Cancer summary data visualisation

For around 60 cancers, this data visualisation provides a wide range of cancer-related statistics that, together, present a summary of national cancer data and trends over time. Help with terms, and information about the data, is available by placing the mouse pointer over the boxes found near the top of the dashboard.

Cancer data in Australia - a summary of incidence, mortality, survival and prevalence of cancer in Australia.

This visualisation contains trend information for around 60 cancers divided across Figures 1 to 4 and Table 1.

Figure 1 is a line graph that contains information on the number of cancer cases or deaths and age-standardised rates of cancer diagnosis or cancer death between 1982 and 2020.

Figure 2 is a line graph that contains information on the crude rate of cancer diagnosis or cancer death for various 5-year age groups from 0-4, 5-9, etc., up to 90+ for a selected year between 1982 and 2020.

Table 1 contains cancer-related summary statistics such as the number of cases or deaths, crude and age-standardised rate of diagnosis or death and mean and median ages at diagnosis or death.

Figure 3 is a line graph that contains information on 5-year relative survival rates for cancer from 1987-1991 to 2012-2016 for a selected cancer.

Figure 4 is a column graph that contains information on cancer prevalence, or, the number of people alive at 31 December 2015 who have been diagnosed with the selected cancer in the last year, last 5 years and 34 years.
Please note that cancer incidence statistics from 2017 to 2020, and cancer mortality data in 2019 and 2020, are projections; all other statistics are derived from actual data.

Data informing the summary dashboard is available as supplementary tables.

References


Vaccarella S, Franceschi S, Bray F, Wild C, Plummer M and Dal Maso L 2016. The increase in thyroid cancer may be due to an increase in medical surveillance and the introduction of new diagnostic techniques, such as neck ultrasonography. The New England Journal of Medicine 375: 614–17.
Cancer rankings data visualisation

The cancer rankings data visualisation provides the top 20 cancers diagnosed and the leading 20 cancers causing death between 1982 and 2020. The rankings are available by sex and age group (including all ages) and can be presented as counts or rates.

Two rankings tables are provided to allow comparisons to be made. Help with terms, and information about the data, is available by placing the mouse pointer over the boxes found near the top of the dashboard.

Australia’s leading cancers. Cancer rankings (and ranking comparison) tables - incidence and mortality, by sex and age groups, 1982 to 2020. This visualisation contains tabulated rankings of the top 20 cancers most commonly diagnosed and the leading 20 cancers causing death from 1982 to 2020 for all ages combined and various 5-year age groups from 0-4, 5-9, etc. up to 90+.

Cancer incidence and mortality data is available as supplementary tables.

References


Vaccarella S, Franceschi S, Bray F, Wild C, Plummer M and Dal Maso L 2016. The increase in thyroid cancer may be due to an increase in medical surveillance and the introduction of new diagnostic techniques, such as neck ultrasonography. The New England Journal of Medicine 375: 614-17.
Cancer survival data visualisation

For around 60 cancers, this data visualisation provides a range of cancer survival statistics. Help with terms, and information about the data, is available by placing the mouse pointer over the boxes found near the top of the dashboard.

This visualisation contains survival information for around 60 cancers divided across Figures 1 to 4.

Figure 1 is a line graph that contains information on 1 to 5-year observed or relative survival rates for the selected cancer from 1987-1991 to 2012-2016.

Figure 2 is a column graph that contains information on 1 to 5-year observed or relative survival rates by sex for the selected cancer for the most recent period 2012-2016.

Figure 3 is a line graph that contains information on 1 to 5-year observed or relative survival rates for the selected cancer in order of increasing age group (0-4, 5-9, etc. up to 90+) for the most recent period 2012-2016.

Figure 4 is a line graph that contains 5-year conditional observed or relative survival, given the person has already survived 1 to 15 years after diagnosis, for the selected cancer in the most recent period 2012-2016.

Cancer survival data is available as supplementary tables.
References


Vaccarella S, Franceschi S, Bray F, Wild C, Plummer M and Dal Maso L 2016. The increase in thyroid cancer may be due to an increase in medical surveillance and the introduction of new diagnostic techniques, such as neck ultrasonography. The New England Journal of Medicine 375: 614-17.

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Cancer by state and territory data visualisation

For around 60 cancers, this data visualisation provides cancer incidence and mortality data for each state and territory. Help with terms, and information about the data, is available by placing the mouse pointer over the boxes found near the top of the dashboard.

Cancer data: state and territory. Incidence and mortality, counts and rates, by sex and state and territory, from 1982 to 2016.

This visualisation contains incidence and mortality information for around 60 cancers divided across Figures 1 and 2.

Figure 1 is a column graph that contains information on the number of cases diagnosed or the number of deaths and the age-standardised rates of diagnosis or death from the selected cancer by sex for each state and territory and Australia for a selected year from 1982 to 2016.

Figure 2 is a line graph that contains information the number of cases diagnosed or the number of deaths and the age-standardised rates of diagnosis or death from the selected cancer for a selected sex and state or territory between 1982 and 2016.

State and territory incidence data is available as [supplementary tables](#).

References


Vaccarella S, Franceschi S, Bray F, Wild C, Plummer M and Dal Maso L 2016. The increase in thyroid cancer may be due to an increase in medical surveillance and the introduction of new diagnostic techniques, such as neck ultrasonography. The New England Journal of Medicine 375: 614-17.

Last updated 3/11/2020 v4.0
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Cancer risk data visualisation

For around 60 cancers, this data visualisation provides cancer incidence and mortality risk data by age. Help with terms, and information about the data, is available by placing the mouse pointer over the icons found near the top of the page. Additional guidance about the risk adjusted for competing mortality and risk unadjusted for competing mortality is located in the cancer data commentaries and methods sections.

Cancer data in Australia: Risk. Trends over time from 1982 to 2016 for selected cancers, by sex and age.

This visualisation contains risk of cancer diagnosis or risk or cancer death for around 60 cancers.

Figure 1 is a line graph that contains information on the risk of cancer diagnosis (adjusted or unadjusted for competing mortality) for the selected cancer and age range from 1982 to 2020.

Figure 2 is a line graph that contains information on the risk of death from cancer (adjusted or unadjusted for competing mortality) for the selected cancer and age range from 1971 to 2020.

Cancer risk data are available as supplementary tables.

References
Cancer incidence and survival by stage data visualisation

Cancer stage at diagnosis refers to the extent of spread of cancer at the time of diagnosis—the higher the number (between I and IV), the further the cancer has spread. The stage at diagnosis and subsequent treatment outcomes are important determinants of cancer survival.

National cancer incidence and survival by stage data were first released in the Cancer data in Australia December 2018 release. While almost all other data are updated annually, more recent cancer incidence and survival by stage data is not available so it was not possible to update it. As it is a unique source of national data, the following cancer incidence and survival by stage data visualisation remains available within this Cancer data in Australia report.

This visualisation contains the latest national data on cancer survival and incidence, by stage of cancer at diagnosis for the 5 most commonly diagnosed cancers (melanoma of the skin, and breast, prostate, lung and colorectal cancers) in 2011.

Cancer stage data is available as supplementary tables.
Cancer data commentaries

The Cancer data in Australia report is primarily a statistical report providing access to a wide and growing range of cancer statistics. On occasion, special purpose commentaries will be published to assist with the use of cancer data. The Cancer data commentaries series has been created within Cancer data in Australia to communicate key findings within the data, to help increase cancer awareness and to provide greater understanding of cancer trends in Australia.

Cancer data commentaries currently include:

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<th>Title and content overview</th>
<th>Release date</th>
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<td>C3</td>
<td><strong>How are pancreatic cancer rates changing?</strong></td>
<td>13/11/2020</td>
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<tr>
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<td>A commentary about how pancreatic cancer incidence, mortality, risk and survival rates have been changing over the last 20 years.</td>
<td></td>
</tr>
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<td>C1</td>
<td><strong>Changes to the cancer risk data and guidance using the risk methods</strong></td>
<td>30/10/2020</td>
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<td></td>
<td>An overview of the expanded range of cancer risk data, including assistance in understanding risk adjusted for competing mortality.</td>
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<td>C2</td>
<td><strong>Risk of melanoma of the skin by age and over time</strong></td>
<td>30/10/2020</td>
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<tr>
<td></td>
<td>An overview of the changing risk of being diagnosed with, or dying from, melanoma of the skin; risk is considered by different ages.</td>
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</table>

The data presented in the Cancer data commentaries are available in the supplementary tables.

Last updated 2/11/2020 v14.0
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Cancer data commentaries

Changes to the cancer risk data and guidance using the risk methods

Cancer data commentary 1

The 2020 release of Cancer data in Australia (CDiA) contains a greater range of risk data than previous AIHW releases. This cancer data commentary provides guidance on using the new risk data and summarises key changes.

Changes in the 2020 release of cancer risk data

Changes to CDiA include the following:

- Previously, the only risk data available was not adjusted for competing mortality; now risk adjusted for competing mortality is also available
- Risk by age 5 up to risk by age 90 (in 5-year increments) and lifetime risk are now released — previously only risk by age 75 and by age 85 were available
- Because of methodological issues associated with its derivation, ‘All cancers combined’ incidence risk time series is not available
- While the previous method of calculating incidence risk (not adjusted for competing mortality) has been revised, the new method is similar to the previous method and produces comparable results (with the exception of ‘All cancers combined’ incidence)

About the two methods for measuring risk

‘Cancer risk’ is generally used to describe the risk of being diagnosed with, or the risk of dying from, cancer.

CDiA includes a ‘risk adjusted for competing mortality’ (AdjCom) method and a ‘risk unadjusted for competing mortality’ (RUCM) method. A more technical overview of the methods is available in the methods section of CDiA.

Risk unadjusted for competing mortality only considers the likelihood of being diagnosed with, or dying from, cancer. ‘Competing mortality’ considers the probability of a certain event occurring for a person (e.g. diagnosis of cancer, death from cancer) while taking into account the fact that the person might die before the event happens. The additional factor of competing mortality results in an estimate that better reflects the ‘real world’ risk but it also produces more complex comparisons. In particular, to what extent are changes in risk over time, or differences between the risk for two populations, influenced by competing mortality and to what extent are they driven by cancer risk?

Why publish two risk methods?

The different methods have their own respective strengths and limitations. Therefore, one method may be better suited to inform a particular investigation than the other. Guidance on using the methods is provided in more detail in the following sections.

What are the practical differences between the risk methods?

AdjCom measures risk by taking into account the mortality that occurs due to other causes whereas RUCM does not. The following hypothetical situation helps highlight the practical differences.

- Suppose that in 1982 and then in 2015, only people aged 10 to 14 were diagnosed with condition X and only people aged 85 to 89 were diagnosed with condition Y.
- Suppose that the number of people who were diagnosed with condition X was equal to 0.5% of the population alive aged 10 to 14, and the number of people who were diagnosed with condition Y was equal to 0.5% of the population alive aged 85 to 89.

Table 1 provides the risk of diagnosis using RUCM and AdjCom for conditions X and Y in 1982 and 2015 and calculates the risk for each condition.

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<td>2.4690% (1 in 41)</td>
<td>2.4635% (1 in 41)</td>
<td>2.4889% (1 in 40)</td>
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<tr>
<td>Condition Y</td>
<td>2.4690% (1 in 41)</td>
<td>2.4690% (1 in 41)</td>
<td>0.4822% (1 in 207)</td>
<td>1.0636% (1 in 94)</td>
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</table>

Observations:

- RUCM for conditions X and Y were the same for 1982. RUCM does not distinguish between age groups. A population risk based only on a rate of 0.5% of 10 to 14 year olds will be the same as a population risk based only on 0.5% of all 85 to 89 year olds.
- AdjCom for condition Y is less than AdjCom for condition X. When competing mortality is taken into account, people have less chance of being diagnosed with condition Y than condition X because a much smaller proportion of people reach age 85 than reach age 10.
- RUCM has remained the same over time. For conditions X and Y, RUCM is the same from 1982 to 2015 because the incidence rates of X and Y have remained unchanged and RUCM does not distinguish between age groups or the likelihood of surviving to a given age.
- AdjCom has increased over time. The risk of being diagnosed with condition Y has more than doubled, even though the incidence rates in 1982 and 2015 are the same (0.5% of the population aged 85 to 89). This occurred because a much greater proportion of people are living to the age of 85 in 2015 than in 1982.

Please note that RUCM minus AdjCom does not somehow isolate the effect of competing mortality. In fact, AdjCom can be higher than RUCM, as is the case for condition X in 2015 in the example above. To view RUCM and AdjCom formulas, please go to Cancer data in Australia methods section.

Which risk method should I use?
The selection of which risk method to use depends on the purpose of the investigation. The most complete understanding of risk is accomplished when using the two methods together.

By factoring in competing mortality, AdjCom provides a better estimate of ‘real world’ cancer risk (that is, a better approximation of the likelihood of being diagnosed with, or dying from, cancer in Australia). However, when viewing changes over time or between populations, the question when using AdjCom is “are the observed differences or changes due to competing mortality or due to the risk purely attributable to cancer?”.

On the other hand, in not factoring in competing mortality, RUCM is less representative of the ‘real world’ risk, particularly at older ages. However, its strength is that comparisons and time series are solely attributable to cancer risk (i.e. not affected by differences in competing mortality).

Because the methods have opposing strengths and limitations, use of the two methods together can help provide a more complete understanding of risk. In general, when writing about cancer risk, AIHW cite AdjCom but also use RUCM to understand cancer-specific trends that are isolated from competing mortality.

How the risk methods can be used together
RUCM and AdjCom measure risk differently and are not directly comparable. However, the information from the respective time series can be used in a complementary manner to provide greater insights into changes over time; the following discussion of changes in lung cancer risk over time helps illustrate this by using AdjCom to estimate the ‘real world’ risk and RUCM to isolate cancer risk.

Between 1982 and 2020, the risk of persons being diagnosed with lung cancer by the age of 90 is estimated to have increased from 1 in 23 to 1 in 18. The increase in risk of being diagnosed with lung cancer by the age of 90 is mostly due to a greater proportion of people surviving to the ages where lung cancer is more commonly diagnosed but increasing lung cancer rates have contributed to some degree (Figure 1).

Figure 1: Risk of being diagnosed with lung cancer by the age of 90, risk adjusted for competing mortality and risk unadjusted for competing mortality, persons, 1982 to 2020

Source: AIHW ACD 2016

The above interpretation of lung cancer risk is undertaken by using AdjCom to provide the ‘real world’ estimate but RUCM to interpret cancer specific risk change over time. Given RUCM focusses only on cancer risk and the RUCM time series is considerably flatter than AdjCom, the sharper increase in AdjCom is likely predominantly due to changes in competing mortality over time.

When using RUCM to assist in the interpretation of AdjCom time series, note that RUCM less AdjCom does not equal competing mortality.

Difficulties using AdjCom to compare populations with different competing mortality
AdjCom comparisons between different populations are accurate but can be open to misinterpretation. Where readers are not aware of the competing mortality concept, it is likely that comparisons will be interpreted as only being due to cancer rates. Where readers are aware of the concept, the question often arises as to whether differences are due to competing mortality or cancer rates.

The potential for misinterpretation, and how to address the issue by using the methods together, is demonstrated in the following consideration of the question ‘Are males more likely to be diagnosed with pancreatic cancer?’.
AdjCom analysis:
The risk of males being diagnosed with pancreatic cancer by the age of 90 between 1982 and 2020 is generally quite similar to females (Figure 2).

RUCM analysis:
Between 1982 and 2020, males consistently have a greater risk of being diagnosed with pancreatic cancer by the age of 90 (Figure 2).

AdjCom used in conjunction with RUCM analysis:
Between 1982 and 2020, the risk of males being diagnosed with pancreatic cancer is quite similar to females. More precisely though, males have a greater risk of being diagnosed with pancreatic cancer but females are more likely to live to the ages where pancreatic cancer more commonly occurs (Figure 2).

Figure 2: Risk of being diagnosed with pancreatic cancer by the age of 90, by sex, RUCM and AdjCom, 1982 to 2020

Source: AIHW ACD 2016

International cancer risk comparisons
When comparing Australian cancer risk data internationally, care should be taken to ensure the comparisons use the same method.

The International Agency for Research on Cancer presents international risk comparisons; these comparisons are unadjusted for competing mortality and the comparisons measure risk of being diagnosed with (based on cases), and risk of death from, specific cancers. The RUCM data AIHW produces is the most comparable method, noting that it measures the risk of being diagnosed for people, not cases (Appendix B provides information on the generally negligible difference between measuring risk of people being diagnosed with cancer and the risk of cancer cases being diagnosed).

General hints for using risk adjusted for competing mortality
Using life expectancy to help interpret change in risk adjusted for competing mortality
Over time, life expectancy is increasing. Cancer is more common in older ages and more people are surviving to older ages. Cancer specific risk may be increasing or decreasing depending on the cancer but the greater number of people reaching older ages, the greater the upwards pressure on the population’s cancer risk.

Using life expectancy to help risk adjusted for competing mortality comparisons
AdjCom comparisons between populations are influenced by cancer rates and competing mortality. RUCM can be used to identify which population has higher rates of cancer. In regards to competing mortality differences, the population with lower life expectancy should have less upwards pressure on risk to some extent because the population is less likely to live to the ages where cancer more commonly occurs.

Using ‘younger’ age groups to simplify interpreting risk adjusted for competing mortality
In many circumstances, risk will be used as supportive information or used a simple measure to inform a general audience. In such circumstances, it may be both undesirable and impractical to distinguish between competing mortality impacts and cancer specific impacts. If appropriate, consideration could be given to reporting on risk by age 75 in preference to older ages. Risk by age 75 is less impacted by competing mortality than older ages; this results in:

- RUCM and AdjCom estimates being more similar than at older ages and therefore less likely to provide contradictory comparisons or trends
- Interpretation of risk over time, or between sexes, being more strongly influenced by cancer specific risk (cancer specific risk is assumed to be the focal point for many general audiences).

Lifetime risk may not be the most appropriate indicator to inform risk for the general population
Lifetime risk is not the risk for an average lifetime. Lifetime risk may be considered as risk by the age of the oldest person in the population for each year; this will be risk by age over 100 for the cancer data time series. Given most people are not expected to live to beyond 100, lifetime risk may not be the most appropriate indicator where the purpose is to provide the general population with a simple and relevant indication of cancer risk.

More about the additional risk by age data

For both AdjCom and RUCM, risk is reported in 5-year increments from risk by age 5 to risk by age 90. Lifetime risk is also provided for AdjCom.
All cancers combined’ incidence risk time series is not available

The time series for All cancers combined incidence risk are not available because the RUCM and AdjCom methods cannot do so with suitable accuracy; the following paragraphs discuss this in more detail.

What should AdjCom and RUCM measure?

The AdjCom and RUCM methods should ideally calculate incidence risk only including people who have not been diagnosed with cancer before; the population who have previously been diagnosed with cancer realised their cancer incidence risk in the year they were first diagnosed with cancer.

What do AdjCom and RUCM measure?

The AdjCom and RUCM methods used calculate incidence risk based on the number of people diagnosed in the year, irrespective of whether individuals have been diagnosed with cancer in previous years.

Why can’t cancer incidence risk be calculated using only those diagnosed with cancer for the first time?

Over 100 years of cancer incidence data would be required to identify all people diagnosed with cancer for the first time so the data required to calculate the exact risk of diagnosis are not yet available, i.e. based only on those diagnosed with cancer for the first time.

A ‘best estimate’ of cancer incidence risk using the ‘first time diagnosed’ concept is provided in Attachment A. The ‘best estimate’ is provided for 2015 and uses 34 years of cancer data to identify and account for the population who have previously been diagnosed with cancer.

Are the AdjCom and RUCM incidence risk measures reliable?

Comparisons between AdjCom and the ‘best estimate’ of cancer incidence risk are provided in Attachment A. Where the two values are suitably close, AdjCom and RUCM risk are considered acceptable proxies that are accurate enough to approximate cancer incidence risk.

For most cancers, the proxy and the best estimate are usually quite close. However, for the group ‘all cancers combined’, the proxy measure of risk is around 10 percentage points higher than the best estimate. The all cancers combined incidence risk using the proxy is over-stated to the extent that it is not considered suitable.

Is the all cancers combined mortality risk time series available?

All cancers combined mortality risk is available. The complexities surrounding cancer incidence risk do not apply to cancer mortality risk. This is because death occurs only once, so the issue of multiple diagnoses and recognising the first occurrence does not apply to mortality risk.

What information is available to inform all cancers combined risk?

The ‘best estimate’ of all cancers combined incidence risk as presented in Attachment A can be used as the most recent estimate of risk. The ‘best estimate’ is only produced for the most recent year for which all states and territories have provided data. A time-series is not available due to comparability issues across time. For example, 2015 will have over 30 years of data from which to identify if a person has been diagnosed with cancer before, whereas the first year of data, 1982, would have no earlier years to identify if a person has been diagnosed with cancer before.

The previous method of cancer incidence risk is no longer available

Prior to the 2020 release of cancer risk data, AIHW measured risk of diagnosis using the RUCM method. However, the previous method measured this risk using ‘cases diagnosed in the year’ while the replacement method of RUCM measures this risk using ‘people diagnosed in the year’. The change to measuring risk of people being diagnosed is closer to the recommended measure of measuring risk of people who were diagnosed for the first time. Attachment B quantifies the impact of changing measurement from cases to people for 2015.

Note that the RUCM method of measuring the risk of death from cancer has not changed from previous publications.

Attachment A

Lifetime risk of diagnosis and risk of diagnosis before age 85 for persons, 2015

Comparison of risk adjusted for competing mortality estimates based on:

- people diagnosed for the first time ever (Method A)
- people diagnosed in a year (Method B)

* the first time ever only factors if a person has been diagnosed previously and since 1982; data on earlier years is not available
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</table>

Notes
1. Risk estimates for sex-specific cancers are presented for the relevant sex e.g. the risk of being diagnosed with prostate cancer is presented as the risk of being diagnosed in males.
2. Risk estimates for breast cancer are presented as the risk of diagnosis in females.

Source: AIHW 2016 Australian Cancer Dataset

Attachment B

Risk of diagnosis before age 75 and age 85, persons, 2015

Comparison of risk unadjusted for competing mortality estimates based on:
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<th>Cancer site/type</th>
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<td>%</td>
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**Notes**

1. Risk estimates for sex-specific cancers are presented for the relevant sex e.g. the risk of being diagnosed with prostate cancer is presented as the risk of being diagnosed in males.
2. Risk estimates for breast cancer are presented as the risk of diagnosis in females.

**Source:** AIHW 2016 Australian Cancer Dataset
Cancer data commentaries

Risk of melanoma of the skin by age and over time
Cancer data commentary 2

This commentary discusses risk trends for melanoma of the skin at different ages and over time. It supports the introduction of the expanded risk data available in the Cancer data in Australia report.

Some key terms

- For convenience, melanoma of the skin has been abbreviated to 'melanoma'; please note melanoma may occur in other sites of the body.
- Melanoma incidence risk’ is the risk of being diagnosed with melanoma while ‘melanoma mortality risk’ is the risk of dying from melanoma. This paper uses a risk method that adjusts for competing mortality; Cancer data commentary no.1 provides help in understanding cancer risk methods and concepts.

Melanoma risk

Cancer awareness campaigns such as the 'Slip-Slop-Slap' campaign of the 1980s and ensuing advertisements since have increased public awareness of melanoma and its prevention. Through continuing education, today’s population should be better informed about how to identify and prevent melanoma than populations of the past.

Lifetime melanoma incidence risk informs risk of being diagnosed with melanoma for the total population (that is, the risk across all ages of the population). Within the total population, older people have lived most of their lives in a less ‘sun smart’ environment while younger Australians have lived the majority of their life in times when public awareness was greater. The following melanoma incidence risk by age commentary highlights the falling risk for the younger populations of today and increasing risk for older populations.

The risk of being diagnosed with melanoma of the skin by the age of 30 has more than halved in 23 years

In 1982, the risk of being diagnosed with melanoma by the age of 30 was around 1 in 600 people. Incidence risk trended upwards and in 1997 has risen to around 1 in 430 people (Figure 1).

From 1997, the risk of melanoma by the age of 30 began to fall. Based on current projections, in 2020 the risk of being diagnosed with melanoma by the age of 30 (estimated at around 1 in 1,170 people) has fallen to less than half of the risk in 1997 (Figure 1).

Following years of consistent decline, the risk of death from melanoma by the age of 30 in 2020 is estimated to be less than one-sixth of the risk in 1982 (1 in 62,000 persons in 2020 compared with 1 in 9,100 persons in 1982) (Figure 1).

Figure 1: Incidence and mortality risk by the age of 30, melanoma of the skin, persons

Note: Incidence risk for 2017-2020 and mortality risk for 2019 - 2020 are based on projections.
Source: AIHW Australian Cancer Database 2016 and National Mortality Database

The risk of being diagnosed with melanoma of the skin by the age of 60 peaked in the 1990’s

In 2005, and following years of increasing risk from 1982, melanoma incidence risk by the age of 60 began to fall and then stabilise from around 2012 (1 in 56 people in 2005 to an estimated 1 in 65 people in 2020) (Figure 2).

The large difference between the incidence risk and mortality risk reflects the relatively high survival rates for melanoma when considered in the context of other cancers..

The risk of death from melanoma by the age of 60 decreased consistently from 1982; from 2013 melanoma mortality risk decreased more sharply (from 1 in 650 in 1982 to 1 in 850 in 2013 and an estimated 1 in 1,600 in 2020) (Figure 2).

Figure 2: Incidence and mortality risk by the age of 60, melanoma of the skin, persons
The risk of death from melanoma of the skin peaked in 2013

The lifetime risk of being diagnosed with melanoma is estimated to have tripled since 1982 (1 in 46 people in 1982 to an estimated 1 in 15 people in 2020) (Figure 3). Considering the younger population’s melanoma of the skin incidence risk has been decreasing and incidence risk by the age of 60 has been stabilising, the continuation of increasing melanoma incidence risk is driven by risks from the older population.

Part of the increase in the total population’s risk of being diagnosed with melanoma is due to increasing life expectancy. Essentially, the ageing population increases the proportion of people living to ages for which melanoma is generally more common (Figure 3).

The lifetime risk of death from melanoma continued to rise up until 2013 (Figure 3). Please note that lifetime risk is not the risk for the ‘average lifetime’, it includes all people within the population and in very broad terms may be considered as risk by age 100 and more.

In 2013, the total population’s risk of death from melanoma was around 1 in 110 people; the lifetime melanoma mortality risk in 2013 had more than doubled from 1982 (1 in 240 people). Since the 2013 peak, lifetime melanoma mortality risk is estimated to have fallen to 1 in 140 people (Figure 4). Sharply decreasing mortality risk in conjunction with increasing incidence risk is indicative of improving survival outcomes for those diagnosed with melanoma (Figure 4).

The lifetime risk of death for males from melanoma of the skin has fallen strongly
The decrease in lifetime mortality risk from 2013 is driven largely by reductions in the comparatively high risk for males (1 in 80 in 2013 to an estimated 1 in 104 in 2020). For females, the lifetime risk of death also fell but at a slower rate (1 in 185 in 2013 to an estimated 1 in 197 in 2020 (Figure 5).

**Figure 5: Lifetime mortality risk, melanoma of the skin, by sex, 1982-2020**

![Graph showing lifetime mortality risk](image)

*Note: Mortality risk for 2019 - 2020 are based on projections.*

*Source: National Mortality Database*

For both sexes, the lifetime risk of being diagnosed with melanoma continues to increase (figure 6) but the lifetime mortality risk for melanoma is starting to decrease.

**Figure 6: Lifetime incidence risk, melanoma of the skin, by sex, 1982-2020**

![Graph showing lifetime incidence risk](image)

*Note: Incidence risk for 2017-2020 are based on projections.*

*Source: AIHW Australian Cancer Database 2016*

While melanoma mortality risk peaked in 2013, impacts of an ageing population (that is, more people living to ages where melanoma incidence rates are higher) will continue to place upwards pressure on the risk of being diagnosed with melanoma and in turn the risk of death from melanoma; this may be particularly true for the ageing populations living in times when ‘Sunsmart’ awareness was less.

### Information about the risk data, terms used and where to find melanoma data

#### About the risk data

- This paper uses a risk method that adjusts for competing mortality; Cancer data commentary no.1 provides help in understanding cancer risk methods and concepts.
- Risk within this paper outlines the risk within the Australian population; an individual’s risk may be different depending on their own risk factors (for example, a daily smoker may have a higher risk of developing types of cancer where smoking is a risk factor).
- Cancer incidence risk in 2017-2020 and cancer mortality risk in 2019-2020 are projections; actual data informs other years.

#### Terms used

- **Lifetime risk** refers to the risk of (being diagnosed with or dying from) melanoma of the skin for the total population. Lifetime risk is not the risk of the ‘average lifetime’; it is risk by age 100 and greater (to the oldest person/s in the population for the year).
- **Melanoma incidence risk** refers to the risk of being diagnosed with melanoma of the skin.
- **Melanoma mortality risk** refers to the risk of dying from melanoma of the skin.

#### Where to find melanoma of the skin data

**Melanoma data used in the commentary**

Data used to inform this commentary is available in these Excel workbooks:

- Data tables: Cancer data in Australia commentary no. 2 - Risk of melanoma of the skin by age and over time (XLSX 145kB).
Cancer data in Australia is updated and revised annually. The data used to inform this commentary is consistent with Cancer data in Australia as of 30 October 2020. Following future updates to Cancer data in Australia, the data within this commentary will differ from future Cancer data in Australia reports to some extent.

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Cancer data commentaries

How are pancreatic cancer rates changing?

Cancer data commentary no. 3

This commentary discusses trends in pancreatic cancer incidence, mortality and survival, in particular, changes that have occurred since around 2000.

The pancreas is located near the stomach; it produces enzymes that aid digestion and hormones that regulate blood sugar levels. Pancreatic cancer occurs when abnormal cells in the pancreas multiply out of control and form a tumour.

Pancreatic cancer has very low survival rates and is becoming more commonly diagnosed. Research indicates that the poorer outcomes associated with pancreatic cancer are primarily due to its presentation at an advanced stage. Early stages of pancreatic cancer do not usually produce symptoms, so it is generally advanced when it is diagnosed (AIHW 2012).

Terms used

*Incidence rates* refer to the rate of pancreatic cancer cases diagnosed.

*Mortality rates* refer to the rate of death from pancreatic cancer.

*Projections* are estimates for the most recent years (2017-2020 for incidence and 2019-2020 for mortality). Estimates are derived based on trends from the previous 10 years of actual data. Where this commentary discusses rates based on projections, the rates are described as ‘estimated’.

For those less familiar with statistical methods and terms, some assistance in their use is provided within the commentary. Please see the *methods* section of Cancer data in Australia for more detailed information.

Pancreatic cancer trends

The estimated number of pancreatic cancer cases diagnosed per year has more than doubled in 20 years

From 1982, the number of pancreatic cancer cases diagnosed each year was steadily increasing; from 2002, the number of cases continued to increase but overall, increases were greater. Between 1982 and 2002, the number of pancreatic cancer cases diagnosed increased by around 60% (from 1,200 cases in 1982 to 1,900 in 2002). It is estimated that the number of pancreatic cancer cases diagnosed in 2020 will be more than double those of 2002 (estimated 3,900 cases in 2020) (Figure 1). This increase in incidence from 2002 is attributable to general population growth, an ageing population and pancreatic cancer becoming more commonly diagnosed across various age groups.

Figure 1: Pancreatic cancer cases diagnosed, persons, 1982-2020

![Graph showing pancreatic cancer cases diagnosed per year from 1982 to 2020.](image)

Source: AIHW Australian Cancer Database 2016

The ageing population places upwards pressure on pancreatic cancer case numbers

The Australian population continues to increase but the growth is not uniform across age groups. With life expectancy increasing, more people are living to older ages than in the past and older populations are growing at a faster pace than younger populations and the overall population growth.

Older populations experience higher rates of pancreatic cancer. The combination of the size of older populations increasing at greater rates and pancreatic cancer being more common at older ages contributes to the number of cases diagnosed increasing at greater rates than general population growth. A clearer understanding of the influence of the ageing population upon the number of pancreatic cancer cases diagnosed over time can be gained through the following crude and age-standardised incidence rate time series.

Pancreatic cancer incidence rates are increasing
About crude rates - interpreting time series

The crude rate of cancer is the rate of cancer within the population. The crude rate of cancer will remain the same where the rate of cancer increases at the same rate as population growth.

Given that pancreatic cancer more commonly occurs in older people and the size of older populations is increasing at a faster rate than general population growth, there is a regular upwards pressure on crude rates.

Crude incidence rates for pancreatic cancer increased from 7.9 cases per 100,000 persons in 1982 to 9.8 cases per 100,000 people in 2002; most of the increase during this time is attributable to impacts of an ageing population. By 2020, crude rates are estimated to reach 15 cases per 100,000; this increase is attributable to both the ageing population and pancreatic cancer becoming more commonly diagnosed across various age groups (Figure 2).

About age-standardised rates - interpreting time series

Like crude rates, age-standardised rate time series focus on changes to cancer rates. Unlike crude rates, they remove the impact of changes to the age composition of the population (such as impacts due to the ageing population).

An increase in age-standardised rates indicates that overall cancer rates are increasing and there are ages for which the cancer is becoming more commonly diagnosed (and vice versa for decreasing age-standardised rates).

Whether an age-standardised rate is increasing, decreasing or remaining stable, it only indicates overall movement. Some rates among individual age groups may not be moving in the same direction as the overall age-standardised cancer rates.

Between 1982 and 2002, age-standardised incidence rates were stable and ranged between 9.6 cases per 100,000 people and 10.3 cases per 100,000 people (Figure 2).

Age-standardised incidence rates began to increase from 2002. It is estimated that age-standardised incidence rates for pancreatic cancer in Australia will be 12.5 cases per 100,000 persons by 2020 (Figure 2).

Figure 2: Pancreatic cancer age-standardised and crude incidence rates, persons, 1982-2020

Source: AIHW Australian Cancer Database 2016

The median age at diagnosis has fallen

The median age at diagnosis had been increasing from 1982. These increases slowed from the late 90’s and began to decrease from 2008 (the median age was 69.6 in 1982, increasing to a peak of 73.9 in 2008 and by 2016 it was 72.8) (Figure 3).

The median age at death from pancreatic cancer has moved in a relatively similar manner in that there has been a general stabilisation from original increases; it differs in that there has not been a drop in median age at death (Figure 3).

Comparability of median age at diagnosis and median age at death

Please note that median age at diagnosis and median age at death are derived from different data sources. The median age at diagnosis time series is more sensitive to change as it is calculated to a month whereas median age at death is only calculated to a year. Comparisons between the two may be impacted by the difference in sensitivity to some extent.

Figure 3: Pancreatic cancer median age at diagnosis and median age at death, persons, 1982-2018
Despite increases in incidence, mortality rate trends remain relatively consistent. Between 1982 and 2020, crude mortality rates ranged between 7.4 cases per 100,000 persons in 1983 and an estimated 12.8 cases per 100,000 persons in 2020. The ageing population is the predominant driver for increasing crude mortality rates (Figure 4).

Between 1982 and 2020, age-standardised mortality rates ranged from 9.2 cases per 100,000 persons in 1982 to 10.4 cases per 100,000 persons in 2017 (Figure 4). While the more recent mortality rates are generally on the higher end of the pancreatic cancer mortality rate range, they have not increased to the same degree as age-standardised incidence rates.

The widening of the gap between incidence and mortality rates indicates improvements in survival rates and the risk data provided later in this commentary help visualise the improvements.

Survival rates remain low but have improved

About relative survival

An observed cancer survival rate is the rate of survival of those diagnosed with cancer. An observed survival rate considers only whether the person has survived for the period in question. It is limited to the extent that it does not take into account the fact that some deaths may have occurred due to causes other than the relevant cancer.

A relative survival rate adjusts the observed survival rate to account for deaths that may be expected to occur in the general population. A relative cancer survival rate is the survival rate of people diagnosed with cancer relative to the survival rate for the general population. A rate of 100% indicates there is no difference between the survival of those diagnosed with cancer and the survival of the general population.

All survival rates referred to in this commentary are relative survival rates. Confidence intervals are available in the supplementary tables.

Survival rates for pancreatic cancer are amongst the lowest of all cancers. The 5-year survival rate for all cancers combined (that is, the survival rate of people diagnosed with any type of cancer) in 2012-2016 was around 69%; the equivalent 5-year survival rate for pancreatic cancer was 10.7%.

The 5-year survival rate of 10.7% remains low but it has been improving (6.5% in 2007-2011) and is around 3 times the survival in 1987-1991 (3.2%) (Figure 5).

Shorter-term survival rates have improved over time and greater improvement is evident in more recent years. For instance, between 2007-2011 and 2012-16, 1-year survival improved by over 8 percentage points (from 24.6% to 33.1%) (Figure 5).
Survival is improving for younger and older populations

Survival rates for pancreatic cancer decrease as age at diagnosis increases. In 2012-2016 the 5-year survival for people aged 0 to 39 was 52%; the equivalent rate for people aged over 80 was 2.9% (Figure 6).

5-year survival rates have been improving for younger and older age groups. In 1997-2001, the 5-year survival for people aged 0-39 was 32%; by 2012-2016 it had increased to 52%. Across the same time periods, for people aged 40-59 years, survival increased from 11% to 21% and for people aged 60-79, survival has increased from 4.3% to 10.5% (Figure 6).

Of the 16,000 total cases in 2012-2016, around 8,600 (54%) were diagnosed in people aged 60 to 79 years. The 5-year survival rate for pancreatic cancer (all ages) continues to be very close to that of the 60-79 age group. For example, the 5-year survival rate for people aged 60-79 was 10.5% in 2012-2016 and 10.7% for pancreatic cancer overall (all ages combined) (Figure 6).

Pancreatic cancer incidence risk is increasing

Risk by the age of 40

The risk of being diagnosed with pancreatic cancer by the age of 40 has been increasing (average risk of 1 in 14,300 for the 1991-2000 period, to 1 in 11,900 in 2001-2010 and 1 in 7,800 in 2011-2020) (Figure 7). While the risk of being diagnosed with pancreatic cancer by the age of 40 is reaching its highest levels in 2011-2020, this is not the case for the risk of dying from pancreatic cancer. The average risk of death for the 2011-2020 period is 1 in 25,500. This is an increase on the average risk over 2001-2010 (1 in 29,900) but is lower than the average risk of death for the 1991-2000 period (1 in 20,300) (Figure 7). The increasing gap between the risks of diagnosis and death reflects the improvement in survival for younger people diagnosed with pancreatic cancer.
The risk of being diagnosed with pancreatic cancer is increasing but it remains a relatively low risk for younger populations. To provide some context by comparison with a couple of cancers more commonly associated with ages 40 and under, the average risk of being diagnosed with colorectal cancer by the age of 40 between 2011-2020 is 1 in 550; for melanoma of the skin it is 1 in 301.

Figure 7: Risk of diagnosis and risk of death, by the age of 40, pancreatic cancer, persons, 1982-2020

Source: AIHW Australian Cancer Database 2016 and AIHW National Mortality Database

Risk by age 70

Since 1982, the median age of diagnosis has generally remained around the age of 70. The risk of being diagnosed with pancreatic cancer by the age of 70 has trended upwards since 2002 (1 in 260 in 2002 to an estimated 1 in 189 in 2020). Over the same time, the risk of death by the age of 70 remained similar (1 in 281 in 2002 to an estimated 1 in 282 in 2020) (Figure 8).

Figure 8: Risk of diagnosis and risk of death, by the age of 70, pancreatic cancer, persons, 1982-2020

Source: AIHW Australian Cancer Database 2016 and AIHW National Mortality Database

Can the data provide insights into the potential reasons behind changing pancreatic cancer rates?

More information and data is required to better understand the potential drivers affecting pancreatic cancer incidence, mortality and survival trends in Australia. This section discusses the available data trends and highlights some possible reasons for the observed changes.

The possibilities considered in this section include:

- improvements in cancer detection
- changes in risk factors
- improvements in cancer treatment
- changes in the proportion of different histological types of pancreatic cancer (noting that mortality by histology is not currently available).

Changes in histology type

Histology describes the type of cells in which cancer originates. Symptom patterns and survival outcomes vary based on histology type. Histology groupings presented in this commentary are based on the histological groups described in *Cancer incidence in five continents* (Bray et al. 2017). See Appendix A for more details.

The histological types for pancreatic cancer include adenocarcinoma, unspecified malignant neoplasms, unspecified carcinomas, neuroendocrine neoplasms, other specified carcinomas, sarcomas and other specified malignant neoplasms. Sarcomas and other specified malignant neoplasms are not discussed further due to the small number of cases diagnosed (4 cases in total in 2016) but are included in totals.

Please note that changes in the proportion of cases diagnosed by histology type may change over time to some degree due to changes in coding practices (for example, some proportion of adenocarcinoma increases over time may be due to reductions in unspecified carcinomas).
While acknowledging changes in coding practices make it difficult to establish the degree to which different histology types may be becoming more commonly diagnosed, neuroendocrine neoplasms increasingly appear to make up a greater portion of the total number of pancreatic cancer's diagnosed (Figure 9). Neuroendocrine neoplasms also have the highest survival rates of all pancreatic cancer histological types (neuroendocrine neoplasms had a 5-year survival of 69% in 2012-2016) (Figure 10).

Neuroendocrine 5-year survival in 2012-2016 improved by around 10 percentage points from 2007-2011 (from 59% to 69%). Improvements in survival for pancreatic cancer's most common histology type, adenocarcinomas, are key to improvements in pancreatic cancer survival rates. Adenocarcinoma has very low 5-year survival rates but they have also improved (from 4.7% in 2007-2011 to 6.7% in 2012-2016) (Figure 10).

In 1987-1991, the adenocarcinoma 5-year survival rate was 1.9% and the overall pancreatic cancer survival rate was 3.2%. In 2012-2016, the respective rates were 6.7% and 10.7% (Figures 5 and 10). Improvements in adenocarcinoma survival are key to the improvements in pancreatic cancer survival overall. The increasing difference between the overall pancreatic survival rate and the adenocarcinoma rate is suggestive that histology types with higher survival are contributing more towards overall pancreatic cancer survival rates.

Figure 9: Proportion of pancreatic cancer cases diagnosed by histology type, persons, 1982-2016

Source: AIHW Australian Cancer Database 2016

Figure 10: 5-year relative survival, pancreatic cancer, by histology type, persons, 1987-1991 to 2012-2016

Source: AIHW Australian Cancer Database 2016

Focussing on shorter-term survival for the most common histology type, adenocarcinoma 1-year survival improved from 30% in 2007-2011 to 36% in 2012-2016 (Figure 11).

Figure 11: 1-year relative survival, pancreatic cancer, by histology type, persons, 1987-1991 to 2012-2016

Source: AIHW Australian Cancer Database 2016

As previously discussed, survival rates for pancreatic cancer decrease with increasing age. Higher survival rates for younger ages (Figure 6) are also influenced by histology to some degree. In particular, the higher survival neuroendocrine neoplasms are proportionally more common in younger age groups (Figure 12).

Figure 12: Proportion of pancreatic cancers diagnosed with neuroendocrine neoplasm histology type, by age group,
Expanding survival rates by age group can provide insights into whether the higher survival rates observed for neuroendocrine neoplasms are only due to it having a younger age profile. Comparisons of the 2012–2016 5-year survival rates for people diagnosed at age 60–79 show that the survival rate is much higher for those diagnosed with neuroendocrine neoplasms (64%) than adenocarcinomas (7.1%) (AIHW 2020, unpublished). This highlights that the higher survival rates for neuroendocrine neoplasms are not solely due to a younger age profile.

Improvements in cancer detection

Improvements in cancer detection would be expected to generally result in increasing incidence rates (for a period of time), increasing survival rates and potentially younger age at diagnosis (as the cancer is diagnosed earlier than it would have otherwise been). Mortality rates would be expected to either decrease or at least not increase proportional to incidence rates.

There are no early detection tests for pancreatic cancer. Pancreatic cancer trends do however exhibit some similarities to trends arising from improvements in cancer detection. As national data on stage at diagnosis are not currently available for pancreatic cancer, it is not possible to determine whether the cancer is being diagnosed at earlier stages.

Increase in the prevalence of risk factors for pancreatic cancer

Risk factors associated with pancreatic cancer include smoking, overweight/obesity, age, family history, diabetes, chronic pancreatitis, liver cirrhosis and stomach infections (Cancer Australia 2020). An increase in the prevalence of these risk factors may lead to increases in pancreatic cancer incidence.

Each risk factor will be changing to varying degrees within the population, the extent to which these changes impact on pancreatic cancer rates cannot be known with any certainty. Focussing on several key risk factors, smoking rates are declining while overweight/obesity and diabetes are increasing. If the key risk factors for pancreatic cancer are changing over time, it may lead to changes in incidence rates and possibly the age at diagnosis may change over time as a result.

The ageing population’s impact on incidence and mortality counts and crude rates is discussed earlier. The ageing population will also place upwards pressure on median age at diagnosis and downwards pressure on survival rates (because survival rates decrease with increasing age at diagnosis).

More effective treatment

More effective treatments would be expected to result in increases in survival rates, decreases in mortality and increases in median age at death. Increases in rates of survival by stage at diagnosis (which is not available nationally for pancreatic cancer) would indicate that any improvements in survival are likely to be due to improvements in treatment rather than pancreatic cancers being diagnosed at earlier stages on average.

National Pancreatic Cancer Roadmap

Cancer Australia is working with the Department of Health to develop a National Pancreatic Cancer Roadmap to improve outcomes and survival for people with pancreatic cancer. The Roadmap will identify key priority areas for action over the next five years, across the continuum of pancreatic cancer care and pancreatic cancer research. The roadmap is expected to be developed by December 2021. More information about the roadmap is available on the Cancer Australia website.

Where can I find more data on pancreatic cancer?

Data used to inform this commentary are available on the Data page.

A more complete range of pancreatic cancer data is available within the Cancer data in Australia report. including by sex. General incidence, mortality and survival trends discussed in this paper are common across the sexes although males have higher incidence and mortality rates (survival rates are generally similar).

The Cancer data in Australia report is updated annually but note that the data to inform this commentary were obtained from the Australian Cancer Database, National Mortality Database and associated projections as at the time this commentary was released. For this reason, the estimates presented in this commentary may not be consistent with the estimates presented in Cancer data in Australia.
### Pancreatic cancer (ICD-10 C25) histology groupings

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<th>Histology group</th>
<th>ICD-O-3.1 histology codes</th>
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**Note:** Only the first 3 digits are given except when the 4th digit is necessary.
Using the data - FAQs

Which cancers are available in this report?

This report contains interactive data visualisations on ‘all cancers combined’ and the following cancers:

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<th>Cancer Type</th>
<th>Cancer Type</th>
<th>Cancer Type</th>
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How are the cancers grouped?

Cancer groupings have been based on the third edition of the International Classification of Diseases of Oncology (ICD-O-3) classifications. Where possible, specified cancers have been provided as well as the larger groupings in which they are included - for example, acute myeloid leukaemia and acute lymphoblastic leukaemia have separate filter options in the summary visualisations, as well as their higher grouping leukaemia.

Note that in the rankings visualisation, higher level groupings such as leukaemia and head and neck cancers are generally excluded; instead, individual cancers such as acute myeloid leukaemia, are included in rankings.

Which cancers are excluded from the cancer data?

Registration of all cancers, excluding basal and squamous cell carcinomas of the skin, is required by law in each state and territory. Information on newly diagnosed cancers are collected by each state and territory cancer registry and provided to the Australian Institute of Health and Welfare annually to produce the Australian Cancer Database. Since basal and squamous cell carcinomas of the skin are not notifiable, data on these cancers are not included in the ACD and therefore not in this report.

Colorectal cancer ICD 10 codes for incidence are different to mortality - why does this occur?

The Australian Institute of Health and Welfare (AIHW) uses the National Mortality Database (NMD) for reporting cancer mortality. The NMD is coded and compiled by the Australian Bureau of Statistics (ABS).
The ABS notes that “The classification of deaths certified as ‘bowel cancer’ to C26.0 evidently leads to an underestimate of deaths due to colon cancer”. The ABS recommends that “When making any interpretation or assessment of colon cancer deaths in Australia, consider the high likelihood that many deaths coded to C26.0 Malignant neoplasms of the intestinal tract, unspecified are deaths from colon, sigmoid, rectum and anus cancers”. More information is available in Cat. no. 3303.0 Causes of Death, Australia, 2015.

Comparing incidence and mortality (in particular rectal cancer and non-melanoma skin cancer)

There are differences between the processes of coding the incidence and mortality data used in this report. The Australian Institute of Health and Welfare (AIHW) uses the National Mortality Database (NMD) for reporting cancer mortality. The NMD is coded and compiled by the Australian Bureau of Statistics (ABS) using information recorded on death certificates. Cancer incidence data are coded by state and territory population-based cancer registries using information recorded on pathology reports, hospital records, death certificates and other sources. The differences between the processes of coding the cancer incidence and mortality data used in this report could lead to some apparent inconsistencies.

For instance, incidence rates of rectal cancer have been decreasing in recent years and survival has been increasing. Under these circumstances one would expect mortality rates to be decreasing. However, according to the data in the NMD mortality rates of rectal cancer are increasing. This apparent inconsistency might be due to differences in mortality and incidence coding. In this report rectal cancer is defined as ICD-10 codes C19 and C20. C19 is a “malignant neoplasm of the rectosigmoid junction”. The rectosigmoid junction lies between the sigmoid colon and the rectum. It is possible that some deaths coded to rectal cancer, and C19 in particular, may actually be cases of colon cancer and are recorded as such in the incidence data. There may be other apparent inconsistencies of this nature so some caution is advised when directly comparing cancer incidence and mortality data.

Why are some survival rates greater than 100%?

Five-year relative survival is the percentage of people diagnosed with a cancer who survived for at least 5 years after diagnosis, relative to people of the same age and sex in the population. Where the survival rate of the population diagnosed with a cancer is greater than the general population and there are little to no deaths in the diagnosed population, the relative survival rate may be greater than 100%. The 5-year relative survival is used as an example, the same principles apply to all relative survival data.

Why are some rates missing?

Suppression rules have been applied to the data. Rates for state and territory incidence and mortality are not calculated where the count of cancers is less than 5. Suppression occurs because population rate trends and comparisons derived from low counts may have a greater likelihood of being misinterpreted. While rates based on low counts are not provided for state and territory incidence and mortality, counts of the data are available in the relevant “Cancer data in Australia source” worksheet.

Survival rates are also suppressed for smaller populations. Count data is not provided for survival, only the rates. Accordingly, suppressed survival rates may appear as missing data.

Why do some cancers have a shorter time series?

Time series are only presented for a cancer where the data is considered complete. The following lists the year from which data were considered sufficiently complete to be reported (unless in the following list, cancers should have data displays ranging back to 1982):

- Mesothelioma (mortality - 1997)
- Kaposi sarcoma (mortality - 1997)
- Non-melanoma of the skin (incidence - 2001)
- All blood cancers combined (mortality - 1997 and incidence 2003)

Neuroendocrine tumours and soft tissue sarcoma data is only available for incidence and survival.

Why don’t state and territory counts of new cases of cancer equal the Australian total?

The Australian Capital Territory and Northern Territory incidence counts for each cancer are equal to the average of the most recent 5 years of data. The presentation of rolling averages are used to reduce volatility associated with cancer rates in these smaller populations. The method is used within this report for methodological consistency with data produced by the respective data custodians.

Is the 2016 state data complete?

The most recent Northern Territory data available for inclusion in the ACD are for 2015. Hence, the 2016 Northern Territory incidence data were estimated by the AIHW (see Methods for detail of procedure). These estimates were combined with the actual data supplied by the other seven state and territory cancer registries to form the 2016 ACD. However, these estimates are not used to provide an estimate of NT 2016 cancer data in state and territory reports with the NT 2016 data reported as ‘not available’.

How do I download data from visualisations?
All of the data visualisations have been created using a program called Tableau. You can interact with filters on these visualisations to see the specific data you are interested in.

To view the underlying data from the visualisations click on the link at the bottom of the page to download an Excel file containing the data.

**How do I print?**

Pages can be printed by pressing Ctrl and P on the keyboard at the same time, or by clicking on ‘File’ at the top of the browser and selecting print. However, note that the visualisations in Tableau do not print correctly with this method.

To print a Tableau visualisation, select ‘Download’ on the menu below the visualisation and choose to download as an image or PDF. Using this method, the visualisation prints in the same way that it is presented on the screen, with the selected filters.

Another useful tool for selecting only the visualisation(s) you require is the ‘Snipping Tool’, which allows a screenshot to be taken of the relevant area on the screen.

**How do I interact with the graphs and maps?**

The graphs, maps and figures have been developed in a program called Tableau. You can interact with these to see the specific data you are interested in. If the mouse pointer is placed over the graph, map or figure to display the Tooltip it will change to a hand selector. The Tooltip displays the underlying data.

You can also download the underlying data from the Tableau visualisations into an Excel file. Click on the link at the bottom of the page which displays the graph you are interested in.

Some Tableau visualisations have a legend where one element can be selected to highlight it. To do this, place the mouse pointer over the legend and a small selector icon will appear (it looks like a highlighter). Click on this icon and then click on the specific element you are interested in.

Some graphs, maps or figures allow the data to be filtered. Filters are displayed either as a button or a drop down list. In either option, select the data you’re interested in to display it. If you want to clear your selections and return the graph, map or figure to its original appearance, click on the ‘revert’ button at the bottom.

When you position your mouse pointer over a Tableau map, a toolbar will appear on the left. The + and - buttons provide zoom in and out. Clicking on the arrow pointing to the right allows you to choose to zoom, pan, or select areas of the map. Click on the home button to return to the map’s default view.

Please note that Tableau is not compatible with versions of Internet Explorer below version 11.

**How do I extract data files?**

Data files are available in .xlsx format by clicking the link at the bottom of each page.

**Where does the information come from?**

This report predominantly uses data from the Australian Cancer Database (ACD) and the National Mortality Database (NMD). Please visit the [Notes section](#) for more information.

**I want to do my own data analysis, where can I get more data?**

The information in this report is free to download, but must be used in accordance with the AIHW’s data use policy. Most information released by AIHW is made available under a Creative Commons BY 3.0 licence.

For more information about [copyright at AIHW](#).

Tableau allows you the freedom to view and manipulate a selection of data. If you require data not currently available here, please:

- email [cancer@aihw.gov.au](mailto:cancer@aihw.gov.au) for questions regarding cancer or
- email [screening@aihw.gov.au](mailto:screening@aihw.gov.au) for questions regarding cancer screening or
- submit a [data request](#)

and we will contact you.

Should you wish to request additional data, the AIHW generally charges for data requests at an hourly rate on a cost-recovery basis. The minimum charge is $300 + GST for each request.

**Where can I get help?**
Cancer is classified by the International Statistical Classification of Diseases and Related Health Problems Version 10 (ICD-10). This is a statistical classification, published by the World Health Organization, in which each morbid condition is assigned a unique code according to established criteria.

Actual mortality data up to 2017 are based on the year of occurrence of the death and data for 2018 are based on the year of registration of the death.


Relative survival was calculated with the period method, using the period 2012-2016 (Brenner & Gefeller 1996). This captured the survival experience of people who were diagnosed with cancer before or during 2012-2016 and were still alive at the beginning of 2012. Note that this period does not contain incidence data for 2016 for the Northern Territory. Data from the National Death Index (NDI) on deaths (from any cause) that occurred up to 31 December 2016 were used to determine which people with cancer had died and when this occurred.

Relative survival for registry-derived (RD) stage tables was calculated using the cohort method, using the period 2011-2016. In this method, a cohort of patients diagnosed with cancer is followed over time to estimate the proportion surviving for a selected timeframe (e.g. 5 years).

Age-specific incidence, mortality and prevalence rates are expressed as per 100,000 population.

Age-standardised incidence and mortality rates for the Australian population were age standardised to the 2001 Australian Standard Population and are expressed as per 100,000 population.

Incidence and mortality rates are based on the Australian population as at 30 June. Prevalence rates are based on the Australian population as at 31 December.

Stage data for colorectal cancer excludes cases identified from death certificates only, cancer of the appendix (ICD-10 code C18.1), and colorectal cancers with a histology for which staging rules are not applicable.

Stage data for breast cancer in females includes ICD-10 code C50, lung cancer excludes trachea (C34), melanoma of the skin excludes skin of genitals and melanoma of “unknown primary site” (C43) and prostate cancer includes C61. Certain morphology codes are excluded.
Technical notes

Methods

Age-standardised rates (ASR)

A crude rate provides information on the number of, for example, new cases of cancer or deaths from cancer by the population at risk in a specified period. No age adjustments are made when calculating a crude rate. Since the risk of cancer heavily depends on age, crude cancer incidence and mortality rates are not as suitable for looking at changes over time or making comparisons between different population groups if there are differences in those populations’ age structures.

More meaningful comparisons can be made using ASRs, with such rates adjusted for age in order to facilitate comparisons between populations that have different age structures—for example, between Indigenous Australians and other Australians. This standardisation process effectively removes the influence of age structure on the summary rate.

There are two methods commonly used to adjust for age: direct and indirect standardisation. In this report, the direct standardisation approach presented by Jensen and colleagues (1991) is used. To age-standardise using the direct method, the first step is to obtain population numbers and numbers of cases (or deaths) in age ranges—typically 5-year age ranges. The next step is to multiply the age-specific population numbers for the standard population (in this case, the Australian population as at 30 June 2001) by the age-specific incidence rates (or death rates) for the population of interest. The next step is to sum across the age groups and divide this sum by the total of the standard population to give an ASR for the population of interest. Finally, this is expressed per 100,000 population in this report.

Age-specific rates

Age-specific rates provide information on the incidence of a particular event in an age group relative to the total number of people at risk of that event in the same age group. It is calculated by dividing the number of events occurring in each specified age group by the corresponding ‘at-risk’ population in the same age group and then multiplying the result by a constant (for example, 100,000) to derive the rate. Age-specific rates are often expressed per 100,000 population.

Australian Cancer Database

All forms of cancer, except basal and squamous cell carcinomas of the skin, are notifiable diseases in each Australian state and territory. This means there is legislation in each jurisdiction that requires hospitals, pathology laboratories and various other institutions to report all cases of cancer to their central cancer registry. An agreed subset of the data collected by these cancer registries is supplied annually to the AIHW, where it is compiled into the ACD. The ACD currently contains data on all cases of cancer diagnosed from 1982 to 2016 for all states and territories with the exception of 2016 Northern Territory data.

Cancer reporting and registration is a dynamic process, and records in the state and territory cancer registries may be modified if new information is received. As a result, the number of cancer cases reported by the AIHW for any particular year may change slightly over time and may not always align with state and territory reporting for that same year.

For more information on the ACD please see the ACD 2016 Data Quality Statement.

Estimating 2016 cancer incidence for the Northern Territory

Cancer incidence for the Northern Territory in 2016 was estimated using the following process.

The total number of in-scope cases for NT for 1982-2015 is well-modelled by a quadratic function of the year of diagnosis (adjusted $R^2 = 0.9884$). The total number of in-scope cases for 2016 was estimated by extrapolating this function to 2016. These cases were then allocated pro-rata to various strata on the basis of the number of cases observed in those strata in NT in the pooled years 2011-2015. The strata were the cross product of sex by Indigenous status by single-year age at diagnosis by topography by morphology by SA2 at diagnosis (2011 ASGS). The estimates within each stratum were then aggregated to obtain estimates for larger categories.

International Classification of Diseases for Oncology (ICDO)

Cancers were originally classified solely under the ICD classification system, based on topographic site and behaviour. However, during the creation of the Ninth Revision of the ICD in the late 1960s, working parties suggested creating a separate classification for cancers that included improved morphological information. The first edition of the ICD-O was subsequently released in 1976 and, in this classification, cancers were coded by both morphology (histology type and behaviour) and topography (site).

Since the First Edition of the ICD-O, a number of revisions have been made, mainly in the area of lymphoma and leukaemia. The current edition, the Third Edition (ICD-O-3), was released in 2000 and is used by most state and territory cancer registries in Australia, as well as by the AIHW in regard to the ACD.

National Mortality Database
The AIHW National Mortality Database (NMD) contains information provided by the Registries of Births, Deaths and Marriages and the National Coronial Information System—and coded by the ABS—for deaths from 1964 to 2018. Registration of deaths is the responsibility of each state and territory Registry of Births, Deaths and Marriages. These data are then collated and coded by the ABS and are maintained at the AIHW in the NMD.

In the NMD, both the year in which the death occurred and the year in which it was registered are provided. For the purposes of this report, actual mortality data are shown based on the year the death occurred, except for the most recent year (namely 2018) where the number of people whose death was registered is used. Previous investigation has shown that the year of death and its registration coincide for the most part. However, in some instances, deaths at the end of each calendar year may not be registered until the following year. Thus, year of death information for the latest available year is generally an underestimate of the actual number of deaths that occurred in that year.

In this report, deaths registered in 2015 and earlier are based on the final version of cause of death data; deaths registered in 2016, 2017 and 2018 are based on revised and preliminary versions, respectively, and are subject to further revision by the ABS.

The data quality statements underpinning the AIHW NMD can be found on the following ABS internet pages:

- ABS quality declaration summary for [Deaths, Australia](http://www.abs.gov.au) (ABS cat. no. 3302.0)

For more information on the AIHW NMD see [Deaths data at AIHW](http://www.aihw.gov.au).

**Population Data**

Throughout this report, population data were used to derive rates of, for example, cancer incidence and mortality. The population data were sourced from the ABS using the most up-to-date estimates available at the time of analysis.

To derive its estimates of the resident populations, the ABS uses the 5-yearly Census of Population and Housing data and adjusts it as described here:

- All respondents in the Census are placed in their state or territory, Statistical Local Area and postcode of usual residence; overseas visitors are excluded.
- An adjustment is made for persons missed in the Census.
- Australians temporarily overseas on Census night are added to the usual residence Census count.

Estimated resident populations are then updated each year from the Census data, using indicators of population change, such as births, deaths and net migration. More information is available from the [ABS website](http://www.abs.gov.au).

**Prevalence**

Limited-duration prevalence is expressed as \(N\)-year prevalence throughout this report. \(N\)-year prevalence on a given index date—where \(N\) is any number 1, 2, 3 and so on—is defined as the number of people alive at the end of that day who had been diagnosed with cancer in the past \(N\) years. For example:

- 1-year prevalence is the number of living people who were diagnosed in the past year to 31 December 2015
- 5-year prevalence is the number of living people who were diagnosed in the past 5 years to 31 December 2015. This includes the people defined by 1-year prevalence.

Note that prevalence is measured by the number of people diagnosed with cancer, not the number of cancer cases. An individual who was diagnosed with two separate cancers will contribute separately to the prevalence of each cancer. However, this individual will contribute only once to prevalence of all cancers combined. For this reason, the sum of prevalence for individual cancers will not equal the prevalence of all cancers combined.

**Projections - Estimating the incidence of cancer**

Please note that no adjustments have been made to the projections to account for the potential impact of COVID. Updates scheduled for Cancer data in Australia in 2021 are expected to contain more information on the matter and in particular, how COVID relates to the updated projections.

Estimates of national incidence in 2017–2020 was estimated by projecting the sex- and age-specific incidence rates observed in Australia during 2007–2016. The time series were stratified by the following variables:

- sex
- 5-year age group (0-4, ..., 85-89, 90+)
- 4-character ICD-O-3 topography code (C00.0, ..., C80.9)
- 4-digit ICD-O-3.1 histology code (8000, ..., 9992).

For each time series, the process was as described below:

- least squares linear regression was used to find the straight line of best fit through the time series
- if the slope was positive, the straight line of best fit was extrapolated to obtain the estimate of the 2017 rate
- if the slope was negative, the time series floor was set to 0
• the estimated incidence rates for 2017 were then multiplied by the Estimated Resident Populations for 2017 to obtain the estimated incidence numbers.

Note the following:

• estimates were made for Australia as a whole, not for individual jurisdictions
• instead of using the topography and histology codes to define the cancer groups, ICD-10 codes were used (for example breast or melanoma of the skin as well as groupings such as head and neck cancers which is a consolidation of cancers of the lip, tongue, mouth, salivary glands, oropharynx, nasopharynx, hypopharynx and other sites in the pharynx).
• the incidence estimates made for 2016 for Northern Territory were treated as real data for the purposes of estimating Australian incidence for 2017-2020
• the 10 years of incidence data used as the baseline were 2007-2016
• for populations, the ABS Estimated Resident Populations were used for 2007-2018, and the ABS population projection series B for 2019-2020 (ABS 2018).

Projections - Estimating the mortality of cancer

Please note that no adjustments have been made to the projections to account for the potential impact of COVID. Updates scheduled for Cancer data in Australia in 2021 are expected to contain more information on the matter and in particular, how COVID relates to the updated projections.

This method is the same as the incidence projections with the exceptions that:

• the 10-year baseline for incidence is 2007-2016 while the baseline for mortality is 2009-2018.
• Northern Territory 2016 data is obtained from the NMD and is not estimated

Relative survival

Relative survival is a measure of the survival of people with cancer compared with that of the general population. It is the standard approach used by cancer registries to produce population-level survival statistics and is commonly used as it does not require information on cause of death. Relative survival reflects the net survival (or excess mortality) associated with cancer by adjusting the survival experience of those with cancer for the underlying mortality that they would have experienced in the general population.

Relative survival is calculated by dividing observed survival by expected survival, where the numerator and denominator have been matched for age, sex and calendar year.

Observed survival refers to the proportion of people alive for a given amount of time after a diagnosis of cancer; it is calculated from population-based cancer data. Expected survival refers to the proportion of people in the general population alive for a given amount of time and is calculated from life tables of the entire Australian population. (Ideally these life tables should be restricted to the population of Australians who do not have cancer but such life tables are unavailable. It is standard practice around the world to use life tables for the entire population.)

A simplified example of how relative survival is interpreted is shown in Figure G1. Given that 6 in 10 people with cancer are alive 5 years after their diagnosis (observed survival of 0.6) and that 9 in 10 people from the general population are alive after the same 5 years (expected survival of 0.9), the relative survival of people with cancer would be calculated as 0.6 divided by 0.9, which is 0.67. This means that individuals with cancer are 67% as likely to be alive for at least 5 years after their diagnosis as are their counterparts in the general population.

Figure M1: Simplified example of how relative survival is calculated

![Relative Survival Diagram]

The survival statistics in this report were produced using a modified version of a SAS program written by Dickman (2004) and employed the period method (Brenner and Gefeller 1996) with 1-year intervals. Observed survival was calculated from data in the ACD. Expected survival was calculated using the Ederer II method whereby matched people in the general population are considered to be at risk of death until the corresponding cancer patient dies or is censored (Ederer and Heise 1959).

Calculation of conditional relative survival
Conditional survival is the probability of surviving \( j \) more days, given that an individual has already survived \( i \) days. It was calculated using the formula:

\[
S(j|i) = \frac{S(i+j)}{S(i)}
\]

where

- \( S(j|i) \) is the probability of surviving at least \( j \) more days given that the person has already survived at least \( i \) days
- \( S(i+j) \) is the probability of surviving at least \( i + j \) days
- \( S(i) \) is the probability of surviving at least \( i \) days

Confidence intervals for conditional survival were calculated using a variation of Greenwood’s (1926) formula for variance (Skuladottir & Olsen 2003):

\[
\text{Var}[S(i|j)] = \sum_{k=i+1}^{i+j} \frac{d_k}{r_k(r_k - d_k)}
\]

where

- \( d_k \) is the number of deaths
- \( r_k \) is the number at risk during the \( k \)th interval.

The 95% confidence intervals were constructed assuming that conditional survival estimates follow a normal distribution.

**Risk**

We use 19 age groups, numbered 1 to 19. Age group \( i \) (\( i = 1 \) to 18) is 5 years wide and comprises all ages in the interval \((5i - 5, 5i)\). Age group 19 comprises all ages 90 and above. The cancer under consideration is referred to as “the cancer”. This could be a specific cancer, a group of related cancers or all cancers combined. There are two different measures of risk, one adjusted for competing mortality and one not adjusted. For brevity, these are called the adjusted risk (\( AR \)) and unadjusted risk (\( UR \)). The full notation is as follows, where \( D \) is for diagnosis and \( M \) is for mortality.

\[
\begin{align*}
ARD(5i) &= \text{adjusted risk of being diagnosed with the cancer before age } 5i \ (i = 1 \text{ to } 18), \\
ARD(\infty) &= \text{adjusted lifetime risk of being diagnosed with the cancer}, \\
ARM(5i) &= \text{adjusted risk of dying from the cancer before age } 5i \ (i = 1 \text{ to } 18), \\
ARM(\infty) &= \text{adjusted lifetime risk of dying from the cancer},
\end{align*}
\]

and similarly for \( URD \) and \( URM \).

For each age group \( i \), the following three rates are used in the risk formulas.

\[
\begin{align*}
D_i &= \text{rate of first ever diagnosis of the cancer (the first in one’s life, not the first in age group } i ), \\
M_i &= \text{rate of death from the cancer }, \\
A_i &= \text{rate of death from all causes (including the cancer) },
\end{align*}
\]

Note that the denominator of \( D_i \) is the general population, not the population of people who have never been diagnosed with the cancer.

**Risk not adjusted for competing mortality**

As this measure of risk is not adjusted for competing mortality, the formulas are relatively simple and do not involve \( A_i \). The formulas come from Day (1987).

\[
\begin{align*}
URD(5i) &= 1 - e^{-5i(D_i + D_{i+1} + \ldots + D_j)} \\
&= 1 - e^{-5i(D_i + D_{i+1} + \ldots + D_{18})} \\
URD(\infty) &= 1.
\end{align*}
\]
\[ URM(5i) = 1 - e^{-5M_i + 18M_i} \]
\[ URM(\infty) = 1. \]

Note that the lifetime risks are necessarily 1. Not adjusting for competing mortality is equivalent to the scenario where it is impossible to die of any cause other than the cancer. Hence every person must eventually be diagnosed with the cancer and eventually die from it. This is why it is not informative to report unadjusted lifetime risks.

Risk adjusted for competing mortality
The formulas in this section come from Fay et al. (2003). The risk of diagnosis is as follows.

\[ ARD(5) = \frac{D_i}{A_1}(1 - e^{-5A_1}) \]

\[ ARD(5i) = ARD(5) + \frac{D_i}{A_1}(1 - e^{-5A_1})e^{-S(A_{i+1} + A_{i+2} + \ldots + A_{i+18})}, \quad i = 2, 3, \ldots, 18 \]

\[ ARD(\infty) = ARD(90) + \frac{D_i}{A_{19}} e^{-S(A_{i+1} + A_{i+2} + \ldots + A_{19})}. \]

The formula for risk of death is the same as above except that \( M_i \) replaces \( D_i \) throughout.

\[ ARM(5) = \frac{M_i}{A_1}(1 - e^{-5A_1}) \]

\[ ARM(5i) = ARM(5) + \frac{M_i}{A_1}(1 - e^{-5A_1})e^{-S(A_{i+1} + A_{i+2} + \ldots + A_{i+18})}, \quad i = 2, 3, \ldots, 18 \]

\[ ARM(\infty) = ARM(90) + \frac{M_i}{A_{19}} e^{-S(A_{i+1} + A_{i+2} + \ldots + A_{19})}. \]

Use of a proxy to calculate risk of diagnosis
In order to calculate the risk of diagnosis we need the age-specific rates, \( D_i \), at which people are being diagnosed with the cancer for the first time in their lives. This requires knowledge of each person’s cancer history from birth. As the Australian Cancer Database (ACD) starts from the beginning of 1982, this is impossible for most age groups and will remain impossible for many decades to come. In order to estimate the risk of diagnosis we need a satisfactory proxy for \( D_i \).

The best available estimate of \( D_i \) is obtained by using the entire history of the ACD. That is, instead of counting first ever diagnoses (which is impossible) we count “first from 1/1/1982” diagnoses. However, using such an estimate would mean that we couldn’t produce a consistent time series of risks. This is because each estimate in the time series would be based on a different amount of “lookback time” for previous diagnoses. The estimate in 1982 would be based on at most one year of lookback time, the estimate in 1983 would be based on up to two years of lookback time, and so on.

In order to enable the production of a time series of risks, the AIHW has chosen to use a lookback time of up to one calendar year for both the adjusted and unadjusted risks of diagnosis. That is, for the year for which the risks are being calculated, lookback goes back to the 1st of January of that year. Using this method we are in fact counting the number of people (not cancers) diagnosed in the year under consideration, irrespective of whether they have been diagnosed with the same cancer in a previous year. AIHW analysis has shown that this method provides a satisfactory estimate of \( D_i \), except for the group “all cancers combined”. No suitable period of lookback time was identified for this group. As such, AIHW does not produce a time series of risk of diagnosis for all cancers combined. However, the best available estimate for the latest year of data available is produced. This estimate is based on lookback to the beginning of 1982. Based on the analysis referred to above, this estimate is likely to be a few percentage points higher than the true value.

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Technical notes

Indices of data quality for the 2016 Australian Cancer Database

The indices of data quality outlines the percentages of cases that were microscopically verified by cancer type and the percentage of cases that were informed only by death certificate.

Percentage of cases that were microscopically verified (MV%)

Microscopic verification is the gold standard for diagnosing cancer. The MV% is the percentage of registered cases for which the diagnosis was microscopically verified. A high MV% suggests higher quality data. A low MV% suggests (1) incomplete notification of pathology reports and therefore possibly lower accuracy of diagnoses, and (2) incomplete notification of cancers for which histology is often the only source of notification, e.g. melanoma of the skin.

Percentage of cases that are death certificate only (DCO%)

The DCO% is the percentage of registered cases for which no evidence of cancer was available other than a statement on the death certificate that the person died from or with cancer. A low DCO% suggests higher quality data. A high DCO% suggests incomplete incidence notification. Also, such diagnoses may be less accurate.

Indices of data quality for the 2016 Australian Cancer Database, year of diagnosis 2015

<table>
<thead>
<tr>
<th>Cancer site/type (ICD-10 codes)</th>
<th>No. of cases</th>
<th>MV%</th>
<th>DCO%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lip cancer (C00)</td>
<td>966</td>
<td>99.3</td>
<td>0.0</td>
</tr>
<tr>
<td>Tongue cancer (C01-C02)</td>
<td>920</td>
<td>97.0</td>
<td>0.4</td>
</tr>
<tr>
<td>Mouth cancer (C03-C06)</td>
<td>611</td>
<td>97.1</td>
<td>0.7</td>
</tr>
<tr>
<td>Cancer of salivary glands (C07-C08)</td>
<td>328</td>
<td>96.0</td>
<td>1.2</td>
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<tr>
<td>Oropharyngeal cancer (C09-C10)</td>
<td>700</td>
<td>97.0</td>
<td>0.1</td>
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<tr>
<td>Nasopharyngeal cancer (C11)</td>
<td>134</td>
<td>95.5</td>
<td>0.0</td>
</tr>
<tr>
<td>Hypopharyngeal cancer (C12-C13)</td>
<td>184</td>
<td>95.7</td>
<td>0.0</td>
</tr>
<tr>
<td>Cancer of other and ill-defined sites in the lip, oral cavity and pharynx (C14)</td>
<td>59</td>
<td>91.5</td>
<td>0.0</td>
</tr>
<tr>
<td>Oesophageal cancer (C15)</td>
<td>1,435</td>
<td>92.6</td>
<td>1.5</td>
</tr>
<tr>
<td>Stomach cancer (C16)</td>
<td>2,123</td>
<td>94.6</td>
<td>1.4</td>
</tr>
<tr>
<td>Cancer of the small intestine (C17)</td>
<td>562</td>
<td>95.9</td>
<td>0.7</td>
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<tr>
<td>Colorectal cancer (C18-C20)</td>
<td>15,527</td>
<td>95.1</td>
<td>1.0</td>
</tr>
<tr>
<td>Anal cancer (C21)</td>
<td>476</td>
<td>96.6</td>
<td>0.6</td>
</tr>
<tr>
<td>Liver cancer (C22)</td>
<td>2,110</td>
<td>50.5</td>
<td>2.0</td>
</tr>
<tr>
<td>Cancer of the gallbladder and extrahepatic bile ducts (C23-C24)</td>
<td>963</td>
<td>81.0</td>
<td>2.1</td>
</tr>
<tr>
<td>Pancreatic cancer (C25)</td>
<td>3,435</td>
<td>72.9</td>
<td>3.3</td>
</tr>
<tr>
<td>Cancer of other and ill-defined digestive organs (C26)</td>
<td>248</td>
<td>62.5</td>
<td>21.4</td>
</tr>
<tr>
<td>Cancer of the nasal cavity, middle ear and sinuses (C30-C31)</td>
<td>220</td>
<td>97.3</td>
<td>0.0</td>
</tr>
<tr>
<td>Laryngeal cancer (C32)</td>
<td>624</td>
<td>95.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Lung cancer (C33-C34)</td>
<td>11,821</td>
<td>85.4</td>
<td>2.5</td>
</tr>
<tr>
<td>Cancer of other thoracic and respiratory organs (C37-C39)</td>
<td>143</td>
<td>93.7</td>
<td>0.7</td>
</tr>
<tr>
<td>Bone cancer (C40-C41)</td>
<td>273</td>
<td>96.3</td>
<td>1.1</td>
</tr>
<tr>
<td>Melanoma of the skin (C43)</td>
<td>13,745</td>
<td>99.6</td>
<td>0.1</td>
</tr>
<tr>
<td>Cancer Type</td>
<td>Cases</td>
<td>% %</td>
<td>Incidence (per 100,000)</td>
</tr>
<tr>
<td>---------------------------------------------------------</td>
<td>-------</td>
<td>-----</td>
<td>-------------------------</td>
</tr>
<tr>
<td>Non-melanoma of the skin (C44)</td>
<td>984</td>
<td>95.5</td>
<td>0.7</td>
</tr>
<tr>
<td>Mesothelioma (C45)</td>
<td>748</td>
<td>90.0</td>
<td>2.1</td>
</tr>
<tr>
<td>Kaposi sarcoma (C46)</td>
<td>52</td>
<td>98.1</td>
<td>0.0</td>
</tr>
<tr>
<td>Peritoneal cancer (C48)</td>
<td>209</td>
<td>94.7</td>
<td>0.0</td>
</tr>
<tr>
<td>Other soft tissue cancer (C47, C49)</td>
<td>777</td>
<td>95.9</td>
<td>0.5</td>
</tr>
<tr>
<td>Breast cancer (C50)</td>
<td>17,126</td>
<td>98.8</td>
<td>0.5</td>
</tr>
<tr>
<td>Vulvar cancer (C51)</td>
<td>360</td>
<td>96.9</td>
<td>0.8</td>
</tr>
<tr>
<td>Vaginal cancer (C52)</td>
<td>85</td>
<td>100.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Cervical cancer (C53)</td>
<td>821</td>
<td>98.1</td>
<td>0.2</td>
</tr>
<tr>
<td>Uterine cancer (C54-C55)</td>
<td>2,692</td>
<td>98.4</td>
<td>0.5</td>
</tr>
<tr>
<td>Ovarian cancer (C56)</td>
<td>1,350</td>
<td>90.7</td>
<td>2.0</td>
</tr>
<tr>
<td>Cancer of other female genital organs and placenta (C57-C58)</td>
<td>290</td>
<td>96.6</td>
<td>0.7</td>
</tr>
<tr>
<td>Cancer of the penis (C60)</td>
<td>106</td>
<td>94.3</td>
<td>0.9</td>
</tr>
<tr>
<td>Prostate cancer (C61)</td>
<td>19,182</td>
<td>96.3</td>
<td>0.6</td>
</tr>
<tr>
<td>Testicular cancer (C62)</td>
<td>846</td>
<td>98.3</td>
<td>0.2</td>
</tr>
<tr>
<td>Cancer of other male genitals (C63)</td>
<td>40</td>
<td>100.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Kidney cancer (C64)</td>
<td>3,514</td>
<td>91.0</td>
<td>1.5</td>
</tr>
<tr>
<td>Bladder cancer (C67)</td>
<td>2,733</td>
<td>91.9</td>
<td>1.9</td>
</tr>
<tr>
<td>Cancer of other urinary organs (C65-C66, C68)</td>
<td>525</td>
<td>90.9</td>
<td>1.9</td>
</tr>
<tr>
<td>Eye cancer (C69)</td>
<td>353</td>
<td>76.2</td>
<td>0.0</td>
</tr>
<tr>
<td>Brain cancer (C71)</td>
<td>1,810</td>
<td>87.8</td>
<td>1.0</td>
</tr>
<tr>
<td>Cancer of other central nervous system (C70, C72)</td>
<td>79</td>
<td>74.7</td>
<td>1.3</td>
</tr>
<tr>
<td>Thyroid cancer (C73)</td>
<td>2,976</td>
<td>99.0</td>
<td>0.1</td>
</tr>
<tr>
<td>Cancer of other endocrine glands (C74-C75)</td>
<td>111</td>
<td>82.9</td>
<td>3.6</td>
</tr>
<tr>
<td>Hodgkin lymphoma (C81)</td>
<td>667</td>
<td>97.8</td>
<td>0.4</td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma (C82-C86)</td>
<td>5,081</td>
<td>95.7</td>
<td>0.7</td>
</tr>
<tr>
<td>Immunoproliferative cancers (C88)</td>
<td>283</td>
<td>97.2</td>
<td>0.0</td>
</tr>
<tr>
<td>Multiple myeloma (C90.0)</td>
<td>1,884</td>
<td>92.9</td>
<td>1.4</td>
</tr>
<tr>
<td>Other plasma cell cancers (C90.1-C90.9)</td>
<td>86</td>
<td>97.7</td>
<td>0.0</td>
</tr>
<tr>
<td>Acute lymphoblastic leukaemia (ALL) (C91.0)</td>
<td>413</td>
<td>96.6</td>
<td>0.5</td>
</tr>
<tr>
<td>Chronic lymphocytic leukaemia (CLL) (C91.1)</td>
<td>1,678</td>
<td>88.9</td>
<td>1.4</td>
</tr>
<tr>
<td>Other and unspecified lymphoid leukaemias (C91.2-C91.9)</td>
<td>175</td>
<td>92.0</td>
<td>1.7</td>
</tr>
<tr>
<td>Acute myeloid leukaemia (AML) (C92.0, C92.3-C92.6, C92.8, C93.0, C94.0, C94.2, C94.4-C94.5)</td>
<td>996</td>
<td>92.8</td>
<td>1.0</td>
</tr>
<tr>
<td>Chronic myelogenous leukaemia (CML) (C92.1)</td>
<td>324</td>
<td>91.7</td>
<td>0.6</td>
</tr>
<tr>
<td>Other and unspecified myeloid leukaemias (C92.2, C92.7, C92.9, C93.1-C93.9, C94.6-C94.7)</td>
<td>368</td>
<td>87.8</td>
<td>1.6</td>
</tr>
<tr>
<td>Other and unspecified leukaemias (C94.1, C94.3, C95)</td>
<td>57</td>
<td>47.4</td>
<td>36.8</td>
</tr>
<tr>
<td>Myelodysplastic syndromes (D46)</td>
<td>1,385</td>
<td>77.7</td>
<td>3.7</td>
</tr>
<tr>
<td>Other cancers of blood and lymphatic system (C96, D45, D47.1, D47.3-D47.5)</td>
<td>1,296</td>
<td>78.7</td>
<td>2.4</td>
</tr>
<tr>
<td>Cancer of other and ill-defined sites (C76)</td>
<td>115</td>
<td>74.8</td>
<td>11.3</td>
</tr>
<tr>
<td>Cancer of unknown primary site (C80)</td>
<td>2,466</td>
<td>60.8</td>
<td>9.8</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>------</td>
<td>------</td>
<td>-----</td>
</tr>
<tr>
<td>All cancers combined (C00-C97, D45, D46, D47.1, D47.3-D47.5)</td>
<td>132,650</td>
<td>92.6</td>
<td>1.3</td>
</tr>
</tbody>
</table>

**Notes:**

1. 2015 is the most recent year for which data are available from all states and territories.
2. The categories “non-melanoma skin cancer” and “all cancers combined” exclude basal and squamous cell carcinomas of the skin.

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Technical notes

Glossary

**Age-specific rate**: the rate for a specific age-group. The numerator and denominator relate to the same age group.

**Age-standardisation**: a method of removing the influence of age when comparing populations with different age structures. This is usually necessary because the rates of many diseases vary strongly (usually increasing) with age. The age structures of the different populations are converted to the same 'standard' structure; then the disease rates that would have occurred with that structure are calculated and compared.

**Cancer**: refers to a large range of diseases in which some of the body’s cells become defective, begin to multiply out of control, can invade and damage the area around them, and can also spread to other parts of the body to cause further damage.

**Cancer incidence**: the number of new cancers diagnosed during a specified time period (usually one year).

**Cancer mortality**: the number of deaths occurring during a specified time period (usually one year) for which the underlying cause of death is cancer.

**Cohort method**: a method for calculating survival. It follows a group (cohort) of patients all diagnosed in a specified era, e.g. 2005–2009, and calculates the proportion of the original cohort that is still alive after a specified period of time after diagnosis, e.g. 5 years. Compare to the period method.

**Crude rate**: the number of events in a given period divided by the size of the population at risk in a specified time period.

**Period method**: a method for calculating survival. It specifies a period of time, e.g. 2010–2014, and calculates survival based on all patients who live part or all of their post-diagnosis life during that period. Compare to the cohort method.

**Prevalence**: the number of people alive with a prior diagnosis of cancer at a given time. The longest period for which it is possible to calculate prevalence using the available national data (from 1982 to 2016) is currently 34 years so this is used to provide an estimate of the ‘total’ prevalence of cancer as at the end of 2015, noting that people diagnosed with cancer before 1982 are not included.

**Projections**: are estimates for the most recent years (2017-2020 for incidence and 2019-2020 for mortality). Estimates are derived based on trends from the previous 10 years of actual data. Where this report discusses rates based on projections, the rates are described as ‘estimated’.

**Relative survival**: the ratio of observed survival of a group of persons with cancer to expected survival of those in the corresponding general population after a specific interval (such as 1, 3 or 5 years) following diagnosis.

**Stage**: the extent of a cancer in the body. Staging is usually based on the size of the tumour, whether lymph nodes contain cancer, and whether cancer has spread from the original site to other parts of the body.

**Survival**: a general term indicating the probability of being alive for a given amount of time after a particular event, such as diagnosis of cancer.
Technical notes

References

Main report (excludes cancer data commentaries)


Vaccarella S, Franceschi S, Bray F, Wild C, Plummer M and Dal Maso L 2016. The increase in thyroid cancer may be due to an increase in medical surveillance and the introduction of new diagnostic techniques, such as neck ultrasonography. The New England Journal of Medicine 375: 614-17.

Cancer data commentaries


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Notes

This report provides a wide range of cancer related statistics including historical data ranging back to 1982 and projections up to 2020; cancer mortality data ranges back to 1968. Australian Cancer Incidence and Mortality (ACIM) books will not be released in 2020 but will again be published in 2021. Data previously within ACIM may be located within the Cancer data in Australia data and visualisations.

Amendments

31 Jan 2019 - Mortality worksheets in the ACIM books for colorectal cancer and cancer of other and ill-defined digestive organs have been revised to correct errors in the counts and rates.

Data quality statement

Visit the ACD 2016 for the respective Data Quality Statement.

The data quality statements underpinning the AIHW NMD can be found on the following ABS internet pages:

- ABS quality declaration summary for Deaths, Australia (ABS cat. no. 3302.0)
- ABS quality declaration summary for Causes of death, Australia (ABS cat. no. 3303.0)

For more information on the AIHW NMD visit Deaths data at AIHW, and for the National Death Index Data Quality Statement visit the NDI.

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Data

Note: Rankings data are only available from the Tableau presentation.

Data tables: Cancer data in Australia - Book 1: Incidence supplementary tables
Data used to inform the CDIA summary page.
Download Data tables: Cancer data in Australia - Book 1: Incidence supplementary tables. Format: XLSX 7.2Mb XLSX 7.2Mb

Data tables: Cancer data in Australia - Book 2: Mortality supplementary tables
Data used to inform the CDIA summary page.
Download Data tables: Cancer data in Australia - Book 2: Mortality supplementary tables. Format: XLSX 6.8Mb XLSX 6.8Mb

Data tables: Cancer data in Australia - Book 3: Survival supplementary tables
Data used to inform the CDIA summary page and survival page.
Download Data tables: Cancer data in Australia - Book 3: Survival supplementary tables. Format: XLSX 2.7Mb XLSX 2.7Mb

Data tables: Cancer data in Australia - Book 4: Incidence and survival by stage supplementary tables
Data used to inform the CDIA cancer incidence and survival by stage page,
Download Data tables: Cancer data in Australia - Book 4: Incidence and survival by stage supplementary tables. Format: XLSX 356Kb XLSX 356Kb

Data tables: Cancer data in Australia - Book 5: Prevalence supplementary tables
Data used to inform the CDIA summary page.
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Data used to inform the CDIA state and territory page.
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Data tables: Cancer data in Australia - Book 7a: Cancer risk, adjusted for competing mortality
Data used to inform the CDIA cancer incidence and mortality risk.
Download Data tables: Cancer data in Australia - Book 7a: Cancer risk, adjusted for competing mortality. Format: XLSX 12.4Mb XLSX 12.4Mb

Data tables: Cancer data in Australia - Book 7b: Cancer risk, unadjusted for competing mortality
Data used to inform the CDIA cancer incidence and mortality risk.
Download Data tables: Cancer data in Australia - Book 7b: Cancer risk, unadjusted for competing mortality. Format: XLSX 12.3Mb XLSX 12.3Mb

Data tables: Cancer data in Australia - Book 8: Cancer incidence and mortality rates (WHO and Segi)
Cancer incidence and mortality data age standardised to the Segi and WHO standard populations; these data are not contained in data visualisations.
Download Data tables: Cancer data in Australia - Book 8: Cancer incidence and mortality rates (WHO and Segi). Format: XLSX 878Kb XLSX 878Kb

Cancer mortality data from 1968 to 1981; these data are not contained in data visualisations.
Download Data tables: Cancer data in Australia - Book 9: Mortality summary 1968 to 1981. Format: XLSX 2.3Mb XLSX 2.3Mb