRS	47.2	42.2	29.1	20.7	15.0	13.3	22.4
	(95% CI)	(42.7-51.7)	(38.5-45.8)	(26.8-31.4)	(19.1-22.3)	(13.8-16.3)	(11.5-15.3)	(15.0-31.7)
1978-1982	5-year ASRS	44.4	48.0	37.5	24.1	18.4	16.0	22.2
	(95% CI)	(40.5-48.3)	(44.7-51.3)	(35.3-39.8)	(22.5-25.7)	(17.1-19.7)	(14.4-17.8)	(16.9-28.5)
1983-1987	5-year ASRS	51.6	49.4	43.6	29.4	23.3	21.0	18.5
	(95% CI)	(47.6-55.4)	(46.6-52.2)	(41.4-45.7)	(27.9-31.0)	(21.9-24.7)	(19.4-22.7)	(15.0-22.5)
1988-1992	5-year ASRS	56.1	57.4	52.9	38.5	31.0	27.2	24.6
	(95% CI)	(52.3-59.8)	(54.9-59.7)	(51.0-54.8)	(36.9-40.0)	(29.6-32.4)	(25.6-28.8)	(21.2-28.3)
1993-1997	5-year ASRS	60.8	63.7	59.8	47.3	37.5	31.3	37.8
	(95% CI)	(56.9-64.5)	(61.5-65.7)	(58.2-61.4)	(45.8-48.8)	(36.3-38.8)	(29.8-32.8)	(34.6-41.2)
1998-2002	5-year ASRS	73.8	70.2	65.7	54.2	41.7	36.1	34.2
	(95% CI)	(70.5-76.9)	(68.3-72.1)	(64.4-67.0)	(52.9-55.4)	(40.6-42.9)	(34.8-37.4)	(32.0-36.5)
2003-2007	5-year ASRS	77.2	76.3	70.1	60.9	50.5	39.5	32.5
	(95% CI)	(74.1-79.9)	(74.5-78.1)	(68.9-71.2)	(59.9-62.0)	(49.3-51.6)	(38.3-40.7)	(30.5-34.4)
2008-2012	5-year ASRS	80.8	79.2	75.2	63.9	55.9	45.3	36.5
	(95% CI)	(78.1-83.3)	(77.5-80.9)	(74.1-76.2)	(63.0-64.8)	(54.9-56.9)	(44.2-46.4)	(34.8-38.3)
2013-2017	5-year ASRS	83.6	83.7	77.6	67.2	60.1	50.1	36.6
	(95% CI)	(81.2-85.7)	(82.1-85.1)	(76.6-78.6)	(66.4-68.0)	(59.2-60.9)	(49.2-51.1)	(35.2-38.1)
2018-2021	5-year ASRS	88.6	86.1	81.0	71.3	64.1	56.1	37.9
	(95% CI)	(86.4-90.5)	(84.6-87.5)	(80.0-82.0)	(70.4-72.1)	(63.3-64.9)	(55.2-57.1)	(36.5-39.3)
2017-2021	5-year ASRS	<b>87.7</b>	<b>85.9</b>	<b>80.9</b>	<b>70.6</b>	<b>63.5</b>	<b>55.5</b>	<b>37.9</b>
	(95% CI)	<b>(85.7-89.5)</b>	<b>(84.5-87.1)</b>	<b>(80.0-81.8)</b>	<b>(69.8-71.4)</b>	<b>(62.8-64.2)</b>	<b>(54.6-56.4)</b>	<b>(36.7-39.2)</b>



## **2.1 Five-year relative survival of cancer by gender, ethnicity and age group**

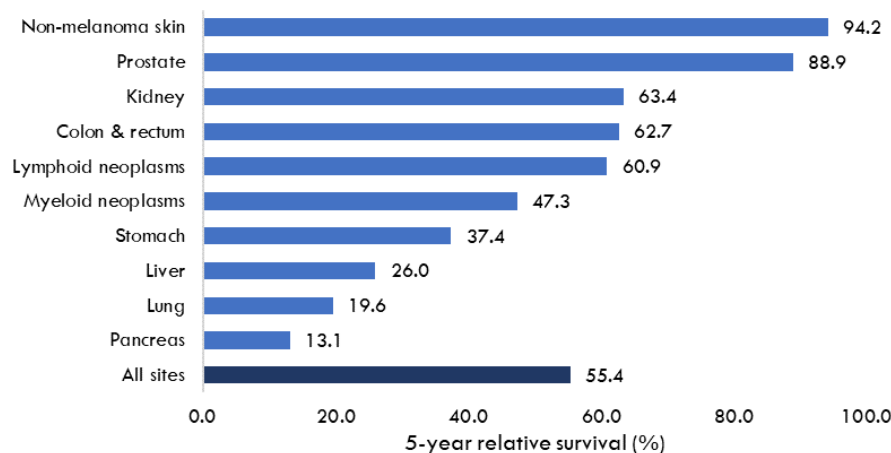
### **KEY POINTS**

- From 1973-1977 to 2017-2021, the five-year relative survival rate had improved significantly for both males and females (13.2% to 55.4% and 28% to 63% respectively). Females were observed to consistently have a higher survival rate compared to males throughout this period.
- While the five-year relative survival rate improved for all three ethnic groups over the years, Malays were found to consistently have the lowest survival rates throughout the years (Chinese: 19.6% to 60.5% from 1973-1977 to 2017-2021; Malay: 17% to 46%; Indian: 24.6% to 57.9%).
- The five-year relative survival rates decreased with age. In 2017-2021, the 5-year ASRS for individuals aged 15-29 years was 87.7%, compared to 37.9% for those aged 80 years and above.

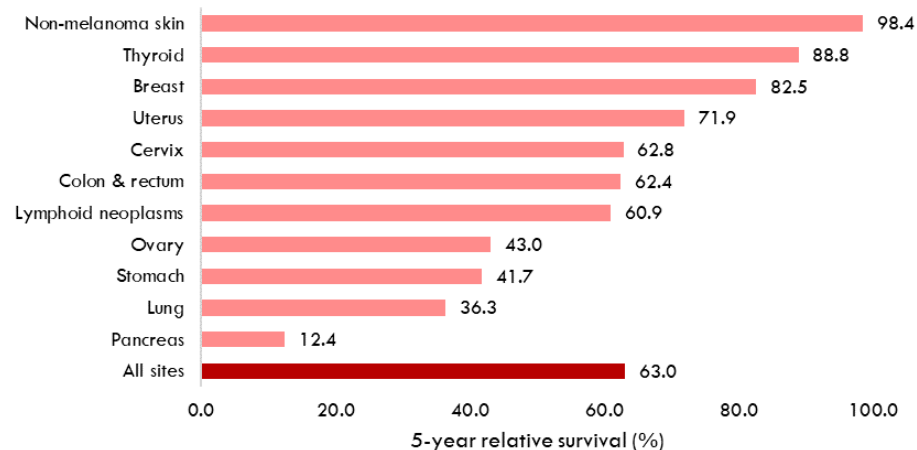
## 2.2 Five-year age-standardised relative survival rate (%) for ten most frequent incident cancers by gender, 2017-2021

Of the ten most frequent incident cancers for both genders in 2017-2021, non-melanoma skin cancer had the highest five-year ASRS, at 94.2% and 98.4% respectively for males and females (Figure 2.2.1, Figure 2.2.2). Prostate cancer in males as well as breast and thyroid cancers in females also had high survival rates that exceeded 80%. Cancers of the stomach, liver, lung and pancreas had poorer survival rates on the whole. Of the ten most frequent incident cancers among males, pancreatic cancer had the lowest five-year ASRS at 13.1% followed by lung and liver cancers at 19.6% and 26.0% respectively. Pancreatic cancer had the lowest five-year ASRS among the top ten most commonly diagnosed cancers in females at 12.4%, followed by lung and stomach cancers at 36.3% and 41.7% respectively.

**Figure 2.2.1** Five-year age-standardised relative survival rate (%) for ten most frequent incident cancers in males, 2017-2021



**Figure 2.2.2** Five-year age-standardised relative survival rate (%) for ten most frequent incident cancers in females, 2017-2021



## 2.2 Five-year relative survival of ten most frequent incident cancers by gender

### KEY POINTS

- Non-melanoma skin cancer had the highest five-year survival rates among the most common incident cancers in both males (94.2%) and females (98.4%) for the period 2017-2021.
- Prostate cancer in males (88.9%) as well as thyroid and breast cancers in females (88.8% and 82.5% respectively) were among the common incident cancers in the 2017-2021 period with the highest survival rates.
- Among the most common incident cancers for 2017-2021, pancreatic, lung, and liver cancers had the poorest survival rates for males (13.1%, 19.6% and 26.0% respectively); while pancreatic, lung, and stomach cancers had the lowest survival rates for females (12.4%, 36.3% and 41.7% respectively).

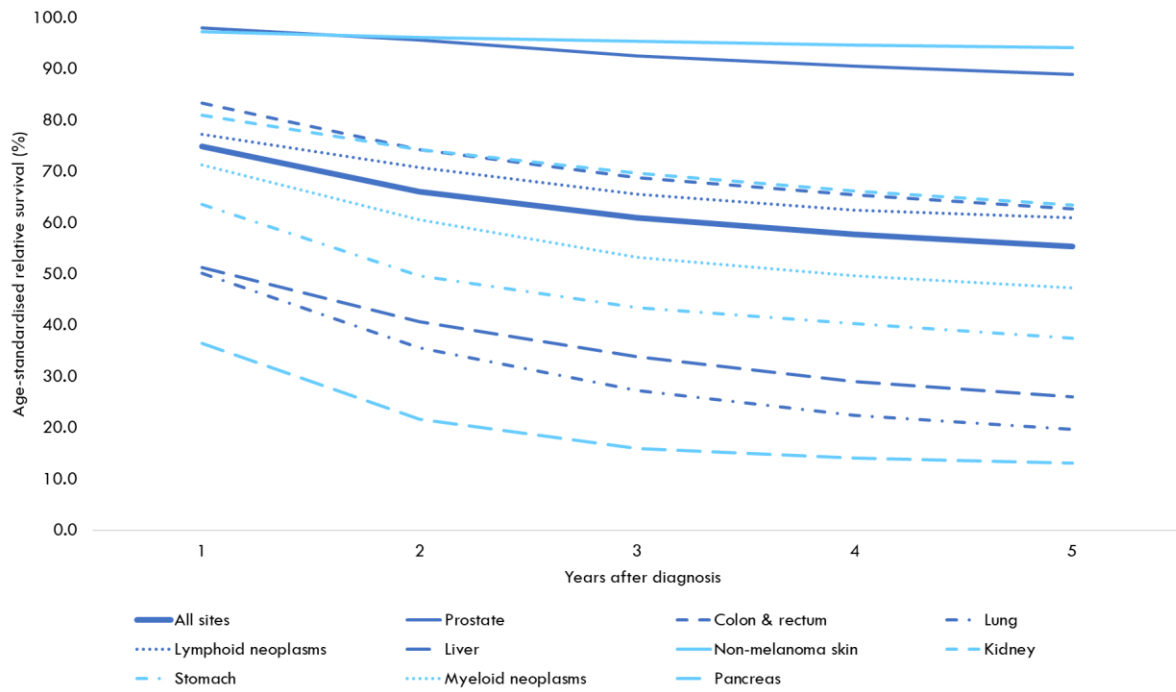
## 2.3 Age-standardised relative survival rate (%) five years following diagnosis for ten most frequent incident cancers by gender, 2017-2021

While the ASRS of cancer for both genders decreased with each year post-diagnosis, the survival for some cancers declined more rapidly for every additional year post-diagnosis in comparison to others. Overall, the cancer survival rate for each year following diagnosis for all cancers was better among for females compared than males.

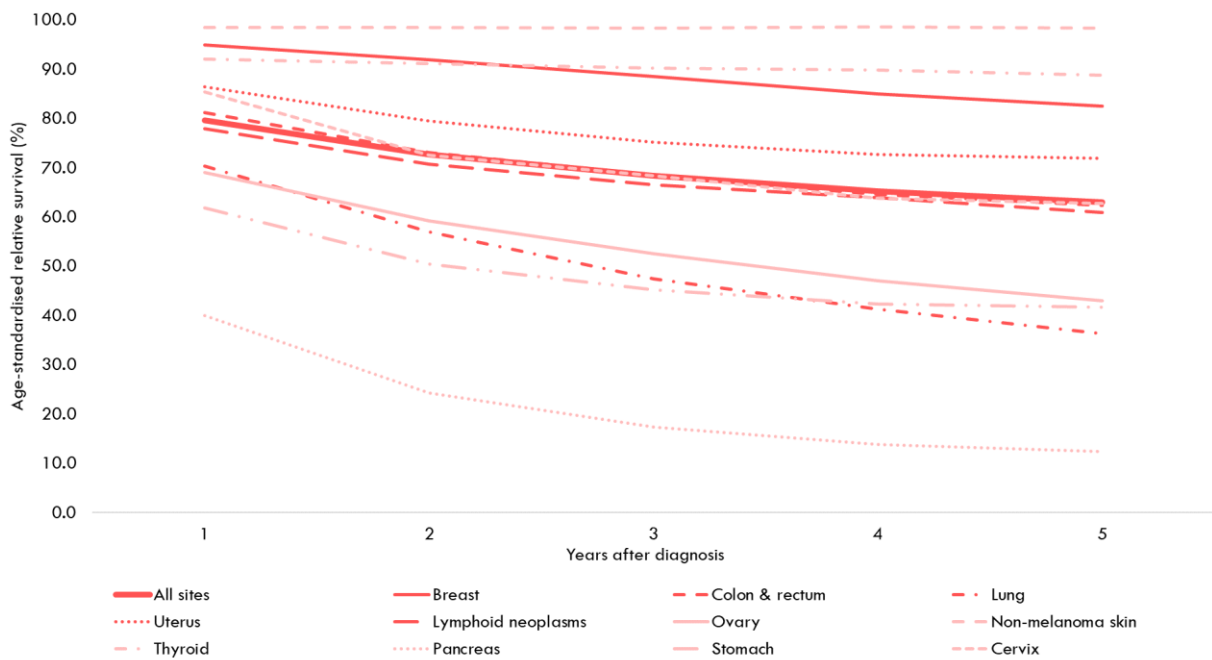
Among males, the one-year survival rate for all cancers was 74.9%, and by the five-year mark, this had decreased gradually to 55.5% (Figure 2.3.1, Table 2.3.1). Prostate and non-melanoma skin cancers had the highest survival rate at every one-year interval after diagnosis. Pancreatic, lung, and liver cancers had the poorest survival rates among males for each year after diagnosis, with the most rapid deterioration occurring between the first and second year.

For females, the ASRS declined gradually from 79.6% at the one-year mark to 63.0% after five years (Figure 2.3.2, Table 2.3.2). Non-melanoma skin, thyroid, and breast cancers consistently had the best survival rates out of the most frequent incident cancers among females, with the survival rate for non-melanoma skin cancer being consistently the highest over the five years following diagnosis. In contrast, pancreatic, lung and stomach cancers had consistently poorer survival rates than other commonly diagnosed cancers in females in the five years following diagnosis, with the most rapid declines observed between the first and second year.

**Figure 2.3.1** Age-standardised relative survival rate (%) five years following diagnosis for ten most frequent incident cancers in males, 2017-2021



**Figure 2.3.2** Age-standardised relative survival rate (%) five years following diagnosis for ten most frequent incident cancers in females, 2017-2021



**Table 2.3.1** Age-standardised relative survival rate (%) five years following diagnosis for ten most frequent incident cancers in males, 2017-2021

		Years after diagnosis				
		1	2	3	4	5
Male	Prostate	97.7 (97.1-98.3)	95.4 (94.5-96.3)	92.4 (91.2-93.5)	90.6 (89.2-91.8)	89.0 (87.5-90.4)
	Colon & rectum	83.3 (82.2-84.3)	74.5 (73.2-75.8)	68.9 (67.5-70.3)	65.4 (63.9-66.9)	63.2 (61.6-64.8)
	Lung	50.8 (49.3-52.4)	36.5 (35.0-38.0)	28.3 (26.9-29.7)	23.5 (22.1-24.9)	20.3 (18.9-21.6)
	Lymphoid neoplasms	77.5 (75.6-79.2)	70.7 (68.6-72.7)	66.2 (64.0-68.3)	63.2 (60.8-65.5)	61.2 (58.7-63.6)
	Liver	51.3 (49.2-53.4)	40.7 (38.6-42.8)	33.5 (31.5-35.6)	28.8 (26.8-30.8)	25.6 (23.7-27.6)
	Non-melanoma skin	97.2 (95.9-98.3)	96.0 (94.3-97.5)	95.4 (93.4-97.2)	94.8 (92.5-96.9)	94.0 (91.5-96.4)
	Kidney	81.1 (78.8-83.1)	74.3 (71.8-76.7)	69.5 (66.7-72.1)	66.0 (63.1-68.8)	63.1 (60.0-66.0)
	Stomach	63.5 (60.7-66.1)	50.1 (47.2-52.9)	43.7 (40.8-46.6)	40.5 (37.5-43.4)	37.7 (34.8-40.8)
	Myeloid neoplasms	70.3 (67.4-73.0)	59.8 (56.8-62.7)	52.7 (49.6-55.7)	49.1 (45.9-52.2)	46.1 (42.8-49.3)
	Pancreas	36.7 (33.9-39.5)	21.6 (19.2-24.1)	15.6 (13.4-17.9)	13.8 (11.7-16.0)	12.7 (10.6-15.0)
	<b>All sites</b>	<b>74.9 (74.4-75.4)</b>	<b>66.2 (65.7-66.8)</b>	<b>61.1 (60.5-61.7)</b>	<b>57.9 (57.3-58.5)</b>	<b>55.5 (54.9-56.2)</b>

**Table 2.3.2** Age-standardised relative survival rate (%) five years following diagnosis for ten most frequent incident cancers in females, 2017-2021

		Years after diagnosis				
		1	2	3	4	5
Female	Breast	94.9 (94.5-95.3)	91.9 (91.4-92.4)	88.5 (87.8-89.1)	85.0 (84.3-85.8)	82.5 (81.7-83.4)
	Colon & rectum	81.2 (80.0-82.2)	73.1 (71.7-74.3)	68.5 (67.1-69.8)	64.6 (63.2-66.1)	62.4 (60.8-63.9)
	Lung	70.3 (68.6-71.9)	57.0 (55.2-58.8)	47.5 (45.6-49.4)	41.3 (39.4-43.2)	36.3 (34.3-38.2)
	Uterus	86.4 (85.2-87.5)	79.5 (78.0-80.9)	75.2 (73.6-76.7)	72.7 (71.0-74.3)	71.9 (70.1-73.6)
	Lymphoid neoplasms	77.9 (76.0-79.6)	70.8 (68.7-72.8)	66.5 (64.3-68.7)	63.9 (61.6-66.2)	60.9 (58.4-63.2)
	Ovary	69.0 (66.9-70.9)	59.2 (57.0-61.3)	52.6 (50.4-54.7)	47.1 (44.9-49.3)	43.0 (40.8-45.2)
	Non-melanoma skin	98.5 (97.3-99.4)	98.5 (97.0-99.7)	98.3 (96.5-99.9)	98.6 (96.5-100.4)	98.4 (96.0-100.5)
	Thyroid	92.1 (90.7-93.3)	91.1 (89.6-92.4)	90.2 (88.5-91.6)	89.8 (88.1-91.4)	88.8 (87.0-90.5)
	Pancreas	40.0 (37.1-42.8)	24.3 (21.8-26.9)	17.3 (15.1-19.6)	13.8 (11.7-16.0)	12.4 (10.5-14.6)
	Stomach	61.9 (58.9-64.8)	50.5 (47.4-53.6)	45.2 (42.1-48.3)	42.3 (39.1-45.4)	41.7 (38.5-44.9)
	Cervix	85.4 (83.3-87.3)	72.6 (70.0-75.1)	68.4 (65.6-71.0)	63.8 (61.0-66.6)	62.8 (59.9-65.6)
		<b>All sites</b>	<b>79.6 (79.2-80.0)</b>	<b>72.7 (72.3-73.2)</b>	<b>68.4 (68.0-68.9)</b>	<b>65.3 (64.8-65.8)</b>

### 2.3 Age-standardised relative survival five years following diagnosis for ten most frequent incident cancers by gender, 2017-2021

#### KEY POINTS

- While cancer survival rates decreased each year after diagnosis, the rate of decline was observed to be quicker for some cancers compared to others.
- Among males, prostate and non-melanoma skin cancers had the highest survival rates for each year post-diagnosis (97.7% and 97.2% at one year and 89% and 94% at five years respectively), while pancreatic, lung, and liver cancers had the lowest survival rates at every one-year interval post-diagnosis (36.7%, 50.8% and 51.3% at one year and 12.7%, 20.3% and 25.6% respectively at five years).
- Among females, non-melanoma skin, breast, and thyroid cancers had the highest survival rates for each year post-diagnosis (98.5%, 94.9% and 92.1% at one year; and 98.4%, 82.5% and 88.8% at five years respectively); whereas pancreatic, stomach, and lung cancers had the poorest survival rates at nearly every one-year interval post-diagnosis (40.0%, 61.9%, and 70.3% at one year; and 12.4%, 41.7% and 36.3% respectively at five years).

### **(3) TRENDS IN INCIDENCE, MORTALITY AND SURVIVAL OF SELECTED CANCERS, 1968-2021**

#### **3.1 Age-standardised incidence, age-standardised mortality, and five-year age-standardised relative survival for selected cancers in males and females, 1968-2021**

##### *Males*

Among the ten most frequent incident cancers in males for the period of 2017-2021, while there had been an overall increase in the five-year age-standardised survival rates across the board from 1968-2021, differing trends can be observed for the incidence and mortality rates of these cancers (Figure 3.1.1, Table 3.1.1).

From the period of 1968-1972 to 2017-2021, there was a notable rise in the ASIR of two common cancers – prostate and colorectal cancers – from 4.0 to 36.5 per 100,000 population (a jump of more than 9 times) and 19.4 to 37.5 per 100,000 population respectively. This is likely linked to Singapore's ageing population, as the likelihood of being diagnosed with these cancers increase significantly with age.

However, there were also significant decreases in the incidence of other cancers during the same period. For instance, the ASIR of lung and liver cancers dropped from 47.3 to 30.0 per 100,000 population and from 28.7 to 16.4 per 100,000 population. Meanwhile, the ASIR of stomach cancer in 2017-2021 was 9.2 per 100,000 population, less than a quarter of what it used to be in 1968-1972 (37.7 per 100,000 population).

Similar to the trends observed for ASIR, the ASMR for stomach cancer also declined from 26.2 per 100,000 population in 1968-1972 to 4.6 per 100,000 population in 2017-2021. The ASMR of prostate and colorectal cancers in males, likewise, had risen from 1968-1972 to 2017-2021, alongside the rise in its corresponding incidence rate, from 1.2 to 5.4 per 100,000 population and 8.9 to 12.6 per 100,000 population respectively. Unfortunately, during the same period, pancreatic cancer, which has a low survival rate, also exhibited an increasing mortality rate alongside its rising incidence, where its ASMR rose from 1.7 to 5.9 per 100,000 population – an increase of more than threefold, although the overall mortality rate was low vis-à-vis other more common cancers such as lung, colorectal, and liver cancers.

Despite exhibiting differing trends in incidence and mortality over the years, there had been improvements in the survival across all ten commonly diagnosed cancers. For instance, while the five-year ASRS of colorectal cancer was 24.4% in 1973-1977, it climbed to 62.7% in 2017-2021. Likewise, the survival of prostate cancer had increased from 47.3% to 88.9% during this period. Even among cancers with generally poorer survival rates, there had been significant improvements in the five-year ASRS over the years – in 1973-1977, the five-year ASRS of lung and liver cancers were 3.0% and 0.2% respectively, but in 2017-2021, these figures had risen to 19.6% and 26.0% respectively.

##### *Females*

As with the trends observed for males, the ten most frequent incident cancers of 2017-2021 among females also displayed differing incidence and mortality trends over the years from 1968-2021. However, there had been a consistent pattern of an overall increase in survival rates for all ten common cancers (Figure 3.1.2, Table 3.1.2).

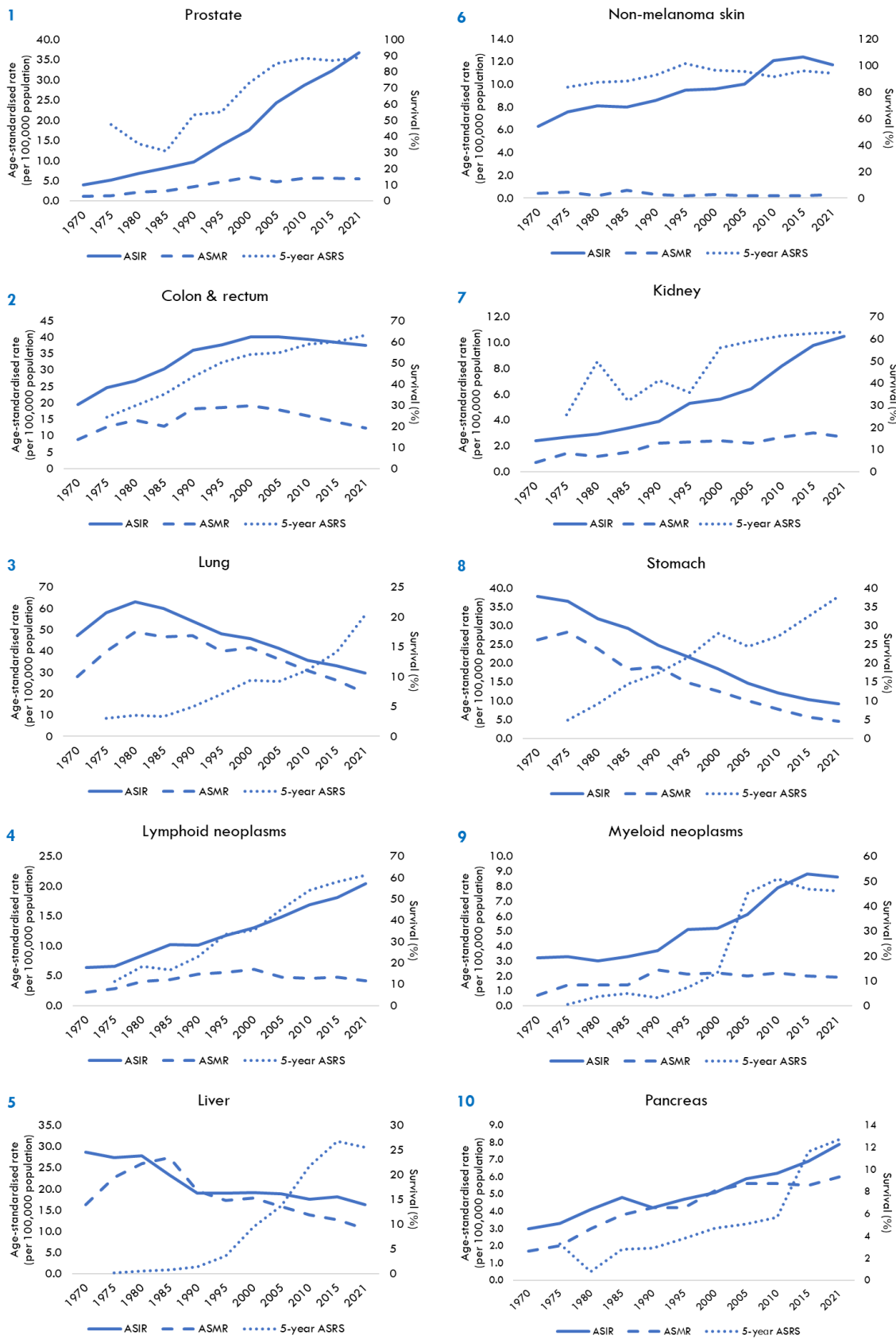
Notably, the ASIR of breast cancer, which is the most common cancer diagnosis in females, had risen about 3.5 times from 20.1 per 100,000 population in 1968-1972 to 74.6 per 100,000 population in 2017-2021. Similarly, the ASIR of uterine and ovarian cancers had also risen significantly over the same period, from 4.9 to 18.8 per 100,000 population and 5.9 to 12.0 per 100,000 population – registering increases of nearly fourfold and about twice respectively. On the other hand, as with males, the ASIR of

stomach cancer in females had also decreased significantly, from 17.4 per 100,000 population in 1968-1972 to 5.1 per 100,000 population in 2017-2021. During the same period, the ASIR of cervical cancer had also fallen drastically from 18.0 to 6.8 per 100,000 population.

The ASMR of many common cancers in females have risen over the years, driven largely by a corresponding increase in the ASIR of these cancers. For example, the ASMR of breast cancer rose from 5.7 per 100,000 population in 1968-1972 to 11.9 per 100,000 population in 2017-2021. During the same period, the ASMR of ovarian cancer had also increased from 1.4 per 100,000 population to 3.6 per 100,000 population, in tandem with an increasing incidence rate. On the other hand, the ASMR of stomach cancer had fallen drastically from 11.9 per 100,000 population in 1968-1972 to 2.7 per 100,000 population in 2017-2021. Similarly, the ASMR of cervical cancer had also decreased from 4.9 to 1.7 per 100,000 population over the same period.

As mortality rates are a function of both incidence and survival rates, rising cancer mortality should not be interpreted in isolation from either. Despite increasing mortality rates, significant improvements were observed in the survival rates for many common cancers. For example, the five-year ASRS of the most common incident cancer in females – breast cancer – had significantly improved from 49.9% in 1973-1977 to 82.5% in 2017-2021. Similarly, the five-year ASRS for uterine cancer had also increased from 48.3% to 71.9% during this period. As with males, improvements were also observed for other common cancers with generally poorer survival rates such as lung and stomach cancers, whereby five-year ASRS improved from 5.3% to 36.3% and 6.4% to 41.7% respectively.

**Figure 3.1.1** Age-standardised incidence rate (per 100,000 population), age-standardised mortality rate (per 100,000 population) and five-year age-standardised relative survival rate (%) of selected cancers in males, 1968-2021





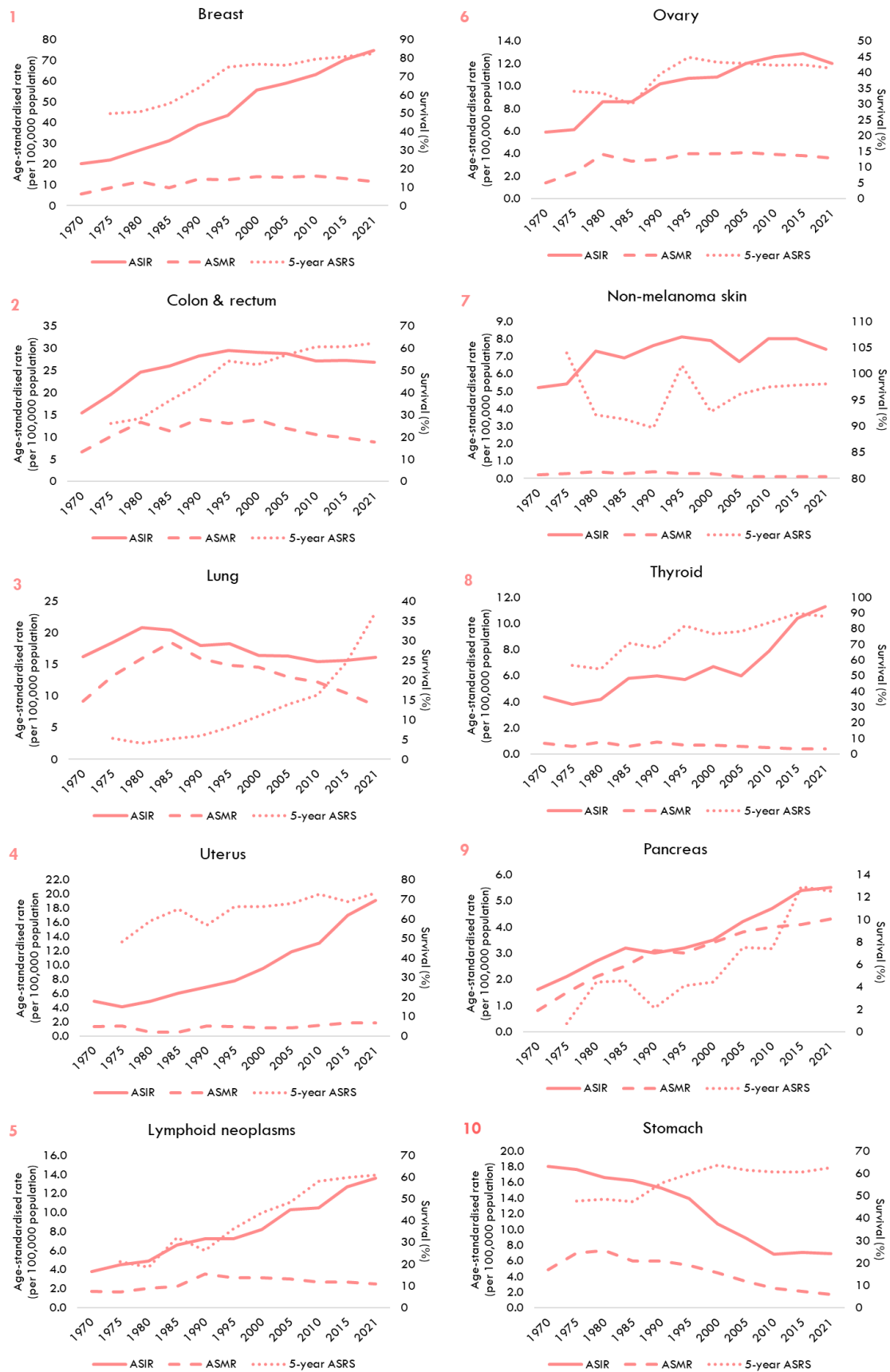
**Table 3.1.1** Incidence number and age-standardised incidence rate (per 100,000 population), age-standardised mortality rate (per 100,000 population) and five-year age-standardised relative survival rate (%) of selected cancers in males, 1968-2021

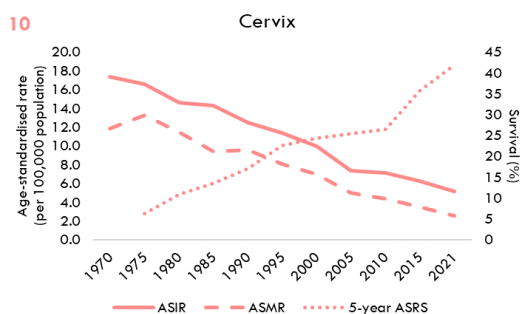
Site	Year	Number	ASIR (95% CI)*	ASMR (95% CI)*	ASRS (95% CI)
Prostate	1968-1972	94	4.0 (3.1-4.8)	1.2 (0.8-1.7)	
	1973-1977	144	5.2 (4.3-6.0)	1.3 (0.9-1.7)	47.3 (33.6-61.6)
	1978-1982	240	6.8 (5.9-7.7)	2.2 (1.7-2.7)	35.4 (25.5-46.2)
	1983-1987	356	8.2 (7.4-9.1)	2.5 (2.1-3.0)	30.8 (24.0-38.1)
	1988-1992	529	9.7 (8.9-10.6)	3.6 (3.1-4.1)	53.4 (46.0-60.7)
	1993-1997	902	13.8 (12.9-14.7)	4.8 (4.3-5.4)	55.3 (49.9-60.7)
	1998-2002	1359	17.6 (16.7-18.5)	5.9 (5.4-6.5)	73.0 (68.9-76.9)
	2003-2007	2213	24.3 (23.2-25.3)	4.8 (4.3-5.2)	85.0 (82.2-87.7)
	2008-2012	3337	28.6 (27.6-29.6)	5.6 (5.2-6.0)	88.5 (86.5-90.4)
	2013-2017	4919	32.2 (31.3-33.1)	5.7 (5.3-6.1)	87.0 (85.3-88.5)
	2018-2021	5723	36.7 (35.8-37.7)	5.5 (5.2-5.9)	89.0 (87.5-90.4)
<b>2017-2021</b>	<b>6912</b>	<b>36.5 (35.6-37.3)</b>	<b>5.4 (5.1-5.8)</b>	<b>88.9 (87.6-90.2)</b>	
Colon & rectum	1968-1972	563	19.4 (17.6-21.2)	8.9 (7.7-10.1)	
	1973-1977	824	24.6 (22.8-26.4)	12.6 (11.3-13.9)	24.4 (20.2-28.9)
	1978-1982	1057	26.7 (25.0-28.4)	14.6 (13.3-15.8)	29.6 (25.9-33.5)
	1983-1987	1435	30.2 (28.6-31.8)	12.9 (11.9-14.0)	35.2 (31.7-38.8)
	1988-1992	2052	36.0 (34.4-37.6)	18.1 (16.9-19.2)	43.5 (40.4-46.6)
	1993-1997	2553	37.7 (36.2-39.2)	18.5 (17.5-19.6)	50.3 (47.6-53.0)
	1998-2002	3252	40.1 (38.7-41.5)	19.1 (18.1-20.0)	54.1 (51.8-56.4)
	2003-2007	3849	40.0 (38.7-41.3)	17.9 (17.0-18.7)	54.7 (52.6-56.6)
	2008-2012	4791	39.3 (38.2-40.4)	16.0 (15.3-16.7)	58.9 (57.1-60.7)
	2013-2017	5824	38.4 (37.4-39.4)	14.1 (13.5-14.7)	60.1 (58.5-61.7)
	2018-2021	5443	37.4 (36.4-38.4)	12.3 (11.8-12.9)	63.2 (61.6-64.8)
<b>2017-2021</b>	<b>6697</b>	<b>37.5 (36.6-38.4)</b>	<b>12.6 (12.1-13.1)</b>	<b>62.7 (61.3-64.2)</b>	
Lung	1968-1972	1361	47.3 (44.6-49.9)	28.0 (25.9-30.0)	
	1973-1977	1920	57.9 (55.3-60.6)	39.9 (37.7-42.2)	3.0 (2.1-4.0)
	1978-1982	2440	63.0 (60.4-65.5)	48.8 (46.5-51.0)	3.5 (2.7-4.4)
	1983-1987	2770	60.1 (57.9-62.4)	46.6 (44.6-48.6)	3.3 (2.7-4.1)
	1988-1992	2972	54.1 (52.1-56.1)	47.3 (45.5-49.1)	4.9 (4.1-5.9)
	1993-1997	3168	48.1 (46.4-49.8)	40.0 (38.4-41.5)	7.1 (6.0-8.2)
	1998-2002	3599	45.8 (44.3-47.3)	41.6 (40.1-43.0)	9.4 (8.4-10.5)
	2003-2007	3862	41.3 (39.9-42.6)	36.2 (34.9-37.4)	9.2 (8.2-10.3)
	2008-2012	4292	35.7 (34.6-36.8)	30.9 (29.9-31.9)	11.1 (10.1-12.2)
	2013-2017	5064	33.0 (32.1-34.0)	26.2 (25.4-27.0)	14.1 (13.0-15.2)
	2018-2021	4520	29.8 (28.9-30.6)	20.4 (19.7-21.1)	20.3 (18.9-21.6)
<b>2017-2021</b>	<b>5567</b>	<b>30.0 (29.2-30.8)</b>	<b>21.0 (20.3-21.7)</b>	<b>19.6 (18.4-20.8)</b>	
Lymphoid neoplasms	1968-1972	260	6.4 (5.6-7.3)	2.2 (1.7-2.7)	
	1973-1977	279	6.6 (5.8-7.5)	2.8 (2.3-3.4)	11.3 (6.9-16.9)
	1978-1982	381	8.4 (7.5-9.3)	4.0 (3.4-4.7)	18.3 (13.2-24.3)
	1983-1987	526	10.2 (9.3-11.1)	4.3 (3.7-4.8)	16.8 (12.5-21.7)
	1988-1992	611	10.1 (9.3-10.9)	5.3 (4.7-5.9)	22.9 (18.9-27.2)
	1993-1997	834	11.7 (10.9-12.6)	5.6 (5.0-6.2)	33.4 (29.1-37.9)
	1998-2002	1050	13.0 (12.2-13.8)	6.1 (5.5-6.6)	35.5 (31.9-39.1)
	2003-2007	1354	14.9 (14.1-15.8)	4.8 (4.3-5.2)	45.3 (42.0-48.6)
	2008-2012	1849	16.9 (16.1-17.7)	4.6 (4.2-5.0)	54.2 (51.4-57.0)
	2013-2017	2305	18.1 (17.3-18.9)	4.8 (4.4-5.1)	58.0 (55.5-60.4)
	2018-2021	2499	20.4 (19.5-21.3)	4.1 (3.8-4.5)	61.2 (58.7-63.6)
<b>2017-2021</b>	<b>2986</b>	<b>20.0 (19.1-20.8)</b>	<b>4.2 (3.9-4.6)</b>	<b>60.9 (58.6-63.1)</b>	
Liver	1968-1972	898	28.7 (26.7-30.6)	16.2 (14.7-17.7)	
	1973-1977	965	27.4 (25.6-29.3)	22.7 (21.0-24.3)	0.2 (0.1-0.4)
	1978-1982	1126	27.8 (26.1-29.4)	25.9 (24.3-27.5)	0.5 (0.3-1.0)
	1983-1987	1095	23.2 (21.8-24.5)	27.4 (25.9-29.0)	0.8 (0.4-1.3)
	1988-1992	1089	19.0 (17.8-20.1)	19.6 (18.4-20.8)	1.4 (0.7-2.4)
	1993-1997	1302	18.9 (17.9-20.0)	17.2 (16.2-18.2)	3.6 (2.5-5.0)
	1998-2002	1555	19.1 (18.1-20.1)	17.9 (16.9-18.8)	9.4 (7.8-11.2)
	2003-2007	1790	18.8 (17.9-19.6)	15.9 (15.1-16.7)	13.7 (11.8-15.7)
	2008-2012	2139	17.6 (16.9-18.4)	13.8 (13.1-14.5)	21.8 (19.7-24.0)
	2013-2017	2769	18.1 (17.4-18.8)	12.7 (12.1-13.3)	26.8 (24.9-28.8)
	2018-2021	2412	16.2 (15.5-16.8)	10.6 (10.1-11.2)	25.6 (23.7-27.6)
<b>2017-2021</b>	<b>2984</b>	<b>16.4 (15.8-17.0)</b>	<b>10.9 (10.4-11.4)</b>	<b>26.0 (24.2-27.7)</b>	
Non-melanoma skin	1968-1972	167	6.3 (5.2-7.4)	0.4 (0.2-0.6)	
	1973-1977	247	7.6 (6.6-8.6)	0.5 (0.2-0.9)	83.5 (70.7-95.1)
	1978-1982	319	8.1 (7.1-9.0)	0.2 (0.1-0.3)	87.2 (78.7-95.0)
	1983-1987	371	8.0 (7.1-8.8)	0.7 (0.5-1.0)	88.2 (79.6-96.0)
	1988-1992	501	8.6 (7.9-9.4)	0.3 (0.2-0.5)	92.6 (85.7-98.8)
	1993-1997	667	9.5 (8.8-10.3)	0.2 (0.1-0.3)	101.4 (95.7-106.4)
	1998-2002	790	9.6 (8.9-10.3)	0.3 (0.1-0.4)	96.5 (91.8-100.8)
	2003-2007	956	10.0 (9.4-10.7)	0.2 (0.1-0.3)	95.2 (91.4-98.6)
	2008-2012	1473	12.1 (11.4-12.7)	0.2 (0.1-0.3)	91.3 (88.1-94.2)
	2013-2017	1887	12.4 (11.9-13.0)	0.2 (0.1-0.2)	95.8 (93.3-98.0)
	2018-2021	1721	11.7 (11.1-12.2)	0.3 (0.2-0.3)	94.0 (91.5-96.4)
<b>2017-2021</b>	<b>2136</b>	<b>11.9 (11.4-12.4)</b>	<b>0.2 (0.2-0.3)</b>	<b>94.2 (91.9-96.4)</b>	

Site	Year	Number	ASIR (95% CI)*	ASMR (95% CI)*	ASRS (95% CI)
Kidney	1968-1972	77	2.4 (1.8-3.0)	0.7 (0.4-1.0)	
	1973-1977	100	2.7 (2.2-3.3)	1.4 (1.0-1.8)	25.7 (15.5-37.7)
	1978-1982	118	2.9 (2.3-3.4)	1.2 (0.9-1.6)	49.6 (33.8-65.7)
	1983-1987	161	3.4 (2.8-3.9)	1.5 (1.2-1.9)	32.1 (22.5-42.8)
	1988-1992	223	3.9 (3.4-4.5)	2.2 (1.8-2.5)	41.2 (32.6-50.1)
	1993-1997	366	5.3 (4.7-5.9)	2.3 (1.9-2.7)	35.7 (29.2-42.5)
	1998-2002	470	5.6 (5.1-6.1)	2.4 (2.1-2.8)	55.9 (50.1-61.6)
	2003-2007	644	6.4 (5.9-6.9)	2.2 (1.9-2.5)	58.9 (53.8-63.9)
	2008-2012	1007	8.2 (7.7-8.7)	2.7 (2.4-3.0)	61.4 (57.3-65.3)
	2013-2017	1446	9.8 (9.3-10.3)	3.0 (2.7-3.3)	62.5 (59.3-65.7)
	2018-2021	1429	10.5 (9.9-11.0)	2.7 (2.4-2.9)	63.1 (60.0-66.0)
2017-2021	1734	10.3 (9.8-10.8)	2.8 (2.5-3.0)	63.4 (60.6-66.1)	
Stomach	1968-1972	1094	37.7 (35.3-40.2)	26.2 (24.2-28.2)	
	1973-1977	1216	36.5 (34.3-38.6)	28.3 (26.4-30.2)	4.8 (3.6-6.4)
	1978-1982	1233	31.8 (29.9-33.6)	23.8 (22.2-25.4)	9.2 (7.4-11.3)
	1983-1987	1334	29.3 (27.7-30.9)	18.3 (17.1-19.6)	14.4 (12.3-16.8)
	1988-1992	1374	24.8 (23.4-26.1)	18.9 (17.7-20.0)	17.3 (15.0-19.8)
	1993-1997	1442	21.7 (20.5-22.8)	14.8 (13.9-15.8)	21.5 (18.9-24.2)
	1998-2002	1453	18.5 (17.5-19.4)	12.6 (11.8-13.4)	28.0 (25.4-30.7)
	2003-2007	1381	14.6 (13.8-15.4)	9.9 (9.2-10.5)	24.5 (21.9-27.1)
	2008-2012	1452	12.0 (11.4-12.7)	7.7 (7.2-8.3)	27.1 (24.4-29.8)
	2013-2017	1569	10.3 (9.7-10.8)	5.6 (5.2-6.0)	32.5 (29.8-35.3)
	2018-2021	1356	9.1 (8.6-9.6)	4.5 (4.1-4.8)	37.7 (34.8-40.8)
2017-2021	1684	9.2 (8.7-9.6)	4.6 (4.3-4.9)	37.4 (34.8-40.2)	
Myeloid neoplasms	1968-1972	138	3.2 (2.6-3.8)	0.7 (0.5-1.0)	
	1973-1977	154	3.3 (2.7-3.8)	1.4 (1.0-1.7)	0.6 (0.1-2.4)
	1978-1982	150	3.0 (2.5-3.5)	1.4 (1.0-1.7)	3.8 (1.3-8.7)
	1983-1987	177	3.3 (2.8-3.8)	1.4 (1.1-1.8)	4.9 (1.8-10.5)
	1988-1992	232	3.7 (3.2-4.2)	2.4 (2.0-2.8)	3.2 (1.4-6.1)
	1993-1997	369	5.1 (4.6-5.7)	2.1 (1.7-2.4)	7.5 (4.4-11.8)
	1998-2002	433	5.2 (4.7-5.7)	2.2 (1.9-2.5)	13.3 (9.3-18.1)
	2003-2007	583	6.1 (5.6-6.6)	2.0 (1.7-2.3)	45.1 (39.4-50.7)
	2008-2012	920	7.9 (7.3-8.4)	2.2 (1.9-2.5)	51.0 (46.8-55.2)
	2013-2017	1237	8.8 (8.2-9.3)	2.0 (1.7-2.2)	46.8 (43.5-50.1)
	2018-2021	1133	8.6 (8.1-9.2)	1.9 (1.7-2.1)	46.1 (42.8-49.3)
2017-2021	1430	8.9 (8.4-9.4)	1.9 (1.7-2.1)	47.3 (44.4-50.3)	
Pancreas	1968-1972	92	3.0 (2.4-3.7)	1.7 (1.2-2.2)	
	1973-1977	112	3.3 (2.7-3.9)	2.0 (1.5-2.5)	3.3 (0.9-8.5)
	1978-1982	161	4.1 (3.4-4.7)	3.0 (2.5-3.6)	0.8 (0.2-2.6)
	1983-1987	224	4.8 (4.1-5.4)	3.8 (3.2-4.4)	2.8 (0.9-6.7)
	1988-1992	239	4.2 (3.7-4.8)	4.2 (3.7-4.7)	2.9 (1.1-6.2)
	1993-1997	310	4.7 (4.1-5.2)	4.2 (3.7-4.7)	3.8 (1.7-7.2)
	1998-2002	410	5.1 (4.6-5.6)	5.2 (4.7-5.7)	4.7 (2.9-7.0)
	2003-2007	579	5.9 (5.4-6.4)	5.6 (5.1-6.0)	5.1 (3.4-7.5)
	2008-2012	747	6.2 (5.7-6.6)	5.6 (5.1-6.0)	5.7 (4.0-7.8)
	2013-2017	1064	6.9 (6.5-7.3)	5.5 (5.1-5.9)	11.6 (9.5-13.8)
	2018-2021	1174	7.9 (7.5-8.4)	6.0 (5.6-6.4)	12.7 (10.6-15.0)
2017-2021	1417	7.8 (7.4-8.2)	5.9 (5.5-6.2)	13.1 (11.2-15.2)	

\* per 100,000 resident population

**Figure 3.1.2** Incidence number and age-standardised incidence rate (per 100,000 population), age-standardised mortality rate (per 100,000 population) and five-year age-standardised relative survival rate (%) of selected cancers in females, 1968-2021





**Table 3.1.2** Incidence number and age-standardised incidence rate (per 100,000 population), age-standardised mortality rate (per 100,000 population) and five-year age-standardised relative survival rate (%) of selected cancers in females, 1968-2021

Site	Year	Number	ASIR (95% CI)*	ASMR (95% CI)*	ASRS (95% CI)
Breast	1968-1972	672	20.1 (18.5-21.6)	5.7 (4.9-6.6)	
	1973-1977	863	22.1 (20.6-23.6)	8.5 (7.5-9.4)	49.9 (45.2-54.6)
	1978-1982	1237	26.9 (25.3-28.4)	11.6 (10.6-12.6)	50.8 (46.7-54.9)
	1983-1987	1740	31.2 (29.7-32.7)	8.6 (7.8-9.4)	55.4 (52.0-58.8)
	1988-1992	2636	38.6 (37.1-40.1)	12.9 (12.0-13.8)	63.7 (61.1-66.2)
	1993-1997	3606	43.6 (42.1-45.0)	12.6 (11.8-13.3)	75.0 (72.9-77.0)
	1998-2002	5582	55.7 (54.2-57.2)	13.9 (13.1-14.7)	76.6 (75.0-78.1)
	2003-2007	6862	59.0 (57.6-60.4)	13.6 (12.9-14.3)	76.1 (74.8-77.4)
	2008-2012	8570	63.0 (61.7-64.4)	14.2 (13.6-14.9)	79.5 (78.4-80.5)
	2013-2017	10910	70.3 (69.0-71.7)	13.0 (12.4-13.5)	80.8 (79.8-81.7)
	2018-2021	10344	74.9 (73.4-76.4)	11.6 (11.1-12.2)	82.5 (81.6-83.4)
<b>2017-2021</b>	<b>12735</b>	<b>74.6 (73.3-75.9)</b>	<b>11.9 (11.4-12.4)</b>	<b>82.5 (81.7-83.4)</b>	
Colon & rectum	1968-1972	478	15.4 (14.0-16.8)	6.7 (5.7-7.6)	
	1973-1977	715	19.6 (18.1-21.1)	10.1 (9.0-11.1)	26.2 (21.9-30.8)
	1978-1982	1085	24.6 (23.2-26.1)	13.4 (12.3-14.5)	28.3 (24.8-32.0)
	1983-1987	1392	26.1 (24.7-27.5)	11.4 (10.4-12.3)	36.4 (33.1-39.8)
	1988-1992	1848	28.3 (27.0-29.6)	14.0 (13.1-14.9)	43.6 (40.5-46.6)
	1993-1997	2300	29.5 (28.2-30.7)	13.0 (12.2-13.8)	54.3 (51.6-56.9)
	1998-2002	2796	29.1 (28.0-30.3)	13.9 (13.1-14.6)	52.5 (50.3-54.7)
	2003-2007	3351	28.8 (27.8-29.8)	12.0 (11.4-12.7)	57.0 (54.9-59.0)
	2008-2012	3922	27.1 (26.2-27.9)	10.5 (10.0-11.1)	60.7 (58.8-62.5)
	2013-2017	4856	27.3 (26.5-28.1)	9.9 (9.4-10.3)	60.6 (58.9-62.2)
	2018-2021	4534	26.9 (26.0-27.7)	8.9 (8.4-9.3)	62.4 (60.7-64.0)
<b>2017-2021</b>	<b>5542</b>	<b>26.9 (26.1-27.6)</b>	<b>8.9 (8.5-9.3)</b>	<b>62.4 (60.8-63.9)</b>	
Lung	1968-1972	489	16.2 (14.7-17.6)	9.2 (8.1-10.2)	
	1973-1977	663	18.5 (17.1-19.9)	13.2 (12.0-14.4)	5.3 (3.6-7.4)
	1978-1982	893	20.8 (19.4-22.2)	15.9 (14.7-17.1)	4.1 (2.8-5.8)
	1983-1987	1072	20.4 (19.2-21.6)	18.5 (17.3-19.7)	5.1 (3.7-6.7)
	1988-1992	1174	18.0 (16.9-19.1)	15.9 (14.9-16.9)	5.9 (4.5-7.6)
	1993-1997	1444	18.3 (17.3-19.2)	14.9 (14.0-15.7)	8.1 (6.5-9.9)
	1998-2002	1602	16.4 (15.6-17.2)	14.6 (13.8-15.4)	11.0 (9.4-12.7)
	2003-2007	1906	16.3 (15.6-17.1)	13.0 (12.3-13.7)	13.9 (12.1-15.8)
	2008-2012	2264	15.4 (14.8-16.1)	12.2 (11.7-12.8)	16.2 (14.5-18.1)
	2013-2017	2842	15.6 (15.0-16.2)	10.5 (10.0-10.9)	24.6 (22.8-26.5)
	2018-2021	2745	16.1 (15.5-16.7)	8.5 (8.1-9.0)	37.2 (35.1-39.4)
<b>2017-2021</b>	<b>3388</b>	<b>16.2 (15.6-16.7)</b>	<b>8.7 (8.3-9.1)</b>	<b>36.3 (34.3-38.2)</b>	
Uterus	1968-1972	159	4.9 (4.1-5.7)	1.3 (0.9-1.7)	
	1973-1977	154	4.1 (3.5-4.8)	1.4 (1.0-1.8)	48.3 (37.8-58.7)
	1978-1982	217	4.9 (4.3-5.6)	0.5 (0.3-0.8)	59.1 (49.7-68.1)
	1983-1987	315	6.0 (5.3-6.7)	0.5 (0.3-0.7)	64.9 (57.2-72.1)
	1988-1992	437	6.9 (6.2-7.5)	1.4 (1.1-1.6)	56.8 (51.2-62.2)
	1993-1997	609	7.8 (7.2-8.4)	1.3 (1.1-1.6)	66.3 (61.3-71.0)
	1998-2002	909	9.5 (8.9-10.1)	1.1 (0.9-1.3)	66.4 (62.7-70.0)
	2003-2007	1357	11.9 (11.3-12.6)	1.1 (0.9-1.3)	68.0 (65.0-71.0)
	2008-2012	1788	13.1 (12.5-13.7)	1.5 (1.3-1.7)	72.7 (70.2-75.1)
	2013-2017	2623	17.0 (16.3-17.7)	1.8 (1.6-2.0)	68.9 (66.8-70.9)
	2018-2021	2559	19.1 (18.3-19.9)	1.8 (1.6-2.0)	73.1 (71.2-74.9)
<b>2017-2021</b>	<b>3133</b>	<b>18.8 (18.1-19.5)</b>	<b>1.9 (1.7-2.1)</b>	<b>71.9 (70.1-73.6)</b>	

Site	Year	Number	ASIR (95% CI)*	ASMR (95% CI)*	ASRS (95% CI)
Lymphoid neoplasms	1968-1972	153	3.8 (3.1-4.4)	1.7 (1.3-2.2)	
	1973-1977	191	4.5 (3.8-5.2)	1.6 (1.2-2.0)	21.0 (12.1-32.0)
	1978-1982	231	4.9 (4.3-5.6)	2.0 (1.6-2.4)	18.6 (12.5-25.8)
	1983-1987	355	6.6 (5.9-7.3)	2.2 (1.8-2.6)	32.1 (25.6-39.0)
	1988-1992	453	7.2 (6.5-7.9)	3.5 (3.0-4.0)	26.3 (21.5-31.5)
	1993-1997	557	7.2 (6.6-7.9)	3.1 (2.7-3.5)	36.2 (31.3-41.3)
	1998-2002	723	8.2 (7.6-8.9)	3.1 (2.7-3.5)	43.5 (39.3-47.8)
	2003-2007	1011	10.3 (9.6-11.0)	3.0 (2.7-3.4)	48.4 (44.6-52.1)
	2008-2012	1256	10.5 (9.9-11.2)	2.7 (2.4-3.0)	58.1 (54.9-61.2)
	2013-2017	1775	12.7 (12.0-13.3)	2.7 (2.5-3.0)	59.8 (57.0-62.5)
	2018-2021	1817	13.6 (12.9-14.4)	2.5 (2.3-2.8)	60.8 (58.1-63.4)
	2017-2021	2221	13.6 (12.9-14.3)	2.6 (2.4-2.8)	60.9 (58.4-63.2)
Ovary	1968-1972	217	5.9 (5.1-6.7)	1.4 (1.0-1.8)	
	1973-1977	258	6.1 (5.4-6.9)	2.3 (1.8-2.7)	34.1 (26.8-41.6)
	1978-1982	410	8.6 (7.7-9.4)	3.9 (3.3-4.4)	33.4 (27.6-39.4)
	1983-1987	497	8.6 (7.9-9.4)	3.3 (2.8-3.8)	30.0 (25.0-35.2)
	1988-1992	692	10.2 (9.4-11.0)	3.5 (3.1-4.0)	39.6 (34.9-44.2)
	1993-1997	866	10.7 (9.9-11.4)	4.0 (3.6-4.5)	44.8 (40.8-48.8)
	1998-2002	1036	10.8 (10.1-11.5)	4.0 (3.6-4.5)	43.3 (40.1-46.5)
	2003-2007	1321	12.0 (11.3-12.6)	4.1 (3.7-4.5)	42.8 (39.9-45.6)
	2008-2012	1610	12.6 (11.9-13.2)	3.9 (3.5-4.2)	42.2 (39.6-44.8)
	2013-2017	1851	12.9 (12.3-13.5)	3.8 (3.5-4.1)	42.5 (40.1-44.9)
	2018-2021	1492	12.0 (11.3-12.6)	3.6 (3.2-3.9)	41.2 (38.8-43.6)
	2017-2021	1855	12.0 (11.5-12.6)	3.6 (3.3-3.9)	43.0 (40.8-45.2)
Non-melanoma skin	1968-1972	153	5.2 (4.3-6.0)	0.2 (0.1-0.4)	
	1973-1977	198	5.4 (4.7-6.2)	0.3 (0.1-0.5)	104.0 (93.6-112.1)
	1978-1982	328	7.3 (6.5-8.1)	0.4 (0.2-0.5)	92.2 (83.3-99.9)
	1983-1987	375	6.9 (6.2-7.6)	0.3 (0.2-0.4)	91.3 (83.7-98.0)
	1988-1992	526	7.6 (7.0-8.3)	0.4 (0.2-0.5)	89.7 (83.7-94.9)
	1993-1997	666	8.1 (7.5-8.7)	0.3 (0.2-0.4)	101.6 (96.8-105.8)
	1998-2002	790	7.9 (7.4-8.5)	0.3 (0.2-0.4)	92.7 (88.7-96.2)
	2003-2007	803	6.7 (6.2-7.2)	0.1 (0.0-0.1)	96.0 (92.2-99.4)
	2008-2012	1217	8.0 (7.5-8.4)	0.1 (0.1-0.1)	97.5 (94.4-100.3)
	2013-2017	1518	8.0 (7.6-8.5)	0.1 (0.1-0.2)	97.8 (95.1-100.2)
	2018-2021	1373	7.4 (7.0-7.8)	0.1 (0.1-0.1)	98.1 (95.5-100.5)
	2017-2021	1713	7.6 (7.2-8.0)	0.1 (0.1-0.1)	98.4 (96.0-100.5)
Thyroid	1968-1972	163	4.4 (3.7-5.1)	0.8 (0.5-1.1)	
	1973-1977	169	3.8 (3.2-4.4)	0.6 (0.4-0.9)	56.8 (46.7-66.3)
	1978-1982	227	4.2 (3.6-4.7)	0.9 (0.6-1.2)	54.1 (46.0-61.8)
	1983-1987	371	5.8 (5.2-6.4)	0.6 (0.4-0.8)	70.9 (64.8-76.5)
	1988-1992	436	6.0 (5.4-6.5)	0.9 (0.7-1.1)	67.8 (62.8-72.4)
	1993-1997	492	5.7 (5.2-6.2)	0.7 (0.5-0.9)	81.9 (77.5-85.8)
	1998-2002	658	6.7 (6.2-7.2)	0.7 (0.6-0.9)	76.6 (72.8-80.1)
	2003-2007	664	6.0 (5.5-6.5)	0.6 (0.5-0.8)	78.4 (75.0-81.6)
	2008-2012	994	7.9 (7.4-8.4)	0.5 (0.4-0.6)	84.0 (81.3-86.4)
	2013-2017	1439	10.4 (9.8-10.9)	0.4 (0.3-0.5)	89.7 (87.7-91.6)
	2018-2021	1338	11.3 (10.6-11.9)	0.4 (0.3-0.5)	88.0 (85.9-89.9)
	2017-2021	1666	11.3 (10.7-11.9)	0.4 (0.3-0.4)	88.8 (87.0-90.5)
Pancreas	1968-1972	50	1.6 (1.2-2.1)	0.8 (0.4-1.1)	
	1973-1977	78	2.1 (1.6-2.6)	1.5 (1.1-1.9)	0.7 (0.1-3.7)
	1978-1982	116	2.7 (2.2-3.2)	2.1 (1.6-2.5)	4.4 (1.8-9.0)
	1983-1987	174	3.2 (2.7-3.7)	2.5 (2.1-2.9)	4.5 (1.9-8.9)
	1988-1992	193	3.0 (2.6-3.4)	3.1 (2.6-3.5)	2.1 (0.8-4.7)
	1993-1997	244	3.2 (2.8-3.6)	3.0 (2.6-3.4)	4.1 (2.1-7.1)
	1998-2002	345	3.5 (3.2-3.9)	3.4 (3.1-3.8)	4.4 (2.5-7.0)
	2003-2007	484	4.2 (3.8-4.5)	3.8 (3.4-4.2)	7.5 (5.1-10.5)
	2008-2012	679	4.7 (4.3-5.0)	4.0 (3.7-4.3)	7.4 (5.3-10.0)
	2013-2017	963	5.4 (5.0-5.8)	4.1 (3.8-4.4)	12.9 (10.6-15.5)
	2018-2021	961	5.5 (5.1-5.9)	4.3 (4.0-4.6)	12.5 (10.4-14.9)
	2017-2021	1187	5.6 (5.2-5.9)	4.3 (4.0-4.6)	12.4 (10.5-14.6)
Stomach	1968-1972	542	17.4 (15.9-18.8)	11.9 (10.6-13.1)	
	1973-1977	610	16.6 (15.3-18.0)	13.3 (12.1-14.5)	6.4 (4.3-9.1)
	1978-1982	643	14.6 (13.4-15.7)	11.5 (10.5-12.5)	11.0 (8.4-14.1)
	1983-1987	772	14.3 (13.3-15.4)	9.4 (8.6-10.2)	13.6 (10.9-16.7)
	1988-1992	826	12.5 (11.6-13.3)	9.6 (8.8-10.3)	17.2 (14.4-20.2)
	1993-1997	917	11.4 (10.7-12.2)	8.1 (7.4-8.7)	22.6 (19.5-26.0)
	1998-2002	968	10.0 (9.3-10.6)	7.0 (6.5-7.6)	24.4 (21.5-27.3)
	2003-2007	888	7.4 (6.9-7.9)	5.0 (4.6-5.4)	25.5 (22.4-28.8)
	2008-2012	1078	7.1 (6.7-7.6)	4.4 (4.0-4.7)	26.6 (23.6-29.7)
	2013-2017	1156	6.3 (5.9-6.6)	3.5 (3.2-3.8)	35.8 (32.6-39.1)
	2018-2021	904	5.2 (4.8-5.5)	2.6 (2.4-2.9)	41.9 (38.3-45.5)
	2017-2021	1111	5.1 (4.8-5.4)	2.7 (2.5-2.9)	41.7 (38.5-44.9)

Site	Year	Number	ASIR (95% CI)*	ASMR (95% CI)*	ASRS (95% CI)
Cervix	1968-1972	603	18.0 (16.6-19.5)	4.9 (4.2-5.7)	
	1973-1977	676	17.6 (16.3-18.9)	7.0 (6.2-7.9)	47.7 (43.2-52.2)
	1978-1982	751	16.6 (15.4-17.8)	7.3 (6.5-8.1)	48.4 (44.1-52.6)
	1983-1987	899	16.2 (15.2-17.3)	6.0 (5.4-6.7)	47.3 (43.3-51.3)
	1988-1992	1002	15.3 (14.3-16.2)	6.0 (5.4-6.6)	55.5 (52.0-58.9)
	1993-1997	1128	13.9 (13.0-14.7)	5.4 (4.9-6.0)	59.8 (56.6-63.0)
	1998-2002	1040	10.7 (10.1-11.4)	4.5 (4.0-4.9)	63.7 (60.6-66.7)
	2003-2007	1015	8.9 (8.3-9.5)	3.4 (3.1-3.8)	61.5 (58.3-64.5)
	2008-2012	928	6.8 (6.4-7.3)	2.5 (2.2-2.8)	60.5 (57.3-63.6)
	2013-2017	1084	7.1 (6.7-7.6)	2.1 (1.9-2.3)	60.5 (57.4-63.4)
	2018-2021	904	6.9 (6.4-7.3)	1.7 (1.5-1.9)	62.6 (59.3-65.7)
	<b>2017-2021</b>	<b>1106</b>	<b>6.8 (6.4-7.2)</b>	<b>1.7 (1.5-1.9)</b>	<b>62.8 (59.9-65.6)</b>

\* per 100,000 resident population

### 3.1 Trends in age-standardised incidence, mortality, and survival of selected cancers in males and females, 1968-2021

#### KEY POINTS

- Five-year age-standardised survival rates had increased over the years for all the top ten common cancers diagnosed in males and females; however, differing trends were observed for their age-standardised incidence and mortality rates.
- From 1968-1972 to 2017-2021, in males, there were notable rises in the age-standardised incidence rates of prostate and colorectal cancers (4.0 to 36.5 , and 19.4 to 37.5 per 100,000 population respectively); but also significant decreases in that of lung, liver, and stomach cancers (47.3 to 30.0, 28.7 to 16.4, and 37.7 to 9.2 per 100,000 population respectively).
- While there was a noteworthy fall in the age-standardised mortality rate of stomach cancer in males (26.2 to 4.6 per 100,000 population), those of pancreatic and colorectal cancers had risen (1.7 to 5.9 and 8.9 to 12.6 per 100,000 respectively).
- In females, while the age-standardised incidence rates of breast, uterine, and ovarian cancers had risen significantly (20.1 to 74.6, 4.9 to 18.8, 5.9 to 12.0 per 100,000 population respectively), there were significant declines in the age-standardised incidence rates of stomach and cervical cancers (17.4 to 5.1, and 18.0 to 6.8 per 100,000 population respectively).
- In conjunction with the changes in the corresponding incidence rates over the years, age-standardised mortality rates for breast and ovarian cancers had risen significantly (from 5.7 to 11.9 and 1.4 to 3.6 per 100,000 population respectively), whereas that of stomach and cervical cancers had fallen (11.9 to 2.7, and 4.9 to 1.7 per 100,000 population respectively).
- Even among cancers with generally poorer survival rates, there had been an increase in the five-year ASRS over the years, such as for lung and liver cancers in males (3.0% to 19.6% and 0.2 to 26.0% from 1968-1972 to 2017-2021 respectively), and for lung and stomach cancers in females (5.3% to 36.3% and 6.4% to 41.7% during this period respectively).

### 3.2 Stage distribution for selected cancers, 2003-2021

The SCR began comprehensive collection of staging information in 2003. From 2003-2007 to 2013-2017, many commonly diagnosed cancers had experienced a shift towards being diagnosed at earlier stages (Stages I-II)<sup>3</sup>.

Among males, liver, pancreatic and prostate cancers registered the biggest changes in the proportion of early-stage (stages I and II) versus late-stage (stages III and IV) diagnoses (20.8, 14.1, and 11.9 percentage points respectively) (Table 3.2.1). The proportion of early-stage diagnosis for liver cancer rose from 23.8% in 2003-2007 to 44.6% in 2013-2017; while that for pancreatic cancer rose from 16.5% to 30.7% during the same period. However, the proportion of prostate cancers diagnosed at an early stage fell from 63.5% in 2003-2007 to 51.6% in 2013-2017.

In 2018-2021, lung, pancreatic, and stomach cancers had the highest proportions of late-stage diagnoses among males (79.3%, 73.7%, and 61.6% respectively), and this pattern was also seen across earlier years (Figure 3.2.1, Table 3.2.1). This could partly explain the higher mortality rates for lung, stomach, and pancreatic cancers relative to their respective incidence rates, as well as lower survival rates (Table 3.1.1).

Among females, the biggest changes in the proportion of early- and late-stage diagnoses occurred in lung, stomach, and pancreatic cancers (Table 3.2.2). 13.8% of lung cancer in females were diagnosed at Stages I and II in 2003-2007, and this increased to 23.2% in 2013-2017. For stomach cancer, 26.9% of diagnoses were made at earlier stages in 2003-2007, and this had increased to 37.8% in 2013-2017. Similarly, the proportion of pancreatic cancer diagnosed at Stage I or II registered a nearly twofold increase from 16.4% in 2003-2007 to 31.3% in 2013-2017.

While the proportion of early-stage diagnoses for lung, pancreatic, and stomach cancers among females had increased, these cancers still had the highest proportions of late-stage diagnoses in 2018-2021 (71.2%, 70.9%, and 59.5% respectively), and similar to that of males, this pattern was also observed for earlier years (Figure 3.2.2, Table 3.2.2). This could partly account for the higher mortality rates vis-à-vis the respective incidence rates, as well as the lower survival rates in contrast to breast and thyroid cancers, which consistently had a higher proportion of early-stage diagnoses (Table 3.1.2).

In 2018-2021, for cancers that were common to both genders, such as colorectal, lung, stomach and pancreatic cancers, women were also slightly more likely to be diagnosed at earlier stages compared to males.

**Table 3.2.1** Stage distribution (%) of selected cancers in males, 2003-2021<sup>^</sup>

	2003-2007 (AJCC 6)				2008-2012 (AJCC 6 & 7)				2013-2017 (AJCC 7)				2018-2021 (AJCC 8)			
	Stage I	Stage II	Stage III	Stage IV	Stage I	Stage II	Stage III	Stage IV	Stage I	Stage II	Stage III	Stage IV	Stage I	Stage II	Stage III	Stage IV
Prostate	1.0	62.5	11.4	25.0	10.0	53.6	9.8	26.7	15.3	36.3	16.6	31.7	14.9	28.7	25.4	31.0
Colon & rectum	12.5	27.9	36.6	23.0	16.0	27.0	33.1	23.9	18.1	24.7	32.8	24.4	19.4	21.4	33.4	25.8
Lung	9.7	4.6	26.8	58.9	9.2	4.9	24.0	61.9	11.0	4.9	18.4	65.7	15.5	5.3	17.1	62.2
Liver	11.4	12.4	32.5	43.7	22.6	19.5	30.5	27.5	26.8	17.8	28.6	26.8	36.1	14.2	24.8	24.9
Non-melanoma skin*	81.3	7.5	7.5	3.8	76.7	18.2	2.3	2.8	75.7	21.3	1.2	1.9				
Kidney	38.9	10.1	19.2	31.7	43.3	11.3	16.5	29.0	50.4	8.1	16.4	25.1	47.4	6.4	17.7	28.5
Stomach	17.3	11.0	17.9	53.8	17.0	11.3	24.8	46.8	22.0	12.4	23.1	42.5	27.3	11.0	20.1	41.5
Pancreas	2.9	13.6	8.9	74.5	5.7	15.4	14.0	64.9	8.2	22.5	11.7	57.6	12.9	13.4	17.2	56.5

<sup>3</sup> The AJCC 6 & 7 are based on anatomic staging and are thus relatively comparable. In contrast, AJCC 8 is based on prognostic staging and is therefore not comparable to the AJCC 6 & 7 systems.

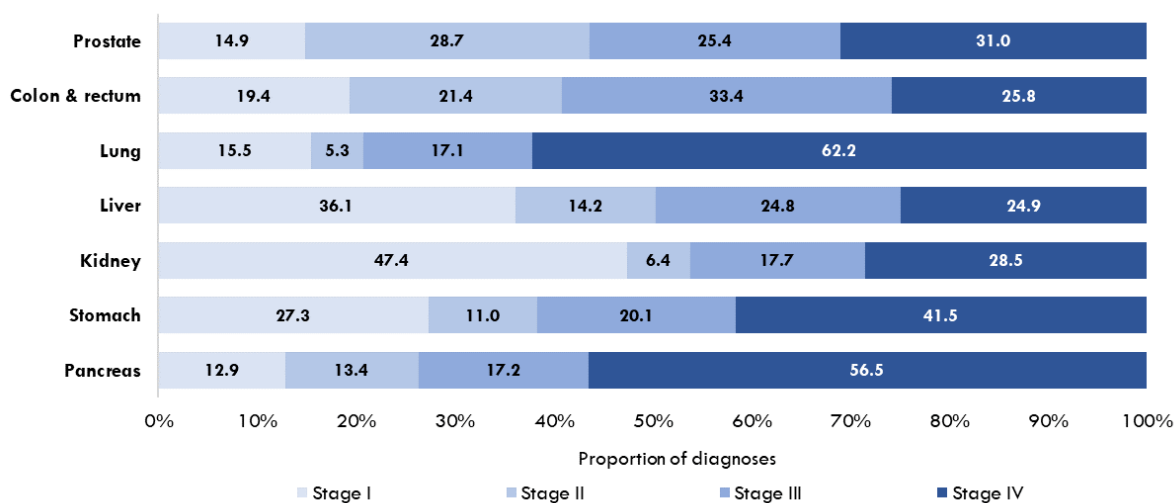
**Table 3.2.2** Stage distribution (%) of selected cancers in females, 2003-2021<sup>^</sup>

	2003-2007 (AJCC 6)				2008-2012 (AJCC 6 & 7)				2013-2017 (AJCC 7)				2018-2021 (AJCC 8)			
	Stage I	Stage II	Stage III	Stage IV	Stage I	Stage II	Stage III	Stage IV	Stage I	Stage II	Stage III	Stage IV	Stage I	Stage II	Stage III	Stage IV
Breast	33.0	37.9	20.4	8.6	33.0	38.3	19.0	9.7	33.6	38.9	16.8	10.6	57.4	19.4	12.2	11.0
Colon & rectum	12.5	29.4	36.2	21.9	14.5	26.0	34.8	24.8	16.8	23.8	34.0	25.4	18.8	23.5	30.9	26.9
Lung	10.6	3.2	23.2	63.0	13.2	3.0	15.5	68.3	18.1	5.1	10.0	66.8	24.4	4.4	9.8	61.4
Uterus	66.4	9.1	16.2	8.2	67.2	8.5	14.5	9.8	68.3	6.6	14.4	10.7	65.7	6.6	15.5	12.1
Ovary	41.9	10.3	31.5	16.3	36.5	9.5	35.6	18.4	40.6	9.7	31.8	17.8	45.0	7.8	25.9	21.3
Non-melanoma skin*	84.2	11.3	4.5	0.0	82.6	16.2	0.9	0.4	81.1	16.4	0.4	2.0				
Thyroid	46.3	15.6	12.6	25.5	62.3	8.9	13.8	15.1	57.5	6.0	21.8	14.6	77.7	14.1	2.4	5.8
Pancreas	4.8	11.6	12.9	70.7	7.5	17.6	14.6	60.4	8.8	22.5	14.0	54.6	13.7	15.4	17.9	53.0
Stomach	16.1	10.8	19.6	53.6	18.5	10.8	22.7	48.0	24.9	12.9	21.0	41.2	29.8	10.7	15.0	44.5
Cervix	46.0	26.0	18.6	9.4	44.6	25.8	15.1	14.6	41.7	22.9	18.9	16.4	35.6	26.2	20.4	17.8

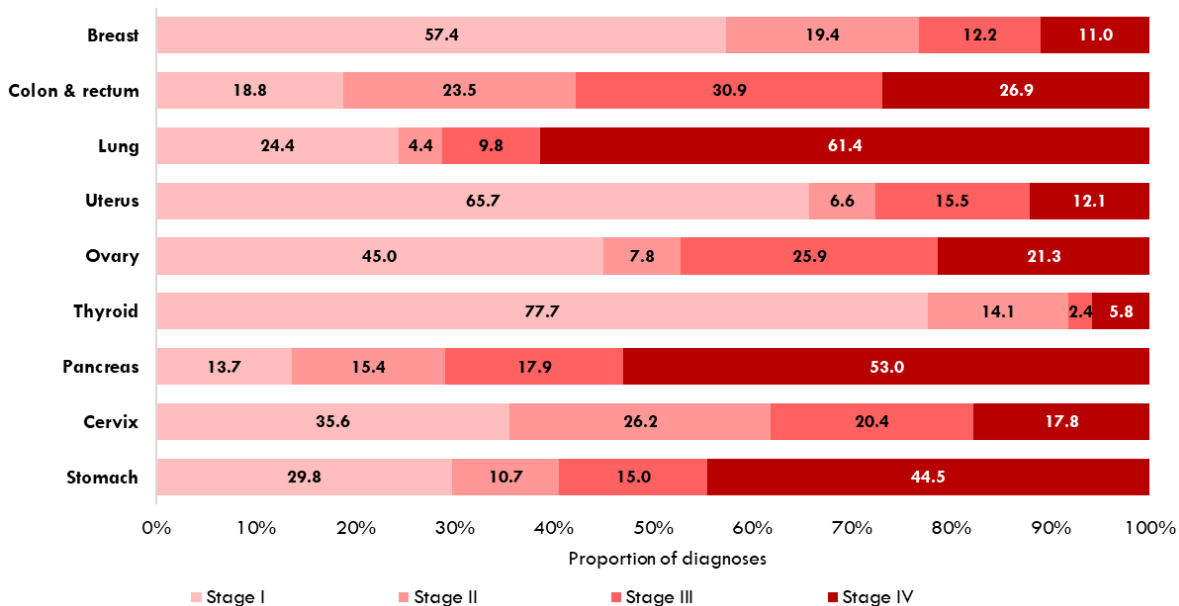
<sup>^</sup> TNM staging is only available for some lymphoid and myeloid neoplasms

\* Under the AJCC 8 staging system, only non-melanoma of the head & neck and trunk are staged; therefore, staging information for non-melanoma skin in 2018-2021 is omitted

**Figure 3.2.1** Stage distribution (%) of selected cancers in males, 2018-2021



**Figure 3.2.2** Stage distribution (%) of selected cancers in females, 2018-2021





### 3.2 Stage distribution for selected cancers by gender, 2003-2021

#### KEY POINTS

- Staging distribution is linked in part to outcomes in terms of cancer mortality and survival.
- From 2003-2007 to 2013-2017, there had been a slight increase in the proportion of diagnoses at early stages (Stage I and II) for most of the common cancers diagnosed in males and females.
- In 2018-2021, among males, lung, pancreatic, and stomach cancers were more likely to be diagnosed at later stages (79.3%, 73.7%, 61.6% respectively). This pattern was consistent across time.
- Similarly, in 2018-2021, among females, lung, pancreatic, and stomach cancers were also more likely to be diagnosed at later stages (71.2%, 70.9%, and 59.5% respectively). This was seen across all time periods.

## CONCLUSION

The diverging trends of increasing cancer incidence and decreasing mortality are indicative of the rising survival rates. However, the increase in numbers of early death and disability due to causes associated with ageing (such as cancer) will remain a challenge for the health system and society at large.

The World Health Organisation estimates that 30%-50% of all cancer cases are preventable through healthy lifestyle choices (24). It is important that individuals lead lifestyles that lower their risk of cancer, such as avoiding smoking and excessive alcohol consumption, as well as maintaining a healthy weight status by engaging in regular physical activity, and having healthy and balanced diets. Attending regular health screening for preventable cancers as recommended (based on one's age and gender profile) will also enable cancers to be detected at early stages and enable timely intervention for better prognosis and outcomes. Preventive measures such as these could help individuals live well into old age healthily and reduce the burden of disease at both individual and societal levels.

# APPENDIX 1

## CANCER SITES AND GROUPS USED IN REPORT BY ICD-10 CODES

ICD-10 description	ICD 10 code	Label in report
Nasopharynx	C11	Nasopharynx
Oesophagus	C15	Oesophagus
Stomach	C16	Stomach
Colon	C18	Colon & rectum
Rectosigmoid & rectum	C19-C20	
Liver	C22	Liver
Gallbladder & other biliary tract	C23.9-C24	Gallbladder
Pancreas	C25	Pancreas
Lung (incl. trachea & bronchus)	C33-C34	Lung
Thymus, heart & mediastinum	C37.9-C38.3, C38.8	Heart, thymus & mediastinum
Bones, joints & articular cartilage	C40, C41	Bone
Connective & soft tissues (incl. peripheral nerves)	C47 & C49	Connective tissue
Other skin cancer	C44	Non-melanoma skin
Breast	C50	Breast
Cervix	C53	Cervix
Uterus	C54	Uterus
Ovary	C56.9	Ovary
Prostate	C61	Prostate
Urinary bladder	C67	Bladder
Kidney & other urinary organs	C64 - C66 & C68	Kidney
Brain & Central Nervous System (CNS)	C70, C71-C72	Brain & Central Nervous System
Thyroid gland	C73	Thyroid
Other endocrine glands & related structures	C74-C75	Other endocrine

## CLASSIFICATION OF NEOPLASMS OF HAEMATOPOETIC & LYMPHOID TISSUES IN THIS REPORT (ICD10: C81-C96, D45-D47)

<b>Lymphoid Neoplasms</b>
Precursor Lymphoid Neoplasms
B Mature Neoplasms
T/NK Mature Neoplasms
Hodgkin's Lymphoma
Immunodeficiency-associated lymphoproliferative disorders
Histiocytic and Dendritic Cell Neoplasms
Malignant Lymphoma NOS
<b>Myeloid Neoplasms and Acute Leukaemia</b>
Acute leukaemia of ambiguous lineage
Acute Myeloid Leukaemia and related Precursor Neoplasms
Myeloproliferative Neoplasms
Myelodysplastic / Myeloproliferative Neoplasms

## REFERENCES

1. **World Health Organisation.** *Manual of the International Statistical Classification of Diseases, Injuries and Causes of Death 10th edition.* Geneva : s.n.
2. **C. Percy, L. Thomas and J. Berg.** *Manual of Tumour Nomenclature and Coding (MOTNAC).* s.l. : American Cancer Society Inc., 1968.
3. **C. Percy, V. Van Holten and C. Muir.** *International Classification of Diseases for Oncology, Second Edition.* Geneva : World Health Organisation, 1990.
4. **A. Fritz, C. Percy, A. Jack, K. Shanmugaratnam and L. Sobin.** *International Classification of Diseases for Oncology, Third Edition.* Geneva : WHO, 2000.
5. **International Agency for Research on Cancer.** WHO Classification of Tumours the 4th edition. [Online] <https://whobluebooks.irac.fr>.
6. **F. Greene, D. Page, I. Fleming, A. Fritz, C. Balch and D. Haller.** *AJCC Cancer Staging Manual 6th edition.* New York : Springer, 2002.
7. **S. Edge, D. Byrd, C. Compton, A. Fritz, F. Greene and A. Trotti.** *AJCC Cancer Staging Manual 7th edition.* New York : Springer, 2010.
8. **M. Amin, S. Edge, F. Greene, D. Byrd, R. Brookland, M. Washington, J. Gershewald, C. Compton, K. Hess, et al.** *AJCC Cancer Staging Manual 8th edition.* New York : Springer, 2017.
9. **Department of Statistics, Singapore.** Singapore Residents By Age Group, Ethnic Group And Sex, End June. *SingStat Table Builder.* [Online] 2023. [Cited: 28 February, 2023.] <https://tablebuilder.singstat.gov.sg/table/TS/M810011>.
10. **EUROCARE.** *EUROCARE-6 Protocol for updating population-based cancer survival in Europe.* 2015.
11. *Global surveillance of trends in cancer survival 2000-14 (CONCORD-3): analysis of individual records for 37 513 025 patients diagnosed with one of 18 cancers from 322 population-based registries in 71 countries.* **C. Allemani, T. Matsuda, V. Di Carlo, et al.** 10125, 2018, *Lancet*, Vol. 391, pp. 1023-1075.
12. **Department of Economic and Social Affairs, United Nations.** *MortPak-The United Nations.* s.l. : <https://un.org/en/development/desa/population/publications/mortality/mortpak.shtml>.
13. **Department of Statistics, Singapore.** Life Tables from 2003. [Online] <https://www.singstat.gov.sg/publications/population/complete-life-table>.
14. *An alternative approach to age adjustment of cancer survival rates.* **H. Brenner, V. Arndt , O. Gefeller and T. Hakulinen.** 15, 2004, *Eur J Cancer* , Vol. 40, pp. 2317-22.
15. *Standard cancer patient population for age standardising survival ratios.* **I. Corazziari, M. Quinn and R. Capocaccia.** 15, 2307-16, *Eur J Cancer*, Vol. 40, p. 2004.
16. *The Epidemiologic Transition: Changing Patterns of Mortality and Population Dynamics.* **R. McKeown.** 2009, *Am J Lifestyle Med*, pp. 19S-26S.
17. **Ministry of Health, Singapore.** *Caring for Our People: 50 years of healthcare in Singapore.* Singapore : MOH Holdings Pte Ltd, 2015.

18. **Department of Statistics, Singapore.** Deaths By Broad Groups Of Causes. *SingStat Table Builder*. [Online] 2023. [Cited: 15 March, 2023.] <https://tablebuilder.singstat.gov.sg/table/TS/M810131>.
19. **Institute for Health Metrics and Evaluation (IHME).** GBD Results. [Online] 2020. [Cited: 15 March, 2023.] <https://vizhub.healthdata.org/gbd-results/>.
20. *Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries.* **H. Sung, et al.** CA CANCER J CLIN, 2021, Vol. 71, pp. 209–249.
21. **World Health Organisation.** Cancer Today. *Global Cancer Observatory (GLOBOCAN)*. [Online] [Cited: 9 May, 2023.] <https://gco.iarc.fr/today/home>.
22. *Living too Long.* **Brown, G.** 2, 2015, EMBO Reports, Vol. 16, pp. 137-141.
23. *Global cancer incidence in older adults, 2012 and 2035: A population-based study.* **S. Pilleron, D. Sarfati, M. Janssen-Heijnen, J. Vignat, J. Ferlay, F. Bray, I. Soerjomataram.** 2019, Int. J. Cancer, Vol. 144, pp. 49-58.
24. **World Health Organisation.** Preventing cancer. [Online] [Cited: 26 March, 2023.] <https://www.who.int/activities/preventing-cancer>.