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Contents

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Abbreviations

AACR	Australasian Association of Cancer Registries
ABS	Australian Bureau of Statistics
ACD	Australian Cancer Database
ACT	Australian Capital Territory
AICR	American Institute for Cancer Research
AIDS	Acquired Immunodeficiency Syndrome
AIHW	Australian Institute of Health and Welfare
ASGC	Australian Standard Geographical Classification
ASR	age-standardised rate
AYA	adolescents and young adults
BCC	basal cell carcinoma
CA	Cancer Australia
CI	confidence interval
CNS	central nervous system
COSA	Clinical Oncological Society of Australia
DCIS	ductal carcinoma in situ
excl.	excluding
HIV	human immunodeficiency virus
ICCC	International Classification of Childhood Cancers
ICD-10	International Statistical Classification of Diseases and Related Health Problems, 10th Revision
ICD-O-3	International Classification of Diseases for Oncology, Third Edition
incl.	including
IRSD	Index of Relative Socio-economic Disadvantage
NCMC	National Centre for Monitoring Cancer
NCSCH	National Cancer Statistics Clearing House
NMD	National Mortality Database
NMSC	non-melanoma skin cancer

No.	number
PNET	primitive neuroectodermal tumour
RS	relative survival
SCC	squamous cell carcinoma
SEER	Surveillance, Epidemiology and End Results
SEIFA	Socio-Economic Indexes for Areas
SLA	statistical local area
WCRF	World Cancer Research Fund
WHO	World Health Organization

Symbols

%	per cent
<	less than
–	nil or rounded to zero
. .	not applicable
n.a.	not available
n.p.	not publishable because of small numbers, confidentiality or other concerns about the quality of the data

Summary

Cancers in adolescents and young adults are uncommon but can have far-reaching consequences and a substantial disease burden (Begg et al. 2007). There is also growing recognition that young people with cancer have distinct biological, psychosocial and information needs (Bleyer 2009; Palmer & Thomas 2008). This is the first report to present a comprehensive picture of national statistics on cancer in young Australians aged 15–29. It provides an evidence base to underpin improvements in cancer outcomes as part of a broader initiative to reduce the impact of cancer on adolescents and young adults.

Cancer incidence has become steady and cancer mortality has fallen

Between 1983 and 1996, cancer incidence in adolescents and young adults increased by 1.5% per year, after which there was no significant change in the rates to 2007. However, cancer mortality in those aged 15–29 decreased by 1.9% per year between 1983 and 2007.

Melanoma was the most common cancer diagnosed and brain cancer was the leading cause of cancer death

In the period 2003–2007, 8,783 new cases of reportable cancer were diagnosed among adolescents and young adults aged 15–29. This represented an age-standardised rate of 419 cases per million. Cancers in adolescents and young adults accounted for 1.7% of all cancer cases diagnosed in Australia. The most common cancer diagnosed in this age group was melanoma.

During the same period, there were 1,018 cancer deaths in adolescents and young adults, comprising 9% of all deaths in this age group. The leading cause of cancer death was brain cancer.

Survival from cancer in adolescents and young adults was relatively high and has improved

In the period 2004–2010, adolescents and young adults with cancer were 95% as likely to live 1 year and 88% as likely to live 5 years after diagnosis as their counterparts in the general population.

Relative survival was highest for adolescents and young adults with thyroid carcinoma, followed closely by gonadal germ cell cancer, Hodgkin lymphoma and melanoma.

Between 1983–1989 and 2004–2010, 5-year relative survival from all cancers increased significantly from 80% to 88% in adolescents and young adults. There were significant increases in survival from most cancers, with the greatest improvement for leukaemias.

Outcomes for adolescents and young adults vary

In the period 2003–2007, adolescents and young adults living outside *Major cities* were more likely to be diagnosed with and to die from cancer than their counterparts in *Major cities*.

There was no significant association between survival and remoteness area; however, relative survival from all cancers was higher for adolescents and young adults living in areas of the highest socioeconomic status than for their counterparts in areas of the lowest socioeconomic status.

1 Introduction

Cancers in adolescents and young adults are uncommon but can have far-reaching consequences and a substantial disease burden (Begg et al. 2007). There is also growing recognition that young people with cancer have distinct biological, psychosocial and information needs (Bleyer 2009; Palmer & Thomas 2008).

In Australia, the need for greater attention to adolescents and young adults with cancer has been recognised with the Australian Government's commitment of $15 million to the Youth Cancer Networks Program. The program included a number of national and jurisdictional projects, which aimed to deliver better models of care to adolescents and young adults with cancer, including through improved services, facilities, support and information (COSA 2011a; Roxon 2008). In addition to this commitment, Cancer Australia (CA) and CanTeen have developed a National Service Delivery Framework for adolescents and young adults with cancer. The framework has highlighted the need to develop an evidence base to measure the effectiveness of health services in meeting the needs of adolescents and young adults, and to further policy development, planning and improvement in service delivery (CA & CanTeen 2009).

Purpose and structure of this report

As part of a broader initiative to reduce the impact of cancer on young Australians, this report provides an evidence base to underpin improvements in cancer outcomes. It aims to increase the level of understanding about cancer in young Australians and to inform decision making, resource allocation and cancer control programs and policies.

This is the first national report focusing on cancers in adolescents and young adults in Australia. It presents national incidence and mortality statistics for adolescents and young adults with cancer between 1983 and 2007, and survival data between 1983–1989 and 2004–2010. Bringing together the latest national cancer statistics and trend data, this report answers the following questions:

- How many adolescents and young adults are diagnosed with cancer each year, and what are the trends in cancer incidence? (Chapter 2)
- What are the survival prospects for adolescents and young adults diagnosed with cancer, and is survival from cancer increasing? (Chapter 3)
- How many adolescents and young adults die from cancer each year, and what are the trends in cancer mortality? (Chapter 4)

Box 1.1: Definitions and terminology in this report

Adolescent and young adult: an individual aged 15–29.

Cancer: a primary tumour that is invasive (that is, malignant). It does not include secondary cancer, nor does it include benign and non-invasive tumours.

Incidence: the number of new cancer cases diagnosed during a given time period.

Mortality: the number of deaths that occurred during a specified period for which the underlying cause of death was recorded as cancer.

Survival: the probability that individuals with cancer will still be alive at a specified point in time after diagnosis.

What is cancer?

Cancer is a common term used to describe a range of diseases in which cells become abnormal, grow in an uncontrolled way and form a mass called a neoplasm or a tumour. Tumours can be benign (not cancerous) or malignant (cancerous). Benign tumours do not spread to other parts of the body, although they may interfere with other areas of the body as they expand. A malignant tumour is characterised by its ability to spread to other parts of the body through a process known as metastasis. Cancers can develop from most cell types in the body and are usually classified according to their organ or tissue of origin and histological features.

Who are adolescents and young adults?

Adolescence is recognised as the developmental period of transition from childhood to early adulthood, which is characterised by cognitive, biological and socio-emotional changes (Santrock 2005). Although cancer is primarily a disease of ageing, it can have far-reaching and serious consequences during this stage of life when young people are facing a range of life events and decisions that impact their longer term health and wellbeing (Palmer & Thomas 2008).

Box 1.2: A profile of adolescents and young adults in Australia

In 2007, there were 4.4 million adolescents and young adults aged 15–29 in Australia, representing one-fifth (21%) of the total population. Males made up a slightly higher proportion of adolescents and young adults than females (51% compared with 50% for the total population). Those aged 15–19 and 25–29 each accounted for 33% of the total young population, slighter lower than those aged 20–24 (34%).

Data from the 2006 Census of Housing and Population showed that the majority of adolescents and young adults in Australia aged 15–29 lived in Major cities (72% compared with 68% for the total population). Moreover, 19% each lived in the two lowest socioeconomic status quintiles, 21% each lived in the third and fourth lowest quintiles, and 20% lived in the highest socioeconomic status quintile (compared with around 20% in each of the five quintiles for the total population).

Why is cancer in adolescents and young adults important?

There is growing evidence that cancers in adolescents and young adults have a unique biology (Bleyer 2009; Tricoli et al. 2011), as well as increasing recognition that young people with cancer have distinct medical, psychosocial and information needs (Palmer & Thomas 2008). While much has been done worldwide to reduce the impact of childhood cancers, cancers in adolescents and young adults have received somewhat less attention until recently. American studies have highlighted a concern that improvements in outcomes for cancer in adolescents and young adults have lagged behind those achieved for cancer in children and older adults (Bleyer 2011; Bleyer et al. 2006a). Whether this is also the case in Australia is unknown.

The reasons for the lag in survival gains in adolescents and young adults are complex and poorly understood. Possible explanations include a lack of focus on adolescents and young adults with cancers by health services, a failure to recruit adolescents and young adults into clinical trials, cancer at a more advanced stage at diagnosis for adolescents and young adults than for children, less aggressive treatment regimens, reduced adherence to treatment among young people with cancer, and a low proportion of adolescents and young adults managed and treated at specialised tertiary centres (Bleyer et al. 2006a; Bullivant et al. 2009).

In Australia, the need for greater attention to and support for adolescents and young adults with cancer has been recognised through a number of initiatives. In 2005, the Senate Community Affairs References Committee conducted an inquiry into cancer treatment and services in Australia, including a review of cancer care for adolescents and young adults. Of the 33 recommendations made, two specific to adolescent cancer care were:

1. that Cancer Australia consider the development of appropriate referral pathways that take account of the particular difficulties confronted by adolescents with cancer
2. that state and territory governments recognise the difficulties experienced by adolescent cancer patients being placed with inappropriate age groups and examine the feasibility of establishing specialised adolescent cancer care units in public hospitals (Senate Community Affairs References Committee 2005).

Based on these recommendations, Cancer Australia formed an Adolescents and Young Adult Cancers National Reference Group, which had its first meeting in 2007. The group's highest priority was to develop a National Service Delivery Framework for adolescents and young adults with cancer. The development of the framework was based on a review of the best available evidence and on extensive consultation with consumers, health professionals and service providers across Australia. The framework focused on aspects of service delivery most likely to increase survival and to enhance quality of life for adolescents and young adults and their families. Notably, it identified several barriers to developing and implementing improved service delivery for adolescents and young adults. These included a lack of both consistent and accessible data and of evidence of outcomes, service quality and effectiveness (CA & CanTeen 2009).

In 2008, the Australian Government invested $15 million over three years to establish the Youth Cancer Networks Program in Australia. The program, which was administered by CanTeen, included a number of national and jurisdictional projects. It aimed to deliver better models of care to adolescents and young adults (aged 15–24) with cancer through improved services, coordination of services, support and care (COSA 2011a; Roxon 2008).

The Clinical Oncological Society of Australia (COSA) was contracted to manage three of the projects of the Youth Cancer Networks Program, guided by an Adolescent and Young Adult Cancer Steering Committee (COSA 2011a). As part of the program, COSA also developed a national Adolescent and Young Adult Cancer Network, which links individuals and organisations across Australia as it works to improve outcomes for young people with cancer (COSA 2011a). As well, COSA has formed an Adolescent and Young Adult Cancer Interest Group. This multidisciplinary group of health professionals is focused on the medical, psychosocial and information needs of adolescents and young adults with cancer and their families (COSA 2011b).

How are cancers in adolescents and young adults classified?

In this publication, the Surveillance, Epidemiology and End Results (SEER) adolescent and young adult site recode was used as the basis to report incidence and survival statistics. The tenth revision of the International Statistical Classification of Disease and Related Health Problems (ICD-10) was used to report mortality statistics.

SEER adolescent and young adult site recode

The Surveillance, Epidemiology and End Results (SEER) adolescent and young adult site recode was developed to describe the major cancers affecting individuals aged 15 to 39 and designed to report cancer incidence rates and trends (SEER 2010). The classification is based on topography (that is, the anatomic location of the tumour) and histology (that is, the type of cell from which the cancer arose), as coded by the third edition of the International Classification of Diseases for Oncology (ICD-O-3).

For the purpose of reporting incidence and survival statistics in this publication, minor adjustments were made to the SEER adolescent and young adult site recode classification, based on discussions with the Clinical Oncological Society of Australia (COSA).

Nine major cancer groups are defined in the classification system:

- Leukaemias
- Lymphomas
- Central nervous system cancers
- Bone cancers
- Soft-tissue sarcomas
- Germ cell cancers
- Melanomas
- Carcinomas
- Other and unspecified cancers

All but two of these major cancer groups are divided further into subgroups. The codes for each group and subgroup are presented in Appendix A. Further information about each of the nine major cancer groups is provided below.

Leukaemias

Leukaemias are cancers arising in the blood-forming cells within the bone marrow, leading to an uncontrolled overproduction of abnormal white blood cells (Leukaemia Foundation 2008b). Leukaemias are grouped based on how quickly the disease develops (acute or chronic) and which type of white blood cell is involved (lymphoid or myeloid) (National Cancer Institute 2011c). There are four main types of leukaemia: acute myeloid leukaemia, acute lymphoid leukaemia, chronic myeloid leukaemia and chronic lymphoid leukaemia. The most common types of leukaemia in adolescents and young adults are acute lymphoid and acute myeloid leukaemia.

Lymphomas

Lymphomas are cancers arising in the lymphatic cells of the immune system. They often present as solid tumours, originating in one or more lymph nodes or in other organs such as the liver, spleen, bowel or bone marrow (Leukaemia Foundation 2008a). Lymphomas can be divided into two main groups: Hodgkin lymphoma and non-Hodgkin lymphoma. This division is based on the different features of the cancer cells that can be seen under a microscope (Leukaemia Foundation 2011).

Central nervous system cancers

Central nervous system cancers consist of a heterogeneous set of invasive tumours arising from different types of cells in the central nervous system. They can occur anywhere in the central nervous system, including in the brain, meninges, spinal cord, cranial nerves, pituitary gland, pineal gland or craniopharyngeal duct (ACS 2010b; Bleyer et al. 2006b). Tumours of the central nervous system differ widely in terms of pathologic appearance, behaviour and prognosis (Youlden et al. 2009). In this report, the following subgroups of central nervous system cancer are presented: glioblastoma and anaplastic astrocytoma; other astrocytoma, glioma or ependymoma; medulloblastoma; supratentorial PNET (primitive neuroectodermal tumour); and other central nervous system tumour.

Bone cancers

Bone cancers are malignant tumours starting in the bone. Generally, bone cancers develop around the knee, wrist, shoulder and pelvis. There are many different types of bone cancer, named according to the area of bone or surrounding tissue that is affected and the types of cells forming the tumour. Common types of bone cancer include osteosarcoma, chondrosarcoma and Ewing tumour (Cancer Council Victoria 2010; National Cancer Institute 2008). In this report, the following subgroups of bone cancer are presented: osteosarcoma, Ewing tumour, and other bone tumour.

Soft-tissue sarcomas

Soft-tissue sarcomas develop in soft tissues (such as muscles, tendons, fibrous tissues, fat, blood vessels, nerves and synovial tissues) that connect, support or surround other structures and organs of the body. They can be found almost anywhere in the body, with common sites including arms and legs. There are many types of soft-tissue sarcoma named after the type of tissue in which they begin. Similar types of soft-tissue sarcoma are grouped based on microscopic features, symptoms and treatment (ACS 2010a, 2011a; National Cancer Institute 2007). In this report, two subgroups of soft-tissue sarcoma are presented: rhabdomyosarcoma and other soft-tissue sarcoma.

Germ cell cancers

Germ cell cancers develop in germ cells (that is, reproductive cells that develop into sperm in males and eggs in females) in the testicles or ovaries or in germ cells that have settled in other parts of the body, such as the bottom of the spine, brain, abdomen and chest. Germ cell cancers that form in the testicles or ovaries are referred to as gonadal germ cell cancers, while those that form in other parts of the body are referred to as non-gonadal germ cell cancers (MacMillan Cancer Support 2010; National Cancer Institute 2011a).

Melanomas

Melanomas are malignant tumours of melanocytes—cells that produce the dark pigment, melanin, responsible for the colour of skin. They predominantly occur in the skin, but are also found in other parts of the body, including the bowel and eye (ACS 2011b; Cancer Council New South Wales 2007).

Carcinomas

Carcinomas are cancers arising in the epithelial cells covering the outside of the body and the body's organs. In this report, the following most common types of carcinoma in adolescents and young adults are presented: thyroid, breast (females only), cervical, colorectal (including anus), and other carcinoma (including breast in males and skin).

Other and unspecified

This group consists of cancers that have a specific histology code but are too uncommon to be listed among the eight specific groups of cancers. It also includes cancers that are so poorly differentiated that it is not possible to classify them.

Box 1.3: How does the SEER adolescent and young adult site recode differ from the International Classification of Childhood Cancers (ICCC)?

Because the distribution of cancers affecting adolescents and young adults is rather different from that found in childhood, the scheme of classifying cancers is also different. The SEER adolescent and young adult site recode contains more detailed classification of carcinomas and central nervous system cancers than the International Classification of Childhood Cancer (Steliarova-Foucher et al. 2005), and a less detailed classification of embryonal and Ewing tumours. It also has a separate group for germ cell cancers.

International Statistical Classification of Diseases and Related Health Problems

Mortality data in the National Mortality Database are coded only according to the International Statistical Classification of Diseases and Related Health Problems (ICD), and not to the International Classification of Diseases for Oncology (ICD-O). Thus, the SEER adolescent and young adult site recode could not be used as the basis for reporting mortality statistics. Mortality statistics presented in this report are instead based on the ICD-10.

Mortality data are therefore based on a different classification system than the incidence and survival data. Hence, cancer groups with similar names in the incidence and survival chapters will not necessarily be identical to those in the mortality chapter. For example, the cancer group *melanomas* in the incidence and survival chapters differs slightly from *melanoma*

of the skin in the mortality chapter. Similarly, *acute lymphoid leukaemia* in the incidence chapter may not be the same as *acute lymphoblastic leukaemia* in the mortality chapter.

Data interpretation

Definitions

There is no universally accepted age group to define adolescence and young adulthood. Definitions of 'young people' have varied between 10 to 44 years in various reports, depending on whether they are based on age or developmental stage (Aubin et al. 2011). In this report, the term 'adolescents and young adults' refers to individuals aged 15–29 at cancer diagnosis or cancer death. It is possible that an individual who was an adolescent or young adult when he or she died from cancer was not necessarily one at diagnosis some time earlier. Similarly, an individual who was an adolescent or young adult at diagnosis may no longer be one when he or she is reported in the 1- or 5-year survival data.

In various sections of this report, cancer incidence, survival and mortality in adolescents and young adults are compared with that for two other age groups: children and older adults. Throughout this report, 'children' refers specifically to individuals aged 0–14 and 'older adults' to individuals aged 30–39 at cancer diagnosis or cancer death. As cancer is primarily a disease of ageing, these age groups were selected based on the incidence and pattern of cancers across the life span.

Time periods for reporting

This report presents incidence and mortality trends between 1983 and 2007, based on the availability of data and, for consistency, the time periods for survival trends. The latest incidence and mortality statistics are presented for the combined 5-year period of 2003–2007, due to small numbers. Survival statistics, which are based on the time at risk, are presented for 2004–2010 for the most recent period, and for seven-year periods from 1983–1989 to 2004–2010 for trends.

Age-standardisation

Information on the actual number of cancer cases and deaths is presented in this report, together with age-standardised rates. The use of age-standardised rates is important when making comparisons between and within groups over time in order to take into account differences in the age structure and size of the population. This is especially important in regard to cancer since the risk of this disease increases with age even within the 15–29 year age group. Rates have been standardised to the Australian population at 30 June 2001 and are expressed per one million population. Further information on age-standardisation and other technical matters can be found in Appendix C.

Statistical significance

Confidence intervals (at the 95% level) are shown in graphs (as error bars) and tables in this report. As explained more fully in Appendix C, confidence intervals can be used as a guide when considering whether differences in rates may be a result of chance variation. Where confidence intervals do not overlap, the difference between rates may be greater than would

readily be attributable to chance. While such differences may be regarded as 'significant' in statistical terms, they may or may not be 'significant' from a practical or clinical perspective.

Data sources

A key data source for this report was the Australian Cancer Database (ACD). The ACD holds information on 1.9 million Australian cancer cases diagnosed between 1982 and 2007. The AIHW compiles and maintains the ACD, in partnership with the Australasian Association of Cancer Registries through the National Cancer Statistics Clearing House (NCSCH). Member registries of the NCSCH provide data to the AIHW on an annual basis. Each Australian state and territory has legislation that makes the reporting of all cancers mandatory (other than basal cell and squamous cell carcinoma of the skin).

Another key data source was the National Mortality Database (NMD). This database contains information on all deaths in Australia registered from 1964 to 2007. Information on deaths in this report was based on the year of death, except for the most recent year (2007) where the year of registration was used. Previous investigation has shown that, due to a lag in processing of deaths, year-of-death information for the latest available year generally underestimates the true number of deaths. The number of deaths registered in that year is closer to the true value.

Additional information about the ACD and NMD can be found in Appendix D.

Box 1.4: Why do some statistics in this report appear old?

While this report is published in 2011, the statistics presented in the main chapters refer to cancer cases or deaths in 2007 or earlier. The reason for this is that whether data are collected recently or not, it can often take a year or more before data from cancer registries are fully processed and released to the AIHW. Furthermore, once the AIHW receives the data it, in turn, needs some time to load, clean, de-duplicate and analyse the data before they are released.

2 Incidence of cancer

Key findings

In the period 2003–2007:

- 8,783 cases of cancer (excluding basal cell and squamous cell carcinoma of the skin) were diagnosed among adolescents and young adults aged 15–29, representing an age-standardised rate of 419 cases per million
- cancers in adolescents and young adults accounted for 1.7% of all cancer cases diagnosed in Australia
- the most common reportable cancer diagnosed in adolescents and young adults was melanoma
- adolescents and young adults living outside *Major cities* were more likely to be diagnosed with cancer than their counterparts in *Major cities*.

Between 1983 and 2007:

- cancer incidence in adolescents and young adults increased by 1.5% per year until 1996, after which there was no significant change in the rates.

Introduction

Incidence refers to the number of new cancer cases (not the number of people) diagnosed during a specified time period. Only cases of primary, invasive tumours are counted. Furthermore, recurrences of previous primary cancers are not included in incidence data (IARC 2004).

The main data source for this chapter was the Australian Cancer Database (ACD). It consists of data provided to the AIHW by the members of the Australasian Association of Cancer Registries through the National Cancer Statistics Clearing House. The ACD contains data on all primary, invasive tumours (excluding basal cell and squamous cell carcinoma of the skin) diagnosed in Australia up to and including 2007.

The cancer classification used in this chapter was based on the Surveillance, Epidemiology and End Results (SEER) adolescent and young adult site recode (see Chapter 1 for further detail).

This chapter begins by presenting incidence for adolescents and young adults in the period 2003–2007, including differences by sex, 5-year age group within this broader age category, and comparisons with other age groups (children aged 0–14 and older adults aged 30–39). Trends in age-standardised incidence rates from 1983 to 2007 and differences by remoteness area and socioeconomic status in the period 2003–2007 are also presented.

How many adolescents and young adults were diagnosed with cancer?

In the period 2003–2007, a total of 8,783 cases of cancer were diagnosed among adolescents and young adults aged 15–29, at an age-standardised rate of 419 per million. This means that an average of 5 adolescents and young adults were diagnosed with cancer each day in Australia. Cancers in this age group accounted for 1.7% of all new cancer cases registered in the period 2003–2007, with people in this age group making up 21% of the Australian population in 2007.

Which cancers were the most common?

In the period 2003–2007, the most commonly diagnosed cancer among adolescents and young adults was melanoma (2,251 cases); it accounted for more than one-quarter of all cancers in this age group. Gonadal germ cell cancers were the second most common (1,127 cases), followed by Hodgkin lymphoma (851 cases) and thyroid carcinoma (685 cases). Together, these four cancers represented just over half of all cancers in adolescents and young adults (Table 2.1).

Further information on the incidence of cancers in adolescents and young adults is provided in Appendix tables E2.1 and E2.2.

Table 2.1: Incidence of the 10 most common cancers, 15–29-year-olds, Australia, 2003–2007

Cancer type/site	No. of cases	% of all cancers	ASR[(a)]
Melanoma	2,251	25.6	107.7
Gonadal germ cell cancer	1,127	12.8	53.8
Hodgkin lymphoma	851	9.7	40.1
Thyroid carcinoma	685	7.8	32.8
Other carcinoma	673	7.7	32.4
Non-Hodgkin lymphoma	494	5.6	23.4
Colorectal carcinoma (including anus)	315	3.6	15.0
Breast carcinoma (females only)	299	3.4	29.6
Other soft-tissue sarcoma	279	3.2	13.3
Cervical carcinoma	253	2.9	24.9
All cancers	**8,783**	**100.0**	**419.1**

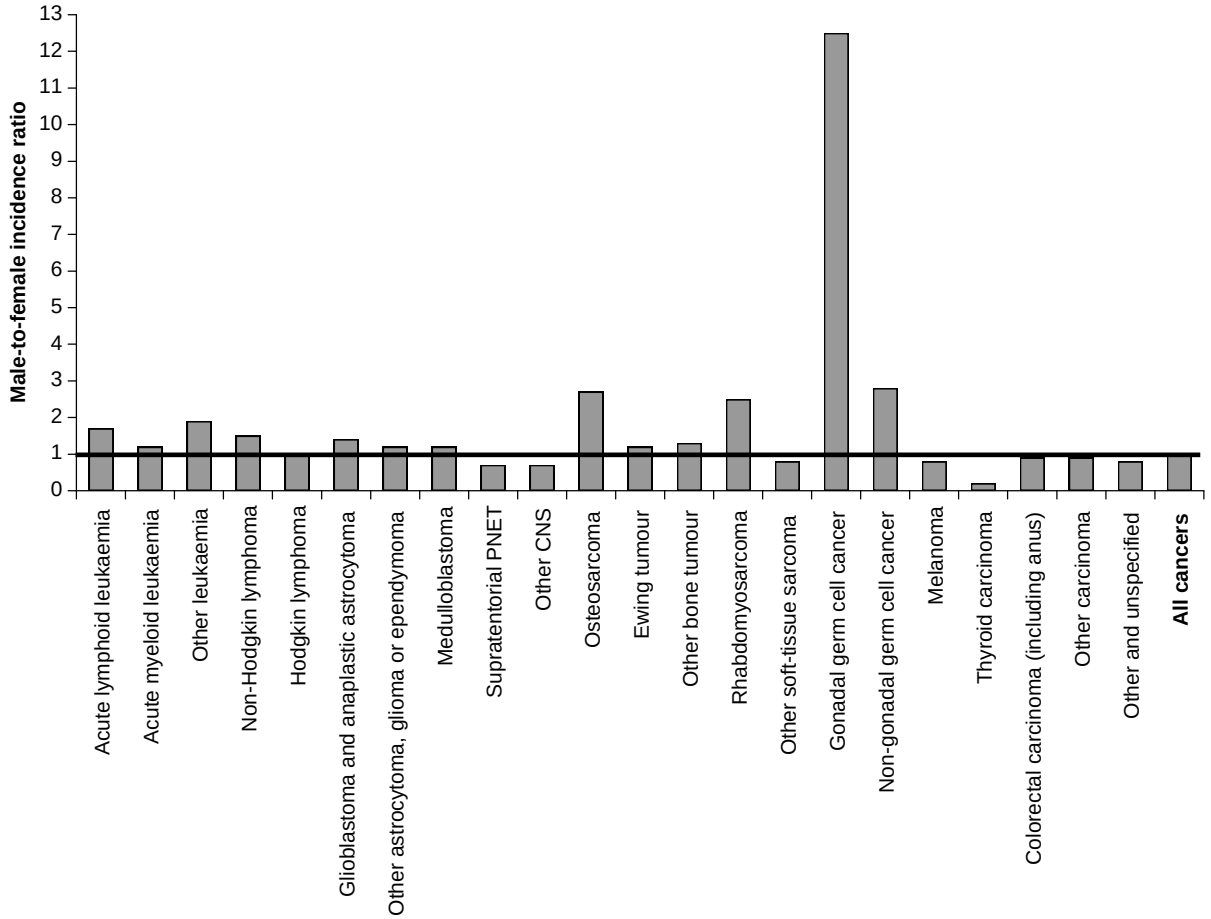
(a) Rates are age standardised to the Australian population as at 30 June 2001 and expressed per million. The rates are based on the total number of cases over the 5-year period.

Source: AIHW Australian Cancer Database 2007.

Does incidence differ by sex?

The male-to-female ratio is used to illustrate the relative risk of developing cancer between the sexes, with ratios greater than 1 indicating an excess in males and ratios less than 1 indicating an excess in females.

Figure 2.1 shows that age-standardised incidence rates for all cancers were equal between males and females aged 15–29 in the period 2003–2007. However, sex differences were evident among incidence of different cancers. The most pronounced difference was for gonadal germ cell cancer, where the age-standardised incidence rate in males was 13 times that of females, due to the high incidence of testicular germ cell cancer in this group. Males were also more than twice as likely as females to develop non-gonadal germ cell cancer (a rate ratio of 2.8), osteosarcoma (a type of bone cancer; rate ratio of 2.7) and rhabdomyosarcoma (a type of soft-tissue sarcoma; rate ratio of 2.5). In contrast, females were far more likely than males to develop thyroid carcinoma (rate ratio of 0.2).



Notes

1. Male-to-female ratio: age-standardised incidence rates for males divided by age-standardised incidence rates for females. Ratios greater than 1 indicate an excess in males, and ratios less than 1 indicate an excess in females. Rates are age standardised to the Australian population as at 30 June 2001 and expressed per million males/females. The rates are based on the total number of cases over the 5-year period.
2. Data for this figure are presented in Appendix Table E2.2.

Source: AIHW Australian Cancer Database 2007.

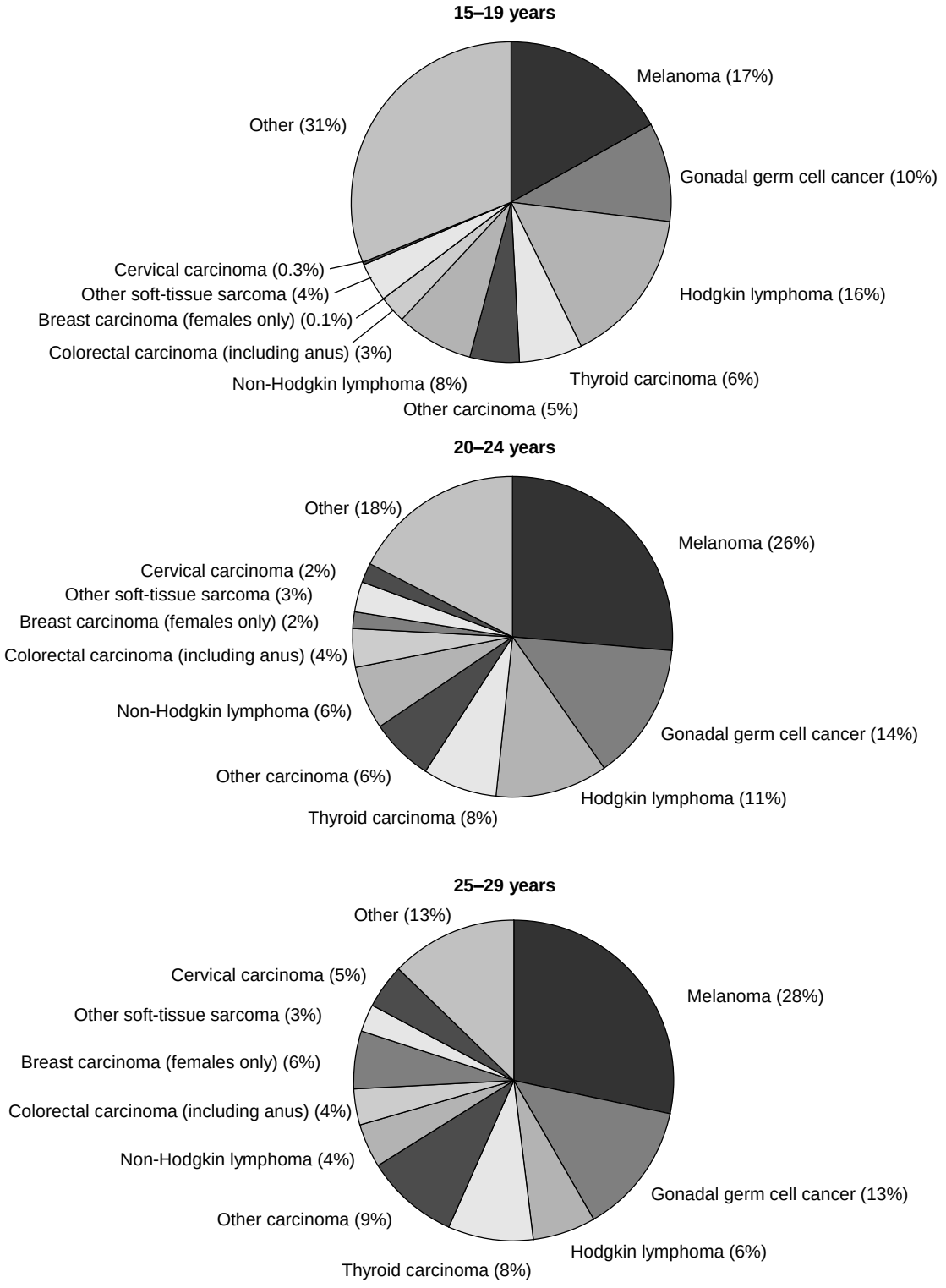
Figure 2.1: Relative risk of cancer in males versus females, 15–29-year-olds, Australia, 2003–2007

Does incidence differ by age?

Within the 15–29 year age group, the incidence of cancer increased sharply with age. As a result, almost half of all cancers in this age group were diagnosed between 25–29 years of age.

Figure 2.2 shows that the proportional incidence of the 10 most common cancers in adolescents and young adults differed markedly by 5-year age intervals. The incidence of carcinomas such as breast, colorectal, cervical and thyroid, as a proportion of all cancers, increased with age. Overall, carcinomas combined accounted for 14% of all cancers in those aged 15–19, 22% of cancers in those aged 20–24 and 32% of cancers in those aged 25–29. Likewise, the proportion of all cancers that were melanoma increased with age: from 17% in those aged 15–19 to 28% in those aged 25–29.

In contrast, there was a decrease in the proportional incidence of Hodgkin lymphoma, from 16% in those aged 15–19 to 6% in those aged 25–29.



Notes

1. Proportions may not sum to 100% due to rounding.
2. Data for this figure are presented in Appendix Table E2.2.

Source: AIHW Australian Cancer Database 2007.

Figure 2.2: Proportional incidence of the most common cancers by 5-year age group, 15–29-year-olds, Australia, 2003–2007

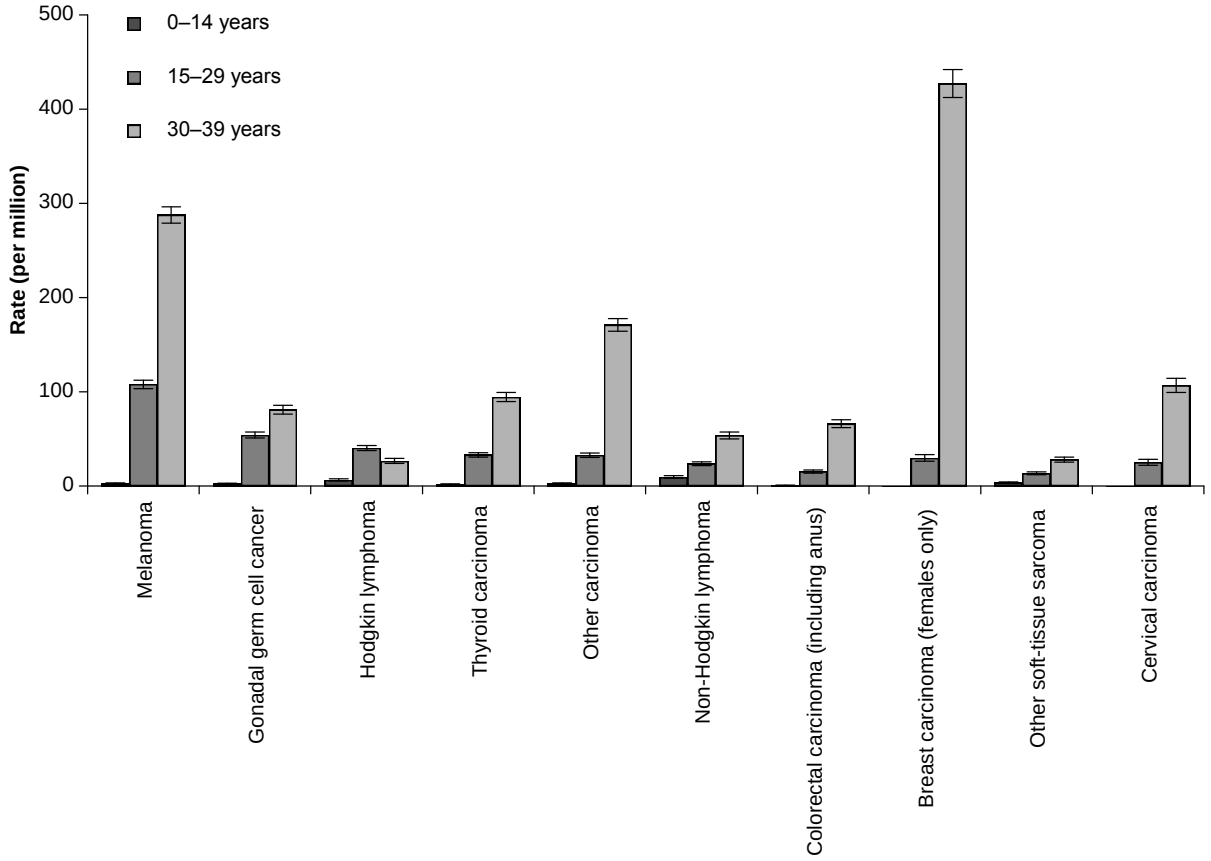
How does cancer in adolescents and young adults compare with that in other age groups?

In this section, the pattern of cancers in adolescents and young adults aged 15–29 is compared with that for two other age groups: children aged 0–14 and older adults aged 30–39.

In the period 2003–2007, cancers in adolescents and young adults made up 1.7% of all cancers registered in Australia. This was higher than the corresponding figure for children (0.6%) and lower than that for older adults (3.5%). The age-standardised incidence of all cancers combined increased steeply with age across these three age groups. Incidence for children was 145 per million, increasing to 419 for adolescents and young adults, and to 1,195 for older adults.

Figure 2.3 shows the age-standardised incidence rates for the 10 most common cancers in adolescents and young adults, compared with that for other age groups. The age-standardised rate for most of these cancers increased between childhood and older adulthood—in particular, for carcinomas and melanoma. Notably, the incidence of breast carcinoma was 14 times that of older adults (427 per million) compared with that for adolescents and young adults (30 per million), but had a rate of zero cases in children. Similarly, the incidence of melanoma rose sharply from 2.3 cases per million in children to 287 cases per million in older adults.

In contrast, Hodgkin lymphoma had the highest incidence in adolescents and young adults (40 cases per million), increasing from 6.3 cases per million in children but decreasing to 26 cases per million in older adults.



Notes

1. Rates are age standardised to the Australian population as at 30 June 2001 and expressed per million. The rates are based on the total number of cases over the 5-year period.
2. Data for this figure are presented in Appendix Table E2.3.

Source: AIHW Australian Cancer Database 2007.

Figure 2.3: Incidence of selected cancers by age group, 0–39-year-olds, Australia, 2003–2007

Tables 2.2 to 2.4 show incidence for subgroups of leukaemia, lymphoma and germ cell cancer for children, adolescents and young adults, and older adults.

Table 2.2 presents data for subgroups of leukaemia. The incidence rate of acute lymphoid leukaemia decreased 8-fold from children to older adults, whereas the incidence of acute myeloid leukaemia showed the opposite pattern: it almost doubled across the same age groups. The incidence of these two leukaemia subgroups crossed over during adolescence and young adulthood, at which point the incidence rates were the same (10 per million).

Table 2.2: Incidence of leukaemia subgroups by age group, 0–39-year-olds, Australia, 2003–2007

	Age group					
	0–14 years		15–29 years		30–39 years	
Leukaemia subgroup	% of all leukaemias	ASR[(a)]	% of all leukaemias	ASR[(a)]	% of all leukaemias	ASR[(a)]
Acute lymphoid leukaemia	80.0	42.7	38.1	9.7	15.2	5.4
Acute myeloid leukaemia	15.5	8.3	39.4	10.0	45.1	16.0
Other leukaemia	4.5	2.4	22.6	5.8	39.7	14.1

(a) Rates are age standardised to the Australian population as at 30 June 2001 and expressed per million. The rates are based on the total number of cases over the 5-year period.

Source: AIHW Australian Cancer Database 2007.

Table 2.3 shows incidence rates for the two subgroups of lymphoma: non-Hodgkin lymphoma and Hodgkin lymphoma. The incidence of non-Hodgkin lymphoma increased markedly with age, with the rate for adolescents and young adults more than 2 times that for children and the rate of older adults almost 6 times that for children. Meanwhile, the incidence rate of Hodgkin lymphoma was highest in adolescents and young adults, at 40 per million.

Table 2.3: Incidence of lymphoma subgroups by age group, 0–39-year-olds, Australia, 2003–2007

	Age group					
	0–14 years		15–29 years		30–39 years	
Lymphoma subgroup	% of all lymphomas	ASR[(a)]	% of all lymphomas	ASR[(a)]	% of all lymphomas	ASR[(a)]
Non-Hodgkin lymphoma	59.5	9.3	36.7	23.4	67.0	53.4
Hodgkin lymphoma	40.5	6.3	63.3	40.1	33.0	26.3

(a) Rates are age standardised to the Australian population as at 30 June 2001 and expressed per million. The rates are based on the total number of cases over the 5-year period.

Source: AIHW Australian Cancer Database 2007.

Table 2.4 presents data for subgroups of germ cell cancer and, in particular, the dramatic increase in incidence of gonadal germ cell cancers with age. Rates increased from 2.2 per million in children to 54 per million in adolescents and young adults, and to 81 per million in older adults: an overall increase of around 40-fold. This steep age-related increase in gonadal germ cell cancers has also been observed in other countries, and is believed to be due to a sharp increase in testicular germ cell cancers (Bleyer & Barr 2007). Meanwhile, non-gonadal germ cell cancer had a relatively low incidence rate and did not differ significantly across the three age groups.

Table 2.4: Incidence of germ cell cancer subgroups by age group, 0–39-year-olds, Australia, 2003–2007

	Age group					
	0–14 years		15–29 years		30–39 years	
Germ cell cancer subgroup	% of all germ cell cancers	ASR[(a)]	% of all germ cell cancers	ASR[(a)]	% of all germ cell cancers	ASR[(a)]
Gonadal	40.7	2.2	92.0	53.8	96.0	80.7
Non-gonadal	59.3	3.2	8.0	4.6	4.0	3.3

(a) Rates are age standardised to the Australian population as at 30 June 2001 and expressed per million. The rates are based on the total number of cases over the 5-year period.

Source: AIHW Australian Cancer Database 2007.

Detailed information on the incidence of other cancer subgroups by age can be found in Appendix Table E2.3.

Has cancer incidence changed over time?

Joinpoint statistical methodology (Kim et al. 2000) was used to examine trends in incidence for major cancer groups as well as all cancers between 1983 and 2007. A joinpoint regression model describes changing trends over successive periods of time and the amount of change within each period. An upward trend suggests an ongoing increase in the rates from year to year; correspondingly, a downward trend suggests an ongoing decrease and the absence of a trend, no change. Further information about joinpoint statistical methodology can be found in Appendix C.

The incidence rate of all cancers in adolescents and young adults showed an upward trend between 1983 and 1996, increasing by 1.5% each year. After this, rates showed a possible decline to 2007 (although this downward trend was not statistically significant).

Figure 2.4 shows trends in age-standardised incidence rates for adolescents and young adults for the 10 most common cancers between 1983 and 2007. There was an ongoing upward trend in incidence between 1983 and 2007 for four cancers: 3.2% per year for thyroid carcinoma, 2.1% for Hodgkin lymphoma, 2.0% for gonadal germ cell cancer, and 0.6% for breast carcinoma. In contrast, there was an ongoing downward trend in incidence for cervical carcinoma, which decreased by 2.6% per year between 1983 and 2007.

Other cancer types showed changing trends over the period of interest. Melanoma showed no statistically significant trend until 1997, after which the rate decreased by 3.6% per year. Colorectal carcinoma showed no significant trend until 1992, after which incidence increased by 5.8% per year. 'Other carcinoma' increased significantly by 2.0% per year until 1997, after which they decreased by 2.6% per year. Non-Hodgkin lymphoma increased by 4.4% per year until 1995, after which there was no significant trend in the incidence. The greatest change in incidence was observed for 'other soft-tissue sarcomas', which increased by 14% per year until 1989, before falling by 2.9% per year thereafter.

Further information on incidence trends by cancer types, including comparisons with children aged 0–14 and older adults aged 30–39, can be found in Appendix Table E2.4.

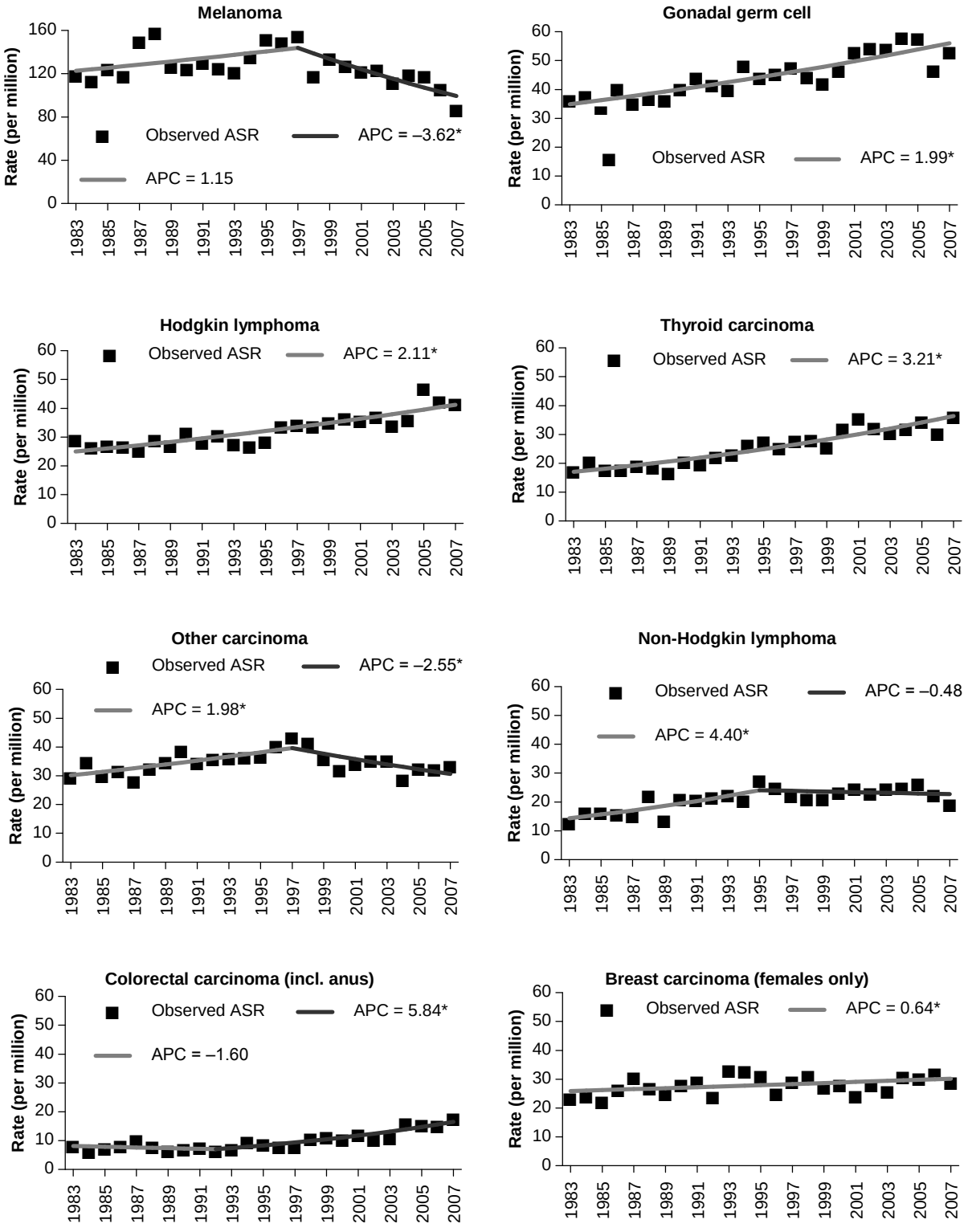
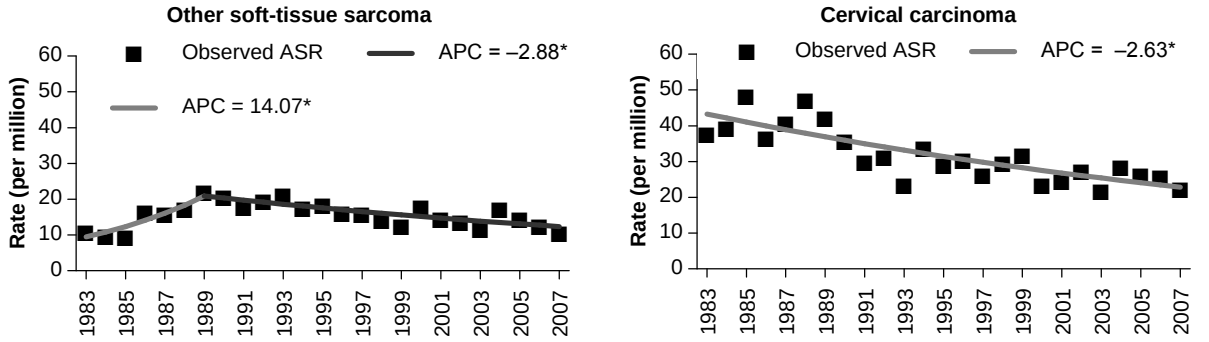


Figure 2.4: Trends in the incidence of the 10 most common cancers, 15–29-year-olds, Australia, 1983–2007

(continued)



Notes

1. APC = Annual percentage change. An asterisk (*) indicates that the APC is statistically significant.
2. Note the difference in the scale of the *y*-axis between cancer types.
3. Rates are age standardised to the Australian population as at 30 June 2001 and expressed per million.
4. Data for this figure are presented in Appendix Table E2.4.

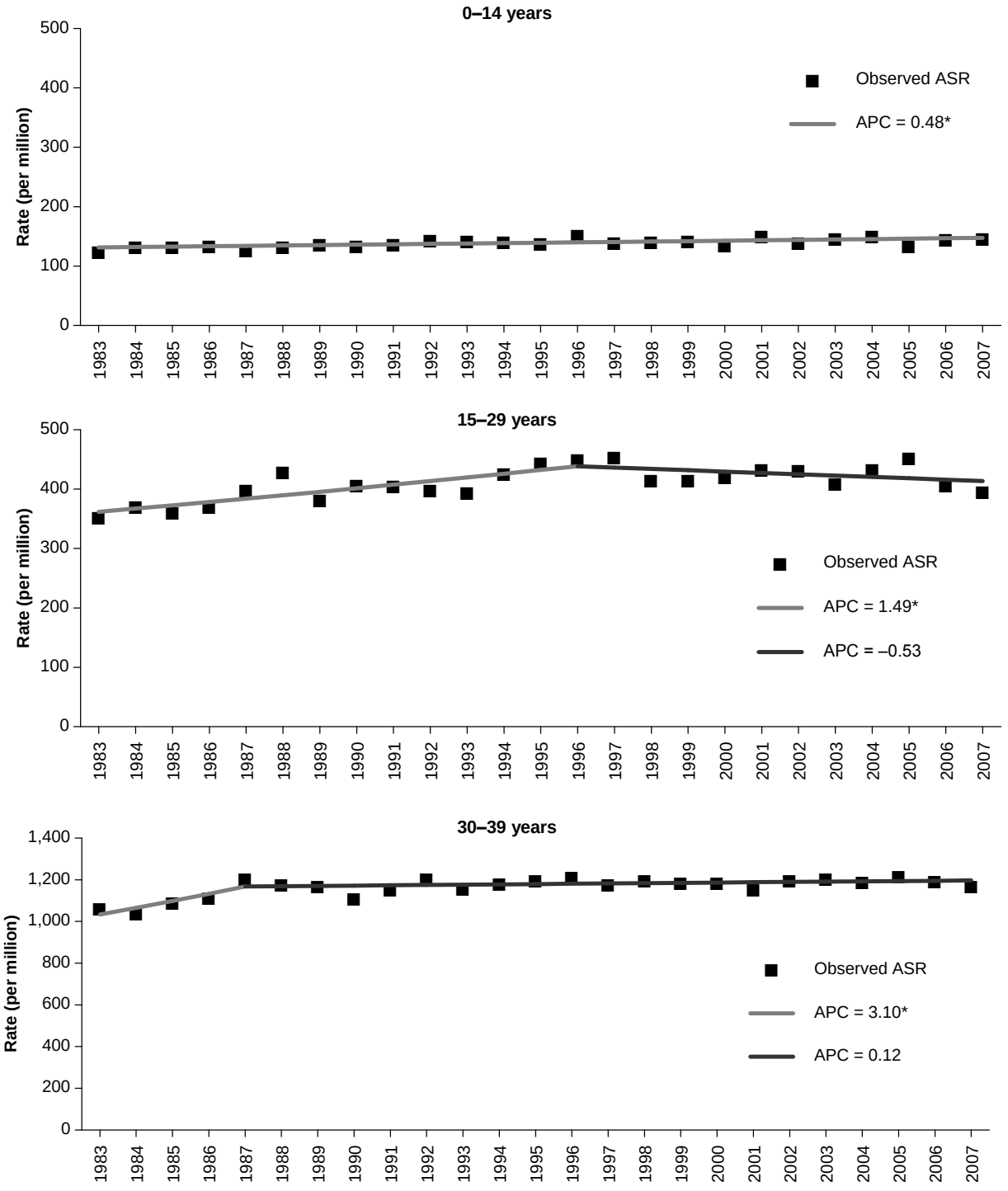
Source: AIHW Australian Cancer Database 2007.

Figure 2.4 (continued): Trends in the incidence of the 10 most common cancers, 15–29-year-olds, Australia, 1983–2007

How do trends for adolescents and young adults compare with those for other age groups?

In this section, trends in the incidence rate of all cancers in adolescents and young adults aged 15–29 are compared with those for two other age groups: children aged 0–14 and older adults aged 30–39.

Figure 2.5 shows that cancer trends in adolescents and young adults differed from those in other age groups. Incidence for all cancers in children aged 0–14 showed an upward trend for the entire period between 1983 and 2007, increasing by 0.5% per year. Meanwhile, incidence of all cancers for older adults aged 30–39 showed a steep upward trend between 1983 and 1987, increasing by 3.1% per year, before slowing down to 0.1% per year from 1987 onwards (the latter upward trend was not statistically significant).



Notes

1. APC = Annual percentage change. An asterisk (*) indicates that the APC is statistically significant.
2. Note the difference in the scale of the *y*-axis between age groups.
3. Rates are age standardised to the Australian population as at 30 June 2001 and expressed per million.
4. Data for this figure are presented in Appendix Table E2.4.

Source: AIHW Australian Cancer Database 2007.

Figure 2.5: Trends in the incidence of all cancers by age group, 0–39-year-olds, Australia, 1983–2007

Does cancer incidence differ across population groups?

In this section, incidence of all cancers is compared by remoteness area and socioeconomic status. In order to take into account differences in the age structures and the sizes of the groups being compared, age-standardised rates are provided for each comparison.

A number of different factors may contribute to variations in incidence across different population groups, including:

- population characteristics
- the prevalence of risk factors
- the availability of diagnostic services.

Does incidence differ by remoteness?

To compare incidence rates by remoteness of the area in which adolescents and young adults lived at the time of diagnosis, the Australian Standard Geographical Classification (ABS 2001) was used to assign areas across Australia to *Major cities* and outside *Major cities*. Further information about this classification is provided in Appendix B.

Figure 2.6 shows that, in the period 2003–2007, adolescents and young adults living outside *Major cities* had a significantly higher incidence of all cancers than their counterparts in *Major cities*. Specifically, adolescents and young adults outside *Major cities* were 1.1 times more likely than their city counterparts to be diagnosed with any cancer (444 per million compared with 409).

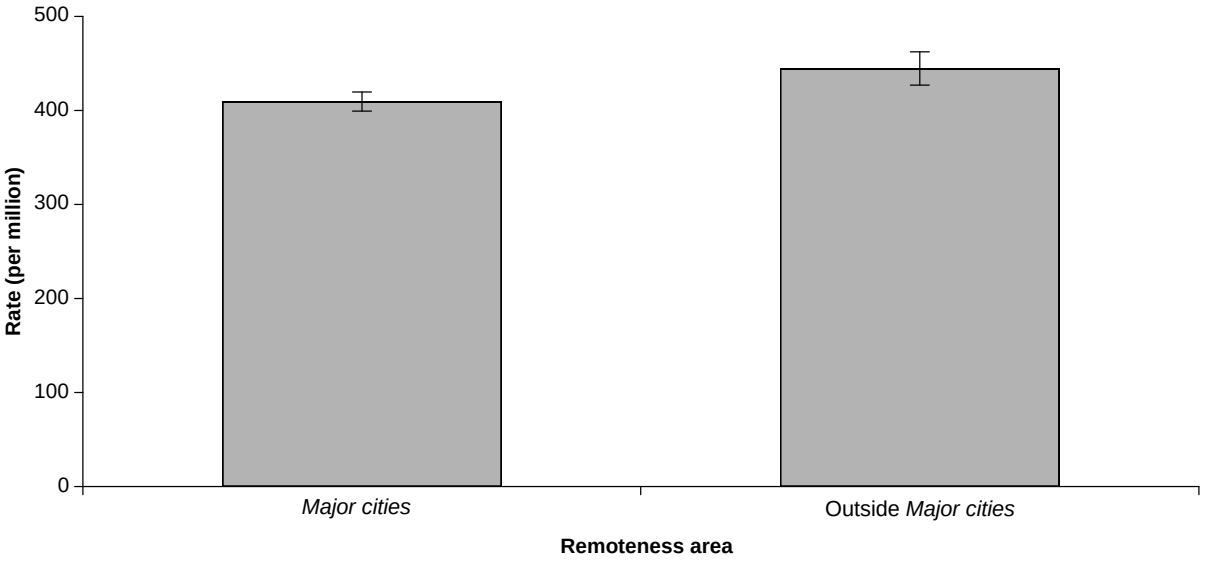
Information on the incidence of major cancer groups by remoteness area is provided in Appendix Table E2.5.

Does incidence differ by socioeconomic status?

The Index of Relative Socio-economic Disadvantage (IRSD) (ABS 2008) was used to classify areas according to socioeconomic disadvantage. The first group (labelled '1') corresponded to geographical areas containing the 20% of the population with the lowest socioeconomic status according to the IRSD; the fifth group corresponded to the 20% of the population with the highest socioeconomic status. This socioeconomic status measure pertains to the characteristics of people in the area in which the adolescents and young adults lived, rather than to the characteristics of the individual. Further information about this classification is provided in Appendix B.

In the period 2003–2007, incidence in adolescents and young adults did not show any significant differences by socioeconomic status for all cancers (see Appendix Table E2.6).

Information on the incidence of major cancer groups by socioeconomic status is provided in Appendix Table E2.6.



Notes

1. Remoteness is classified according to the Australian Standard Geographical Classification (ASGC; see Appendix B).
2. Rates are age standardised to the Australian population as at 30 June 2001 and expressed per million. The rates are based on the total number of cases over the 5-year period.
3. Data for this figure are presented in Appendix Table E2.5.

Source: AIHW Australian Cancer Database 2007.

Figure 2.6: Incidence by remoteness area for all cancers, 15–29-year-olds, Australia, 2003–2007

3 Survival from cancer

Key findings

In the period 2004–2010:

- 1-year relative survival for adolescents and young adults diagnosed with cancer was 95% and 5-year relative survival was 88%
- relative survival was highest for adolescents and young adults with thyroid carcinoma, gonadal germ cell cancer, Hodgkin lymphoma and melanoma
- there was no statistically significant association between relative survival from all cancers and remoteness
- adolescents and young adults with cancer in areas of the highest socioeconomic status had significantly higher survival than their counterparts in areas of the lowest socioeconomic status.

Between 1983–1989 and 2004–2010:

- 5-year relative survival from all cancers increased significantly from 80% to 88% in adolescents and young adults
- there were significant increases in 5-year relative survival for many cancers, with the biggest increase for leukaemias.

Introduction

Survival estimates show the probability that people with cancer will still be alive at a specified point in time (such as 1 or 5 years after diagnosis). Information on the survival of adolescents and young adults diagnosed with cancer provides not only an indication of the prognosis of cancer but also the success of cancer control programs as well as treatments available.

Survival is influenced by many factors, including the characteristics of those diagnosed with cancer (for instance, age, sex, additional diagnoses and lifestyle); the nature of the tumours (for example, stage at diagnosis and histology type); and the health-care system (for instance, screening, diagnostic and treatment facilities, as well as follow-up services) (Black et al. 1998; WCRF & AICR 2007).

Since survival estimates are based on the outcomes of a group of people with a diverse mix of cancer and other characteristics, they provide an indication of the average survival experience. They do not reflect an individual's chance of surviving cancer, which is affected by a range of factors such as the specific characteristics of the individual, the cancer they have and the treatments received. A doctor is the best source of information about an individual's survival prospects.

In this chapter, relative survival estimates for adolescents and young adults with cancer in the period 2004–2010 are described and compared with those for children and older adults. Trends in relative survival between 1983–1989 and 2004–2010 are examined and differences by remoteness area and socioeconomic status are also presented.

How is survival calculated?

Most commonly, 'relative survival' statistics are used to examine survival from cancer. These estimates are derived by comparing the survival of people diagnosed with cancer (that is, observed survival) with that experienced by people in the general population, matched for age and sex in the same calendar year (that is, expected survival). An estimate of less than 100% suggests that those with cancer had a lower chance of survival than the general population. For example, 5-year relative survival of 50% for people diagnosed with a particular type of cancer means that these people had half the chance of surviving 5 years after diagnosis relative to comparable people in the general population.

In this report, the period method developed by Brenner and Gefeller (1996) was used to calculate relative survival estimates. The period method examines the survival experience of people during a particular at-risk period and who were diagnosed with cancer before this period (see Appendix C for further information).

The survival estimates shown in this report are based on records of cancers diagnosed between 1983 and 2007, and followed for deaths up to the end of 2010 as held in the Australian Cancer Database. Similar to the incidence chapter, the cancer classification used for survival was based on the Surveillance, Epidemiology and End Results (SEER) adolescent and young adult site recode (see Chapter 1 for further details).

What was the prospect of survival for adolescents and young adults with cancer?

In the period 2004–2010, 1-year relative survival for adolescents and young adults with cancer was 95% (Table 3.1). The corresponding 5-year relative survival was somewhat lower at 88%. In other words, adolescents and young adults with cancer were 88% as likely as their counterparts in the general population to live 5 years after their diagnosis.

Table 3.1: Relative survival from all cancers, 15–29-year-olds, Australia, 2004–2010

Survival duration	Relative survival (%)	95% confidence interval
1-year	95.1	94.6–95.5
5-year	87.8	87.2–88.5

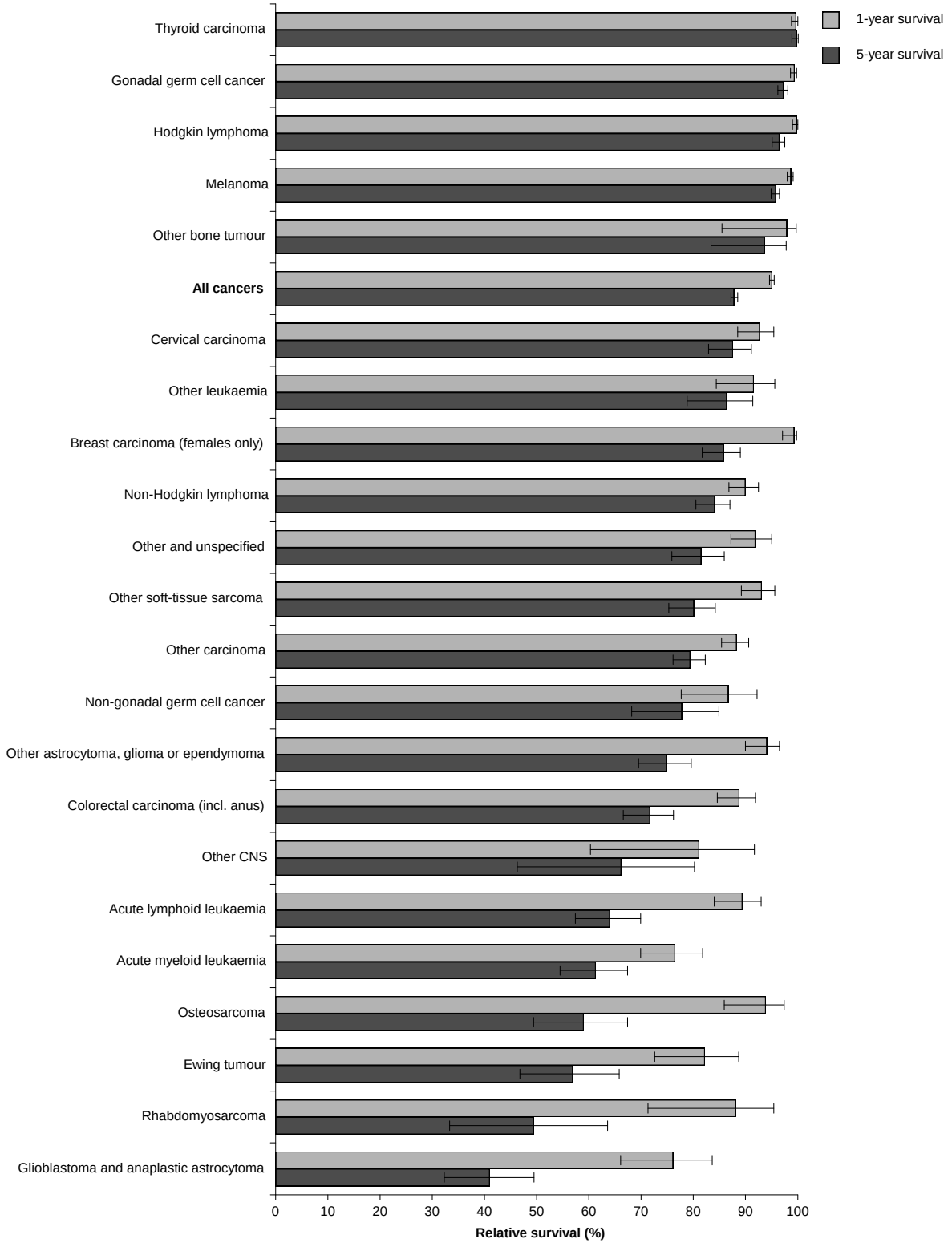
Source: AIHW Australian Cancer Database 2007.

Which cancers had the highest and lowest survival?

In adolescents and young adults, the cancers that were the most common also tended to have the highest survival, contributing towards the relatively high cancer survival in this age group overall.

In the period 2004–2010, 5-year relative survival was highest for adolescent and young adults with thyroid carcinoma (almost 100%), followed closely by gonadal germ cell cancer (97%), Hodgkin lymphoma (97%) and melanoma (96%) (Figure 3.1). These cancers, in addition to breast cancer in females, also had the highest survival at 1 year after diagnosis at 99% or higher.

The lowest 5-year relative survival was observed for glioblastoma and anaplastic astrocytoma (types of central nervous system cancer; relative survival of 41%) and rhabdomyosarcoma (a type of soft-tissue sarcoma; relative survival of 49%). At 1 year after diagnosis, survival from glioblastoma and anaplastic astrocytoma was also the lowest (76%), followed by acute myeloid leukaemia (77%).



Notes

1. Data for supratentorial PNET and medulloblastoma are not shown due to small numbers.

2. Data for this figure are presented in Appendix Table E3.1.

Source: AIHW Australian Cancer Database 2007.

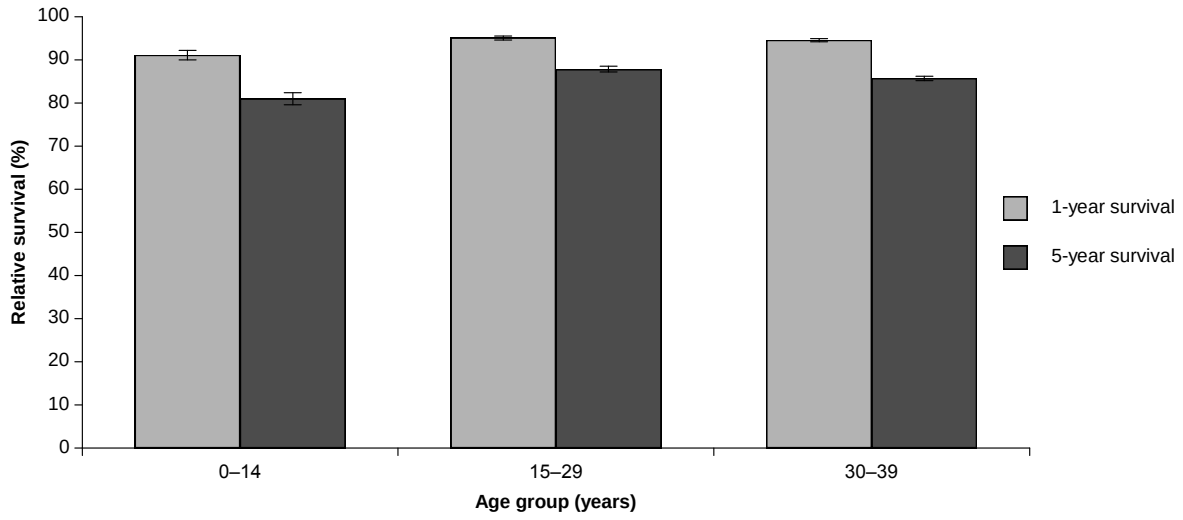
Figure 3.1: Relative survival by cancer type, 15–29-year-olds, Australia, 2004–2010

How does cancer survival in adolescents and young adults compare with that in other age groups?

In this section, survival from cancer for adolescents and young adults aged 15–29 is compared with that for two other age groups: children aged 0–14 and older adults aged 30–39.

One-year relative survival from all cancers for adolescents and young adults (95.1%) was significantly higher than that for children (91%) but very close to that for older adults (94.6%) (Figure 3.2).

These differences became more apparent by 5 years after diagnosis, where relative survival for adolescents and young adults (88%) was highest of all three age groups, followed by older adults (86%) and then by children (81%).



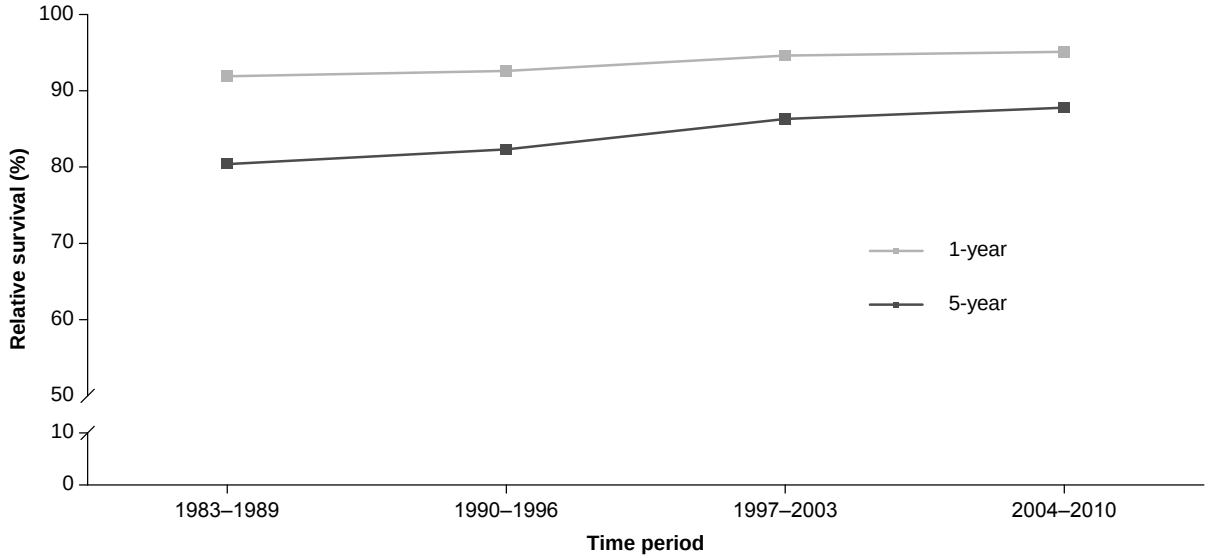
Note: Data for this figure are presented in Appendix tables E3.1–E3.3.

Source: AIHW Australian Cancer Database 2007.

Figure 3.2: Relative survival from all cancers by age group, 0–39-year-olds, Australia, 2004–2010

Has survival from cancer changed over time?

Survival for adolescents and young adults diagnosed with cancer increased between 1983–1989 and 2004–2010 (Figure 3.3). Specifically, 1-year relative survival rose significantly from 92% to 95% and 5-year relative survival increased significantly from 80% to 88%. However, much of this improvement occurred between 1983–1989 and 1997–2003, rather than in the later time period.



Note: Data for this figure are presented in Appendix Table E3.1.

Source: AIHW Australian Cancer Database 2007.

Figure 3.3: Trends in relative survival from all cancers, 15–29-year-olds, Australia, 1983–1989 to 2004–2010

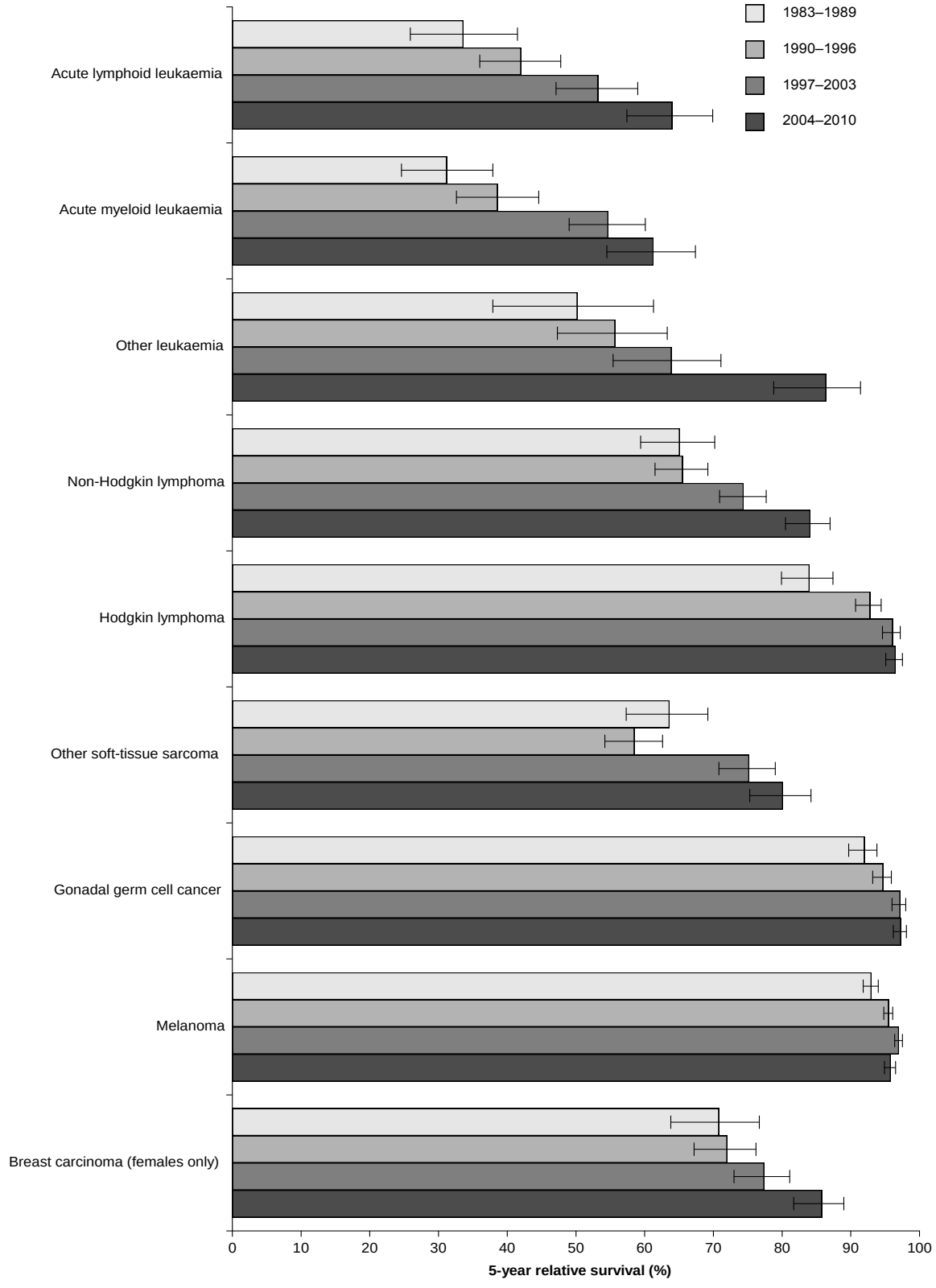
Which cancers showed an improvement in survival over time?

Between 1983–1989 and 2004–2010, a significant improvement in 5-year relative survival for adolescents and young adults was observed for many cancers, including acute lymphoid leukaemia, acute myeloid leukaemia, 'other leukaemia', non-Hodgkin lymphoma, Hodgkin lymphoma, 'other soft-tissue sarcoma', gonadal germ cell cancer, melanoma, and breast carcinoma (Figure 3.4).

The greatest gains in survival were observed for all three types of leukaemia, with the majority of the increase taking place from 1990–1996 onwards. Five-year relative survival from acute lymphoid leukaemia increased from 34% to 64% between 1983–1989 and 2004–2010. Similarly, relative survival from acute myeloid leukaemia increased from 31% to 61% during the same period.

Other cancers showed little change in survival over time, but no cancers showed a significant decrease in survival between 1983–1989 and 2004–2010.

Time trends in 1- and 5-year relative survival estimates by cancer groups are provided in Appendix Table E3.1.



Note: Data for this figure are presented in Appendix Table E3.1.

Source: AIHW Australian Cancer Database 2007.

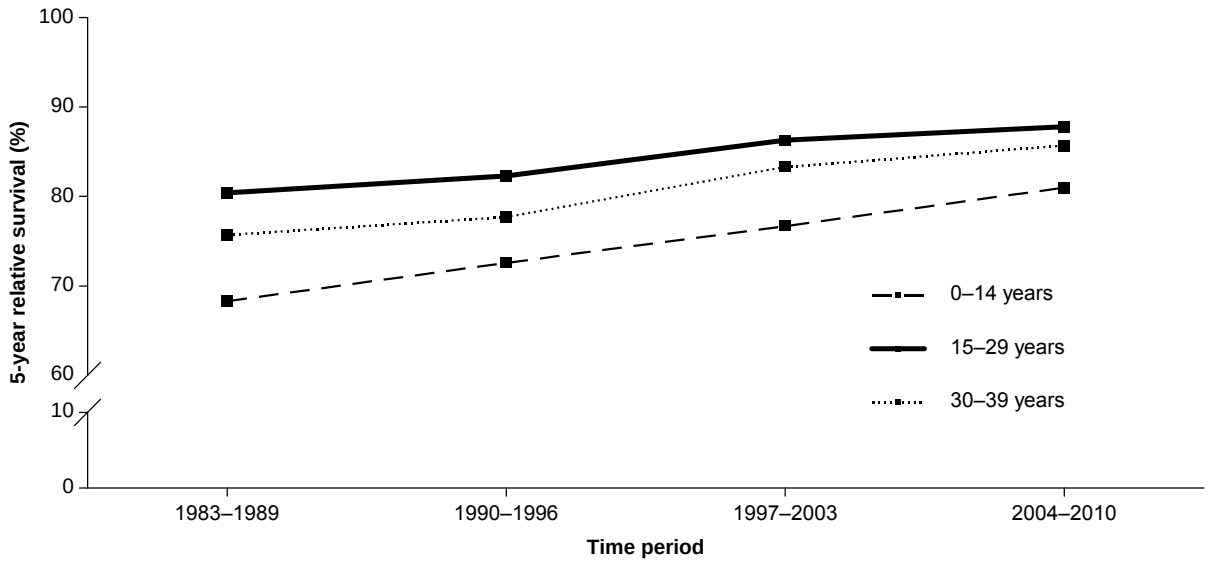
Figure 3.4: Trends in 5-year relative survival by selected cancer type, 15–29-year-olds, Australia, 1983–1989 to 2004–2010

How do trends in survival for adolescents and young adults compare with those for other age groups?

Five-year relative survival for all cancers is presented in Figure 3.5 from 1983–1989 to 2004–2010 for adolescents and young adults aged 15–29, children aged 0–14, and older adults aged 30–39.

During every time period, 5-year relative survival for adolescents and young adults was significantly higher than that for children and older adults.

While survival improved for all three age groups between 1983–1989 and 2004–2010, greater gains in survival were observed for children and older adults than for adolescents and young adults. That is, the 5-year relative survival for adolescents and young adults increased significantly from 80% to 88%, while the corresponding improvement for children was 68% to 81%, and 76% to 86% for older adults.



Note: Data for this figure are presented in Appendix tables E3.1–E3.3.

Source: AIHW Australian Cancer Database 2007.

Figure 3.5: Trends in 5-year relative survival from all cancers by age group, 0–39-year-olds, Australia, 1983–1989 to 2004–2010

Does cancer survival differ across population groups?

In this section of the report, 1- and 5-year relative survival from all cancers for adolescents and young adults are compared by remoteness area and socioeconomic status.

Does survival differ by remoteness?

One- and 5-year relative survival were analysed according to level of remoteness of the area in which adolescents or young adults lived at diagnosis. The Australian Standard

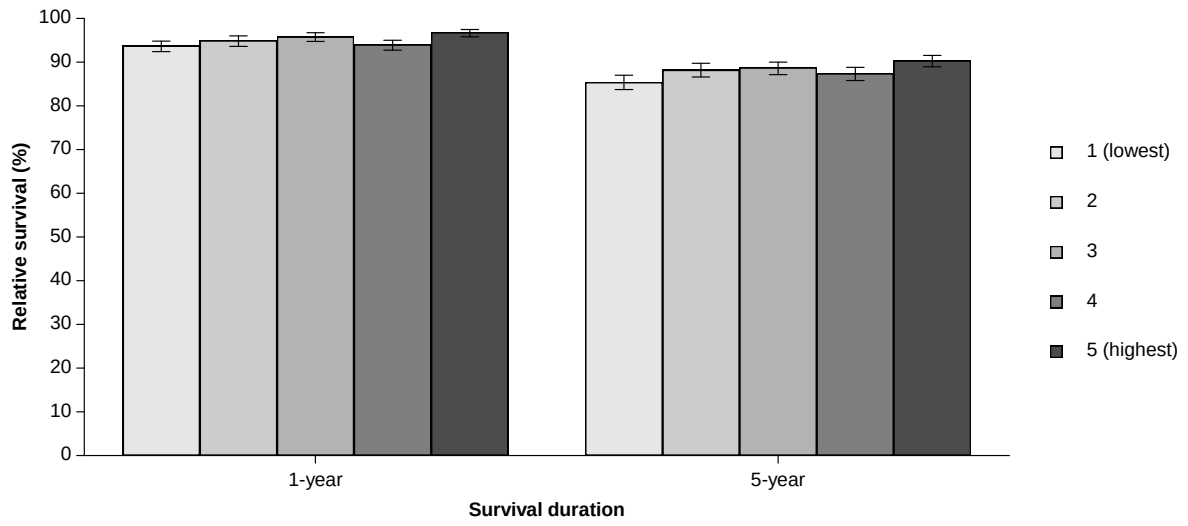
Geographical Classification (ABS 2001) was used to categorise areas of Australia. Further information about this classification is provided in Appendix B.

In the period 2004–2010, both 1- and 5-year relative survival from all cancers for adolescents and young adults living outside *Major cities* were not significantly different from those of their city counterparts (Appendix Table E3.4).

Does survival differ by socioeconomic status?

The Index of Relative Socio-economic Disadvantage (IRSD) (ABS 2008) was used to classify areas according to socioeconomic disadvantage. This measure of socioeconomic status pertains to the characteristics of people in the area in which the adolescents and young adults lived, rather than to the characteristics of the individual. Further information about this classification is provided in Appendix B.

In the period 2004–2010, adolescents and young adults living in areas with the highest socioeconomic status had significantly higher relative survival (97% at 1 year after diagnosis, 90% at 5 years after diagnosis) from all cancers than those living in areas with the lowest socioeconomic status (94% at 1 year, 85% at 5 years) (Figure 3.6).



Notes

1. Socioeconomic status is classified using the ABS Socio-Economic Indexes for Areas (SEIFA) Index of Relative Socio-economic Disadvantage (see Appendix B).
2. Data for this figure are presented in Appendix Table E3.5.

Source: AIHW Australian Cancer Database 2007.

Figure 3.6: Relative survival from all cancers by socioeconomic status, 15–29-year-olds, Australia, 2004–2010

4 Mortality from cancer

Key findings

In the period 2003–2007:

- there were 1,018 cancer deaths in adolescents and young adults, comprising 9.2% of all deaths in this age group
- the age-standardised mortality rate was 48 deaths per million
- the leading causes of cancer death in adolescents and young adults were brain cancer, bone cancer and melanoma of the skin
- adolescents and young adults living outside *Major cities* were more likely to die from cancer than their city counterparts.

Between 1983 and 2007:

- cancer mortality in those aged 15–29 showed a decrease of 1.9% per year.

Introduction

In this report, mortality refers to deaths from cancer for which the underlying cause was a primary cancer. The cancer that led to the death may have been diagnosed before or in the same year in which the person died or, in some cases, after death (for example, at autopsy). Information on the underlying cause of death is derived from the medical certificate of cause of death, which is issued by a certified medical practitioner.

The number of deaths from cancer in a given period is influenced by the incidence of cancer, as well as by factors affecting the likelihood of fatality, such as the characteristics of the cancers diagnosed (for instance, stage at diagnosis and histological type of cancer) and the nature and quality of treatments received.

The main data source for this chapter was the National Mortality Database. Since mortality data in the National Mortality Database are coded according to the International Statistical Classification of Diseases and Related Health Problems (ICD), and not to the International Classification of Diseases for Oncology (ICD-O), mortality data cannot be provided for the groups used in the incidence and survival chapters. Instead the ICD-10 is used as the basis for reporting of mortality statistics (see Chapter 1 for further details).

This chapter presents mortality from cancer in adolescents and young adults in the period from 2003 to 2007, including differences by sex and 5-year age group within this broader age category, and comparisons with other age groups. Trends in age-standardised mortality rates from 1983 to 2007 and differences by remoteness area and socioeconomic status in the period from 2003 to 2007 are also presented.

How many adolescents and young adults died from cancer?

In the period 2003–2007, cancer was the second most common cause of death in adolescents and young adults aged 15–29, after injury and poisoning. A total of 1,018 deaths from cancer occurred in adolescents and young adults, comprising 9.2% of all deaths in this age group. Furthermore, deaths from cancer in adolescents and young adults accounted for 0.2% of all deaths in Australia and for 0.5% of all cancer deaths.

The age-standardised mortality rate from all cancers in adolescents and young adults was 48 deaths per million in the period 2003–2007.

Which cancers led to the most deaths?

Table 4.1 illustrates that among adolescents and young adults, brain cancer was the most common cause of cancer death in the period 2003–2007 (145 deaths). Bone cancers were the next most common cause of cancer death (107 deaths), followed by melanoma of the skin (91 deaths), acute lymphoblastic leukaemia (86 deaths) and acute myeloid leukaemia (77 deaths). Together, these five cancers made up 50% of all deaths from cancer in adolescents and young adults.

Further information on cancer causes of death is provided in Appendix tables E4.1 and E4.2.

Table 4.1: Mortality from the 10 most common causes of cancer death, 15–29-year-olds, Australia, 2003–2007

Cancer type/site (ICD-10)	No. of deaths	% of all cancer deaths	ASR[(a)]
Brain cancer (C71)	145	14.2	6.9
Bone cancer (C40, C41)	107	10.5	5.0
Melanoma of skin (C43)	91	8.9	4.4
Acute lymphoblastic leukaemia (C91.0)	86	8.4	4.0
Acute myeloid leukaemia (C92.0, C92.3–C92.5, C93.0, C94.0, C94.2, C94.4, C94.5)	77	7.6	3.6
Non-Hodgkin lymphoma (C82–C85)	71	7.0	3.4
Other soft-tissue cancer (C47, C49)	60	5.9	2.8
Bowel cancer (C18–C20)	46	4.5	2.2
Unknown primary site (C77–C80)	28	2.8	1.3
Hodgkin lymphoma (C81)	28	2.8	1.3
All cancers (C00–C97, D45, D46, D47.1, D47.3)	**1,018**	**100.0**	**48.4**

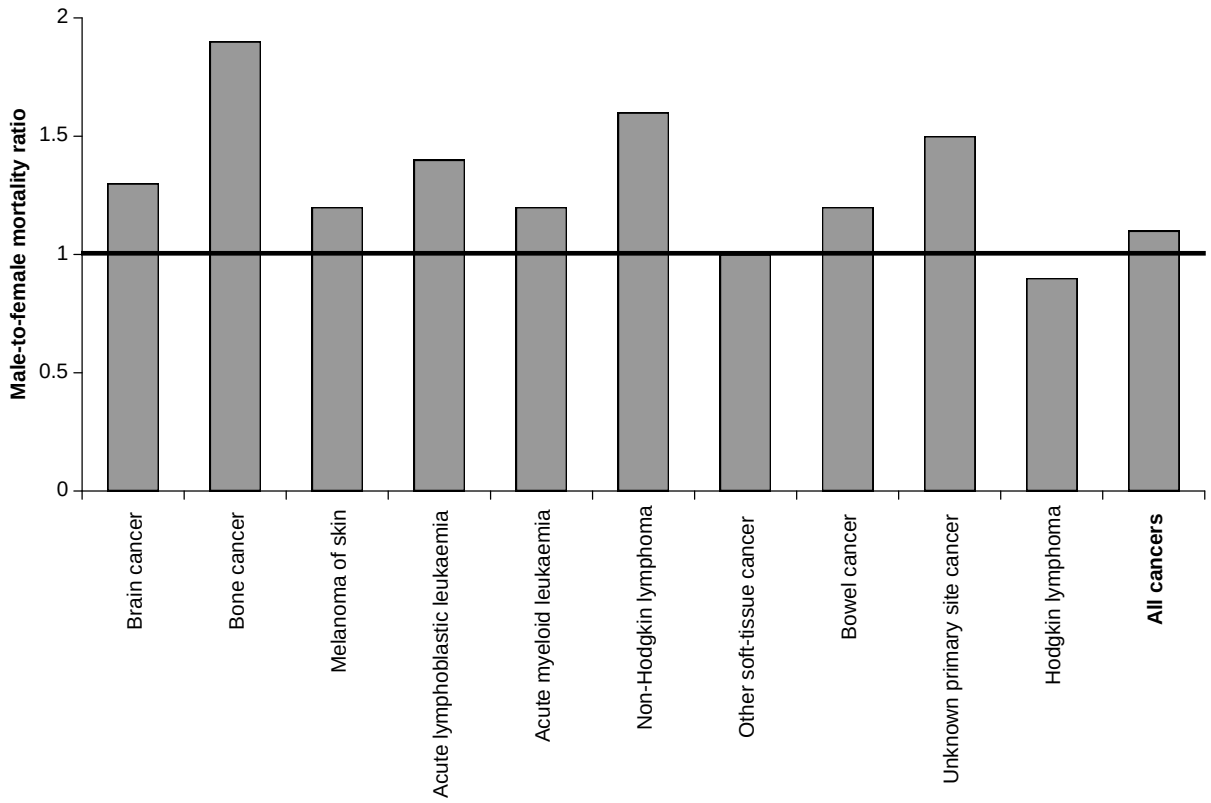
(a) Rates are age standardised to the Australian population as at 30 June 2001 and expressed per million. The rates are based on the total number of deaths over the 5-year period.

Source: AIHW National Mortality Database.

Does mortality differ by sex?

The male-to-female ratio is used to illustrate the relative risk of dying from cancer between the sexes, with ratios greater than 1 indicating an excess in males, and ratios less than 1 indicating an excess in females.

In the period 2003–2007, more males than females aged 15–29 died from cancer (a rate ratio of 1.1) (Figure 4.1). This also applied to the majority of individual cancers. The difference was particularly marked for bone cancer, with the mortality rate for males being 1.9 times the rate for females. In contrast, females were more likely than males to die from Hodgkin lymphoma (a rate ratio of 0.9).



Notes

1. Male-to-female ratio: age-standardised mortality rates for males divided by age-standardised mortality rates for females. Ratios greater than 1 indicate an excess in males and ratios less than 1 indicate an excess in females. Rates are age standardised to the Australian population as at 30 June 2001 and expressed per million males/females. The rates are based on the total number of deaths over the 5-year period.
2. Data for this figure are presented in Appendix Table E4.1.

Source: AIHW National Mortality Database.

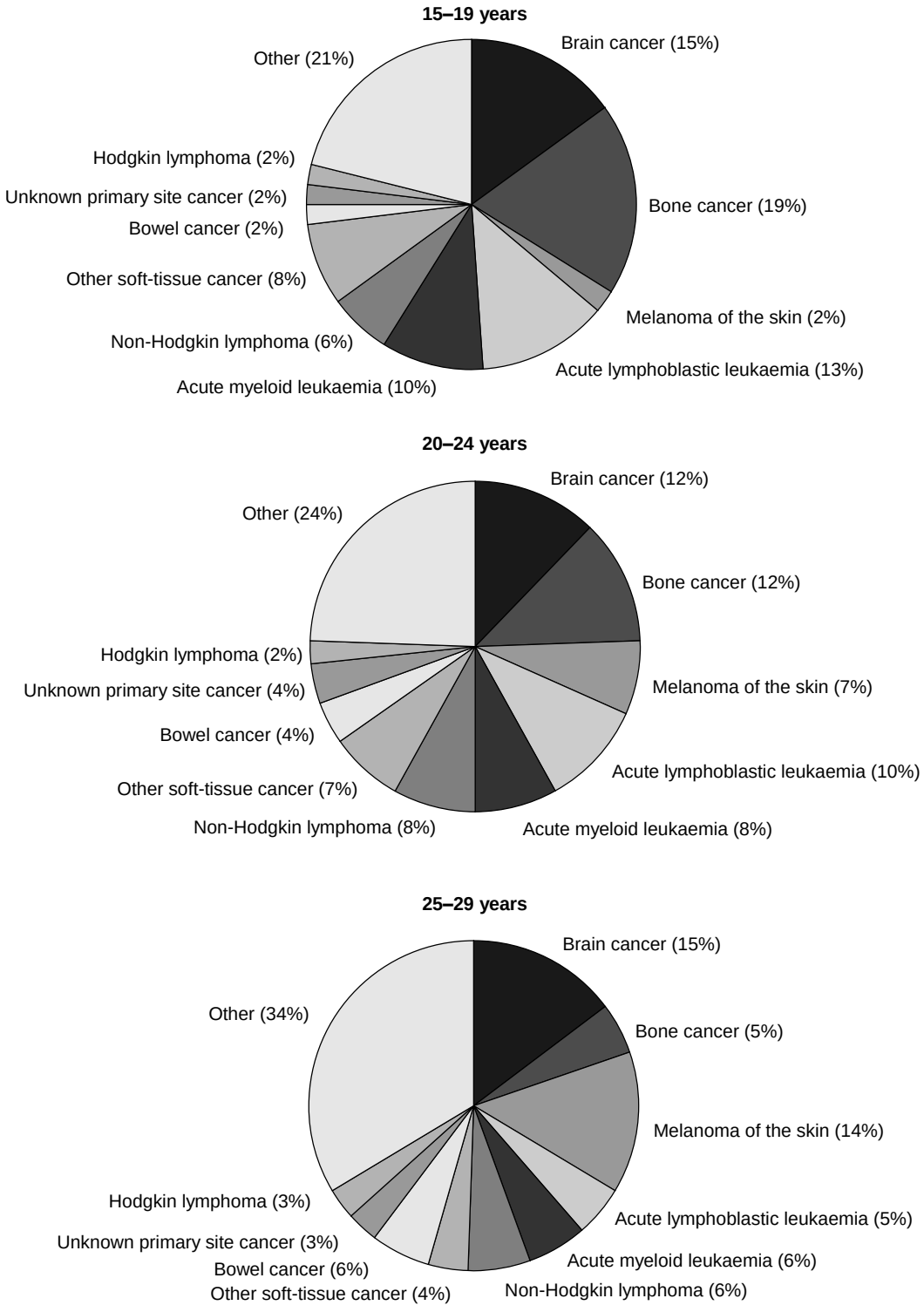
Figure 4.1: Relative risk of dying from cancer in males versus in females, 15–29-year-olds, Australia, 2003–2007

Does mortality differ with age?

Within the adolescent and young adult age group, the number of cancer deaths increased with age, with deaths in 25–29-year-olds making up 44% of all cancer deaths in this age group.

Figure 4.2 shows that between 15 and 29 years of age, the distribution of the most common causes of cancer death changed markedly with age. Deaths from cancers such as melanoma of the skin and bowel cancer contributed to a greater share of cancer deaths in the older age group. Namely, deaths due to melanoma of the skin accounted for 2.0% of all cancer deaths in those aged 15–19, 7.1% in those aged 20–24 and 14% in those aged 25–29. The mortality of 'other cancers' as a proportion of all cancer deaths also increased with age, particularly from 20–24 years to 25–29 years, suggesting an increasing range of cancer causes of death with age.

In contrast, the proportion of bone cancer deaths relative to all cancer deaths decreased from 19% in those aged 15–19 to 12% in those aged 20–24, and to 4.7% in those aged 25–29. The same pattern was seen for deaths from acute lymphoblastic leukaemia, acute myeloid leukaemia and other soft-tissue cancers.



Notes

1. Proportions may not sum to 100% due to rounding.
2. Data for this figure are presented in Appendix Table E4.1.

Source: AIHW National Mortality Database.

Figure 4.2: Proportional mortality of the leading causes of cancer death by 5-year age group, 15–29-year-olds, Australia, 2003–2007

Finally, mortality from non-Hodgkin lymphoma, cancer of unknown primary site, brain cancer and Hodgkin lymphoma relative to that of all cancer deaths showed only small differences across the 15–29-year age group.

How does cancer mortality in adolescents and young adults compare with that in other age groups?

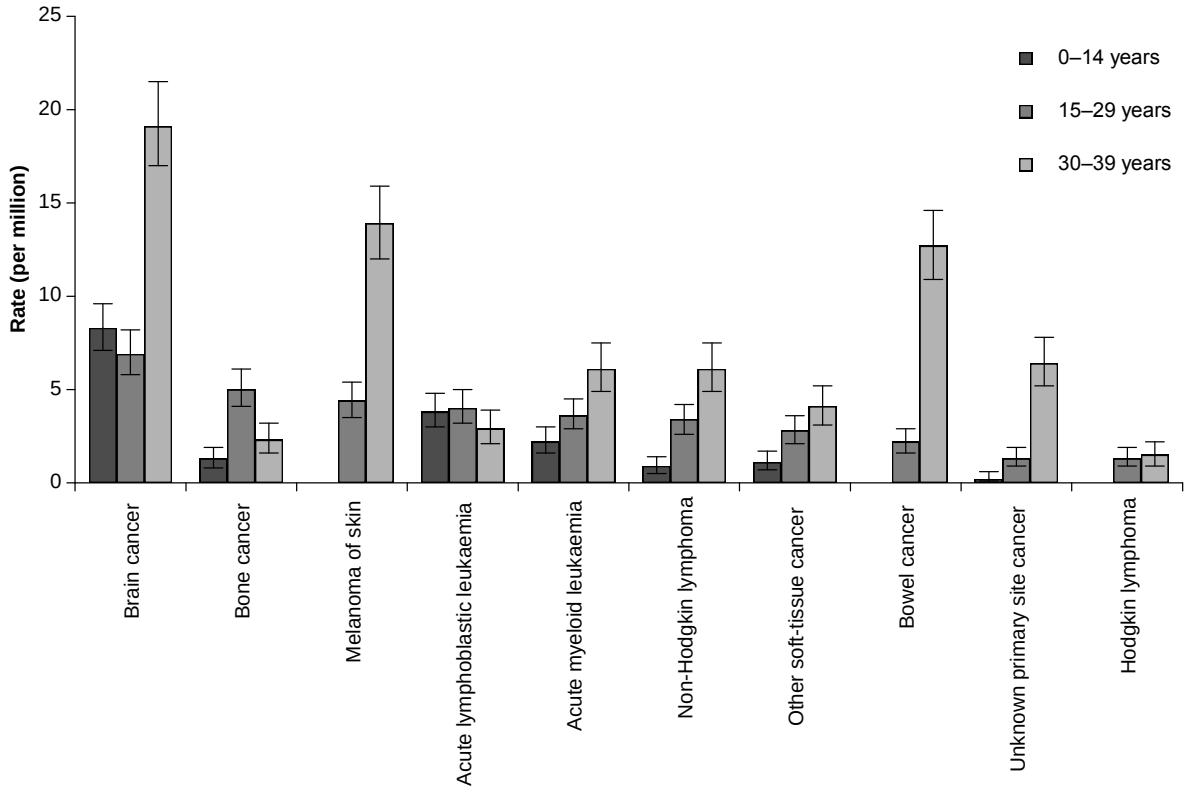
In this section, the pattern of cancer mortality for adolescents and young adults aged 15–29 is compared with that for two other age groups: children aged 0–14 and older adults aged 30–39.

In the period 2003–2007, 0.5% of all deaths from cancer in Australia occurred in adolescents and young adults. This was slightly higher than the corresponding figure for children (0.3%) and lower than that for older adults (1.2%).

The age-standardised mortality rate for all cancers increased sharply with age: the rate for adolescents and young adults (48 deaths per million) was almost 2 times that of children (25 per million) and the rate for older adults (157 per million) was more than 3 times that for adolescents and young adults.

Compared with children, adolescents and young adults had significantly higher mortality rates for many of the selected cancers (Figure 4.3). In particular, mortality from bone cancer and non-Hodgkin lymphoma was almost 4 times that of children. However, it should be noted that the actual number of deaths was small, particularly for younger age groups. Some of the top causes of cancer death in adolescents and young adults were responsible for very few or no deaths in children, including melanoma of the skin, bowel cancer, Hodgkin lymphoma and cancer of unknown primary site.

Compared with older adults, adolescents and young adults had significantly lower mortality rates for most of the selected cancers. In particular, mortality rates from bowel cancer and cancer of unknown primary site in older adults were respectively 6 and 5 times those for adolescents and young adults. Only mortality from bone cancer was significantly lower in older adults than in adolescents and young adults.



Notes

1. Rates are age standardised to the Australian population as at 30 June 2001 and expressed per million. The rates are based on the total number of deaths over the 5-year period.
2. Data for this figure are presented in Appendix Table E4.3.

Source: AIHW National Mortality Database.

Figure 4.3: Mortality from selected types of cancer by age group, 0–39-year-olds, Australia, 2003–2007

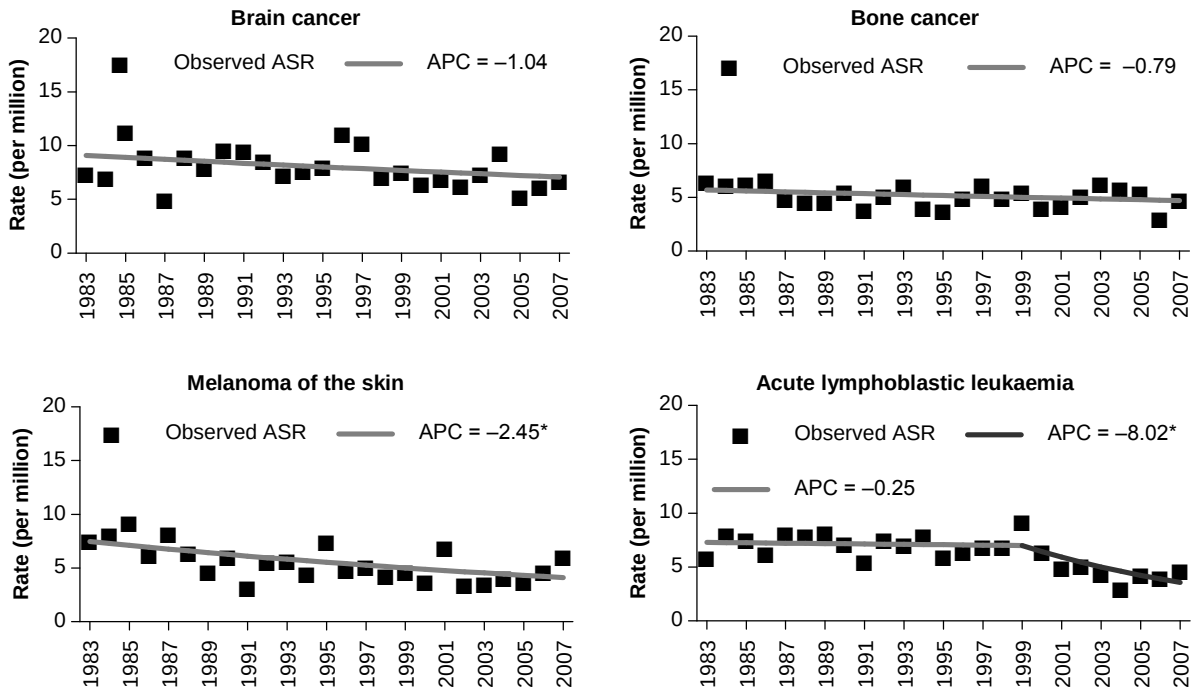
Has mortality from cancer changed over time?

Joinpoint statistical methodology (Kim et al. 2000) was used to examine trends in mortality from leading causes of cancer death and all cancers between 1983 and 2007. Further information about joinpoint statistical methodology can be found in Appendix C.

Cancer mortality in adolescents and young adults showed a downward trend during the entire 1983 to 2007 period, with rates decreasing by 1.9% per year.

Figure 4.4 shows mortality trends in adolescents and young adults between 1983 and 2007, for the top four causes of cancer death. Mortality from the two leading causes of cancer death—brain and bone cancer—showed no significant trend, with rates remaining unchanged for the entire period between 1983 and 2007. In contrast, mortality from melanoma of the skin decreased significantly by 2.5% per year for the entire period, while mortality from acute lymphoblastic leukaemia decreased by 8.0% per year from 1999 onwards.

Further information on mortality trends by cancer types, including comparisons with children aged 0–14 and older adults aged 30–39, can be found in Appendix Table E4.4.



Notes

1. APC = Annual percentage change. An asterisk (*) indicates that the APC is statistically significant.
2. Rates are age standardised to the Australian population as at 30 June 2001 and expressed per million.
3. Data for this figure are presented in Appendix Table E4.4.

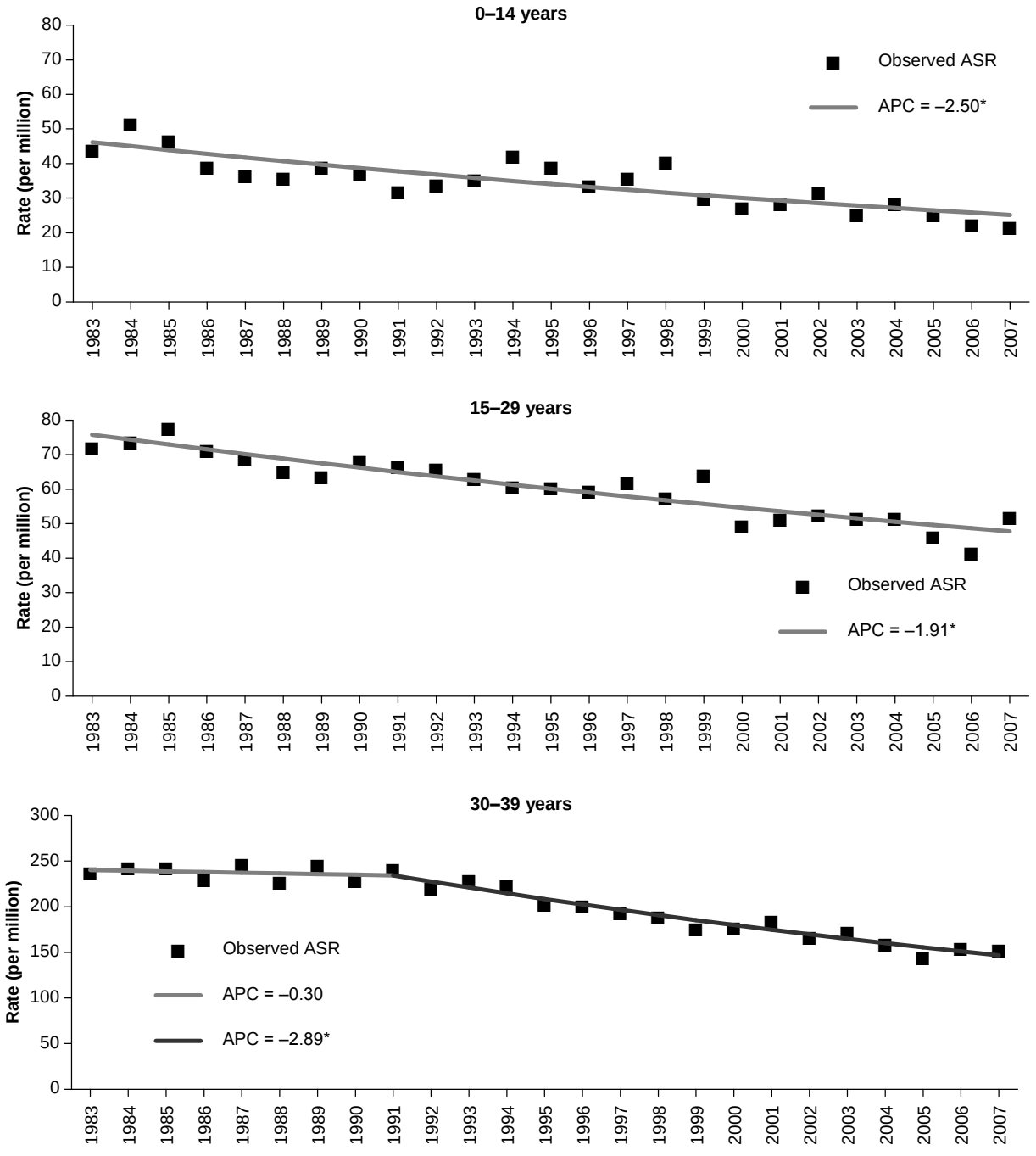
Source: AIHW National Mortality Database.

Figure 4.4: Trends in mortality from the four most common causes of cancer death, 15–29-year-olds, Australia, 1983–2007

How do mortality trends for adolescents and young adults compare with those of other age groups?

Figure 4.5 shows age-standardised mortality trends for all cancers between 1983 and 2007 for three age groups: 0–14-year-olds, 15–29-year-olds and 30–39-year-olds. Cancer mortality in adolescents and young adults showed a downward trend during the entire period, with rates decreasing by 1.9% per year. Likewise, cancer mortality in children showed a downward trend between 1983 and 2007, although the decline was sharper, with rates dropping by 2.5% per year. Mortality from all cancers in older adults showed no significant trend until 1991, after which rates fell by 2.9% per year—the steepest downward trend of all three age groups.

A study using data from the United States of America (Bleyer et al. 2006b) has also shown that the reduction in cancer mortality in adolescents and young adults has lagged behind that in children and older adults. The authors of this study suggest that this may be explained by fewer adolescents and young adults participating in clinical trials and being referred to dedicated, comprehensive cancer centres compared with patients in other age groups (Bleyer et al. 2006a).



Notes

1. APC = Annual percentage change. An asterisk (*) indicates that the APC is statistically significant.
2. Note the difference in the scale of the *y*-axis between age groups.
3. Rates are age standardised to the Australian population as at 30 June 2001 and expressed per million.
4. Data for this figure are presented in Appendix Table E4.4.

Source: AIHW National Mortality Database.

Figure 4.5: Trends in mortality from all cancers by age group, 0–39-year-olds, Australia, 1983–2007

Does mortality from cancer differ across population groups?

In this section, mortality from all cancers, as well as from the five leading causes of cancer death among adolescents and young adults, is compared by remoteness area and socioeconomic status. In order to take into account differences in the age structures and the sizes of the groups being compared, age-standardised rates are provided for each comparison.

A number of different factors may contribute towards variations in mortality across different population groups, including:

- differences in incidence rates of cancer
- the characteristics of the cancers diagnosed (for example, stage at diagnosis and type of tumour)
- access to and quality of treatment.

Does mortality differ by remoteness?

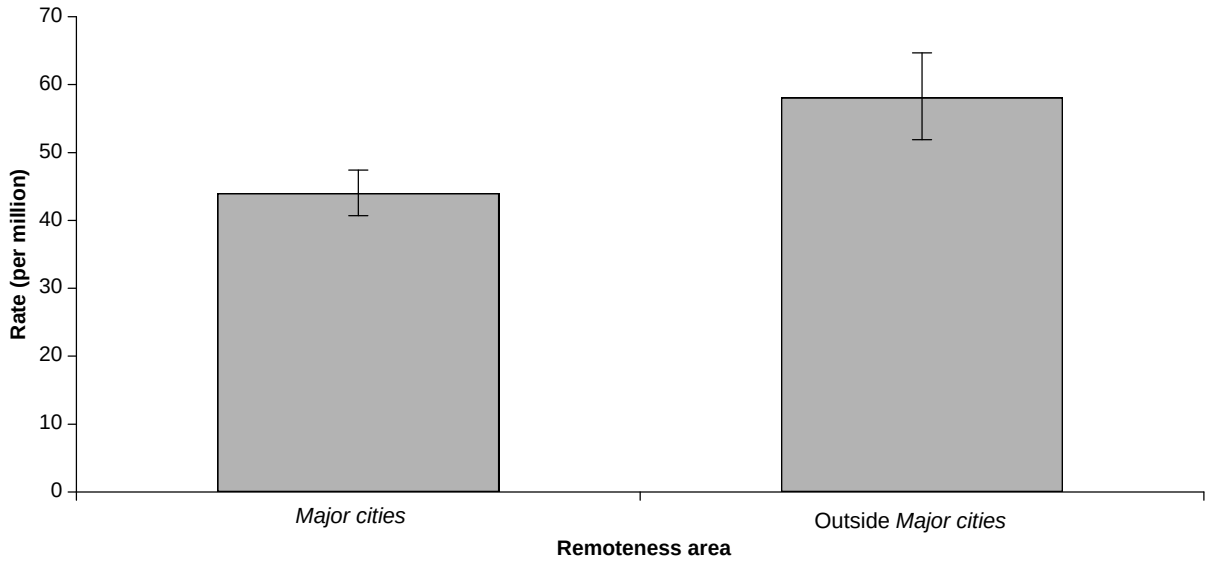
To compare mortality rates by remoteness of the area in which adolescents and young adults lived at the time of death, the Australian Standard Geographical Classification (ABS 2001) was used to assign areas across Australia to *Major cities* and outside *Major cities*. Further information about this classification is provided in Appendix B.

In the period 2003–2007, adolescents and young adults living outside *Major cities* were 1.3 times more likely to die from cancer than their city counterparts (Figure 4.6). However, individually, there was no statistically significant association between mortality and remoteness for any of the five leading causes of cancer death.

Does mortality differ by socioeconomic status?

The Index of Relative Socio-economic Disadvantage (IRSD) (ABS 2008) was used to classify areas according to socioeconomic disadvantage. This socioeconomic status measure pertains to the characteristics of people in the area in which the adolescents and young adults lived, rather than to the characteristics of the individual. Further information about this classification is provided in Appendix B.

In the period 2003–2007, mortality from all cancers, as well as from the five leading causes of cancer death in adolescents and young adults did not show any statistically significant differences by socioeconomic status. Further details from this analysis are presented in Appendix Table E4.6.



Notes

1. Remoteness is classified according to the Australian Standard Geographical Classification (ASGC; see Appendix B).
2. Rates are age standardised to the Australian population as at 30 June 2001 and expressed per million. The rates are based on the total number of deaths over the 5-year period.
3. Data for this figure are presented in Appendix Table E4.5.

Source: AIHW National Mortality Database.

Figure 4.6: Mortality from all cancers by remoteness area, 15–29-year-olds, Australia, 2003–2007

Appendix A: Classification of cancers in adolescents and young adults

The system of grouping cancers for incidence and survival was based primarily on the Surveillance, Epidemiology and End Results (SEER) adolescent and young adult site recode, with additional information from the Clinical Oncological Society of Australia (COSA).

Table A.1: Classification of cancers in adolescents and young adults

Cancer type/site	ICD-O-3 codes	
	Topography	Histology
Leukaemias		
Acute lymphoid leukaemia	C000–C809	9826–9827, 9835–9837
Acute myeloid leukaemia	C000–C809	9840, 9861, 9866–9867, 9871–9874, 9891, 9895–9897, 9910, 9920
Other leukaemia	C000–C809	9863, 9875–9876, 9742, 9800–9801, 9805, 9820, 9823, 9831–9834, 9860, 9870, 9930–9931, 9940, 9945–9946, 9948, 9963–9964
Lymphomas		
Non-Hodgkin lymphoma	C000–C809	9590–9591, 9596, 9670–9671, 9673, 9675, 9678–9680, 9684, 9687, 9689–9691, 9695, 9698–9702, 9705, 9708–9709, 9714, 9716–9719, 9727–9729
Hodgkin lymphoma	C000–C809	9650–9655, 9659, 9661–9665, 9667
Central nervous system cancers		
Glioblastoma and anaplastic astrocytoma	C000–C809	9401, 9440–9442
Other astrocytoma, glioma or ependymoma	C723	9380
	C000–C809	9410–9411, 9420–9421, 9424
	C000–C809	9400
	C000–C722, C724–C809	9380
	C000–C809	9381–9384, 9423, 9430, 9450–9451, 9460
	C000–C809	9391–9394
Medulloblastoma	C716	9470–9474
Supratentorial PNET	C000–C715, C717–C809	9470–9474
Other central nervous system tumour	C000–C699, C730–C750, C754–C809	9350–9351, 9360–9362, 9390, 9480, 9530–9535, 9537–9539, 9541, 9550, 9562, 9570
	C700–C729, C751–C753	9161, 9361–9362, 9390, 9530–9531, 9535, 9538, 9540, 9560, 9571
	C700	9532, 9534, 9537, 9539
	C753	9360
	C711	9480, 9539
	C713	9480, 9533
	C719	9350
	C714, C717	9480
	C709	9539
	C700–C729, C751–C753	8000–8005

(continued)

Table A.1 (continued): Classification of cancers in adolescents and young adults

Cancer type/site	ICD-O-3 codes	
	Topography	Histology
Bone cancers		
Osteosarcoma	C000–C809	9180–9187, 9192–9194
Ewing tumour	C000–C809	9260, 9364–9365
Other bone tumour	C000–C809	8812, 9250, 9261, 9370–9372, 9220–9221, 9230–9231, 9240, 9242–9243
	C400–C419	8000–8005, 8800–8803, 8805–8806, 9200
Soft-tissue sarcomas		
Rhabdomyosarcoma	C000–C809	8900–8904, 8910, 8912, 8920–8921, 8991
Other soft-tissue sarcoma	C000–C809	8810–8811, 8813–8815, 8820–8824, 8830, 8832–8833, 8835–8836, 9252, 8804, 8825, 8840–8897, 8982–8983, 8990, 9040–9044, 9120–9139, 9141–9150, 9170, 9251, 9561, 9580–9581, 9970, 9140
	C000–C699, C730–C750, C754–C809	9540, 9560, 9571
	C000–C399, C420–C809	8800–8803, 8805–8806
Germ cell cancers		
Gonadal	C569, C620–C629	9060–9065, 9070–9073, 9080–9085, 9090–9091, 9100–9102, 9105
Non-gonadal	C700–C729, C751–C753	9060–9065, 9070–9073, 9080–9085, 9090–9091, 9100–9102, 9105
	C000–C568, C570–C619, C630–C699, C730–C750, C754–C809	9060–9065, 9070–9073, 9080–9085, 9090–9091, 9100–9102, 9104–9105
Melanomas	C000–C809	8720–8723, 8726, 8728, 8730, 8740–8746, 8761, 8770–8774, 8780
Carcinomas		
Thyroid	C739	8010–8589
Breast (females only)	C500–C509	8010–8589
Cervix	C530–C539	8010–8589
Colorectal (including anus)	C180–C218	8010–8589
Other carcinoma (including skin and breast in males)	C000–C179, C219–C499, C510–C529, C540–C559, C561–C738, C740–C809	8010–8589
	C000–C809	8590–8593
	C809	9010
Other and unspecified	C000–C809	8959–8960, 9490, 9500, 8963–8964, 8970–8973, 8981, 9363, 9501–9523, 8680–8711, 8600–8650, 9000, 9731–9741, 9743–9764, 9766, 9769, 9960, 8930–8951, 8980, 9020, 9050–9053, 9110, 9160, 9270–9330, 9950, 9962, 9980, 9982
	C569	8670, 9013–9015, 9054
	C421	9961, 9975, 9989
	C000–C699, C730–C750, C754–C809	9161
	C000–C399, C420–C699, C730–C750, C754–C809	8000–8005

Appendix B: Classifications

Australian Standard Geographical Classification

The Australian Standard Geographical Classification (ASGC) was used to assign areas across Australia to remoteness categories (ABS 2001). The ASGC consists of five remoteness areas: *Major cities*, *Inner regional*, *Outer regional*, *Remote*, and *Very remote* (AIHW 2004). Due to smaller populations outside urban areas and the relatively low number of cancers diagnosed in adolescents and young adults, these remoteness areas were further aggregated in this report to *Major cities* and outside *Major cities,* which comprised the remaining four remoteness areas.

Index of Relative Socio-economic Disadvantage

The Index of Relative Socio-economic Disadvantage (IRSD) is one of four Socio-Economic Indexes for Areas (SEIFAs) developed by the Australian Bureau of Statistics (ABS 2008). This index is based on factors such as average household income, education levels and unemployment rates. The IRSD is not a person-based measure; rather, it is an area-based measure of socioeconomic status in which small areas of Australia are classified on a continuum from disadvantaged to affluent. This information is used as a proxy for the socioeconomic status of people living in those areas and may not be correct for each person living in that area.

In this report, socioeconomic status quintiles were assigned to cancer cases and deaths according to the IRSD of the statistical local area (SLA) of residence at diagnosis or death. Given that the IRSD was based on information collected from the 2006 Census of Population and Housing, and that SLA boundaries may change from year to year, this may affect the precision of socioeconomic status data for years further away from 2006.

In this report, the first socioeconomic status group (labelled '1') corresponds to geographical areas containing the 20% of the population with the lowest socioeconomic status according to the IRSD; the fifth group (labelled '5') corresponds to the 20% of the population with the highest socioeconomic status.

International Statistical Classification of Diseases and Related Health Problems

The International Statistical Classification of Diseases and Related Health Problems (ICD) is used to classify diseases and other health problems (including symptoms and injuries) in clinical and administrative records. The use of a standard classification system enables the storage and retrieval of diagnostic information for clinical and epidemiological purposes that is comparable between different service providers, across countries and over time.

In 1903, Australia adopted the ICD to classify causes of death and it was fully phased in by 1906. Since 1906, the ICD has been revised nine times to recognise new diseases (for example, acquired immunodeficiency syndrome (AIDS)), increased knowledge of diseases, and changing terminology in the description of diseases. The version that is currently in use,

ICD-10 (WHO 1992), was endorsed by the 43rd World Health Assembly in May 1990 and officially came into use in World Health Organization (WHO) member states from 1994.

International Classification of Diseases for Oncology

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 ICD in the late 1960s, working parties suggested the creation of a separate classification for cancers that included improved morphological information. The first edition of the International Classification of Diseases for Oncology (ICD-O) was subsequently released in 1976. 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 lymphomas and leukaemias. The current edition, the third edition, was released in 2000 (Fritz et al. 2000). It is currently used by most state and territory cancer registries in Australia, as well as by the AIHW for the Australian Cancer Database.

SEER adolescent and young adult site recode

Major groups of cancers in the incidence and survival chapters of this report were based on the SEER adolescent and young adult site recode, which is based on ICD-O-3 definitions of cancer morphology and topography. It is tailored to the unique distribution of cancers affecting adolescents and young adults. The scheme contains nine major groups of cancers: leukaemias, lymphomas, central nervous system cancers, bone cancers, soft-tissue sarcomas, germ cell cancers, melanomas, carcinomas, and other and unspecified cancers. For a detailed list of the cancer codes used in this classification see Appendix Table A.1.

Appendix C: Statistical methods and technical notes

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 instance, 1,000,000) to derive the rate.

Age-standardised rates

Age-standardised rates adjust for age in order to facilitate comparisons between populations that have different age structures. 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. The first step is to obtain population numbers and numbers of cases (or deaths) in age ranges—typically 5-year age ranges. The second 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 (such as those in a certain socioeconomic status group or those who lived in *Major cities*). The third step is to sum across the age groups and divide this sum by the total of the standard population to give an age-standardised rate for the population of interest. Finally, this is converted to a rate per million population. Note that all rates in this publication are reported per million rather than the standard 100,000 used in other AIHW reports.

Confidence intervals

An observed value of a rate may vary due to chance, even where there is no variation in the underlying value of the rate. A confidence interval provides a range of values that has a specified probability of containing the true rate or trend. The 95% (p-value = 0.05) confidence interval is used in this report; thus, there is a 95% likelihood that the true value of the rate is somewhere within the stated range. Confidence intervals can be used as a guide to whether or not differences are consistent with chance variation. In cases where no values within the confidence intervals overlap, the difference between rates is greater than that which could be explained by chance and is regarded as statistically significant. Note, however, that overlapping confidence intervals do not necessarily mean that the difference between two rates is definitely due to chance. Instead, an overlapping confidence interval represents a difference in rates that is too small to allow differentiation between a real difference and one that is due to chance variation. It can, therefore, be stated only that no statistically significant differences were found, and not that no differences exist. The approximate comparisons presented might understate the statistical significance of some differences, but they are sufficiently accurate for the purposes of this report.

As with all statistical comparisons, care should be exercised in interpreting the results of the comparison of rates. If two rates are statistically significantly different from each other, this means that the difference is unlikely to have arisen by chance. Judgement should, however, be exercised in deciding whether or not the difference is of any practical significance.

One of the issues with computing confidence intervals for administrative data, such as the annual rate of new cancer cases, is the fact that the data are a census, not a sample; as such, they are not prone to sampling error that would normally be captured by standard confidence intervals. In this report, the variances of the age-specific rates were calculated by assuming that the counts follow a Poisson distribution, as recommended in Jensen et al. (1991) and Breslow and Day (1987). When the age-specific rates are low relative to the population at risk, the variability in the observed counts is accepted to be Poisson. However, even if the age-specific rate is not low, a Poisson distribution is still generally assumed (Brillinger 1986; Eayres et al. 2008; U.S. Cancer Statistics Working Group 2010).

The confidence intervals of the age-standardised rates presented in this report were calculated using a method developed by Dobson et al. (1991). This method calculates approximate confidence intervals for a weighted sum of Poisson parameters.

AIHW intends in the near future to undertake some analytical work to study the underlying distribution of Australian cancer data to provide a better understanding of the accuracy of the calculated rates.

Joinpoint analysis

Joinpoint statistical methodology (Kim et al. 2000) was used to examine temporal trends in cancer mortality and incidence in this report. A joinpoint regression model describes changing trends over successive segments of time and the amount of change within each segment. Trends are characterised by joined linear segments on a logarithmic scale; a joinpoint is created where two segments meet, thus representing a statistically significant change in the trend. The number of significant joinpoints is identified through performing several permutation tests, and each *p*-value is found using Monte Carlo methods. The tests can be extended to data sets with non-constant variance to handle rates with Poisson variation and auto-correlated errors.

The software used to perform joinpoint analysis was Joinpoint Version 3.4.3, developed by the Statistical Research and Applications Branch of the National Cancer Institute in the United States of America (National Cancer Institute 2011b). This software has been used frequently to examine cancer trends both internationally (Cancer Care Ontario 2006; Yang et al. 2009), and within Australia (Baade & Coory 2005; Tracey et al. 2009).

The joinpoint software takes trend data in the form of age-adjusted cancer rates and fits the simplest joinpoint model possible, where there is a minimum number of segments necessary to characterise a trend. The software begins with a model with zero joinpoints (that is, no changes in trend) and incrementally tests whether more joinpoints are statistically significant.

For this report, a number of parameters were also specified based on preliminary examination of the data:

- **Model specification**: to achieve a better fit and for ease of interpretation, a logarithmic transformation was applied to all joinpoint models to make them log-linear.

- **Heteroscedastic errors**: preliminary testing of the data indicated non-constant variance of errors. Accordingly, the standard errors of the age-standardised rates were also input to the joinpoint software.
- **Number of joinpoints and observations**: the default values of 0 and 4 were selected for the minimum and maximum number of joinpoints. Similarly, the default values were used for the minimum number of observations from a joinpoint to either end of the data (3) and the minimum number of observations between two joinpoints (4).
- **Method**: the permutation method was used to determine the optimal number of joinpoints, which permuted the residuals from the null model and added them back onto fitted values. This method produced similar results to the alternative, the Bayesian Information Criterion, but was selected as it tended to be more conservative. The overall significance level for the permutation tests was 0.05.
- **Model selection method**: the grid search method (Lerman 1980) was used to fit the joinpoint model and compute point estimates of the coefficients. It created a 'grid' of all possible locations for joinpoints and tested the sum of squares at each one to find the best fit.

Annual percentage change

The annual percentage change (APC) in each joinpoint segment is the rate of change in a cancer rate per year in a given time frame. It is expressed as a constant percentage change of the rate of the previous year. A negative APC indicates a decreasing trend whereas a positive APC indicates an increasing trend. All reported trends are statistically significant unless noted otherwise.

Male-to-female ratio

The male-to-female ratio indicates the relative incidence rate or mortality rate between males and females. It can be calculated based on crude rates, age-standardised rates and cumulative rates. In this publication, it is calculated using the age-standardised rates as:

$$\text{M:F ratio} = \frac{\text{ASR of males}}{\text{ASR of females}}$$

Ratios greater than 1 indicate an excess in males, while ratios less than 1 indicate an excess in females.

Relative survival analysis

Relative survival estimates compare the survival of persons diagnosed with a cancer (that is, the observed survival) with the survival of the entire Australian population of the same sex and age in the same calendar year as the cancer cohort (that is, the expected survival). Note that the actual cause of death (whether it is from cancer or another cause) is not of importance in these analyses. Thus, relative survival is defined as follows:

$$\text{relative survival} = \frac{\text{observed survival for cancer cohort}}{\text{expected survival for 'matched' general population}}$$

The resulting value is usually given as a proportion. For example, if the observed 5-year survival of a particular cohort diagnosed with a particular type of cancer was 0.60 (that is, 60% of them were still alive 5 years after diagnosis) and their expected survival, based on Australian life tables, was 0.90 (that is, 90% of people with the same age- and sex-profile as the cohort would be expected to be alive 5 years later), then the 5-year relative survival would be 0.6/0.9 = 0.67 or 67%. One way to interpret this figure is that the 'average' person in that particular cancer cohort has a 67% chance of being alive 5 years after diagnosis relative to the general population of the same sex and age.

The relative survival proportions presented in this report have been calculated using the 'period method' which was developed by Brenner and Gefeller (1996). This method examines the survival experience of people who were alive at the beginning of a particular recent at-risk period and who were diagnosed with cancer before this period. Therefore, the period method might provide more up-to-date estimates of survival, especially in the presence of temporal trends affected by improvements in cancer detection and treatment.

Survival analysis was based on records of cancer cases from the Australian Cancer Database (ACD) diagnosed between 1983 and 2007 and followed to the end of 2010 for deaths. In order to calculate expected survival belonging to the age-, sex- and calendar-year matched population, life tables for the population under study were used.

The software used to calculate relative survival proportions was written by Dickman (2004). It uses the Ederer II method of calculating the interval-specific expected survivals. Further details on the approach used to calculate relative survival estimates, including rules that were applied during data preparation, can be found in the 2008 report prepared by the AIHW on cancer survival and prevalence (AIHW et al. 2008).

Appendix D: Data sources

Australian Cancer Database

The Australian Cancer Database (ACD) holds information on 1.9 million cancer cases of Australians who were diagnosed with cancer (other than basal cell and squamous cell carcinomas of the skin) between 1982 and 2007. In chapters 2 and 3 of this report, data from this source are presented for cancers diagnosed between 1983 and 2007.

The AIHW compiles and maintains the ACD, in partnership with the Australasian Association of Cancer Registries (AACR), whose member registries provide data to the AIHW on an annual basis. Each Australian state and territory has legislation that makes the reporting of all cancers (excluding basal cell and squamous cell carcinomas of the skin) mandatory. Pathology laboratories and Registrars of Births, Deaths and Marriages across Australia must report on cancer cases, as do hospitals, radiation oncology units and nursing homes in some (but not all) jurisdictions.

The data provided to the AIHW by the state and territory cancer registries include, at a minimum, an agreed set of items that provide information about the individual with the cancer, the characteristics of the cancer and, where relevant, deaths from malignant tumours (see Table D.1). In addition to the agreed set of items, registries often provide other data, which are also included in the ACD. For example, data on ductal carcinoma in situ (DCIS) are not part of the agreed ACD data set but are regularly provided by the state and territory registries.

Once the data are received from the state and territory cancer registries, the AIHW assembles the data into the ACD. Internal linking checks are undertaken to identify those who had tumours diagnosed in more than one state or territory; this process reduces the degree of duplication within the ACD to a negligible rate. The ACD is also linked with information on deaths (from the National Death Index) in order to add information on which people with cancer have died (from any cause). Any conflicting information and other issues with the cancer data are resolved through consultation with the relevant state or territory cancer registry.

The registration of cases of cancer is a dynamic process such that records in the state and territory cancer registries may be modified if new information is received. Thus, records in the cancer registries are always open and they are updated as required. In order for these changes to be incorporated into the ACD, a new complete file for all years of cancer data is provided by each of the jurisdictions annually. As a result, the number of cancer cases reported by the AIHW for any particular year may change slightly over time. In addition, data published by a cancer registry at a certain point in time may differ to some extent from what is published by the AIHW (AIHW 2009).

The data in the ACD are protected both physically (with built-in computer security systems) and by legislation under the *Australian Institute of Health and Welfare Act 1987* as well as under agreements with the state and territory cancer registries. More information about physical security and legislative protection of the ACD can be found in the National Cancer Statistics Clearing House protocol (AIHW 2009).

Table D.1: Agreed set of items to be provided by the states and territories to the AIHW for inclusion in the Australian Cancer Database

Person-level attributes	Tumour-level attributes
Person identification number (assigned by the state/territory)	Tumour identification number (assigned by the state/territory)
Surname	Date of diagnosis
First given name	Date of diagnosis flag
Second given name	Age at diagnosis
Third given name	ICD-O-3[(a)] topography code
Sex	ICD-O-3[(a)] morphology code
Date of birth	ICD-10[(b)] disease code
Date of birth flag	Most valid basis of diagnosis
Indigenous status	Statistical local area at diagnosis
Country of birth	Postcode at diagnosis
Date of death	Melanoma thickness (mm)
Age at death	
Cause of death	

(a) International Classification of Diseases for Oncology, Third Edition.

(b) International Statistical Classification of Diseases and Related Health Problems, 10th Revision.

Source: AIHW 2009.

Non-melanoma skin cancers

Data on all types of cancer, other than two types of non-melanoma skin cancer (NMSC), are reportable and collected by the state and territory registries. The two most common types of NMSC—namely, basal cell carcinoma (BCC) and squamous cell carcinoma (SCC)—are not reportable and are thus not generally recorded in cancer registries in Australia. These two types of skin cancer are by far the most frequently diagnosed cancers in Australia for both males and females (AIHW & CA 2008). A number of other rarer types of cancer also fall within the NMSC category (for example, Merkel cell lesions) and these are reportable.

In the past, the agreed approach was to exclude all NMSC cases from the cancer incidence data produced by the AIHW. However, since 2009, a new approach has been used whereby all cases that pertained to reportable forms of NMSC are included in the incidence data.

National Mortality Database

Data from the National Mortality Database (NMD) are used in Chapter 4 to provide statistical information on adolescent and young adult mortality from cancer in Australia.

The registration of deaths has been compulsory since the mid-1850s. This information is sourced from the Registrars of Births, Deaths and Marriages in each jurisdiction, and from the National Coroners Information System. Since 1906, the Commonwealth Statistician has compiled the information collected by the Registrars and published national death information.

The NMD is maintained by the AIHW and currently contains information for all deaths in Australia registered from 1964 to 2007. In this report, data are presented for the period from 1983 to 2007.

Death data are coded by the Australian Bureau of Statistics (ABS) according to the rules in the appropriate versions of the ICD. Deaths are reported by the underlying cause of death. Since 1997, data for multiple causes of death are available in the NMD. The change in the ICD versions in 1997 (from ICD-9 to ICD-10) did not affect calculations in this report; that is, for two periods between 1983–1996 and 1997–2007, no comparability factors were used to produce corresponding number of deaths from particular cancers.

The NMD includes the year of *registration* of death and the year of *occurrence* of death. For the purposes of this report, deaths are counted according to the year of *occurrence* of death, except for the most recent year of data (namely, 2007) where deaths are counted according to year of *registration* of death. Previous investigation has shown that the year of death and year of registration, for the most part, coincide.

Population data

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

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

- 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 (approximately 2%)
- 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 <www.abs.gov.au>.

Appendix E: Additional tables

Additional tables for Chapter 2: Incidence of cancer

Table E2.1: Number of new cancer cases by 5-year age group, 15–29-year-olds, Australia, 1983–2007

Cancer type/site	Age group (years)			
	15–19	20–24	25–29	15–29
Leukaemias	**930**	**755**	**827**	**2,512**
Acute lymphoid leukaemia	503	263	197	963
Acute myeloid leukaemia	308	328	381	1,017
Other leukaemia	119	164	249	532
Lymphomas	**1,474**	**1,855**	**2,150**	**5,479**
Non-Hodgkin lymphoma	518	643	982	2,143
Hodgkin lymphoma	956	1,212	1,168	3,336
Central nervous system cancers	**548**	**657**	**965**	**2,170**
Glioblastoma and anaplastic astrocytoma	89	146	268	503
Other astrocytoma, glioma or ependymoma	344	399	591	1,334
Medulloblastoma	37	31	36	104
Supratentorial PNET (primitive neuroectodermal tumour)	34	28	19	81
Other central nervous system tumour	44	53	51	148
Bone cancers	**536**	**339**	**280**	**1,155**
Osteosarcoma	266	104	79	449
Ewing tumour	199	144	73	416
Other bone tumour	71	91	128	290
Soft-tissue sarcomas	**409**	**510**	**854**	**1,773**
Rhabdomyosarcoma	102	45	36	183
Other soft-tissue sarcoma	307	465	818	1,590
Germ cell cancers	**755**	**1,710**	**2,516**	**4,981**
Gonadal	635	1,569	2,377	4,581
Non-gonadal	120	141	139	400
Melanomas	**1,965**	**4,186**	**6,807**	**12,958**
Carcinomas	**920**	**2,584**	**6,649**	**10,153**
Thyroid	353	835	1,431	2,619
Breast (females only)	8	183	1,208	1,399
Cervix	22	292	1,280	1,594
Colorectal (including anus)	115	298	598	1,011
Other carcinoma (including breast in males and skin)	422	976	2,132	3,530
Other and unspecified	**164**	**266**	**419**	**849**
All cancers	**7,701**	**12,862**	**21,467**	**42,030**

Source: AIHW Australian Cancer Database 2007.

Table E2.2: Number of new cancer cases by 5-year age group, 15–29-year-olds, Australia, 2003–2007

Cancer type/site	Age group (years)				M:F ratio[(a)]
	15–19	20–24	25–29	15–29	
Leukaemias	**211**	**177**	**153**	**541**	**1.5**
Acute lymphoid leukaemia	109	59	38	206	1.7
Acute myeloid leukaemia	72	79	62	213	1.2
Other leukaemia	30	39	53	122	1.9
Lymphomas	**393**	**485**	**467**	**1,345**	**1.2**
Non-Hodgkin lymphoma	131	172	191	494	1.5
Hodgkin lymphoma	262	313	276	851	1.0
Central nervous system cancers	**98**	**128**	**199**	**425**	**1.2**
Glioblastoma and anaplastic astrocytoma	14	28	62	104	1.4
Other astrocytoma, glioma or ependymoma	53	78	116	247	1.2
Medulloblastoma	11	7	8	26	1.2
Supratentorial PNET (primitive neuroectodermal tumour)	8	7	5	20	0.7
Other central nervous system tumour	12	8	8	28	0.7
Bone cancers	**116**	**66**	**54**	**236**	**1.6**
Osteosarcoma	61	14	13	88	2.7
Ewing tumour	41	37	19	97	1.2
Other bone tumour	14	15	22	51	1.3
Soft-tissue sarcomas	**93**	**95**	**127**	**315**	**1.0**
Rhabdomyosarcoma	20	10	6	36	2.5
Other soft-tissue sarcoma	73	85	121	279	0.8
Germ cell cancers	**193**	**420**	**612**	**1,225**	**10.2**
Gonadal	164	383	580	1,127	12.5
Non-gonadal	29	37	32	98	2.8
Melanomas	**284**	**730**	**1,237**	**2,251**	**0.8**
Carcinomas	**241**	**597**	**1,387**	**2,225**	**0.4**
Thyroid	108	210	367	685	0.2
Breast (females only)	<3	<45	254	299	. .
Cervix	5	51	197	253	. .
Colorectal (including anus)	43	114	158	315	0.9
Other carcinoma (including breast in males and skin)	<84	<178	411	673	0.9
Other and unspecified	**42**	**67**	**111**	**220**	**0.8**
All cancers	**1,671**	**2,765**	**4,347**	**8,783**	**1.0**

(a) Male-to-female ratio: age-standardised incidence rates for males divided by age-standardised incidence rates for females. Ratios greater than 1 indicate an excess in males and ratios less than 1 indicate an excess in females. Rates are age standardised to the Australian population as at 30 June 2001 and expressed per million males/females. The rates are based on the total number of cases over the 5-year period.

Note: Where the number in a table cell was small (1 or 2), the number was confidentialised (to <3). In some instances, cells 3 or larger may also be confidentialised to ensure that the small cells cannot be calculated from the remaining data.

Source: AIHW Australian Cancer Database 2007.

Table E2.3: Cancer incidence by age group, 0–39-year-olds, Australia, 2003–2007

	Age group								
	0–14 years			15–29 years			30–39 years		
Cancer type/site	No. of cases	ASR[(a)]	95% CI	No. of cases	ASR[(a)]	95% CI	No. of cases	ASR[(a)]	95% CI
Leukaemias	**1,075**	**53.4**	**50.2–56.7**	**541**	**25.5**	**23.4–27.8**	**532**	**35.4**	**32.5–38.6**
Acute lymphoid leukaemia	860	42.7	39.9–45.7	206	9.7	8.4–11.1	81	5.4	4.3–6.7
Acute myeloid leukaemia	167	8.3	7.1–9.6	213	10.0	8.7–11.5	240	16.0	14.0–18.1
Other leukaemia	48	2.4	1.8–3.2	122	5.8	4.8–6.9	211	14.1	12.2–16.1
Lymphomas	**316**	**15.6**	**13.9–17.4**	**1,345**	**63.5**	**60.2–67.0**	**1,196**	**79.6**	**75.2–84.3**
Non-Hodgkin lymphoma	188	9.3	8.0–10.8	494	23.4	21.4–25.6	801	53.4	49.7–57.2
Hodgkin lymphoma	128	6.3	5.2–7.5	851	40.1	37.5–42.9	395	26.3	23.7–29.0
Central nervous system cancers	**393**	**19.5**	**17.7–21.6**	**425**	**20.3**	**18.4–22.3**	**582**	**38.7**	**35.7–42.0**
Glioblastoma and anaplastic astrocytoma	42	2.1	1.5–2.8	104	5.0	4.1–6.1	190	12.7	10.9–14.6
Other astrocytoma, glioma or ependymoma	177	8.8	7.5–10.2	247	11.8	10.3–13.3	338	22.5	20.2–25.0
Medulloblastoma	67	3.3	2.6–4.2	26	1.2	0.8–1.8	11	0.7	0.4–1.3
Supratentorial PNET (primitive neuroectodermal tumour)	69	3.4	2.7–4.3	20	0.9	0.6–1.5	9	0.6	0.3–1.1
Other central nervous system tumour	38	1.9	1.3–2.6	28	1.3	0.9–1.9	34	2.3	1.6–3.2
Bone cancers	**165**	**8.1**	**6.9–9.5**	**236**	**11.1**	**9.8–12.7**	**106**	**7.1**	**5.8–8.5**
Osteosarcoma	62	3.0	2.3–3.90	88	4.2	3.3–5.1	27	1.8	1.2–2.6
Ewing tumour	93	4.6	3.7–5.6	97	4.5	3.7–5.5	22	1.5	0.9–2.2
Other bone tumour	10	0.5	0.2–0.9	51	2.4	1.8–3.2	57	3.8	2.9–4.9

(continued)

Table E2.3 (continued): Cancer incidence by age group, 0–39-year-olds, Australia, 2003–2007

	Age group								
	0–14 years			15–29 years			30–39 years		
Cancer type/site	No. of cases	ASR[(a)]	95% CI	No. of cases	ASR[(a)]	95% CI	No. of cases	ASR[(a)]	95% CI
Soft-tissue sarcomas	**170**	**8.4**	**7.2–9.8**	**315**	**15.0**	**13.4–16.7**	**425**	**28.3**	**25.7–31.1**
Rhabdomyosarcoma	107	5.3	4.4–6.4	36	1.7	1.2–2.3	7	0.5	0.2–1.0
Other soft-tissue sarcoma	63	3.1	2.4–4.0	279	13.3	11.8–14.9	418	27.8	25.2–30.6
Germ cell cancers	**108**	**5.3**	**4.4–6.4**	**1,225**	**58.4**	**55.1–61.7**	**1,264**	**84.0**	**79.5–88.8**
Gonadal	44	2.2	1.6–2.9	1,127	53.8	50.7–57.0	1,214	80.7	76.2–85.4
Non-gonadal	64	3.2	2.4–4.0	98	4.6	3.7–5.6	50	3.3	2.5–4.4
Melanomas	**48**	**2.3**	**1.7–3.1**	**2,251**	**107.7**	**103.2–112.2**	**4,315**	**287.4**	**278.8–296.1**
Carcinomas	**91**	**4.5**	**3.6–5.5**	**2,225**	**107.1**	**102.7–111.7**	**8,979**	**599.1**	**586.8–611.6**
Thyroid	31	1.5	1.0–2.2	685	32.8	30.4–35.3	1,416	94.3	89.5–99.3
Breast (females only)	0	—	—	299	29.6	26.3–33.1	3,215	426.8	412.2–441.8
Cervix	0	—	—	253	24.9	21.9–28.1	805	106.5	99.3–114.1
Colorectal (including anus)	8	0.4	0.2–0.8	315	15.0	13.4–16.7	985	65.7	61.7–70.0
Other carcinoma (including breast in males and skin)	52	2.6	1.9–3.3	673	32.4	30.0–34.9	2,558	170.7	164.2–177.5
Other and unspecified	**551**	**27.4**	**25.1–29.7**	**220**	**10.5**	**9.2–12.0**	**528**	**35.2**	**32.3–38.4**
All cancers	**2,917**	**144.6**	**139.4–149.9**	**8,783**	**419.1**	**410.4–428.0**	**17,927**	**1,194.9**	**1,177.5–1,212.5**

(a) Rates are age standardised to the Australian population as at 30 June 2001 and expressed per million. The rates are based on the total number of cases over the 5-year period.

Source: AIHW Australian Cancer Database 2007.

Table E2.4: Trends in incidence by age group and cancer type, 0–39-year-olds, Australia, 1983–2007

Age group/ Cancer type/site	Trend 1		Trend 2		Trend 3		Trend 4	
	Years	APC[(a)]	Years	APC[(a)]	Years	APC[(a)]	Years	APC[(a)]
0–14 years								
Leukaemias	**1983–2007**	**0.87***						
Acute lymphoid leukaemia	1983–2007	0.90*						
Acute myeloid leukaemia	1983–2007	0.65						
Other leukaemia	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Lymphomas	**1983–1985**	**–19.30**	**1985–1988**	**19.39**	**1988–2007**	**0.18**		
Non-Hodgkin lymphoma	1983–2007	0.47						
Hodgkin lymphoma	1983–2007	1.89*						
Central nervous system	**1983–2007**	**–0.93***						
Glioblastoma and anaplastic astrocytoma	1983–1996	9.77*	1996–2007	–4.05				
Other astrocytoma, glioma or ependymoma	1983–2007	–2.88*						
Medulloblastoma	1983–2007	1.04						
Supratentorial PNET	1983–2007	0.99						
Other central nervous system tumour	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Bone tumours	**1983–2007**	**0.77**						
Osteosarcoma	1983–2007	1.00						
Ewing tumour	1983–2007	0.86						
Other bone tumour	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Soft-tissue sarcomas	**1983–2007**	**–0.40**						
Rhabdomyosarcoma	1983–2007	–0.50						
Other soft-tissue sarcoma	1983–2007	–0.07						
Germ cell tumours	**1983–2007**	**1.98***						
Gonadal	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Non-gonadal	1983–2007	2.37*						
Melanomas	**1983–1996**	**5.56***	**1996–2007**	**–10.06***				
Carcinomas	**1983–2007**	**1.81***						
Thyroid	1983–2007	2.39*						
Breast (females only)	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Cervix	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Colorectal (incl. anus)	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Other carcinoma	1983–2007	0.84						
Other and unspecified	**1983–2007**	**0.68***						
All cancers	**1983–2007**	**0.48***						
15–29 years								
Leukaemias	**1983–2007**	**0.85***						
Acute lymphoid leukaemia	1983–2007	0.66						
Acute myeloid leukaemia	1983–2007	0.93						
Other leukaemia	1983–2007	0.82						

(continued)

Table E2.4 (continued): Trends in incidence by age group and cancer type, 0–39-year-olds, Australia, 1983–2007

Age group/ Cancer type/site	Trend 1		Trend 2		Trend 3		Trend 4	
	Years	APC[(a)]	Years	APC[(a)]	Years	APC[(a)]	Years	APC[(a)]
Lymphomas	**1983–2007**	**1.98***						
Non-Hodgkin lymphoma	1983–1995	4.40*	1995–2007	–0.48				
Hodgkin lymphoma	1983–2007	2.11*						
Central nervous system	**1983–2007**	**–0.62**						
Glioblastoma and anaplastic astrocytoma	1983–2007	1.65						
Other astrocytoma, glioma or ependymoma	1983–2007	–1.50*						
Medulloblastoma	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Supratentorial PNET	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Other central nervous system tumour	1983–2007	–2.24						
Bone tumours	**1983–2007**	**0.61**						
Osteosarcoma	1983–2007	0.42						
Ewing tumour	1983–2007	1.76*						
Other bone tumour	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Soft-tissue sarcomas	**1983–1989**	**12.97***	**1989–2007**	**–2.60***				
Rhabdomyosarcoma	1983–2007	0.77						
Other soft-tissue sarcoma	1983–1989	14.07*	1989–2007	–2.88*				
Germ cell tumours	**1983–2007**	**1.92***						
Gonadal	1983–2007	1.99*						
Non-gonadal	1983–2007	1.25						
Melanomas	**1983–1997**	**1.15**	**1997–2007**	**–3.62***				
Carcinomas	**1983–2007**	**0.92***						
Thyroid	1983–2007	3.21*						
Breast (females only)	1983–2007	0.64*						
Cervix	1983–2007	–2.63*						
Colorectal (incl. anus)	1983–1992	–1.60	1992–2007	5.84*				
Other carcinoma	1983–1997	1.98*	1997–2007	–2.55*				
Other and unspecified	**1983–2007**	**2.31***						
All cancers	**1983–1996**	**1.49***	**1996–2007**	**–0.53**				
30–39 years								
Leukaemias	**1983–2007**	**1.36***						
Acute lymphoid leukaemia	1983–2007	1.21						
Acute myeloid leukaemia	1983–2007	1.35*						
Other leukaemia	1983–2007	1.20*						
Lymphomas	**1983–1993**	**3.39***	**1993–2007**	**–0.72**				
Non-Hodgkin lymphoma	1983–1993	4.82*	1993–2007	–1.74*				
Hodgkin lymphoma	1983–2007	1.15*						

(continued)

Table E2.4 (continued): Trends in incidence by age group and cancer type, 0–39-year-olds, Australia, 1983–2007

Age group/ Cancer type/site	Trend 1		Trend 2		Trend 3		Trend 4	
	Years	APC[(a)]	Years	APC[(a)]	Years	APC[(a)]	Years	APC[(a)]
Central nervous system	**1983–2007**	**–0.06**						
Glioblastoma and anaplastic astrocytoma	1983–2007	1.79*						
Other astrocytoma, glioma or ependymoma	1982–1992	1.35	1992–1995	–12.79	1995–2007	2.27		
Medulloblastoma	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Supratentorial PNET	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Other central nervous system tumour	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Bone tumours	**1983–2007**	**0.18**						
Osteosarcoma	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Ewing tumour	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Other bone tumour	1983–2007	–0.80						
Soft-tissue sarcomas	**1983–1993**	**9.14***	**1993–1999**	**–11.29***	**1999–2007**	**–0.24**		
Rhabdomyosarcoma	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Other soft-tissue sarcoma	1983–1993	9.18*	1993–1999	–11.60*	1999–2007	0.07		
Germ cell tumours	**1983–2007**	**2.32***						
Gonadal	1983–1995	3.78*	1995–2007	1.35*				
Non-gonadal	1983–2007	–0.14						
Melanomas	**1983–1987**	**8.51***	**1987–1990**	**–6.50**	**1990–1997**	**1.53**	**1997–2007**	**–1.46***
Carcinomas	**1983–2007**	**0.36***						
Thyroid	1983–2007	5.08*						
Breast (females only)	1983–2007	0.44*						
Cervix	1983–1990	0.61	1990–2001	–6.12*	2001–2007	1.02		
Colorectal (incl. anus)	1983–1993	–1.58*	1993–2007	2.17*				
Other carcinoma	1983–1994	1.00*	1994–2007	–0.63*				
Other and unspecified	**1983–1991**	**–7.17***	**1991–2007**	**4.37***				
All cancers	**1983–1987**	**3.10***	**1987–2007**	**0.12**				

(a) Annual percentage change. An asterisk (*) indicates that the APC is statistically significant.

Notes

1. Rates are age standardised to the Australian population as at 30 June 2001 and expressed per million.
2. Joinpoint trends are not available for some cancer types and age groups due to small numbers.

Source: AIHW Australian Cancer Database 2007.

Table E2.5: Incidence by cancer group and remoteness area[a], 15–29-year-olds, Australia, 2003–2007

Cancer group/Remoteness area	Number of cases	ASR[b]	95% CI
Leukaemias			
Major cities	384	25.1	22.7–27.8
Outside *Major cities*	155	26.0	22.0–30.4
Unknown	2	. .	. .
Total	*541*	*25.5*	*23.4–27.8*
Lymphomas			
Major *cities*	994	64.7	60.7–68.9
Outside *Major cities*	348	60.2	54.0–66.9
Unknown	3	. .	. .
Total	*1,345*	*63.5*	*60.2–67.0*
Central nervous system cancers			
Major *cities*	306	20.0	17.8–22.4
Outside *Major cities*	117	20.6	17.0–24.6
Unknown	2	. .	. .
Total	*425*	*20.3*	*18.4–22.3*
Bone cancers			
Major cities	178	11.8	10.1–13.6
Outside *Major cities*	57	9.2	6.9–11.9
Unknown	1	. .	. .
Total	*236*	*11.1*	*9.8–12.7*
Soft-tissue sarcomas			
Major cities	227	14.8	12.9–16.9
Outside *Major cities*	86	14.9	11.8–18.3
Unknown	2	. .	. .
Total	*315*	*15.0*	*13.4–16.7*
Germ cell cancers			
Major cities	919	59.7	55.9–63.7
Outside *Major cities*	304	54.6	48.6–61.2
Unknown	2	. .	. .
Total	*1,225*	*58.4*	*55.1–61.7*
Melanomas			
Major cities	1,449	94.1	89.3–99.1
Outside *Major cities*	799	144.9	135.0–155.4
Unknown	3	. .	. .
Total	*2,251*	*107.7*	*103.2–112.2*

(continued)

Table E2.5 (continued): Incidence by cancer group and remoteness area[(a)], 15–29-year-olds, Australia, 2003–2007

Cancer group/Remoteness area	Number of cases	ASR[(b)]	95% CI
Carcinomas			
Major cities	1,656	108.2	103.0–113.5
Outside *Major cities*	564	104.3	95.8–113.3
Unknown	5	. .	. .
Total	*2,225*	*107.1*	*102.7–111.7*
Other and unspecified			
Major cities	165	10.8	9.2–12.5
Outside *Major cities*	54	9.6	7.2–12.5
Unknown	1	. .	. .
Total	*220*	*10.5*	*9.2–12.0*
All cancers			
Major cities	6,276	409.2	399.2–419.5
Outside *Major cities*	2,486	444.4	427.0–462.3
Unknown	21	. .	. .
Total	**8,783**	**419.1**	**410.4–428.0**

(a) Remoteness is classified according to the Australian Standard Geographical Classification (ASGC; see Appendix B).

(b) Rates are age standardised to the Australian population as at 30 June 2001 and expressed per million. The rates are based on the total number of cases over the 5-year period.

Note: Data may not sum to total due to rounding.

Source: AIHW Australian Cancer Database 2007.

Table E2.6: Incidence by cancer group and socioeconomic status [(a)], 15–29-year-olds, Australia, 2003–2007

Cancer group/ Socioeconomic status quintile	Number of cases	ASR[(b)]	95% CI
Leukaemias			
1 (lowest)	112	27.9	22.9–33.5
2	104	26.3	21.4–31.7
3	112	26.2	21.5–31.5
4	98	22.0	17.8–26.7
5 (highest)	111	25.3	20.7–30.4
Unknown	3	. .	. .
Total	*541*	*25.5*	*23.4–27.8*
Lymphomas			
1 (lowest)	266	66.0	58.3–74.4
2	258	65.5	57.6–73.9
3	283	66.2	58.6–74.3
4	254	56.7	49.9–64.1
5 (highest)	279	63.5	56.3–71.4
Unknown	5	. .	. .
Total	*1,345*	*63.5*	*60.2–67.0*
Central nervous system cancers			
1 (lowest)	85	21.3	17.0–26.3
2	76	19.3	15.2–24.2
3	80	18.9	15.0–23.5
4	89	20.0	16.0–24.6
5 (highest)	93	21.4	17.2–26.2
Unknown	2	. .	. .
Total	*425*	*20.3*	*18.4–22.3*
Bone cancers			
1 (lowest)	41	10.1	7.2–13.6
2	46	11.6	8.5–15.4
3	44	10.3	7.4–13.7
4	55	12.4	9.3–16.1
5 (highest)	47	10.8	7.8–14.2
Unknown	2	. .	. .
Total	*236*	*11.1*	*9.8–12.7*

(continued)

Table E2.6 (continued): Incidence by cancer group and socioeconomic status[a], 15–29-year-olds, Australia, 2003–2007

Cancer group/ Socioeconomic status quintile	Number of cases	ASR[b]	95% CI
Soft-tissue sarcomas			
1 (lowest)	64	15.9	12.2–20.3
2	59	15.2	11.5–19.5
3	51	12.0	8.9–15.8
4	66	14.8	11.3–18.7
5 (highest)	72	16.5	12.9–20.8
Unknown	3	. .	. .
Total	*315*	*15.0*	*13.4–16.7*
Germ cell cancers			
1 (lowest)	232	58.6	51.2–66.6
2	220	56.7	49.4–64.7
3	240	56.5	49.5–64.1
4	252	56.1	49.4–63.5
5 (highest)	276	63.3	56.0–71.2
Unknown	5	. .	. .
Total	*1,225*	*58.4*	*55.1–61.7*
Melanomas			
1 (lowest)	359	90.9	81.7–100.8
2	453	117.5	106.9–128.8
3	486	114.6	104.6–125.3
4	477	106.7	97.4–116.8
5 (highest)	468	107.6	98.1–117.8
Unknown	8	. .	. .
Total	*2,251*	*107.7*	*103.2–112.2*
Carcinomas			
1 (lowest)	447	114.7	104.3–125.9
2	421	110.4	100.1–121.5
3	410	97.4	88.2–107.3
4	477	106.7	97.3–116.7
5 (highest)	462	107.1	97.5–117.3
Unknown	8	. .	. .
Total	*2,225*	*107.1*	*102.7–111.7*

(continued)

Table E2.6 (continued): Incidence by cancer group and socioeconomic status[(a)], 15–29-year-olds, Australia, 2003–2007

Cancer group/ Socioeconomic status quintile	Number of cases	ASR[(b)]	95% CI
Other and unspecified			
1 (lowest)	40	10.1	7.2–13.7
2	42	11.0	7.9–14.7
3	45	10.6	7.6–14.1
4	46	10.3	7.5–13.7
5 (highest)	46	10.6	7.7–14.1
Unknown	1	. .	. .
Total	*220*	*10.5*	*9.2–12.0*
All cancers			
1 (lowest)	1,647	415.5	395.6–436.1
2	1,680	433.4	412.9–454.7
3	1,751	412.8	393.7–432.6
4	1,815	405.8	387.3–424.9
5 (highest)	1,853	426.0	406.8–445.9
Unknown	37	. .	. .
Total	**8,783**	**419.1**	**410.4–428.0**

(a) Socioeconomic status is classified using the ABS Socio-Economic Indexes for Areas (SEIFA) Index of Relative Socio-economic Disadvantage (see Appendix B).

(b) Rates are age standardised to the Australian population as at 30 June 2001 and expressed per million. The rates are based on the total number of cases over the 5-year period.

Note: Data may not sum to total due to rounding.

Source: AIHW Australian Cancer Database 2007.

Additional tables for Chapter 3: Survival from cancer

Table E3.1: Trends in relative survival from cancer, by survival duration and cancer type, 15–29-year-olds, Australia, 1983–1989 to 2004–2010

Survival duration/	At-risk period							
	1983–1989		1990–1996		1997–2003		2004–2010	
Cancer type/site	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI
1-year survival								
Leukaemias	**69.0**	**64.9–72.6**	**78.2**	**74.9–81.0**	**80.5**	**77.5–83.2**	**84.7**	**81.2–87.6**
Acute lymphoid leukaemia	75.6	69.4–80.8	74.9	69.5–79.6	81.5	76.5–85.6	89.4	84.0–93.0
Acute myeloid leukaemia	55.1	48.4–61.3	74.8	69.2–79.5	75.3	70.1–79.7	76.5	69.9–81.8
Other leukaemia	82.8	74.6–88.6	89.9	84.0–93.7	89.8	83.6–93.8	91.6	84.4–95.6
Lymphomas	**90.7**	**88.8–92.3**	**89.8**	**88.1–91.2**	**93.9**	**92.6–95.0**	**96.3**	**95.1–97.2**
Non-Hodgkin lymphoma	78.6	74.4–82.3	76.8	73.2–79.9	85.7	82.8–88.2	90.0	86.8–92.5
Hodgkin lymphoma	97.8	96.4–98.7	99.2	98.3–99.7	99.2	98.4–99.6	99.8	99.0–100.0
Central nervous system cancers	**84.2**	**81.0–87.0**	**84.0**	**80.9–86.6**	**86.5**	**83.4–89.1**	**89.2**	**85.6–92.0**
Glioblastoma and anaplastic astrocytoma	64.1	53.4–72.9	72.9	65.1–79.2	75.0	67.8–80.9	76.1	66.1–83.6
Other astrocytoma, glioma or ependymoma	87.4	83.6–90.3	89.2	85.7–91.8	93.0	89.6–95.4	94.1	90.0–96.5
Medulloblastoma	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Supratentorial PNET	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Other central nervous system tumour	90.3	78.1–95.9	86.2	67.3–94.6	81.5	63.4–91.3	81.1	60.3–91.7
Bone cancers	**86.5**	**81.9–90.0**	**87.8**	**83.7–91.0**	**92.1**	**88.8–94.4**	**89.9**	**85.0–93.2**
Osteosarcoma	85.1	77.1–90.5	88.8	81.9–93.3	93.5	87.9–96.6	93.9	85.9–97.4
Ewing tumour	82.3	72.8–88.8	82.4	74.0–88.3	88.2	81.5–92.6	82.2	72.6–88.7
Other bone tumour	93.5	84.9–97.3	93.8	85.7–97.4	95.7	88.7–98.4	97.9	85.5–99.7
Soft-tissue sarcomas	**84.2**	**80.3–87.5**	**80.3**	**77.0–83.3**	**90.0**	**86.9–92.4**	**92.5**	**88.8–95.0**
Rhabdomyosarcoma	73.2	58.3–83.4	72.4	58.5–82.3	68.8	55.3–79.1	88.1	71.3–95.4
Other soft-tissue sarcoma	85.8	81.7–89.0	81.1	77.6–84.1	93.0	90.0–95.1	93.1	89.2–95.6
Germ cell cancers	**94.9**	**93.4–96.1**	**97.2**	**96.1–98.0**	**98.7**	**98.0–99.2**	**98.4**	**97.4–99.0**
Gonadal	96.3	94.9–97.4	98.1	97.1–98.7	99.2	98.6–99.6	99.4	98.6–99.8
Non-gonadal	80.5	70.9–87.3	87.5	79.7–92.4	91.5	84.3–95.5	86.7	77.7–92.2

(continued)

Table E3.1 (continued): Trends in relative survival from cancer, by survival duration and cancer type, 15–29-year-olds, Australia, 1983–1989 to 2004–2010

Survival duration/ Cancer type/site	At-risk period							
	1983–1989		1990–1996		1997–2003		2004–2010	
	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI
Melanomas	**98.4**	**97.9–98.8**	**98.9**	**98.5–99.2**	**99.0**	**98.6–99.3**	**98.7**	**98.0–99.1**
Carcinomas	**91.2**	**90.0–92.3**	**92.4**	**91.3–93.3**	**93.3**	**92.4–94.2**	**93.9**	**92.7–94.9**
Thyroid	99.2	97.8–99.8	99.4	98.4–99.8	99.6	98.8–99.9	99.7	98.8–100.0
Breast (females only)	95.1	92.1–97.0	96.9	94.6–98.2	97.1	94.8–98.3	99.3	97.1–99.8
Cervix	95.7	93.6–97.2	95.1	92.6–96.8	95.2	92.6–97.0	92.7	88.5–95.4
Colorectal (incl. anus)	82.4	76.4–87.0	86.0	80.6–89.9	90.7	86.8–93.5	88.8	84.6–91.9
Other carcinoma (incl. breast in males and skin)	84.3	81.5–86.6	86.4	84.2–88.3	86.9	84.7–88.8	88.3	85.4–90.6
Other and unspecified	**87.7**	**81.7–91.8**	**88.6**	**83.4–92.2**	**94.6**	**91.0–96.8**	**91.9**	**87.2–95.0**
All cancers	**91.9**	**91.3–92.4**	**92.6**	**92.1–93.0**	**94.6**	**94.1–95.0**	**95.1**	**94.6–95.5**
5-year survival								
Leukaemias	**36.1**	**31.4–40.9**	**43.8**	**40.0–47.5**	**56.0**	**52.2–59.5**	**68.0**	**64.0–71.7**
Acute lymphoid leukaemia	33.6	25.9–41.5	42.0	36.0–47.8	53.2	47.1–59.0	64.0	57.4–69.9
Acute myeloid leukaemia	31.2	24.6–37.9	38.6	32.6–44.6	54.7	49.0–60.1	61.3	54.5–67.4
Other leukaemia	50.2	37.9–61.3	55.7	47.3–63.3	63.9	55.4–71.1	86.4	78.8–91.4
Lymphomas	**76.9**	**73.6–79.9**	**81.4**	**79.2–83.3**	**87.5**	**85.8–89.1**	**92.0**	**90.4–93.3**
Non-Hodgkin lymphoma	65.1	59.4–70.2	65.5	61.5–69.2	74.4	70.9–77.7	84.1	80.5–87.0
Hodgkin lymphoma	84.0	79.9–87.4	92.8	90.7–94.4	96.1	94.6–97.2	96.5	95.1–97.5
Central nervous system cancers	**64.8**	**60.1–69.2**	**61.7**	**57.8–65.3**	**62.0**	**57.9–65.9**	**65.6**	**61.2–69.7**
Glioblastoma and anaplastic astrocytoma	29.8	19.5–40.9	34.6	26.6–42.8	37.8	30.2–45.3	41.0	32.3–49.5
Other astrocytoma, glioma or ependymoma	70.3	64.6–75.3	71.7	67.0–75.8	76.1	71.0–80.4	75.0	69.5–79.6
Medulloblastoma	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Supratentorial PNET	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Other central nervous system tumour	83.8	69.7–91.8	67.1	49.2–79.9	57.5	38.9–72.3	66.2	46.3–80.2

(continued)

Table E3.1 (continued): Trends in relative survival from cancer, by survival duration and cancer type, 15–29-year-olds, Australia, 1983–1989 to 2004–2010

Survival duration/ Cancer type/site	At-risk period							
	1983–1989		1990–1996		1997–2003		2004–2010	
	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI
Bone cancers	**62.7**	**55.7–69.0**	**62.7**	**57.0–67.9**	**63.3**	**57.9–68.2**	**65.5**	**59.5–70.8**
Osteosarcoma	54.4	42.9–64.5	59.6	50.1–67.9	58.2	48.9–66.3	59.0	49.4–67.4
Ewing tumour	50.4	37.0–62.4	47.5	37.7–56.7	49.3	40.5–57.5	56.9	46.8–65.8
Other bone tumour	88.8	78.2–94.5	86.7	77.0–92.6	91.3	83.0–95.8	93.7	83.4–97.8
Soft-tissue sarcomas	**59.9**	**54.0–65.3**	**56.1**	**51.9–60.0**	**70.5**	**66.2–74.4**	**76.7**	**71.9–80.8**
Rhabdomyosarcoma	31.8	17.3–47.3	29.1	17.4–41.8	35.2	22.9–47.6	49.4	33.3–63.6
Other soft-tissue sarcoma	63.6	57.3–69.2	58.5	54.2–62.6	75.2	70.8–79.0	80.1	75.3–84.2
Germ cell cancers	**89.6**	**87.3–91.6**	**93.3**	**91.7–94.6**	**96.0**	**94.8–96.9**	**95.7**	**94.4–96.7**
Gonadal	92.0	89.7–93.8	94.7	93.2–95.9	97.2	96.0–98.0	97.3	96.2–98.1
Non-gonadal	64.6	51.7–75.0	78.3	69.5–84.9	80.5	71.5–86.9	77.8	68.2–84.9
Melanomas	**93.0**	**91.8–94.0**	**95.5**	**94.8–96.1**	**97.0**	**96.4–97.5**	**95.8**	**94.9–96.5**
Carcinomas	**80.6**	**78.6–82.4**	**82.1**	**80.6–83.5**	**84.5**	**83.1–85.7**	**86.5**	**85.1–87.8**
Thyroid	98.5	96.0–99.6	98.8	97.4–99.5	99.4	98.5–99.9	99.8	98.9–100.1
Breast (females only)	70.8	63.8–76.7	72.0	67.2–76.2	77.4	73.0–81.1	85.8	81.7–89.0
Cervix	87.0	83.0–90.1	86.3	82.8–89.1	89.1	85.6–91.8	87.6	82.9–91.1
Colorectal (incl. anus)	61.5	52.8–69.1	62.8	55.9–68.9	70.8	64.9–75.8	71.7	66.6–76.2
Other carcinoma (incl. breast in males and skin)	74.3	70.7–77.5	77.9	75.2–80.4	77.2	74.6–79.6	79.4	76.1–82.3
Other and unspecified	**75.3**	**67.3–81.6**	**76.7**	**70.3–82.0**	**87.6**	**82.7–91.2**	**81.5**	**75.9–85.9**
All cancers	**80.4**	**79.5–81.4**	**82.3**	**81.6–83.0**	**86.3**	**85.7–86.9**	**87.8**	**87.2–88.5**

Note: Survival estimates and/or confidence intervals are not available for some cancer types and age groups due to small numbers.

Source: AIHW Australian Cancer Database 2007.

Table E3.2: Trends in relative survival from cancer, by survival duration and cancer type, 0–14-year-olds, Australia, 1983–1989 to 2004–2010

Survival duration/ Cancer type/site	At-risk period							
	1983–1989		1990–1996		1997–2003		2004–2010	
	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI
1-year survival								
Leukaemias	**87.6**	**85.5–89.5**	**90.4**	**88.6–91.9**	**91.4**	**89.8–92.7**	**95.2**	**93.7–96.4**
Acute lymphoid leukaemia	93.4	91.5–94.9	94.9	93.4–96.1	95.5	94.1–96.6	97.9	96.6–98.7
Acute myeloid leukaemia	62.3	54.8–68.9	73.5	67.0–79.0	76.1	70.0–81.1	85.4	78.6–90.2
Other leukaemia	79.0	64.4–88.1	66.0	50.7–77.6	74.0	61.5–82.9	80.2	64.3–89.6
Lymphomas	**87.1**	**82.7–90.4**	**90.8**	**87.4–93.3**	**93.4**	**90.5–95.4**	**96.9**	**94.1–98.4**
Non-Hodgkin lymphoma	82.3	76.2–87.0	85.6	80.5–89.4	90.1	85.7–93.2	94.7	90.0–97.2
Hodgkin lymphoma	96.1	90.0–98.6	99.3	95.3–99.9	98.2	94.6–99.4	100.0	n.a.
Central nervous system cancers	**74.6**	**70.9–77.9**	**74.1**	**70.5–77.4**	**73.0**	**69.3–76.3**	**72.9**	**68.0–77.2**
Glioblastoma and anaplastic astrocytoma	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Other astrocytoma, glioma or ependymoma	79.9	75.5–83.5	82.7	78.4–86.2	80.3	75.2–84.4	78.1	70.8–83.7
Medulloblastoma	75.3	63.4–83.9	79.8	68.7–87.3	86.6	78.1–92.0	78.0	65.2–86.6
Supratentorial PNET	67.4	53.8–77.7	67.0	55.7–76.0	59.2	47.0–69.5	67.5	54.4–77.6
Other central nervous system tumour	57.9	42.4–70.6	49.3	33.0–63.7	75.7	63.0–84.6	77.0	59.3–87.8
Bone cancers	**90.8**	**85.3–94.4**	**95.7**	**91.5–97.8**	**90.7**	**85.8–94.0**	**95.3**	**90.4–97.8**
Osteosarcoma	92.2	82.3–96.7	94.3	85.5–97.8	92.3	83.6–96.5	98.3	88.2–99.8
Ewing tumour	89.4	80.5–94.3	96.1	89.9–98.5	91.3	84.4–95.2	92.9	84.8–96.7
Other bone tumour	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Soft-tissue sarcomas	**84.8**	**79.0–89.2**	**89.0**	**84.4–92.3**	**91.9**	**87.2–94.9**	**89.0**	**82.9–93.0**
Rhabdomyosarcoma	79.5	71.0–85.8	86.0	79.5–90.5	92.4	85.3–96.1	93.0	85.9–96.7
Other soft-tissue sarcoma	92.6	84.2–96.7	93.9	86.8–97.2	91.4	84.0–95.4	81.6	68.6–89.7
Germ cell cancers	**90.2**	**81.9–94.8**	**92.5**	**85.9–96.1**	**92.3**	**86.7–95.6**	**93.6**	**86.2–97.2**
Gonadal	95.3	82.4–98.9	96.7	86.9–99.3	98.7	90.9–99.9	100.1	n.a.
Non-gonadal	85.7	72.2–93.0	88.5	77.2–94.4	86.1	76.3–92.2	88.7	76.3–94.8
Melanomas	**100.0**	**n.a.**	**98.6**	**94.5–99.7**	**99.2**	**94.5–99.9**	**97.7**	**84.6–99.7**

(continued)

Table E3.2 (continued): Trends in relative survival from cancer, by survival duration and cancer type, 0–14-year-olds, Australia, 1983–1989 to 2004–2010

Survival duration/ Cancer type/site	At-risk period							
	1983–1989		1990–1996		1997–2003		2004–2010	
	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI
Carcinomas	**86.2**	**75.9–92.4**	**90.3**	**82.7–94.7**	**84.3**	**76.5–89.7**	**93.6**	**85.2–97.3**
Thyroid	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Breast (females only)	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Cervix	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Colorectal (incl. anus)	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Other carcinoma (incl. breast in males and skin)	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Other and unspecified	**84.3**	**81.0–87.1**	**89.7**	**87.1–91.8**	**91.4**	**89.0–93.2**	**90.9**	**88.0–93.1**
All cancers	**84.9**	**83.6–86.1**	**88.1**	**87.1–89.1**	**88.8**	**87.8–89.8**	**91.1**	**90.0–92.2**
5-year survival								
Leukaemias	**66.5**	**62.8–69.9**	**70.9**	**68.3–73.4**	**78.5**	**76.2–80.6**	**86.8**	**84.7–88.6**
Acute lymphoid leukaemia	72.8	68.8–76.4	77.1	74.3–79.6	83.6	81.2–85.7	90.1	88.0–91.8
Acute myeloid leukaemia	36.7	27.9–45.5	48.6	41.6–55.2	60.0	53.0–66.3	74.4	67.2–80.3
Other leukaemia	64.9	48.2–77.5	39.4	26.7–51.9	53.5	40.3–65.0	71.5	56.0–82.4
Lymphomas	**78.6**	**72.5–83.5**	**83.6**	**79.5–87.0**	**89.0**	**85.6–91.7**	**94.2**	**91.1–96.3**
Non-Hodgkin lymphoma	71.7	63.5–78.3	77.4	71.6–82.2	84.1	78.9–88.1	90.8	85.8–94.2
Hodgkin lymphoma	91.6	82.4–96.2	93.9	88.5–96.9	96.4	92.1–98.5	98.9	95.5–99.8
Central nervous system cancers	**55.9**	**51.0–60.5**	**57.6**	**53.6–61.3**	**57.5**	**53.5–61.3**	**56.0**	**51.1–60.6**
Glioblastoma and anaplastic astrocytoma	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Other astrocytoma, glioma or ependymoma	64.8	59.1–70.0	70.9	66.0–75.3	69.5	63.9–74.4	65.9	58.5–72.2
Medulloblastoma	44.8	28.3–60.0	51.2	39.3–61.9	64.4	53.6–73.2	63.9	51.5–74.0
Supratentorial PNET	37.2	22.7–51.6	47.2	35.6–57.9	39.4	28.2–50.3	41.7	30.1–52.9
Other central nervous system tumour	45.9	30.1–60.4	28.5	16.2–42.1	66.0	52.1–76.8	59.9	43.3–73.1

(continued)

Table E3.2 (continued): Trends in relative survival from cancer, by survival duration and cancer type, 0–14-year-olds, Australia, 1983–1989 to 2004–2010

Survival duration/ Cancer type/site	At-risk period							
	1983–1989		1990–1996		1997–2003		2004–2010	
	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI
Bone cancers	**64.2**	**54.7–72.2**	**67.6**	**59.9–74.1**	**64.4**	**57.3–70.6**	**77.8**	**71.1–83.2**
Osteosarcoma	62.6	45.0–75.9	65.3	52.5–75.4	65.3	53.3–74.9	78.5	67.3–86.3
Ewing tumour	62.5	49.6–72.9	65.3	54.4–74.2	63.3	53.7–71.4	78.7	69.2–85.6
Other bone tumour	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Soft-tissue sarcomas	**70.2**	**62.1–76.9**	**74.6**	**68.7–79.6**	**73.5**	**67.0–79.0**	**74.6**	**67.7–80.3**
Rhabdomyosarcoma	57.7	46.2–67.7	67.0	58.9–74.0	68.4	58.9–76.2	71.2	62.2–78.5
Other soft-tissue sarcoma	88.1	78.1–93.8	86.5	77.8–92.0	79.5	70.2–86.1	78.3	65.4–86.9
Germ cell cancers	**81.8**	**70.1–89.3**	**87.0**	**79.1–92.1**	**90.4**	**84.4–94.2**	**87.8**	**79.7–92.8**
Gonadal	92.6	78.2–97.7	94.5	83.3–98.4	98.8	91.0–100.0	98.1	86.3–99.8
Non-gonadal	70.5	48.9–84.4	79.7	66.8–88.1	82.4	71.9–89.3	79.9	67.2–88.2
Melanomas	**90.3**	**74.8–96.5**	**92.1**	**86.0–95.6**	**97.8**	**93.2–99.4**	**93.9**	**83.7–97.8**
Carcinomas	**77.6**	**64.1–86.5**	**84.8**	**75.9–90.6**	**76.9**	**68.3–83.5**	**86.9**	**77.9–92.4**
Thyroid	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Breast (females only)	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Cervix	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Colorectal (incl. anus)	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Other carcinoma (incl. breast in males and skin)	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Other and unspecified	**73.3**	**69.1–77.0**	**75.4**	**71.9–78.6**	**80.0**	**76.9–82.8**	**79.8**	**76.3–82.9**
All cancers	**68.3**	**66.3–70.2**	**72.6**	**71.1–74.0**	**76.7**	**75.4–78.0**	**81.0**	**79.6–82.4**

Note: Survival estimates and/or confidence intervals are not available for some cancer types and age groups due to small numbers.

Source: AIHW Australian Cancer Database 2007.

Table E3.3: Trends in relative survival from cancer, by survival duration and cancer type, 30–39-year-olds, Australia, 1983–1989 to 2004–2010

Survival duration/ Cancer type/site	At-risk period							
	1983–1989		1990–1996		1997–2003		2004–2010	
	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI
1-year survival								
Leukaemias	**71.3**	**66.9–75.2**	**71.9**	**68.0–75.4**	**79.1**	**76.0–81.9**	**88.0**	**84.7–90.6**
Acute lymphoid leukaemia	62.3	50.4–72.1	68.1	58.3–76.2	69.1	60.2–76.4	86.9	76.9–92.7
Acute myeloid leukaemia	56.7	49.4–63.3	59.5	53.3–65.1	72.3	67.1–76.9	81.7	75.8–86.3
Other leukaemia	89.6	84.3–93.2	89.2	84.1–92.7	91.4	87.4–94.2	95.4	91.3–97.6
Lymphomas	**87.7**	**85.6–89.6**	**80.6**	**78.5–82.4**	**90.1**	**88.5–91.4**	**94.3**	**92.7–95.5**
Non-Hodgkin lymphoma	83.3	80.4–85.9	73.9	71.3–76.4	86.0	83.9–87.9	91.6	89.3–93.4
Hodgkin lymphoma	96.7	94.2–98.2	98.5	96.7–99.3	98.9	97.5–99.6	99.5	97.9–99.9
Central nervous system cancers	**79.0**	**75.6–82.1**	**82.6**	**79.6–85.2**	**85.8**	**83.0–88.1**	**84.4**	**80.9–87.3**
Glioblastoma and anaplastic astrocytoma	62.6	54.3–69.8	69.4	62.9–74.9	74.9	69.3–79.6	73.7	66.4–79.6
Other astrocytoma, glioma or ependymoma	84.5	80.6–87.7	89.1	85.8–91.6	93.8	90.9–95.8	90.3	86.3–93.2
Medulloblastoma	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Supratentorial PNET	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Other central nervous system tumour	83.2	70.2–90.9	83.0	60.8–93.3	74.0	53.1–86.7	89.7	71.1–96.6
Bone cancers	**91.9**	**85.0–95.8**	**94.1**	**88.4–97.0**	**92.1**	**86.0–95.6**	**92.9**	**85.6–96.6**
Osteosarcoma	87.0	64.8–95.7	84.8	67.3–93.4	94.0	77.9–98.5	88.1	67.3–96.0
Ewing tumour	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Other bone tumour	95.7	87.1–98.7	97.5	90.0–99.4	92.6	84.2–96.7	98.1	86.8–99.8
Soft-tissue sarcomas	**78.2**	**74.5–81.5**	**74.5**	**71.7–77.1**	**91.6**	**89.2–93.5**	**91.6**	**88.4–94.0**
Rhabdomyosarcoma	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Other soft-tissue sarcoma	78.2	74.4–81.5	74.6	71.8–77.2	92.0	89.6–93.9	91.5	88.2–93.9
Germ cell cancers	**96.8**	**95.4–97.8**	**98.4**	**97.5–99.0**	**98.5**	**97.7–99.0**	**99.1**	**98.4–99.6**
Gonadal	97.8	96.5–98.6	99.1	98.4–99.5	98.8	98.1–99.3	99.4	98.7–99.7
Non-gonadal	81.4	68.1–89.5	79.8	65.6–88.6	90.3	79.5–95.6	93.7	81.5–98.0
Melanomas	**97.7**	**97.2–98.1**	**98.4**	**98.0–98.7**	**98.7**	**98.4–99.0**	**98.6**	**98.2–98.9**

(continued)

Table E3.3 (continued): Trends in relative survival from cancer, by survival duration and cancer type, 30–39-year-olds, Australia, 1983–1989 to 2004–2010

Survival duration/ Cancer type/site	At-risk period							
	1983–1989		1990–1996		1997–2003		2004–2010	
	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI
Carcinomas	**88.2**	**87.5–88.9**	**90.7**	**90.1–91.2**	**92.0**	**91.5–92.5**	**93.4**	**92.9–94.0**
Thyroid	99.2	98.1–99.7	99.5	98.7–99.8	99.3	98.7–99.6	100.1	n.a.
Breast (females only)	96.7	96.0–97.3	97.7	97.2–98.1	98.6	98.2–98.9	98.5	98.0–98.9
Cervix	95.8	94.8–96.7	96.1	95.0–96.9	95.9	94.6–96.9	95.8	94.1–97.1
Colorectal (incl. anus)	81.6	79.0–83.9	85.9	83.6–87.9	88.5	86.6–90.1	91.2	89.2–92.9
Other carcinoma (incl. breast in males and skin)	73.7	72.0–75.3	78.7	77.3–80.0	81.0	79.7–82.2	83.3	81.7–84.8
Other and unspecified	**79.9**	**75.6–83.4**	**82.7**	**78.5–86.1**	**90.2**	**87.2–92.5**	**91.7**	**88.8–93.9**
All cancers	**90.0**	**89.6–90.4**	**90.9**	**90.5–91.2**	**93.5**	**93.1–93.8**	**94.6**	**94.2–94.9**
5-year survival								
Leukaemias	**34.6**	**28.9–40.4**	**43.9**	**39.7–48.0**	**58.6**	**54.8–62.3**	**72.6**	**68.7–76.1**
Acute lymphoid leukaemia	21.8	9.9–36.8	34.7	24.8–44.8	35.7	27.4–44.0	64.6	53.4–73.8
Acute myeloid leukaemia	24.3	17.0–32.2	31.6	26.0–37.4	52.4	46.5–58.0	62.3	56.0–68.0
Other leukaemia	49.5	39.5–58.7	63.0	55.9–69.2	76.5	70.9–81.2	87.0	81.8–90.8
Lymphomas	**72.5**	**69.2–75.6**	**68.1**	**65.6–70.4**	**82.1**	**80.1–83.9**	**89.3**	**87.4–90.9**
Non-Hodgkin lymphoma	66.4	62.1–70.4	59.4	56.4–62.2	76.6	74.0–79.1	85.5	82.8–87.8
Hodgkin lymphoma	84.9	79.6–88.9	91.6	88.3–94.0	94.1	91.6–95.9	96.7	94.5–98.1
Central nervous system cancers	**44.4**	**39.1–49.5**	**53.1**	**49.3–56.7**	**58.9**	**55.1–62.5**	**56.4**	**52.5–60.1**
Glioblastoma and anaplastic astrocytoma	24.8	16.4–34.0	26.4	20.5–32.7	35.8	29.9–41.8	31.2	25.4–37.2
Other astrocytoma, glioma or ependymoma	50.8	44.0–57.2	62.8	58.2–67.0	74.3	69.5–78.5	69.8	65.0–74.2
Medulloblastoma	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Supratentorial PNET	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Other central nervous system tumour	56.4	39.2–70.5	75.5	54.8–87.8	57.5	36.2–74.1	72.3	53.3–84.7

(continued)

Table E3.3 (continued): Trends in relative survival from cancer, by survival duration and cancer type, 30–39-year-olds, Australia, 1983–1989 to 2004–2010

Survival duration/ Cancer type/site	At-risk period							
	1983–1989		1990–1996		1997–2003		2004–2010	
	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI
Bone cancers	**77.6**	**66.6–85.4**	**70.3**	**61.9–77.2**	**72.4**	**63.7–79.4**	**74.2**	**65.3–81.2**
Osteosarcoma	71.3	46.0–86.5	61.2	42.6–75.4	41.9	19.8–62.7	64.1	44.5–78.4
Ewing tumour	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Other bone tumour	94.2	84.2–98.2	83.2	73.4–89.7	84.4	74.3–90.8	92.7	82.7–97.2
Soft-tissue sarcomas	**55.5**	**50.4–60.4**	**44.2**	**41.0–47.4**	**74.5**	**71.0–77.6**	**79.7**	**75.7–83.1**
Rhabdomyosarcoma	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Other soft-tissue sarcoma	55.7	50.5–60.6	44.2	41.0–47.4	75.3	71.8–78.4	79.8	75.8–83.2
Germ cell cancers	**93.5**	**91.4–95.2**	**96.0**	**94.7–97.1**	**97.4**	**96.3–98.1**	**97.9**	**96.9–98.6**
Gonadal	95.0	92.9–96.5	97.6	96.4–98.5	98.0	97.0–98.7	98.4	97.5–99.1
Non-gonadal	70.4	54.1–81.9	61.5	47.3–73.0	81.6	68.9–89.6	85.3	72.4–92.5
Melanomas	**92.4**	**91.4–93.3**	**94.1**	**93.5–94.7**	**95.5**	**94.9–96.0**	**95.4**	**94.8–96.0**
Carcinomas	**70.9**	**69.7–72.0**	**74.8**	**74.0–75.6**	**78.9**	**78.1–79.6**	**82.0**	**81.3–82.8**
Thyroid	98.6	96.7–99.5	98.8	97.8–99.5	99.2	98.5–99.7	99.6	99.1–100.0
Breast (females only)	71.9	69.7–74.0	77.0	75.6–78.3	82.3	81.1–83.4	86.4	85.3–87.4
Cervix	83.5	81.1–85.6	85.3	83.5–86.9	87.4	85.4–89.1	87.6	85.2–89.6
Colorectal (incl. anus)	57.5	53.6–61.1	63.0	59.9–65.9	66.7	64.0–69.4	70.6	67.8–73.2
Other carcinoma (incl. breast in males and skin)	60.8	58.7–62.8	63.9	62.3–65.5	67.4	65.8–68.9	69.6	67.8–71.3
Other and unspecified	**70.6**	**65.4–75.1**	**70.1**	**65.2–74.4**	**77.3**	**73.2–80.8**	**82.5**	**79.0–85.5**
All cancers	**75.7**	**75.0–76.5**	**77.7**	**77.2–78.3**	**83.3**	**82.9–83.8**	**85.7**	**85.2–86.2**

Note: Survival estimates and/or confidence intervals are not available for some cancer types and age groups due to small numbers.

Source: AIHW Australian Cancer Database 2007.

Table E3.4: Relative survival from all cancers by remoteness area[(a)], 15–29-year-olds, Australia, 2004–2010

	1-year relative survival		5-year relative survival	
Remoteness area	**RS (%)**	**95% CI**	**RS (%)**	**95% CI**
Major cities	95.5	94.9–96.0	88.3	87.5–89.1
Outside *Major cities*	94.2	93.1–95.1	86.7	85.3–88.0
Total	**95.1**	**94.6–95.5**	**87.8**	**87.2–88.5**

(a) Remoteness is classified according to the Australian Standard Geographical Classification (ASGC; see Appendix B).

Source: AIHW Australian Cancer Database 2007.

Table E3.5: Relative survival from all cancers by socioeconomic status[(a)], 15–29-year-olds, Australia, 2004–2010

	1-year relative survival		5-year relative survival	
Socioeconomic status quintile	**RS (%)**	**95% CI**	**RS (%)**	**95% CI**
1 (lowest)	93.8	92.5–94.9	85.0	83.3–86.6
2	94.5	93.2–95.6	87.4	85.8–88.9
3	95.8	94.7–96.7	88.6	87.0–89.9
4	94.3	93.0–95.3	87.9	86.3–89.3
5 (highest)	96.9	95.9–97.6	90.2	88.8–91.4
Total	**95.1**	**94.6–95.5**	**87.8**	**87.2–88.5**

(a) Socioeconomic status is classified using the ABS Socio-Economic Indexes for Areas (SEIFA) Index of Relative Socio-economic Disadvantage (see Appendix B).

Source: AIHW Australian Cancer Database 2007.

Additional tables for Chapter 4: Mortality from cancer

Table E4.1: Number of deaths from the 10 most common causes of cancer death by 5-year age group, 15–29-year-olds, Australia, 2003–2007

	Age group (years)				
Cancer type/site (ICD-10)	**15–19**	**20–24**	**25–29**	**15–29**	**M:F ratio[(a)]**
Brain (C71)	37	40	68	145	1.3
Bone (C40, C41)	47	39	21	107	1.9
Melanoma of the skin (C43)	5	23	63	91	1.2
Acute lymphoblastic leukaemia (C91.0)	33	31	22	86	1.4
Acute myeloid leukaemia (C92.0, C92.3–C92.5, C93.0, C94.0, C94.2, C94.4, C94.5)	25	27	25	77	1.2
Non-Hodgkin lymphoma (C82–C85)	16	27	28	71	1.6
Other soft-tissue cancer (C47, C49)	20	24	16	60	1.0
Bowel (C18–C20)	5	14	27	46	1.2
Unknown primary site (C77–C80)	4	12	12	28	1.5
Hodgkin lymphoma (C81)	6	8	14	28	0.9
Other	*52*	*77*	*150*	*279*	. .
All cancers (C00–C97, D45, D46, D47.1,D47.3)	**250**	**322**	**446**	**1,018**	**1.1**

(a) Male-to-female ratio: age-standardised mortality rates for males divided by age-standardised mortality rates for females. Ratios greater than 1 indicate an excess in males and ratios less than 1 indicate an excess in females. Rates are age standardised to the Australian population as at 30 June 2001 and expressed per million males/females. The rates are based on the total number of deaths over the 5-year period.

Source: AIHW National Mortality Database.

Table E4.2: Mortality by cancer type, 15–29-year-olds, Australia, 1997–2007

Cancer type/site (ICD-10)	No. of deaths	% of all cancer deaths
Brain (C71)	326	13.6
Acute lymphoblastic leukaemia (C91.0)	245	10.2
Bone (C40, C41)	228	9.5
Melanoma of the skin (C43)	206	8.6
Acute myeloid leukaemia (C92.0, C92.3–C92.5, C93.0, C94.0, C94.2, C94.4, C94.5)	199	8.3
Non-Hodgkin lymphoma (C82–C85)	186	7.8
Other soft–tissue cancer (C47, C49)	153	6.4
Bowel (C18–C20)	101	4.2
Breast (C50)	64	2.7
Hodgkin lymphoma (C81)	60	2.5
Unknown primary site (C77–C80)	60	2.5
Liver (C22)	48	2.0
Cervix (C53)	46	1.9
Stomach (C16)	42	1.8
Ovary (C56)	42	1.8
Lung (C33–C34)	39	1.6
Testis (C62)	39	1.6
Chronic myelogenous leukaemia (C92.1)	31	1.3
Other cancers of the blood and lymphatic system (C95, C96.0, C96.1, C96.3–C96.9)	25	1.0
Tongue (C01–C02)	22	0.9
Other endocrine glands (C74–C75)	22	0.9
Other thoracic and respiratory organs (C37–C39)	21	0.9
Kidney (C64)	21	0.9
Other digestive organs (C26)	16	0.7
Multiple primary (C97)	16	0.7
Other central nervous system (C70, C72)	14	0.6
Oesophagus (C15)	12	0.5
Nasopharynx (C11)	10	0.4
Pancreas (C25)	9	0.4
Mouth (C03–C06)	9	0.4
Myelodysplastic syndrome (D46)	9	0.4
Nose, sinuses, etc. (C30–C31)	7	0.3
Mesothelioma (C45)	7	0.3
Unspecified myeloid leukaemia (C92.2, C92.7, C92.9, C93.1–C93.9, C94.7)	7	0.3
Other and ill-defined sites (C76)	6	0.3
Small intestine (C17)	5	0.2

(continued)

Table E4.2 (continued): Mortality by cancer type, 15–29-year-olds, Australia, 1997–2007

Cancer type/site (ICD-10)	No. of deaths	% of all cancer deaths
Non-melanoma of the skin (C44)	5	0.2
Prostate (C61)	5	0.2
Eye (C69)	5	0.2
Other and unspecified lymphoid leukaemia (C91.2–C91.9)	4	0.2
Salivary glands (C07–C08)	3	0.1
Thyroid (C73)	3	0.1
Oropharynx (C09–C10)	3	0.1
Other myeloproliferative cancers (C94.1, C94.3, C96.2, D45, D47.1, D47.3)	3	0.1
Other	*11*	*0.5*
All cancers (C00–C97, D45, D46, D47.1, D47.3)	**2,395**	**100.0**

Source: AIHW National Mortality Database.

Table E4.3: Mortality from the 10 most common causes of cancer death by age group, 0–39-year-olds, Australia, 2003–2007

	Age group								
	0–14 years			15–29 years			30–39 years		
Cancer type/site (ICD-10)	**No. of deaths**	**ASR[(a)]**	**95% CI**	**No. of deaths**	**ASR[(a)]**	**95% CI**	**No. of deaths**	**ASR[(a)]**	**95% CI**
Brain (C71)	166	8.3	7.1–9.6	145	6.9	5.8–8.2	287	19.1	17.0–21.5
Bone (C40, C41)	26	1.3	0.8–1.9	107	5.0	4.1–6.1	34	2.3	1.6–3.2
Melanoma of skin (C43)	<3	n.p.	n.p.	91	4.4	3.5–5.4	208	13.9	12.0–15.9
Acute lymphoblastic leukaemia (C91.0)	77	3.8	3.0–4.8	86	4.0	3.2–5.0	44	2.9	2.1–3.9
Acute myeloid leukaemia (C92.0, C92.3–C92.5, C93.0, C94.0, C94.2, C94.4, C94.5)	45	2.2	1.6–3.0	77	3.6	2.9–4.5	92	6.1	4.9–7.5
Non-Hodgkin lymphoma (C82–C85)	18	0.9	0.5–1.4	71	3.4	2.6–4.2	92	6.1	4.9–7.5
Other soft-tissue cancer (C47, C49)	23	1.1	0.7–1.7	60	2.8	2.1–3.6	61	4.1	3.1–5.2
Bowel (C18–C20)	<3	n.p.	n.p.	46	2.2	1.6–2.9	190	12.7	10.9–14.6
Unknown primary site (C77–C80)	5	0.2	0.1–0.6	28	1.3	0.9–1.9	96	6.4	5.2–7.8
Hodgkin lymphoma (C81)	<3	n.p.	n.p.	28	1.3	0.9–1.9	22	1.5	0.9–2.2
Other	*132*	*. .*	*. .*	*279*	*. .*	*. .*	*1,221*	*. .*	*. .*
All cancers (C00–C97, D45, D46, D47.1, D47.3)	**494**	**24.5**	**22.4–26.8**	**1,018**	**48.4**	**45.5–51.5**	**2,347**	**156.6**	**150.3–163.0**

(a) Rates are age standardised to the Australian population as at 30 June 2001 and expressed per million. The rates are based on the total number of deaths over the 5-year period.

Note: Where the number in a table cell was small (1 or 2), the number was confidentialised (to <3). In some instances, cells 3 or larger may also be confidentialised to ensure that the small cells cannot be calculated from the remaining data.

Source: AIHW National Mortality Database.

Table E4.4: Trends in mortality from selected cancers by age group, 0–39-year-olds, Australia, 1983–2007

Age group/ Cancer type/site	Trend 1		Trend 2	
	Years	APC[(a)]	Years	APC[(a)]
0–14 years				
Brain cancer	1983–2007	–0.80*		
Acute lymphoblastic leukaemia	1983–1998	–1.72	1998–2007	–11.08*
All cancers	**1983–2007**	**–2.50***		
15–29 years				
Brain cancer	1983–2007	–1.04		
Bone cancer	1983–2007	–0.79		
Melanoma of the skin	1983–2007	–2.45*		
Acute lymphoblastic leukaemia	1983–1999	–0.25	1999–2007	–8.02*
All cancers	**1983–2007**	**–1.91***		
30–39 years				
Brain cancer	1983–2007	–0.91*		
Bone cancer	1983–2007	–0.94		
Melanoma of the skin	1983–2007	–3.41*		
Acute lymphoblastic leukaemia	1983–2007	–0.76		
All cancers	**1983–1991**	**–0.30**	**1991–2007**	**–2.89***

(a) Annual percentage change. An asterisk (*) indicates that the APC is statistically significant.

Note: Rates are age standardised to the Australian population as at 30 June 2001 and expressed per million.

Source: AIHW National Mortality Database.

Table E4.5: Mortality from selected cancers by remoteness area[a], 15–29-year-olds, Australia, 2003–2007

	Major cities			Outside *Major cities*			Unknown	Total		
Cancer type/site	**No. of deaths**	**ASR[b]**	**95% CI**	**No. of deaths**	**ASR[b]**	**95% CI**	**No. of deaths**	**No. of deaths**	**ASR[b]**	**95% CI**
Brain	102	6.7	5.4–8.1	43	7.7	5.6–10.4	0	145	6.9	5.8–8.2
Bone	69	4.5	3.5–5.7	37	6.1	4.2–8.3	1	107	5.0	4.1–6.1
Melanoma of skin	57	3.8	2.8–4.8	32	5.9	4.0–8.3	2	91	4.4	3.5–5.4
Acute lymphoblastic leukaemia	52	3.4	2.5–4.4	33	5.6	3.8–7.8	1	86	4.0	3.2–5.0
Acute myeloid leukaemia	49	3.2	2.3–4.2	28	4.8	3.1–6.9	0	77	3.6	2.9–4.5
All cancers	**673**	**44.0**	**40.7–47.4**	**330**	**58.1**	**51.9–64.7**	**15**	**1,018**	**48.4**	**45.5–51.5**

(a) Remoteness is classified according to the Australian Standard Geographical Classification (ASGC; see Appendix B).

(b) Rates are age standardised to the Australian population as at 30 June 2001 and expressed per million. The rates are based on the total number of deaths over the 5-year period.

Note: Data may not sum to total due to rounding.

Source: AIHW National Mortality Database

Table E4.6: Mortality from selected cancers by socioeconomic status[(a)], 15–29-year-olds, Australia, 2003–2007

Cancer type/site / Socioeconomic status quintile	No. of deaths	ASR[(b)]	95% CI
Brain			
1 (lowest)	19	4.8	2.9–7.5
2	22	5.6	3.5–8.5
3	26	6.2	4.0–9.0
4	36	8.1	5.7–11.2
5 (highest)	26	6.0	3.9–8.8
Unknown	16	. .	. .
Total	*145*	*6.9*	*5.8–8.2*
Bone			
1 (lowest)	23	5.5	3.5–8.3
2	14	3.5	1.9–5.9
3	23	5.4	3.4–8.1
4	16	3.5	2.0–5.7
5 (highest)	16	3.7	2.1–5.9
Unknown	15	. .	. .
Total	*107*	*5.0*	*4.1–6.1*
Melanoma of skin			
1 (lowest)	9	2.3	1.0–4.4
2	13	3.5	1.8–5.9
3	20	4.7	2.9–7.3
4	13	2.9	1.5–5.0
5 (highest)	27	6.3	4.2–9.2
Unknown	9	. .	. .
Total	*91*	*4.4*	*3.5–5.4*
Acute lymphoblastic leukaemia			
1 (lowest)	8	2.0	0.9–3.9
2	26	6.6	4.3–9.6
3	17	4.0	2.3–6.3
4	13	2.9	1.6–5.0
5 (highest)	13	2.9	1.6–5.0
Unknown	9	. .	. .
Total	*86*	*4.0*	*3.2–5.0*

(continued)

Table E4.6 (continued): Mortality from selected cancers by socioeconomic status[(a)], 15–29-year-olds, Australia, 2003–2007

Cancer type/site / Socioeconomic status quintile	No. of deaths	ASR[(b)]	95% CI
Acute myeloid leukaemia			
1 (lowest)	15	3.8	2.1–6.2
2	13	3.2	1.7–5.6
3	13	3.0	1.6–5.2
4	13	2.9	1.5–5.0
5 (highest)	10	2.3	1.1–4.2
Unknown	13	. .	. .
Total	*77*	*3.6*	*2.9–4.5*
All cancers			
1 (lowest)	161	40.3	34.3–47.1
2	169	43.2	36.9–50.2
3	189	44.5	38.3–51.3
4	184	41.2	35.5–47.6
5 (highest)	175	40.4	34.7–46.9
Unknown	140	. .	. .
Total	**1,018**	**48.4**	**45.5–51.5**

(a) Socioeconomic status is classified using the ABS Socio-Economic Indexes for Areas (SEIFA) Index of Relative Socio-economic Disadvantage (see Appendix B).

(b) Rates are age standardised to the Australian population as at 30 June 2001 and expressed per million. The rates are based on the total number of deaths over the 5-year period.

Note: Data may not sum to total due to rounding.

Source: AIHW National Mortality Database.

Glossary

This section provides a general description of the terms used in this report. The terms have been defined in the context of this report; some terms may have other meanings in other contexts.

Age-specific rate: A 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.

Associated cause of death: Any other condition or event that was not related to the underlying cause of death but was still considered to contribute to the individual's death.

Benign: Non-cancerous tumours that may grow larger but do not spread to other parts of the body.

Cancer (malignant neoplasm): 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.

Carcinoma: A cancer that begins in the lining layer (epithelial cells) of organs.

Confidence interval (CI): A statistical term describing a range (interval) of values within which we can be 'confident' that the true value lies, usually because it has a 95% or higher chance of doing so.

Death due to cancer: A death where the underlying cause is indicated as cancer.

Incidence: The number of new cases (of an illness or event, and so on) occurring during a given period.

International Statistical Classification of Diseases and Related Health Problems: The World Health Organization's internationally accepted classification of death and disease. The tenth revision (ICD-10) is currently in use.

Invasive: See *Malignant*.

Malignant: A tumour with the capacity to spread to surrounding tissue or to other sites in the body.

Metastasis: See *Secondary cancer*.

Mortality due to cancer: The number of deaths that occurred during a specified period for which the underlying cause of death was recorded as cancer.

Neoplasm: An abnormal ('neo', new) growth of tissue. Can be 'benign' (not a cancer) or 'malignant' (a cancer). Also known as a tumour.

New cancer case: See *Incidence*.

Population estimates: Official population numbers compiled by the Australian Bureau of Statistics at both state and territory and statistical local area levels by age and sex, as at 30 June each year. These estimates allow comparisons to be made between geographical areas of differing population sizes and age structures (see Appendix D).

Primary cancer: A tumour that is at the site where it first formed (also see *Secondary cancer*).

Relative survival: The ratio of observed survival of a group of persons diagnosed with cancer to expected survival of those in the corresponding general population after a specified interval following diagnosis (such as 5 or 10 years).

Risk factor: Any factor that represents a greater risk of a health disorder or other unwanted condition or event. Some risk factors are regarded as causes of disease, others are not necessarily so. Along with their opposites, namely protective factors, risk factors are known as 'determinants'.

Secondary cancer: A tumour that originated from a cancer elsewhere in the body. Also referred to as a metastasis.

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 the cancer has spread from the original site to other parts of the body.

Statistical significance: An indication from a statistical test that an observed difference or association may be significant or 'real' because it is unlikely to be due just to chance. A statistical result is usually said to be 'significant' if it would occur by chance only once in twenty times or less often (see Appendix C for more information about statistical significance).

Underlying cause of death: The disease or injury that initiated the sequence of events leading directly to death.

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Related publications

This report, *Cancer in adolescents and young adults in Australia*, is part of a cancer series. Other publications in this series and any published subsequently can be downloaded for free from the AIHW website <http://www.aihw.gov.au/publications>. The website also includes information on ordering printed copies.

The following AIHW publications relating to cancer and the health and wellbeing of young Australians might also be of interest:

- AIHW 2011. Young Australians: their health and wellbeing 2011. Cat. no. PHE 140. Canberra: AIHW.
- AIHW & AACR 2010. Cancer in Australia: an overview, 2010. Cancer series no. 60. Cat. no. CAN 56. Canberra: AIHW.