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An overview, 2009

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National Breast and Ovarian Cancer Centre (NBOCC) is Australia's authority and source of evidence-based information on breast and ovarian cancer. Funded by the Australian Government, NBOCC works in partnership with health professionals, cancer organisations, researchers, governments and those diagnosed to improve outcomes in breast and ovarian cancer. NBOCC plays a vital role in the translation of worldwide cancer research into meaningful and evidence-based information to guide the work of Australian health professionals, improve health service delivery, inform people with breast or ovarian cancer about all aspects of their diagnosis and treatment, inform policy and raise community awareness about these diseases. For more information, visit <www.nbocc.org.au>.

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Foreword

Breast cancer in Australia: an overview, 2009 brings together under one cover the most up-to-date national statistical information available on the epidemiology, public health and health services impact of breast cancer in Australia. These data, collected through population-based cancer registries and other sources, are central to advancing our efforts to understand and ultimately control this disease. This report not only builds on previous monitoring reports but additionally provides data about the burden of disease due to breast cancer, and survival by Indigenous status and different histology types.

Breast cancer in Australia: an overview, 2009 also represents the significant contributions and the continuing partnership of National Breast and Ovarian Cancer Centre, the Australian Institute of Health and Welfare, and the Australasian Association of Cancer Registries and it highlights the importance of cancer registries as a national resource. The current report provides a nationwide snapshot of a major condition affecting a substantial number of Australians.

The value of data and monitoring is its relevance to outcomes and its capacity to impact on change. This report identifies areas of significant gain over time and provides some predictions for the future. Our ability to plan for services and patient needs are predicated on this understanding of the impact of the disease as it affects our population.

We would like to thank the staff members of the various cancer registries and data repositories. It is through their effort and diligence that these data are available to the Australian public. We anticipate that the information contained in *Breast cancer in Australia: an overview, 2009* will be used extensively to further our goal of reducing the mortality from breast cancer and improving the wellbeing of Australians with the disease.

Dr Helen Zorbas
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This report was prepared by staff in the Cancer and Screening Unit of the Australian Institute of Health and Welfare (AIHW). The main author was Dr Adriana Vanden Heuvel. Other AIHW staff who made a substantial contribution were, in alphabetical order, Ms Chun Chen, Dr Brett Davis, Mr David Meere, Ms Galina Prosselkova, Dr Mark Short, Ms Shubhada Shukla, Ms Christine Sturrock and Ms Kun Zhao. The authors would like to thank those AIHW staff who commented on earlier drafts of this report, in particular, Dr Alison Budd and Mr George Bodilsen.

The support of the Australasian Association of Cancer Registries in both the provision of data and reviewing the draft report is gratefully acknowledged.

Abbreviations

AACR	Australasian Association of Cancer Registries
ABS	Australian Bureau of Statistics
ACD	Australian Cancer Database
ACHI	Australian Classification of Health Interventions
ACT	Australian Capital Territory
AIHW	Australian Institute of Health and Welfare
ALOS	average length of stay
ASR	age-standardised rate
BCC	basal cell carcinoma
CI	confidence interval
CS	crude survival
DALY	disability-adjusted life year
DCIS	ductal carcinoma in situ
DoHA	Australian Government Department of Health and Ageing
IARC	International Agency for Research on Cancer
ICD-10	International Statistical Classification of Diseases and Related Health Problems, 10th revision
ICD-O-3	International Classification of Diseases for Oncology, 3rd edition
IRSD	Index of Relative Socio-economic Disadvantage
LCIS	lobular carcinoma in situ
MBS	Medicare Benefits Schedule
MIR	mortality-to-incidence ratio
NBOCC	National Breast and Ovarian Cancer Centre
NHMD	National Hospital Morbidity Database
NMSC	non-melanoma skin cancer
NSW	New South Wales
NT	Northern Territory
NZ	New Zealand
Qld	Queensland
RS	relative survival
SA	South Australia
SCC	squamous cell carcinoma
SEER	Surveillance Epidemiology End Results
SEIFA	Socio-Economic Indexes for Areas

Tas	Tasmania
TNM	a staging system for classifying tumours based on size of the tumour (T), lymph node involvement (N) and presence of distant metastases (M)
UK	United Kingdom
USA	United States of America
Vic	Victoria
WA	Western Australia
WHO	World Health Organization
YLL	years of life lost
YLD	years lost due to disability

Symbols

—	nil or rounded to zero
. .	not applicable
<	less than
>	greater than
+	and over

Executive summary

On an average day in 2006, 35 Australian women were diagnosed with invasive breast cancer and 7 women died from this disease. These and other data in this report show that breast cancer continues to be a major health problem for Australian women, their families, the health system and society as a whole.

Breast cancer in Australia: an overview, 2009 provides a comprehensive picture of national statistics on breast cancer for both females and males using a range of data sources. The latest available data and trends over time are examined in this report. As well, differences by geographical area, socioeconomic status, Indigenous status and country of birth are discussed.

Breast cancer is a major cause of illness for Australian women

Breast cancer is the most common cancer in women (excluding 2 types of non-reportable skin cancer), representing over a quarter (28%) of all reported cancer cases in women in 2006. A total of 12,614 invasive breast cancer cases were diagnosed in women that year, the largest number recorded to date. More than two-thirds (69%) of these cases were in women aged 40 to 69 years. In the same year, 102 cases of invasive breast cancer were diagnosed in men, accounting for 0.8% of breast cancer cases.

While breast cancer is the most commonly reported cancer in Indigenous women in the four jurisdictions for which data were available, Indigenous women were significantly less likely to be diagnosed with breast cancer than non-Indigenous women in 2002 to 2006 (69 and 103 new cases per 100,000 women, respectively).

Breast cancer was the sixth leading cause of burden of disease for women in 2003 and it accounted for 7% of all years of life lost due to premature mortality.

There were 1,558 cases of ductal carcinoma in situ (a non-invasive tumour of the breast) diagnosed in women in 2005.

Breast cancer mortality is decreasing and survival is improving

A total of 2,618 women died from breast cancer in 2006, making it the second most common cause of cancer-related death for Australian women after lung cancer (2,683 deaths). However, breast cancer mortality rates have been decreasing since 1994. In 2006, there were 22 breast cancer deaths per 100,000 women, the lowest recorded rate in the period considered (1982 to 2006).

Outcomes for women diagnosed with breast cancer have improved significantly. Overall, 5-year relative survival was 88% for women diagnosed with breast cancer in 2000 to 2006 compared with 73% for women diagnosed in 1982 to 1987.

In the 2002 to 2006 period, 5-year crude survival for Indigenous women diagnosed with breast cancer in four jurisdictions was significantly lower than for non-Indigenous women (65% and 82% crude survival, respectively), but mortality rates did not differ significantly.

The number of screening mammograms and hospitalisations has increased

The number of women who had a screening mammogram through the BreastScreen Australia Program increased by 31% between 1996–1997 and 2005–2006.

In 2007–08, 2.6% of all hospitalisations of women were due to breast cancer. This comprised just over 106,000 hospitalisations, which was 74% higher than the 1999–00 figure.

Health expenditure on breast cancer for females grew by 32%, from $252 million in 2000–01 to $331 million in 2004–05 (with prices adjusted for inflation).

The future

Due to ageing of the population, the number of women diagnosed with breast cancer is expected to continue to increase. Projections suggest that in 2015, the number of new breast cancer cases diagnosed in Australian women will be approximately 15,400, which is 22% more than the number diagnosed in 2006. This would equate to 42 women being diagnosed with breast cancer every day in 2015.

1 Introduction

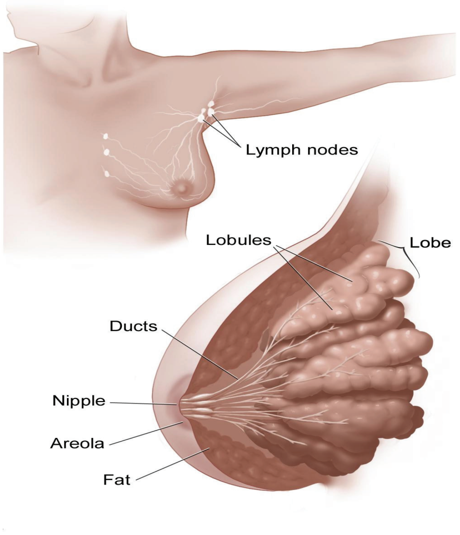
Breast cancer is a major cause of illness and death for women in Australia. On average, one in nine Australian women will develop breast cancer and one in 38 women will die from it before the age of 85 years. Although much less common in males, men also develop breast cancer. Because breast cancer affects so many people—either directly through personally developing the disease or indirectly through family and community members—breast cancer is an important topic of interest to many and a priority issue for the Australian health system.

What is breast cancer?

Breast cancer is a disease in which abnormal cells in the breast tissues multiply and form an invasive (or malignant) tumour. Such tumours can invade and damage the tissue around them and spread to other parts of the body through the lymphatic or vascular systems. If the spread of these tumours is not controlled, they can result in death. Not all tumours are invasive; some are benign tumours that are not life-threatening.

Breast tissue consists mainly of fat, glandular tissue (arranged in lobes which, in women, can produce milk), ducts (the tubes that carry milk to the nipple) and connective tissue (see Figure 1.1). In the majority of invasive breast cancers, the abnormal cell growth begins in the ducts; this type of breast cancer is referred to as *infiltrating (or invasive) duct carcinoma*. *Invasive lobular carcinoma* is another type of invasive breast cancer which, as the name suggests, begins in the lobes. Other, less common types of breast cancers include *inflammatory breast cancer*, *medullary carcinoma* and *Paget disease* (see ACS 2009a for a description of the various types of breast cancer).

If abnormal cell growth does not spread but instead begins and remains within the duct, or the lobes, these conditions are referred to as 'ductal carcinoma in situ' (DCIS) and 'lobular carcinoma in situ' (LCIS), respectively. These forms of abnormal cell growth are not a type of invasive breast cancer and nearly all carcinomas at this stage can be cured. However, it is thought that invasive breast cancer often starts as DCIS (ACS 2008; NBCC 2004) and having DCIS or LCIS is associated with an increased risk of developing invasive breast cancer (ACS 2007; NCI 2005).



Source: National Cancer Institute, 2009.

Figure 1.1: Anatomy of the female breast

Purpose and structure of this report

The purpose of this report is to provide a comprehensive overview of national statistics on breast cancer in Australia. The aim is to increase levels of understanding about this disease and to inform decision-making, resource allocation and the evaluation of breast cancer control programs and policies. The report is aimed at a wide audience, including health professionals, policy makers, health planners, educators, researchers, consumers and the general public.

As in the previous edition (AIHW & NBCC 2006), this report brings together the latest available statistics and trend data to answer questions such as:

- How many people are diagnosed with breast cancer and how is this changing over time (Chapter 2)?
- Is the number of people who die from breast cancer decreasing (Chapter 3)?
- What are the prospects of survival for those diagnosed with breast cancer (Chapter 4)?
- How many living people have been diagnosed with breast cancer (Chapter 5)?
- How much of the total burden of disease for women is due to breast cancer (Chapter 6)?
- How many people have a mammogram (Chapter 7)?
- How is the number of hospitalisations for breast cancer changing (Chapter 8)?
- How many health-care dollars are spent on breast cancer (Chapter 9)?

This report builds on the previous edition in a number of ways. For the first time, information on the burden of disease due to breast cancer is included, as is national information on how patterns of breast cancer differ within Australia according to country of birth. It also provides additional information on how Australian breast cancer data compare globally and by Aboriginal and Torres Strait Islander status within Australia. Furthermore, this edition has been re-structured to increase readability and the alignment of the information with policy questions. Also, more methodological details are provided, together with caveats around data interpretation and use. While graphs are frequently used for illustrative purposes, the underlying data are included in appendix tables.

Given that the proportion of females who develop breast cancer is much greater than the proportion of males who do so, the emphasis in this report is on breast cancer in females. However, a range of statistics on breast cancer in males is also presented.

Data interpretation

In this report, the term 'breast cancer' is used to refer to *primary* breast cancers which are *invasive* (i.e. malignant). It does not encompass secondary breast cancers, nor does it include benign breast tumours or non-invasive breast cancers, such as DCIS. Nonetheless, given that invasive breast cancer may begin as DCIS and given the large number of cases of DCIS diagnosed each year, incidence data are provided for these lesions in Chapter 2.

A number of different classifications are referred to in this report, such as ICD (i.e. International Statistical Classification of Diseases and Related Health Problems) and ICD-O (i.e. International Classification of Diseases for Oncology). Information about these classifications is included in Appendix A.

It is well recognised that information on tumour stage, size and nodal status at time of diagnosis is important in relation to both prognosis and determining the most appropriate type of treatment. Information on change over time in stage, size and nodal status also assists in the monitoring of breast cancer control policies and programs. While some of the states and territories collect information on tumour stage, size and/or nodal status, not all do so and there are no nationally agreed standards for the collection of these data. While national data on these items are not available, some state-level and overseas data on incidence and survival are presented by tumour stage in this report.

Information on the actual *number* of breast cancer cases and deaths is presented, together with *age-standardised rates*. The use of age-standardised rates is important when making comparisons between groups 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 breast cancer since the risk of this disease is strongly linked to age. Rates have been standardised to the Australian population at 30 June 2001 and are generally expressed per 100,000 population. In addition, for some of the key statistics, data were standardised to the World Health Organization (WHO) 2000 World Standard Population. Since this standard is utilised widely throughout the world, its use allows for the comparison of the Australian data with those of other countries. Note that within the text of this report, all discussion of age-standardised rates pertains to the rates that were standardised to the Australian population, with the exception of the discussion on international comparisons. Further information on age standardisation and other technical matters can be found in Appendix B.

In this report, 95% confidence intervals are shown in graphs (as error bars) and tables. As explained more fully in Appendix B, 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.

International comparisons are provided in relation to breast cancer incidence, mortality and survival. While such comparisons help to put the Australian situation into a global context, caution must be taken when comparing cancer data from different countries for a number of reasons. In particular, observed differences in cancer incidence and mortality may be influenced not only by the underlying number of cancer cases, but also by differences in the following:

- cancer detection and screening
- types of treatment provided and access to treatment services
- characteristics of the cancer such as stage at diagnosis and histology type
- coding practices and cancer registration methods, as well as the accuracy and level of cancer coverage of the data.

Data sources

A key data source for this report was the Australian Cancer Database (ACD), which was previously known as the National Cancer Statistics Clearing House. The ACD is a database that holds information on 1.8 million Australian cancer cases diagnosed between 1982 and 2006. The ACD is compiled and maintained by the Australian Institute of Health and Welfare (AIHW), in partnership with the Australasian Association of Cancer Registries (AACR), with each state and territory providing data to the AIHW on an annual basis. Each jurisdiction has legislation that makes the reporting of all newly diagnosed invasive cancers (other than two types of non-melanoma skin cancer (NMSC)) mandatory. Note that compared with past reports prepared by the AIHW, a different approach to the exclusion of NMSC from the data shown has been used in this report. Additional information about the ACD can be found in Appendix C.

Another key data source was the National Mortality Database. This database contains information on dates and causes of death for all deaths in Australia that were registered from 1964 to 2006. Unless stated otherwise, death information in this report was based on the year of death, except for the most recent year (namely, 2006) where 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, with the number of deaths registered in that year being closer to the true value.

In addition, several other data sources—including the National Death Index, the BreastScreen Australia Program, the National Hospital Morbidity Database, Medicare Australia and the Disease Expenditure Database—have been used to present a broad picture of the effect of breast cancer in Australia. Information about each of these data sources can be found in Appendix C.

Throughout this report:

- The term 'breast cancer' refers to primary breast cancers that are invasive.
- Differences that are described as 'significant' refer to a statistically significant difference. Such differences may or may not be significant from a practical or clinical perspective.

2 Incidence of breast cancer

Incidence data indicate the number of new cases of breast cancer diagnosed during a specified time period, usually 1 year. The number of new cases is largely determined by the risk profile of the population—that is, the types of risk factors for breast cancer that people have. In addition, for females, the number of new cases of breast cancer diagnosed in any 1 year is affected by the extent of participation in screening mammography.

Details on the incidence of invasive breast cancer are provided in this chapter. Only cases in which the invasive breast cancer was the primary cancer are counted since a secondary breast cancer is not considered to be a new case. In addition, to be counted, the case must be a 'new' primary cancer and not a reoccurrence of a previous primary cancer (IARC 2004).

Note that data on breast cancer incidence refer to the number of *cases* newly diagnosed and not to the number of *people* newly diagnosed with breast cancer. Since it is rare (although possible) that any one person would be diagnosed with more than one primary breast cancer during a 1-year period, the annual number of new breast cancer cases is practically the same as the annual number of people newly diagnosed with breast cancer.

In this chapter, trends in the number and rate of breast cancer cases in women are presented. In addition, this chapter provides information on the projected number of new cases of breast cancer in women to 2015, the risk of being diagnosed with breast cancer by the age of 75 and 85 years, and disparities in the incidence of breast cancer among women according to age, geographical area, socioeconomic status, Aboriginal and Torres Strait Islander status and country of birth. Information on how Australian rates compare internationally is also presented, as are data on the incidence of ductal carcinoma in situ (DCIS) in women. For men, discussion is focused on incidence trends, differences by age, and the risk of being diagnosed with breast cancer.

The main data source for this chapter was the Australian Cancer Database (ACD).

Incidence of breast cancer in females

Incidence in 2006

The five most commonly diagnosed cancers among females in 2006 are shown in Table 2.1. Note that since two types of skin cancer—basal cell carcinoma (BCC) and squamous cell carcinoma (SCC)—are not reported to cancer registries, data on these two types of cancer are not included in the ACD and thus not included in Table 2.1. Past research shows that these skin cancers are by far the most frequently diagnosed cancers in Australia in both males and females (AIHW & CA 2008).

Excluding basal and squamous cell carcinomas of the skin, breast cancer was the most commonly diagnosed cancer among females. A total of 12,614 females were diagnosed with this disease and this accounted for 28% of all new cancer cases diagnosed in 2006 (excluding basal and squamous cell carcinomas of the skin). This means that across Australia, on average, 35 females were diagnosed with breast cancer each day in 2006. Bowel cancer (or colorectal cancer as it is also called) was a distant second (6,159 cases and 14% of reported cancer cases), followed by melanoma of the skin (4,275 cases and 9% of reported cancers).

Table 2.1: The five most commonly diagnosed cancers[a], females, 2006

Cancer type (ICD-10 codes[b])	Number of cases	Per cent of all cancer cases	Age-standardised rate[c]	95% confidence interval
Breast (C50)	12,614	27.7	112.4	110.4–114.4
Bowel (C18–C20)	6,159	13.5	52.1	50.8–53.4
Melanoma of skin (C43)	4,275	9.4	38.2	37.1–39.4
Lung (C33–C34)	3,533	7.8	30.3	29.3–31.3
Lymphoma (C81–C85, C96)	1,961	4.3	17.2	16.4–18.0
All cancers[d]	**45,534**	**100.0**	**396.3**	**392.6–400.0**

(a) Excluding basal and squamous cell carcinomas of the skin.

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

(c) Standardised to the Australian population as at 30 June 2001 and expressed per 100,000 females.

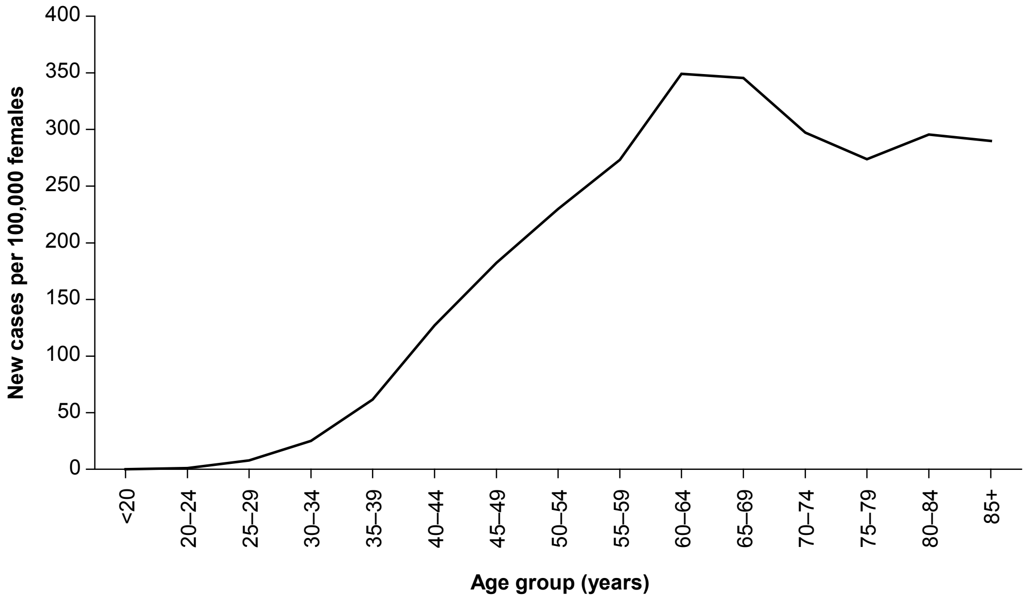
(d) Includes cancers coded in ICD-10 as C00–C97, D45, D46, D47.1 and D47.3 with the exception of those C44 codes which indicate a basal or squamous cell carcinoma of the skin.

Source: Australian Cancer Database, AIHW.

The age-standardised rate of breast cancer incidence stood at 112 (per 100,000 females) in 2006. The corresponding rate was 52 for bowel cancer and 38 for melanoma of the skin.

Differences by age

Differences by age in breast cancer incidence rates for women are shown in Figure 2.1. In 2006, the breast cancer incidence rate increased steadily and significantly for each female age group until the age of 60 to 64 years, where incidence was highest at 349 new cases per 100,000 women. While the incidence rate for women aged 65 to 69 years was not significantly



Note: The data for this figure are shown in Appendix Table D2.1.

Source: Australian Cancer Database, AIHW.

Figure 2.1: Incidence of breast cancer by age at diagnosis, females, 2006

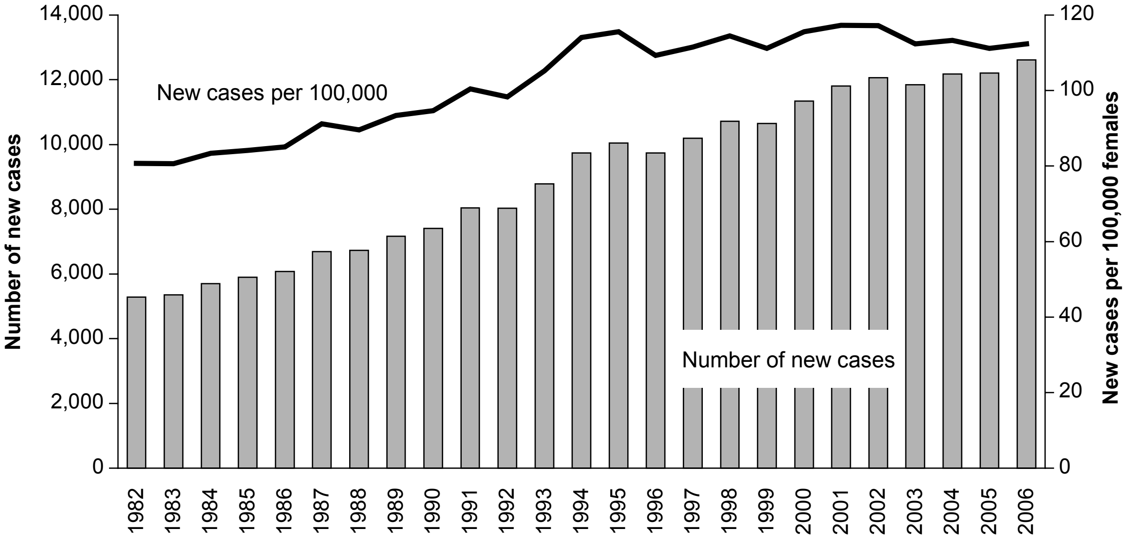
different from that of the 60 to 64 year olds, the rates for women aged 70 years and over were somewhat lower and significantly so. At least part of the reason for the lack of a further age-related increase in the detection of breast cancers among females aged 70 years and over would be the lower participation rate of these women in the BreastScreen Australia Program (see Chapter 7).

Overall, in 2006, more than two in three (69%) breast cancers in women were diagnosed in those aged 40 to 69 years, while one in four (25%) were diagnosed in those aged 70 and over.

Trends

The number of new breast cancer cases in women has more than doubled over the 25-year period from 1982 (the year in which national incidence data were first available) to 2006 (Figure 2.2). In 1982, 5,289 new cases of breast cancer were diagnosed among Australian women compared with 12,614 cases in 2006. In addition, the number of cases diagnosed in 2006 was 3% higher than the number diagnosed in the previous year (12,213 cases) and is the largest number of new breast cancer cases in women reported in any year to date.

The share of all cancers (excluding basal and squamous cell carcinomas of the skin) that were breast cancers also increased for women over the years—in 1982, 24% of reported cancers were breast cancers compared with 28% in 2006 (Appendix Table D2.2).



Notes

1. The rates were age-standardised to the Australian population as at 30 June 2001.
2. The data for this figure are shown in Appendix Table D2.2.

Source: Australian Cancer Database, AIHW.

Figure 2.2: Incidence of breast cancer, females, 1982 to 2006

The age-standardised incidence rate of new breast cancer cases was 81 per 100,000 females in 1982. It increased in the following years and reached 116 per 100,000 females in 1995. Somewhat lower rates were seen in the remainder of the 1990s but, by 2001, the rate peaked at 117 new cases per 100,000 women with that same rate observed for 2002 as well. From 2003 to 2006, the rates levelled off at a somewhat lower level than seen in the previous 2 years (between 111 and 113 cases per 100,000 women) and no statistically significant differences in the rates for those 4 years were observed. These trend data indicate that while the absolute number of new cases of breast cancer is tending to increase from year to year, much of the increase over the last 10 years was due to changes in the age and size of the population.

Trends by age and possible screening effects

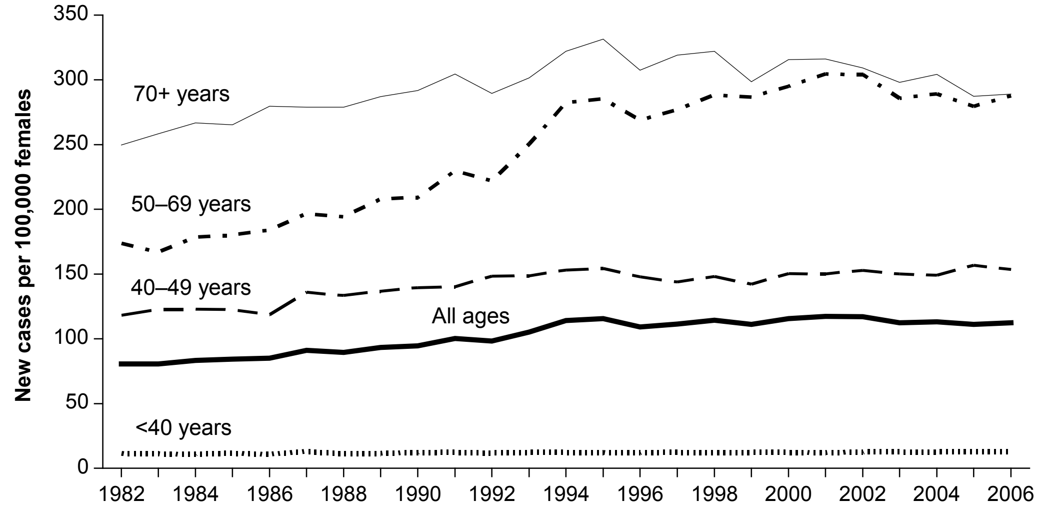
In Australia, women aged 40 years and over are eligible for free screening mammograms through the BreastScreen Australia Program, with those aged 50 to 69 years constituting the target age group (see Chapter 7). As mentioned earlier, the recorded incidence of breast cancer can be influenced by the extent of participation of women in population-based mammographic screening programs. In particular, the number of new cases of breast cancer found in females increases in the years directly following the start of screening. A major contributor to this would have been the increased diagnosis of small tumours that, without screening, would not have been found until they became larger. The number of these small tumours, in addition to the number of larger tumours that would have been found irrespective of screening, lead to an elevated number of diagnosed cancers. It is expected that this elevation would be temporary. In time, the incidence of diagnosed cancers would be expected to decrease towards the level that would have been expected had population-based screening not been undertaken.

Pinpointing a specific year when the effect of mammographic screening might have first had a substantial influence on national breast cancer incidence rates is not straightforward. Although the provision of screening mammograms through BreastScreen Australia has been coordinated as a national program since 1991, the screening programs themselves commenced in each state and territory at a different date, ranging from 1989 (in Western Australia and South Australia) to 1994 (in the Northern Territory) (AIHW 1998). Also, the dates at which full geographical coverage was achieved in various jurisdictions differed; for example, state-wide coverage in New South Wales first occurred in 1995 (Chiu et al. 2006).

While it is difficult to specify a particular year when the effect of screening mammography might first be seen at the national level, one would expect the effect to have begun during the early 1990s. The data in Figure 2.3 correspond with this expectation. For women aged 50 to 69 years, a smaller rise in incidence rates during the 1980s was followed by a much steeper rise between 1992 and 1995. After that time, the increase in incidence rates for this age category was less steep and between 2002 and 2006, it declined from 304 to 288 per 100,000 women.

While a steep increase in incidence rates in the early- to mid-1990s was also observed for women aged 70 years and over, after that time the rates tended to level off and, in more recent years, to decrease. In addition, consistently from 2001 to 2006, the rate of new cases of breast cancer for women aged 70 years and over did not differ significantly from the rate for women aged 50 to 69 years. This contrasts with the situation in the 1980s and early 1990s when the incidence rate of breast cancers for older women was substantially higher than that for those aged 50 to 69 years.

Unlike that observed for other women, no decrease in the incidence rate is seen for women aged 40 to 49 years and for those aged less than 40 years. Instead, for those under the age of 40 years, the number of new cases of breast cancer remained between 11 and 13 per 100,000 women for the entire 25-year period considered. For those aged 40 to 49 years, the incidence rate has increased moderately but fairly steadily over the years, from 118 per 100,000 women in 1982 to 154 per 100,000 in 2006.



Notes

1. The rates were age-standardised to the Australian population as at 30 June 2001.
2. The data for this figure are shown in Appendix Table D2.3.

Source: Australian Cancer Database, AIHW.

Figure 2.3: Incidence of breast cancer by age at diagnosis, females, 1982 to 2006

Risk of breast cancer and average age at diagnosis

Table 2.2 shows the risk of an Australian woman being diagnosed with breast cancer by the age of 75 years and then by the age of 85 years (see Appendix B for an explanation of how these risks were calculated). Based on data for 2006, the risk that a woman would be diagnosed with breast cancer before the age of 75 years was calculated to be 1 in 11 and, before the age of 85 years, 1 in 9. This is higher than the risk of being diagnosed with breast cancer in the 1980s. For example, based on 1982 data, the risk of a woman being diagnosed with breast cancer was calculated to be 1 in 16 by the age of 75 years and 1 in 12 by the age of 85 years.

Table 2.2 also indicates the mean and median age at first diagnosis. Throughout the 25-year period for which national data are available, the mean age at first diagnosis has been stable at approximately 60 years.

Projections

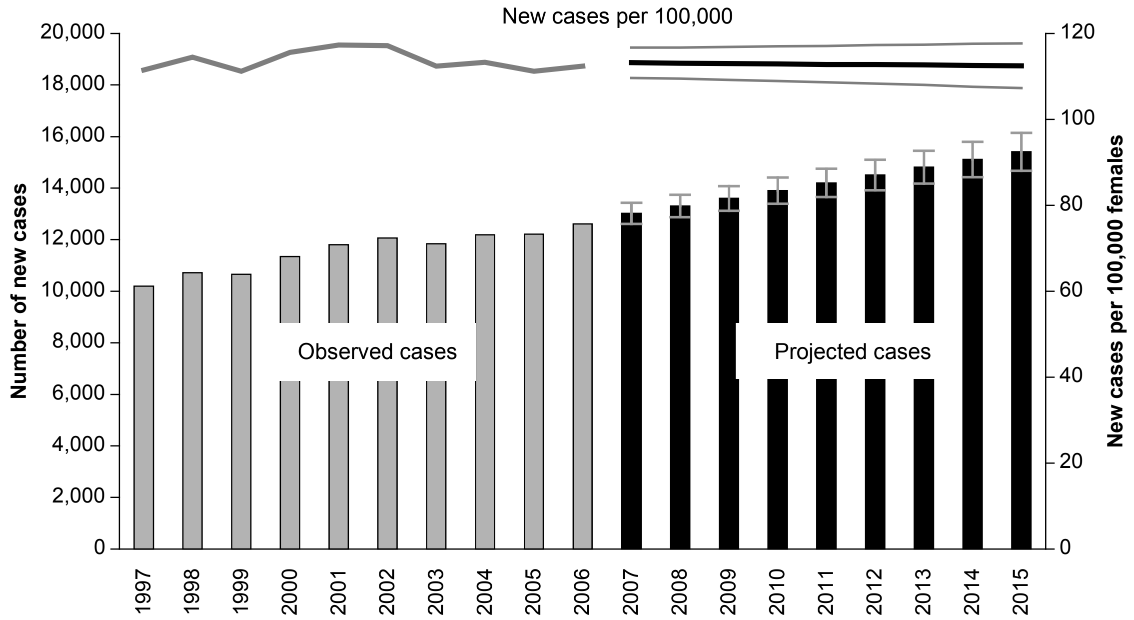
To estimate the incidence of breast cancer in women during 2007 to 2015, data on the number of new cases of breast cancer diagnosed in females over the 10-year period from 1997 to 2006 were extrapolated (see Appendix B for further details on the methodology used). This estimation approach assumes that the trends in breast cancer incidence during that 10-year period will continue to 2015. Since it is impossible to anticipate and quantify future developments that might cause a change in incidence, these projections should be interpreted as only indicative of future trends. Note also that there is greater margin of error surrounding the projections for the later years than the earlier years.

Table 2.2: Risk and average age at diagnosis of breast cancer, females, 1982 to 2006

Year	Risk to age 75 years	Risk to age 85 years	Mean age at first diagnosis	Median age at first diagnosis
1982	1 in 16	1 in 12	59.7	60.0
1983	1 in 16	1 in 12	59.9	60.0
1984	1 in 16	1 in 11	60.1	60.0
1985	1 in 16	1 in 11	60.1	61.0
1986	1 in 15	1 in 11	60.6	61.0
1987	1 in 15	1 in 10	59.9	60.0
1988	1 in 15	1 in 11	60.0	61.0
1989	1 in 14	1 in 10	60.1	61.0
1990	1 in 14	1 in 10	60.0	60.0
1991	1 in 13	1 in 9	60.1	60.0
1992	1 in 13	1 in 10	59.9	59.0
1993	1 in 12	1 in 9	59.8	60.0
1994	1 in 11	1 in 8	60.1	60.0
1995	1 in 11	1 in 8	60.1	59.0
1996	1 in 12	1 in 9	60.0	59.0
1997	1 in 11	1 in 9	60.2	59.0
1998	1 in 11	1 in 8	60.1	59.0
1999	1 in 11	1 in 9	60.0	59.0
2000	1 in 11	1 in 8	60.1	59.0
2001	1 in 11	1 in 8	60.2	59.0
2002	1 in 11	1 in 8	60.1	59.0
2003	1 in 11	1 in 9	60.1	59.0
2004	1 in 11	1 in 9	60.2	59.0
2005	1 in 11	1 in 9	59.9	59.0
2006	1 in 11	1 in 9	60.1	59.0

Source: Australian Cancer Database, AIHW.

Due to ageing of the population, the number of women diagnosed with breast cancer is expected to increase in the future (Figure 2.4). By 2015, the number of new breast cancer cases among women is projected to be 22% higher than in 2006, with an estimated 15,409 women expected to be diagnosed with breast cancer. This equates to an estimated 42 women in Australia being diagnosed with breast cancer every day in 2015. The projected increase in the number of women diagnosed with breast cancer has important implications not only for women and the broader community, but also for the health system's capacity to provide the health services required.



Notes

1. The projections are based on breast cancer incidence data for females for 1997 to 2006.
2. The rates were age-standardised to the Australian population as at 30 June 2001.
3. For the years 2007 to 2015, grey lines around the age-standardised rate indicate the 95% prediction intervals.
4. The data for this figure are shown in Appendix Tables D2.2 and D2.4.

Source: Australian Cancer Database, AIHW.

Figure 2.4: Incidence of breast cancer, females, observed for 1997 to 2006, projected for 2007 to 2015

Figure 2.4 also indicates the projected age-standardised rate for new breast cancer cases in women from 2007 to 2015. When expected changes in the age structure and size of the population are taken into account, the results suggest that the rate at which new breast cancer cases are diagnosed will remain fairly stable through to 2015, at about 113 new cases per 100,000 women.

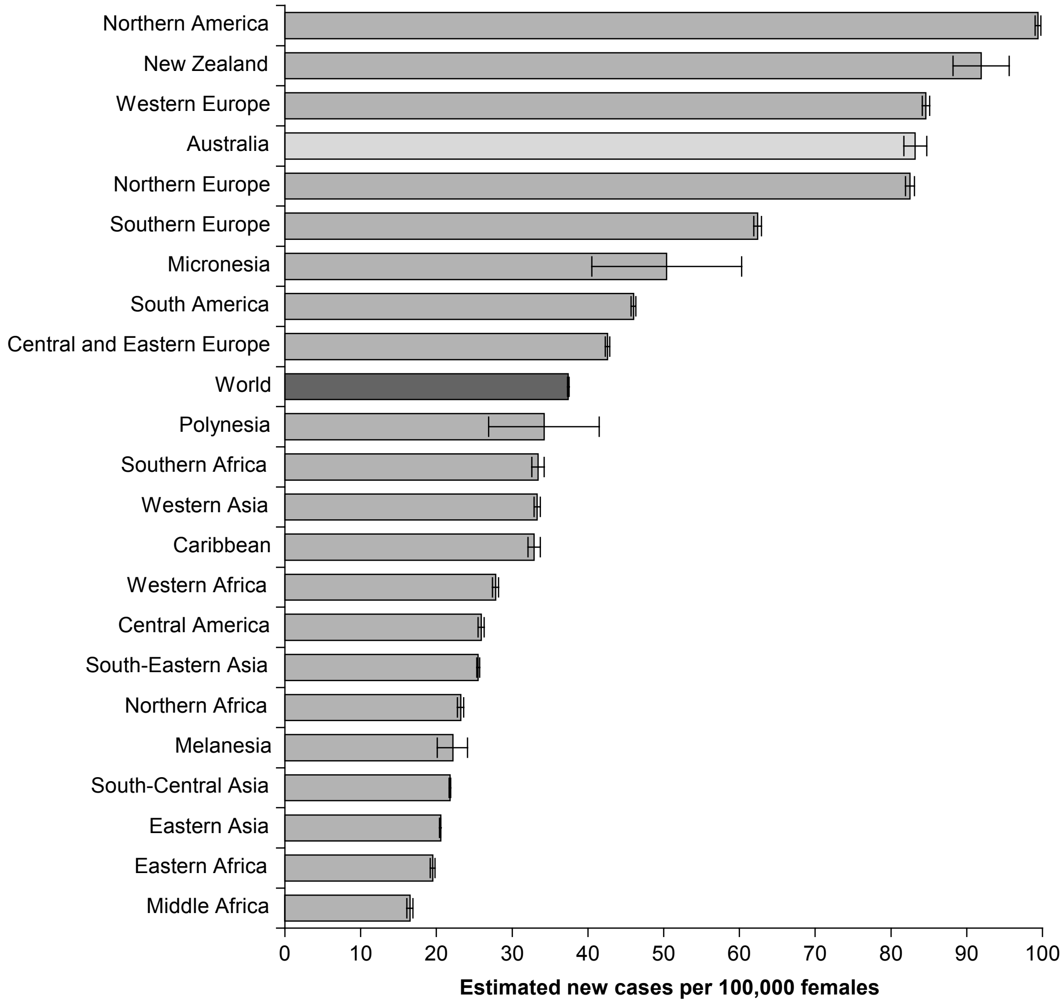
International comparisons

In this section, data on the incidence of breast cancer in women in Australia compared with corresponding data for women in other countries are shown. As discussed in Chapter 1, caution must be taken when comparing data from different countries since observed differences in incidence rates may be due to a range of methodological factors, not just differences in the underlying incidence rates. One of the main sources of internationally comparable data on cancer is the GLOBOCAN database which is prepared by the International Agency for Research on Cancer (IARC) (Ferlay et al. 2004). The IARC collates cancer incidence and mortality data from cancer registries around the world and uses those data to produce estimates for a 'common year'. The most recent GLOBOCAN estimates for which data could be obtained are for 2002, with these estimates based on data from approximately 3 to 5 years earlier.

Figure 2.5 shows the estimated incidence rates of breast cancer around the world by region, and for Australia and New Zealand. The estimated age-standardised rate of breast cancer for

Australian women (83 new cases per 100,000 women) was significantly lower than the rate estimated for Northern America women (99 per 100,000 women) and New Zealand women (92 per 100,000 women), but it was generally at the same level as that estimated for women in the Western European and Northern European regions (85 and 83 per 100,000 women, respectively). Australia's rate was significantly higher than that estimated for women in regions such as Southern Europe (62 per 100,000 women) and Central and Eastern Europe (43 per 100,000 women), as well as each of the African and Asian regions.

A number of factors could explain the international differences in breast cancer incidence rates including differences in genetic susceptibility, reproductive patterns, lifestyle (e.g. diet and physical activity), obesity levels, screening intensity and use of hormone replacement therapy (CCS & NCIC 2007; Hulka & Moorman 2008), as well as differences in diagnostic procedures and completeness of cancer registration.



Notes

1. The data were estimated for 2002 and are based on data from approximately 3 to 5 years earlier.
2. The rates were age-standardised using the World Health Organization 2000 World Standard Population. The confidence intervals (as shown by the error bars) are approximations (see Appendix B).
3. The data for this figure are shown in Appendix Table D2.5.

Source: Ferlay et al. 2004.

Figure 2.5: International comparison of estimated incidence of breast cancer, females, 2002

Type of breast cancer

The type (or histology) of breast cancer refers to the kind of breast cancer a woman had when diagnosed. For the purposes of this report, histology types of breast cancer were categorised into nine groups (Table 2.3). The histology types included in each group were determined by National Breast and Ovarian Cancer Centre (NBOCC) and are listed in Appendix Table D2.6.

Table 2.3: Incidence of breast cancer and average age at diagnosis by type of breast cancer[(a)], females, 2006

Type of breast cancer[(a)]	Number of cases	Per cent of total breast cancers	Mean age at diagnosis	Median age at diagnosis
Group 1: Invasive ductal carcinoma	9,933	78.7	59.0	58.0
Group 2: Invasive lobular carcinoma	1,354	10.7	62.2	62.0
Group 3: Medullary carcinoma and atypical medullary carcinoma	49	0.4	51.4	50.0
Group 4: Tubular carcinoma and invasive cribriform carcinoma	193	1.5	58.5	57.0
Group 5: Mucinous carcinoma	235	1.9	66.7	68.0
Group 6: Invasive papillary carcinoma	58	0.5	66.7	68.0
Group 7: Inflammatory carcinoma	9	0.1	58.1	55.0
Group 8: Other—specified	269	2.1	63.4	63.0
Group 9: Unspecified	514	4.1	71.6	76.0
Total	**12,614**	**100.0**	**60.1**	**59.0**

(a) Appendix Table D2.6 provides a list of the histology types included in each group.

Source: Australian Cancer Database, AIHW.

In 2006, over three-quarters (79% or 9,933 cases) of newly diagnosed breast cancers in women were in 'Group 1: Invasive ductal carcinoma'. Of these, most (9,414 cases) were *infiltrating duct carcinoma* (i.e. tumours originated in the ducts). For 1 in 10 cases (11% or 1,354 cases), the breast cancers were in 'Group 2: Invasive lobular carcinoma' (i.e. tumours originated in lobes). A further 4% of cases (514 cases) were diagnosed with an unspecified type of breast cancer (Group 9).

Table 2.3 also shows the mean and median age at diagnosis by histology type. Women with breast cancers classified as 'Group 3: Medullary carcinoma and atypical medullary carcinoma' had the lowest mean age (51 years compared with the overall average of 60 years). Meanwhile, the mean age for those with an unspecified type of breast cancer (i.e. Group 9) had the highest mean age of 72 years.

Anatomical location

In jurisdictions other than Victoria, South Australia and the Northern Territory, data are collected on anatomical location of the breast cancer. The level of missing information in these data is very high (34%) and caution should be exercised in data interpretation.

As shown in Table 2.4, in the five states and territories for which data were available, the most frequently recorded anatomical location of the breast cancer in 2006 was 'upper-outer quadrant of breast' (28%), followed by 'upper-inner quadrant of breast' (11%).

Table 2.4: Incidence of breast cancer by anatomical location, New South Wales, Queensland, Western Australia, Tasmania and Australian Capital Territory[(a)], females, 2006

Anatomical location	Number of cases	Per cent
Upper-outer quadrant of breast	2,303	27.6
Upper-inner quadrant of breast	885	10.6
Overlapping lesion of breast	732	8.8
Lower-outer quadrant of breast	610	7.3
Central portion of breast	397	4.8
Lower-inner quadrant of breast	394	4.7
Nipple and areola	118	1.4
Axillary tail of breast	36	0.4
Unspecified	2,868	34.4
Total	**8,343**	**100.0**

(a) Data were not available for Victoria, South Australia and the Northern Territory.

Source: Australian Cancer Database, AIHW.

Incidence by stage at diagnosis

Stage refers to the extent or spread of the breast cancer at diagnosis. Staging information is essential in determining prognosis, the most appropriate treatment and the effectiveness of screening programs.

A number of different staging systems are used to classify breast cancer tumours. The TNM staging system is frequently used in clinical settings. This system makes use of information on the size of the primary tumour (T), lymph node involvement (N) and the absence or presence of distant metastases (M) to assign a value to invasive breast cancers ranging from stage I (early disease) to stage IV (advanced disease).

A simpler system for staging breast cancers is the Surveillance Epidemiology End Results (SEER) Summary Stage system (or 'summary stage' system for short). This system is used more commonly in reporting staging information to cancer registries. It has three categories that indicate the extent of spread of breast cancer at diagnosis, i.e. local (when the tumour is confined to the breast); regional (the tumour has spread to surrounding tissue or nearby lymph nodes); and distant (the tumour has spread to distant organs) (ACS 2007; Tracey et al. 2006).

There is currently no national requirement for the collection of data on stage and not all states and territories collect this information; thus, no national data on the staging of breast cancer are available. However, Queensland and New South Wales both collect staging information and data from these states are described below.

Queensland data on the incidence of female breast cancer by stage are presented in Table 2.5. These data are based on the TNM staging system of classifying the stage of tumours. Since the Queensland Cancer Registry does not collect complete information on stage (e.g. information on the presence of metastases was incomplete), the Queensland measure is a proxy measure of TNM staging (Youlden et al. 2009). During 2002 to 2006, almost half (47%) of the breast cancer cases in women in Queensland were diagnosed at an early stage (stage I), while 45% were diagnosed at later stages (stages II to IV). The stage of diagnosis was unknown in 7% of Queensland cases.

Table 2.5: Incidence of breast cancer by stage[(a)] and age at diagnosis, females, Queensland, 2002–2006

	Age group (%)					All ages	
Stage at diagnosis[(a)]	**<40 years**	**40–49 years**	**50–69 years**	**70–79 years**	**80+ years**	**Per cent**	**Average annual number of cases**
Stage I	34	43	53	53	29	47	1,101
Stages II, III and IV	61	53	43	39	42	45	1,053
Unknown	4	4	5	8	29	7	167
Total	**100**	**100**	**100**	**100**	**100**	**100**	**2,321**

(a) Based on an approximation of the TNM staging system. Stage I tumours are defined as 'tumours of not more than 20 mm diameter, with no evidence of lymph node involvement or distant metastases'; Stage II to IV tumours are defined as 'cancers larger than 20 mm diameter, and/or evidence of spread to lymph nodes; or distant metastases' (Youlden et al. 2009:53).

Source: Youlden et al. 2009 and personal communication from Queensland Cancer Registry.

Table 2.5 also shows that when breast cancer was diagnosed in women under the age of 40 years, the tumour was likely to be at a more advanced stage than for other women. Specifically, data for 2002 to 2006 indicate that in Queensland, 6 out of 10 (61%) breast cancers diagnosed among women aged less than 40 years were stages II to IV tumours compared with about 40% of breast cancers diagnosed among women aged 50 and above.

The Queensland data also indicate a clear difference by age in terms of the proportion of women for which the stage was unknown. While, overall, the stage at diagnosis was unknown for 7% of cases, stage was unknown for almost one in three (29%) cases of those aged 80 years or over. This difference may be due to a number of factors including advanced comorbidity at the time of diagnosis, frailty of the person due to age or other factors leading to a less comprehensive investigation of the tumour stage among those in the oldest age range.

Data for New South Wales, which is based on the summary stage system, are shown in Table 2.6. These data pertain to the 1995 to 2004 period and include all cases of breast cancer (i.e.

Table 2.6: Incidence of breast cancer by stage at diagnosis[(a)], New South Wales, 1995–2004 and United States of America, 1996–2004[(b)]

Stage at diagnosis[(a)]	**New South Wales (%)**	**United States of America[(c)] (%)**
Localised	53	61
Regional	32	31
Distant	4	6
Unknown	11	2
Total	**100**	**100**

(a) Based on the 'SEER Summary Stage' system of classifying the stage at diagnosis. Briefly, localised tumours are those that were confined to the breast; regional tumours are those that had spread to surrounding tissue or nearby lymph nodes; and distant tumours had spread to distant organs (see Tracey et al. 2006:128 & Ries et al. 2008:O-19).

(b) The NSW data pertain to both males and females since separate data for females were not available. The USA data pertain to females only.

(c) Data are from the 'SEER 17' areas which cover approximately a quarter of the USA (see Table IV-10 in Ries et al. 2008).

Source: Tracey et al. 2006; Ries et al. 2008.

for both males and females). However, it is expected that the findings for females would be very similar to the data shown due to the high proportion of all breast cancers found in females. Data from 17 cancer registries in the United States of America (USA) for 1996 to 2004 are also shown as a point of comparison; these data apply to females.

Both sets of data suggest that the majority of breast cancer cases were diagnosed when the cancer was still localised (53% in the NSW data and 61% in the USA data), while approximately a third were regional and about 1 in 20 were distant at the time of diagnosis. The stage of the breast cancer at diagnosis was unknown in 11% of NSW cases and 2% of USA cases. When only those cases for which the stage at diagnosis was known are considered, the proportion of breast cancer cases which were localised was 60% for NSW and 62% for the USA.

Differences across groups

Thus far in this chapter, the incidence of breast cancer in females has been examined for all women combined as well as by age. In this section, data are provided according to geographical area, socioeconomic status, Aboriginal and Torres Strait Islander status and country of birth. In order to take into account differences in the age structures and the size of the groups compared, age-standardised rates are provided for each of the comparisons. The data are presented for the 5-year period of 2002 to 2006 rather than for just 1 year since presenting the data for multiple years reduces random variation in the data. This is especially important for comparisons of small subgroups (e.g. Indigenous women or women in smaller states and territories).

Observed differences by the characteristics examined in this section may result from a number of factors including variation in:

- population characteristics (e.g. a relatively greater proportion of Indigenous women live in remote areas)
- the prevalence of risk factors (e.g. obesity and reproductive patterns)
- participation rates in screening mammography programs
- the availability of diagnostic services.

Differences by geographical area

As expected, there is a clear relationship between the size of the jurisdiction and the average number of breast cancer cases diagnosed annually in 2002 to 2006, such that the largest number of cases were diagnosed in New South Wales (4,101 cases) and the smallest number in the Northern Territory (59 cases) (Table 2.7).

When the age-standardised incidence rates for 2002 to 2006 are considered, the two territories stand out. The incidence rate of breast cancer for women was significantly higher in the Australian Capital Territory (129 new cases per 100,000 women) than in the other states and territories. In contrast, the Northern Territory had a significantly lower rate (83 per 100,000 women), which may be due, at least in part, to the higher proportion of Aboriginal and Torres Strait Islander women residing in the Northern Territory.

Table 2.7: Incidence of breast cancer by state and territory, females, 2002–2006

State or territory	Average annual number of cases[(a)]	Age-standardised rate[(b)]	95% confidence interval
New South Wales	4,101	113.1	111.5–114.6
Victoria	3,009	111.4	109.6–113.2
Queensland	2,304	114.6	112.5–116.7
Western Australia	1,168	114.9	111.9–117.9
South Australia	1,022	113.5	110.4–116.7
Tasmania	317	114.8	109.2–120.6
Australian Capital Territory	204	129.2	121.3–137.4
Northern Territory	59	83.3	72.7–94.8
Total	**12,185**	**113.2**	**112.3–114.2**

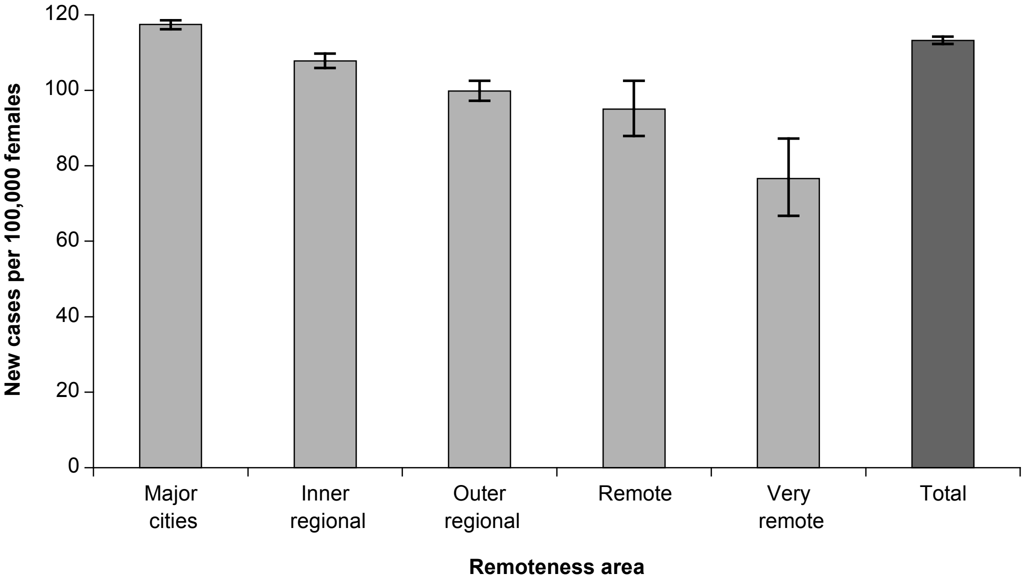
(a) Numbers may not sum to the total due to rounding.

(b) Standardised to the Australian population as at 30 June 2001 and expressed per 100,000 females.

Source: Australian Cancer Database, AIHW.

People living in more inaccessible regions of Australia are often disadvantaged regarding access to goods and services (including primary health-care services), income, educational and employment opportunities and, in some instances, access to basic amenities, such as clean water and fresh food (AIHW 2008a). To compare incidence rates according to level of remoteness of the area in which the women lived, the Australian Standard Geographical Classification Remoteness Area classification (ABS 2001) was used to assign areas across Australia to a remoteness category. This classification divides all areas of Australia into five categories—namely, *Major cities*, *Inner regional*, *Outer regional*, *Remote* and *Very remote* (AIHW 2004).

As shown in Figure 2.6, women living in more urbanised areas at the time of diagnosis had higher age-standardised incidence rates of breast cancer, while those in more remote areas had lower rates. Specifically, during 2002 to 2006, the incidence rate of breast cancer for women was significantly higher in *Major cities* (117 new cases per 100,000 women) than in all other areas. The second highest incidence rate applied to those in *Inner regional* areas (108 per 100,000 women), with this rate being significantly higher than the rates for those living in each of the less urbanised areas. In contrast, the incidence rate was 77 (per 100,000 women) in *Very remote* areas, which was significantly lower than for other areas. This difference may be related to a number of factors including lower rates of mammographic screening in *Very remote* regions (see Chapter 7), the higher proportion of Indigenous women living in *Remote* and *Very remote* areas, and differential rates of access to diagnostic and other health services in remoter areas.



Notes

1. Remoteness area was measured using the Australian Standard Geographical Classification Remoteness Area classification.
2. The rates were age-standardised to the Australian population as at 30 June 2001.
3. The data for this figure are shown in Appendix Table D2.7.
4. The 'Total' column includes cases for which information on remoteness area was not available.

Source: Australian Cancer Database, AIHW.

Figure 2.6: Incidence of breast cancer by remoteness area, females, 2002–2006

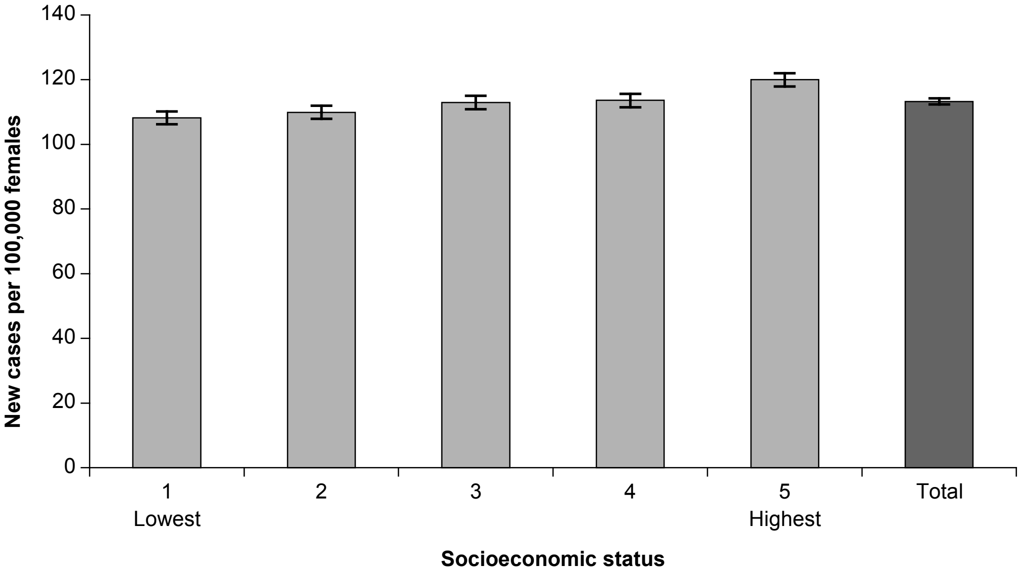
Differences by socioeconomic status

It is well established those of lower socioeconomic status have a higher overall risk of cancer. Socioeconomic status is associated with access to health services, material resources and educational opportunities. Furthermore, persons of lower socioeconomic status are more likely to have higher levels of cancer risk factors, including physical inactivity, tobacco use and poorer diet (ACS 2008). In regard to breast cancer, though, research suggests that a higher socioeconomic status is associated with higher breast cancer incidence (AIHW & NBCC 2006). This may be explained, at least to some degree, by differences in fertility and reproductive patterns by socioeconomic status.

In this report, the Index of Relative Socio-economic Disadvantage (IRSD) is used to indicate socioeconomic status. This index is one of four Socio-Economic Indexes for Areas (SEIFAs) developed by the Australian Bureau of Statistics (ABS 2008a). It is based on factors such as average household income, education levels and unemployment rates. Note that the IRSD is an area-based measure of socioeconomic status—rather than a person-based measure—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, 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 and the fifth group corresponds to the 20% of the population with the highest socioeconomic status.

In the 2002 to 2006 period, women living in areas with the highest socioeconomic status (i.e. group '5') had a significantly higher incidence rate of breast cancer (120 new cases per

100,000 women) than women living in other areas (Figure 2.7). Meanwhile, those living in areas with the lowest socioeconomic status had the lowest rate (108 per 100,000 women), although this rate was not significantly different from that observed for those in the second group. Incidence rates for the middle three socioeconomic status groups were not significantly different from each other. Overall, these data suggest that the largest contrast in breast cancer incidence is found between women living in areas with the highest socioeconomic status and the remainder, with the differences between those in the lowest and middle socioeconomic status groups being less obvious.



Notes

1. Socioeconomic status was measured using the ABS Socio-Economic Index for Areas (SEIFA) Index of Relative Socio-economic Disadvantage.
2. The rates were age-standardised to the Australian population as at 30 June 2001.
3. The data for this figure are shown in Appendix Table D2.8.
4. The 'Total' column includes cases for which information on socioeconomic status was not available.

Source: Australian Cancer Database, AIHW.

Figure 2.7: Incidence of breast cancer by socioeconomic status, females, 2002–2006

Differences by Aboriginal and Torres Strait Islander status

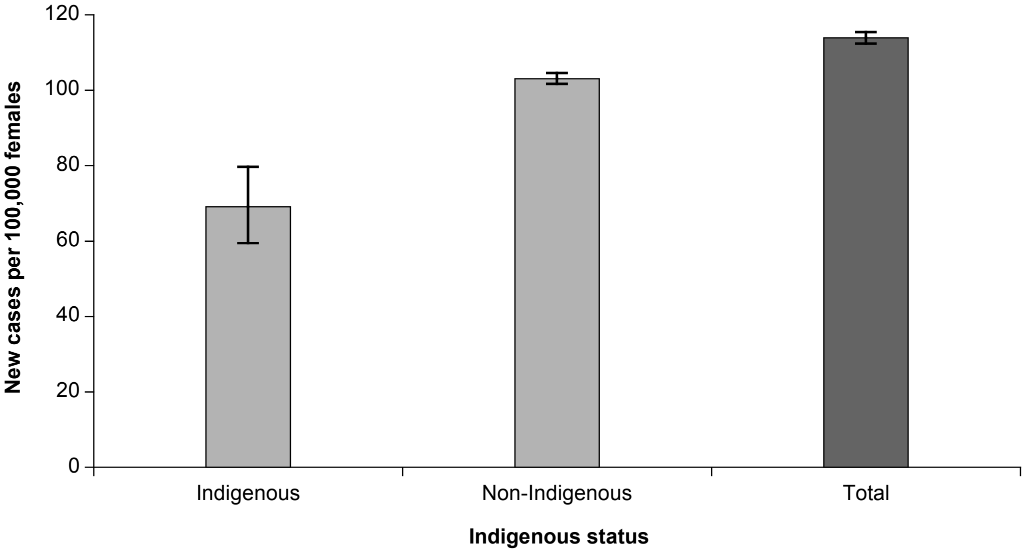
Across a range of health-related and socioeconomic indicators, Aboriginal and Torres Strait Islander peoples are disadvantaged relative to other Australians (ABS & AIHW 2008). They are also more likely to live in remote areas of Australia and to have a relatively young age structure, with a median age of 21 years compared with 37 years for the non-Indigenous population. This age difference is believed to be largely due to higher rates of fertility as well as deaths occurring at younger ages among the Indigenous population (ABS & AIHW 2008).

Several studies at the state and territory level have found that Indigenous women are relatively less likely than non-Indigenous women to be diagnosed with breast cancer. For example, a study pertaining to women in the Northern Territory found that Indigenous women were half as likely as non-Indigenous women to be diagnosed with breast cancer (Cunningham et al. 2008); another study led to a similar conclusion with regard to Indigenous women in South Australia (Roder 2007).

Reliable data on the incidence of cancer for Indigenous women are not available. While all of the state and territory cancer registries collect Indigenous status information, the quality of the data in some areas is insufficient for analysis. In this report, data for four states and territories—Queensland, Western Australia, South Australia and the Northern Territory—are used to compare breast cancer incidence by Indigenous status. Note that even for these jurisdictions, the level of missing data on Indigenous status is about 10%.

An average of 47 Indigenous women in Queensland, Western Australia, South Australia and the Northern Territory were diagnosed with breast cancer each year in the 2002 to 2006 period, making breast cancer the most common reportable cancer in Indigenous women in these four jurisdictions. The second most common reportable cancer was lung cancer (average of 27 cases per year), followed by bowel cancer (20 cases) and cervical cancer (17 cases).

When the age-standardised incidence rates in the four jurisdictions are compared, the results are similar to those of earlier state-based studies. That is, Indigenous women in Queensland, Western Australia, South Australia and the Northern Territory were significantly less likely to be diagnosed with breast cancer than their non-Indigenous counterparts (69 and 103 per 100,000, respectively) (Figure 2.8). This difference may be explained, at least in part, by the fact that Indigenous women are, on average, more likely than other Australian women to have children at a younger age and to have more pregnancies (ABS & AIHW 2008) which may help to protect Indigenous women against breast cancer (Roder 2005). Indigenous women are also significantly less likely than other women to have a screening mammogram (as discussed in Chapter 7).



Notes

1. The rates were age-standardised to the Australian population as at 30 June 2001.
2. The data for this figure are shown in Appendix Table D2.9.
3. The 'Total' column includes cases for which information on Indigenous status was not available.

Source: Australian Cancer Database, AIHW.

Figure 2.8: Incidence of breast cancer by Indigenous status, females, Queensland, Western Australia, South Australia and the Northern Territory, 2002–2006

A similar pattern by Indigenous status is observed in the United States of America; data for 2000 to 2004 indicate that American Indian and Alaskan native women had approximately half the incidence rate of breast cancer than their 'white' counterparts (ACS 2008). However, this same pattern is not observed in New Zealand Māori women who had a higher rate of breast cancer incidence than other New Zealand women—102 and 91 per 100,000 women, respectively, in 2005 (NZ Ministry of Health 2009).

Differences by country of birth

Australia has one of the largest proportions of immigrant populations in the world; it was home to 4.4 million overseas-born people in 2006, and one in four (25%) residents were born outside of the country (ABS 2009a). Research has found that most migrants are at least as healthy, if not more so, than the Australian-born population. This 'healthy migrant effect' is believed to result from two main factors: a self-selection process in which those people who are physically and economically able to migrate are the ones who do; and government eligibility criteria for migrants based on health, education, language and job skills (AIHW 2008a). Research has shown that this migrant health advantage decreases over time, with the diminishing of the advantage in relation to breast cancer incidence emerging as soon as 10 years after migration in some migrant groups (Ziegler 1993).

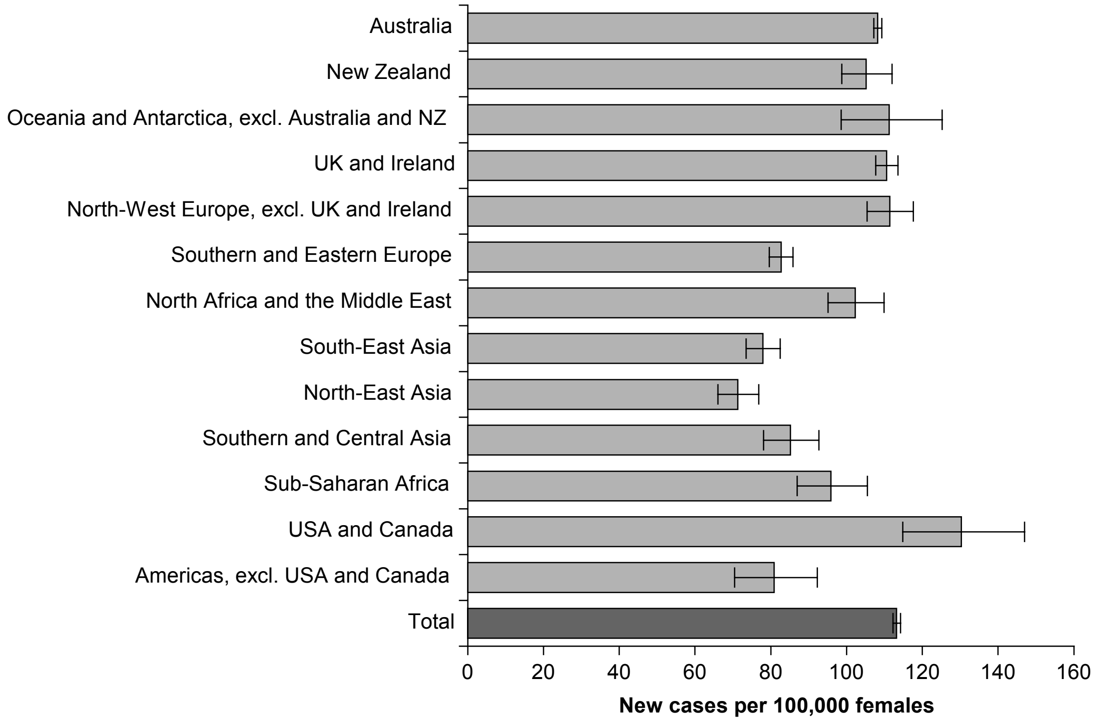
Furthermore, immigrants are more likely than Australian-born people to live in urban areas (ABS 2009a); this provides immigrants with relatively easier access to health-care services. At the same time, though, language and cultural barriers may mean that some immigrants are less likely or able to access available services. This is supported by the observation that women whose main language spoken at home was not English were significantly less likely than other women to participate in screening mammography programs (see Chapter 7). Thus cancer detection rates may be lower in these women.

In the earlier edition of this report (AIHW & NBCC 2006), data on breast cancer incidence by country of birth were only available for New South Wales, whereas in this edition, national data are provided. Note that these data do not take into account the length of time the immigrants lived in Australia although it is well known that some groups—for instance, people from Asia—tend to be more recent immigrants, while people from many European countries have been in Australia for a longer period of time (ABS 2009a). Note also that for 8% of cases, information on the woman's country of birth was not available.

The highest age-standardised rate was observed for cases in which the women were born in the United States of America and Canada (130 new cases per 100,000 females) and this rate was significantly higher than that observed for Australian-born women (108 per 100,000 females) (Figure 2.9). Women born in North-East Asia had a relatively low breast cancer incidence rate (71 per 100,000 females), as did those born in South-East Asia (78 per 100,000 females) and Southern and Eastern Europe (83 per 100,000 females); these rates were significantly lower than the rate for Australian-born women.

Incidence of ductal carcinoma in situ in females

Ductal carcinoma in situ (DCIS) is a non-invasive tumour of the breast contained within the cells lining the ducts. As noted in Chapter 1, it is thought that invasive breast cancer may start as DCIS. Monitoring how the number of DCIS cases changes over time is of particular interest in terms of assessing effects of interventions. One would expect to see a relatively larger number of in situ cases where there has been an increase in early detection, as well as



Notes

1. Country of birth is classified according to the Standard Australian Classification of Countries, 2nd edition (ABS 2008c).
2. The rates were age-standardised to the Australian population as at 30 June 2001.
3. The data for this figure are shown in Appendix Table D2.10.
4. The 'Total' category includes cases for which information on country of birth was not available.

Source: Australian Cancer Database, AIHW.

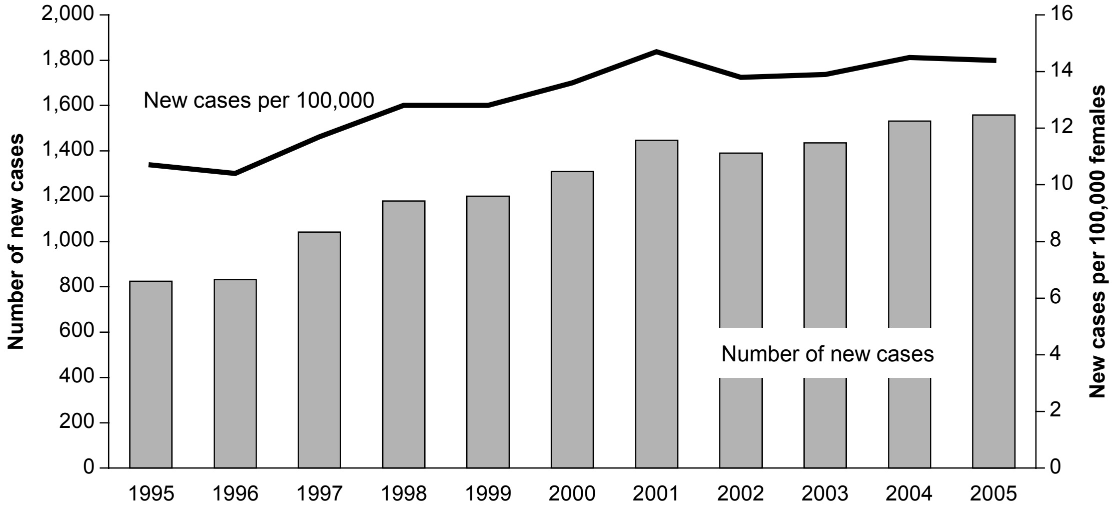
Figure 2.9: Incidence of breast cancer by country/region of birth, females, 2002–2006

a decrease in the number of invasive cancers over time (Cancer Council Victoria 2008) and in the number of deaths from breast cancer.

Since DCIS is a condition that is usually not palpable, it is mostly diagnosed by a mammogram. Therefore, the number of diagnosed DCIS cases is widely believed to have increased substantially since the introduction of screening mammography programs in the early 1990s. While data from the USA (ACS 2007) and from individual Australian states such as Victoria (Cancer Council Victoria 2002) support this belief, no national data are available. This is because some state and territory cancer registries did not begin to record DCIS information until well after the introduction of widespread mammography screening, while others captured such data but it was regarded as incomplete. Queensland, for example, has collected DCIS data since 1982, but they do not consider their data to have acceptable coverage until 1995.

In 2008, each of the state and territory cancer registries were asked to provide the AIHW with data on the number of cases of DCIS diagnosed in females between 1995 and 2005. While most states and territories were able to provide such data, the completeness of recording of DCIS cases in South Australia was uncertain for 1995 and 1996, and in the Northern Territory for 1995. Thus, the first year in which data on the number of DCIS cases were provided for all states and territories was 1997 (see Appendix C for further details on these data).

Between 1997 and 2005, the number of DCIS cases diagnosed in women increased by 50% — from 1,042 to 1,558 cases (Figure 2.10). Meanwhile, the age-standardised rate of women diagnosed with this disease increased from 12 cases per 100,000 women in 1997 to 14 cases per 100,000 women in 2005. This increase in the incidence rate indicates that the observed increase in the number of DCIS cases over this period is not simply due to the ageing and growth in size of the population.



Notes

1. The rates were age-standardised to the Australian population as at 30 June 2001.
2. No data for South Australia and the Northern Territory were provided for 1995 and no data for South Australia were provided for 1996. The rates for those years apply to females in the states and territories for which data were provided.
3. The data for this figure are shown in Appendix Table D2.11.

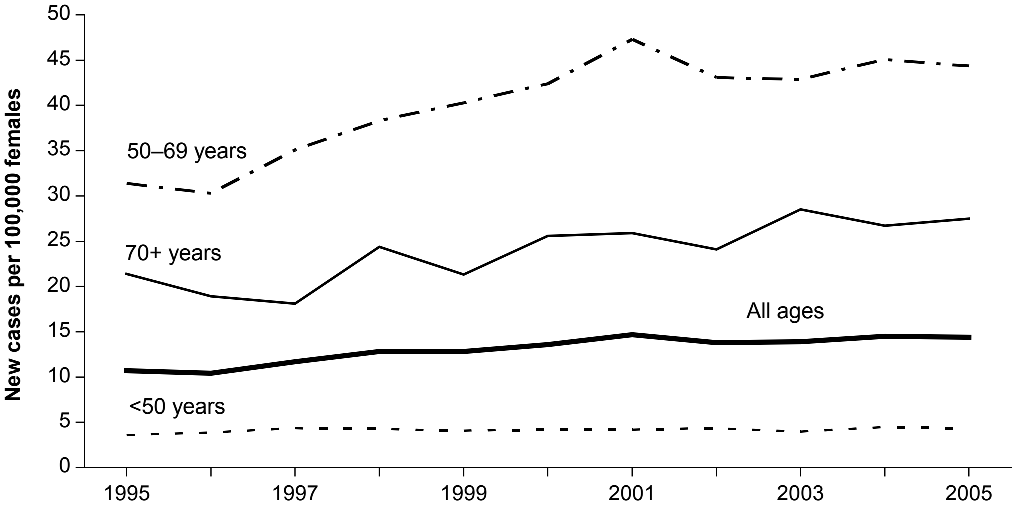
Source: AIHW analyses of data supplied by state/territory cancer registries.

Figure 2.10: Incidence of ductal carcinoma in situ, females, 1995 to 2005

The incidence rate for DCIS by age is shown in Figure 2.11. Since the target group for screening mammography is women aged 50 to 69 years, it was expected that the rate of DCIS for women in that age group would be much higher than that for women in other age groups. Over all of the years considered, this was the case. Furthermore, the data suggest a general increase in the incidence rate of DCIS cases for women in the 50 to 69 year age group between 1995 and 2005 (from 31 to 44 cases per 100,000 women). Meanwhile, over the years for which data were available, the rate of DCIS cases for women aged less than 50 years was fairly steady (at approximately 4 cases per 100,000 women), probably because these women are less likely than other women to have a screening mammography (see Chapter 7).

Incidence of breast cancer in males

Since males also have breast tissue, they can develop breast cancer. However, breast cancer is far less common in men than women because their breast duct cells are less developed and because their breast cells are not constantly exposed to the tumour-promoting effects of female hormones (ACS 2009b).



Notes

1. The rates were age-standardised to the Australian population as at 30 June 2001.
2. No data for South Australia and the Northern Territory were provided for 1995 and no data for South Australia were provided for 1996. The rates for those years apply to females in the states and territories for which data were provided.
3. The data for this figure are shown in Appendix Table D2.12.

Source: AIHW analyses of data supplied by state/territory cancer registries.

Figure 2.11: Incidence of ductal carcinoma in situ by age group, females, 1995 to 2005

Even though the number of males diagnosed with breast cancer each year has increased somewhat over the years, breast cancer in men is still rare (Table 2.8). In the 1980s, approximately 50 to 60 new cases of breast cancer were diagnosed in men each year. In the 2000s, this number was about 80 to 110 cases each year. In 2006, 102 cases of breast cancer were diagnosed in men and this type of cancer represented 0.2% of all cancer cases among men (excluding basal and squamous cell carcinomas of the skin).

Considering breast cancer in both males and females, the total number of breast cancer cases in 2006 was 12,716, with men accounting for 0.8% of these cases. The female to male incidence ratio was 124 to 1.

The age-standardised rate of breast cancer cases for men has remained largely unchanged over the 25-year period for which national data are available at around 1 per 100,000 men. Since men are not eligible for mammograms through BreastScreen Australia's program, the number of breast cancer cases among males was not affected by the roll-out of screening mammography across Australia.

The risk of a man being diagnosed with breast cancer before the age of 75 years was low—1 in 1,239 based on 2006 data (Table 2.9). The corresponding risk to the age of 85 was 1 in 767.

Table 2.10 presents data on the incidence of breast cancer by age for men in the 2002 to 2006 period. The lowest incidence rate was observed for those under the age of 50 years (0.1 per 100,000 males), while the highest rates were found for those aged 70 to 79 years (5 per 100,000 males) and 80 years and over (7 per 100,000 males).

The data also indicate that males tend to be diagnosed, on average, at an older age than females (Tables 2.2 and 2.9). In 2006, the mean age at first diagnosis of breast cancer for men was 68 years compared with 60 years for women.

Most breast cancer cases diagnosed in men during 2002 to 2006 were categorised as 'Group 1: Invasive ductal carcinoma' (average of 85 cases per year), with most of these being *infiltrating duct carcinoma* (80 cases) (see Appendix Table D2.13).

Table 2.8: Incidence of breast cancer, males, 1982 to 2006

Year	Number of cases	Per cent of all cancer cases[(a)]	Age-standardised rate (A)[(b)]	95% confidence interval	Age-standardised rate (W)[(c)]	95% confidence interval
1982	62	0.2	1.2	0.9–1.6	0.8	0.6–1.1
1983	45	0.2	0.9	0.6–1.2	0.6	0.4–0.8
1984	51	0.2	0.9	0.6–1.1	0.6	0.5–0.8
1985	59	0.2	1.0	0.7–1.3	0.7	0.6–0.9
1986	53	0.2	0.9	0.7–1.2	0.6	0.5–0.8
1987	55	0.2	0.9	0.6–1.1	0.6	0.5–0.8
1988	60	0.2	1.0	0.7–1.3	0.7	0.5–0.9
1989	67	0.2	1.0	0.8–1.3	0.7	0.6–0.9
1990	78	0.2	1.2	0.9–1.5	0.8	0.7–1.0
1991	64	0.2	1.0	0.7–1.3	0.7	0.5–0.8
1992	48	0.1	0.7	0.5–1.0	0.5	0.4–0.7
1993	63	0.2	0.9	0.7–1.1	0.6	0.5–0.8
1994	71	0.2	1.0	0.8–1.3	0.7	0.6–0.9
1995	57	0.1	0.8	0.6–1.0	0.6	0.4–0.7
1996	87	0.2	1.2	0.9–1.4	0.8	0.6–1.0
1997	71	0.2	0.9	0.7–1.1	0.6	0.5–0.8
1998	91	0.2	1.1	0.9–1.3	0.8	0.7–1.0
1999	73	0.2	0.9	0.7–1.1	0.6	0.5–0.8
2000	80	0.2	0.9	0.7–1.2	0.6	0.5–0.8
2001	91	0.2	1.1	0.9–1.3	0.7	0.6–0.9
2002	85	0.2	0.9	0.7–1.1	0.7	0.5–0.8
2003	100	0.2	1.1	0.9–1.3	0.8	0.6–0.9
2004	108	0.2	1.1	0.9–1.4	0.8	0.6–1.0
2005	97	0.2	1.0	0.8–1.2	0.7	0.6–0.9
2006	102	0.2	1.0	0.8–1.2	0.7	0.6–0.9

(a) Includes cancers coded in the International Statistical Classification of Diseases and Related Health Problems, 10th revision (ICD-10) as C00–C97, D45, D46, D47.1 and D47.3 with the exception of those C44 codes which indicate a basal or squamous cell carcinoma of the skin. Due to changes over time in which cancers were reportable, the data on cancers that begin with an ICD-10 code of 'D' may be incomplete before 2003 and data on C44 codes (other than basal or squamous cell carcinomas) may be incomplete before 2001.

(b) Standardised to the Australian population as at 30 June 2001 and expressed per 100,000 males.

(c) Standardised using the World Health Organization 2000 World Standard Population and expressed per 100,000 males.

Source: Australian Cancer Database, AIHW.

Table 2.9: Risk and average age at diagnosis of breast cancer, males, selected years from 1982 to 2006

Year	Risk to age 75 years	Risk to age 85 years	Mean age at first diagnosis	Median age at first diagnosis
1982	1 in 1,249	1 in 619	65.8	67.5
1986	1 in 1,576	1 in 702	65.3	68.0
1991	1 in 1,453	1 in 641	68.9	70.0
1996	1 in 1,197	1 in 667	67.8	68.0
2001	1 in 1,397	1 in 678	69.5	72.0
2006	1 in 1,239	1 in 767	67.6	69.0

Source: Australian Cancer Database, AIHW.

Table 2.10: Incidence of breast cancer by age group, males, 2002–2006

Age group (years)	Average annual number of cases(a)	Age-specific rate(b)	95% confidence interval
<50	9	0.1	0.1–0.2
50–59	19	1.5	1.2–1.9
60–69	25	3.0	2.5–3.6
70–79	28	5.2	4.4–6.1
80+	17	6.8	5.5–8.5
Total(c)	**98**	**1.0**	**0.9–1.1**

(a) Numbers may not sum to the total due to rounding.

(b) Number of cases per 100,000 males.

(c) The rate shown in this row is age-standardised to the Australian population as at 30 June 2001; it is expressed per 100,000 males.

Source: Australian Cancer Database, AIHW.

3 Mortality from breast cancer

The number of deaths from breast cancer in any given time period is a result of the incidence of breast cancer as well as factors that affect case fatality such as the characteristics of the breast cancers diagnosed (e.g. stage at diagnosis, type of breast cancer) and the nature and quality of treatments received. In this report, mortality refers to the number of deaths for which the underlying cause was breast cancer. The breast cancer that led to the death may have been diagnosed many years previously, in the same year in which the person died or, in some cases, after death (e.g. 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 main data source used in this chapter was the National Mortality Database. This database contains information about all deaths registered in Australia (see Appendix C for further information).

In this chapter, information on the number of female and male deaths attributed to breast cancer in 2006 is presented, as is trend information. In addition, for women, differences in mortality rates according to age, geographical area, socioeconomic status, Aboriginal and Torres Strait Islander status and country of birth are provided. Data for Australia are compared with data for other countries.

Mortality of females from breast cancer

Mortality in 2006

The five types of cancers that led to the largest number of cancer deaths of women in 2006 are shown in Table 3.1. Breast cancer was the second most common cause of cancer mortality of women in 2006, with 2,618 women dying from this disease. This means that on average, 7 women in Australia died from breast cancer every day in 2006.

Table 3.1: The five most common types of cancer death, females, 2006

Cancer type (ICD-10 codes)	Number of cases	Per cent of all cancer deaths	Per cent of all deaths	Age-standardised rate[(a)]	95% confidence interval
Lung (C33–C34)	2,683	15.7	4.1	22.7	21.8–23.6
Breast (C50)	2,618	15.3	4.0	22.1	21.3–23.0
Unknown primary site (C26, C39, C76–C80)	1,917	11.2	2.9	15.1	14.5–15.8
Bowel (C18–C20)	1,675	9.8	2.6	13.6	12.9–14.2
Pancreas (C25)	1,029	6.0	1.6	8.4	7.9–8.9
All cancers[(b)]	**17,123**	**100.0**	**26.3**	**141.0**	**139.7–142.3**

(a) Standardised to the Australian population as at 30 June 2001 and expressed per 100,000 females.

(b) Includes cancers coded in the International Statistical Classification of Diseases and Related Health Problems, 10th revision (ICD-10) as C00–C97, D45, D46, D47.1 and D47.3.

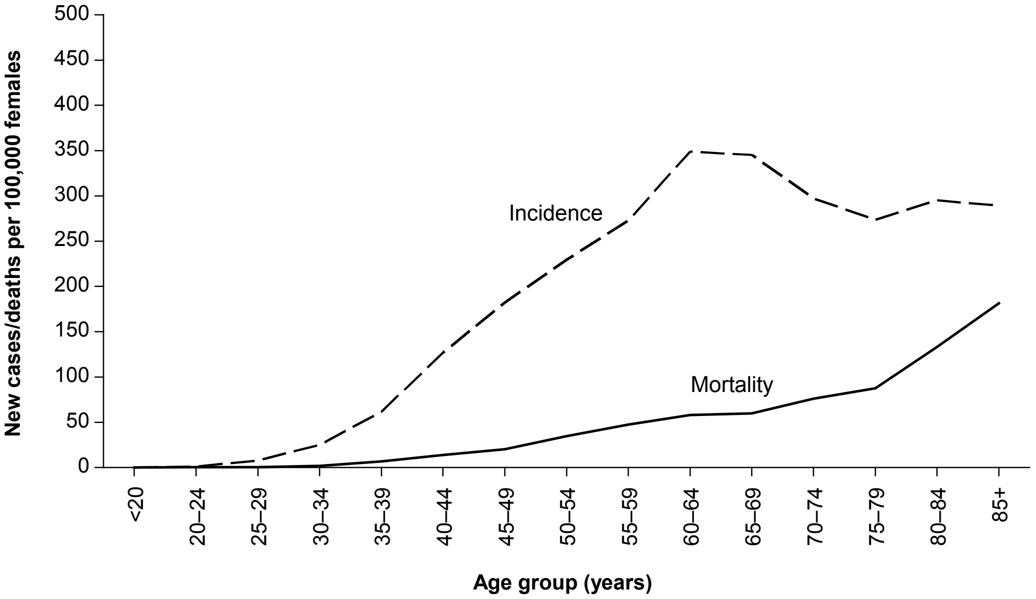
Source: National Mortality Database, AIHW.

Lung cancer was the leading cause of cancer death of females in 2006 (2,683 deaths), but the difference between the number of lung cancer and breast cancer deaths among women was small at 65 deaths. When the 2006 age-standardised mortality rates for lung and breast cancers were compared (22.7 and 22.1 deaths per 100,000 women, respectively), the difference was not statistically significant.

Deaths from breast cancer accounted for one in seven (15%) cancer deaths of females in 2006, and one in 25 (4%) deaths from any cause.

Differences by age at death

Differences in the mortality rate according to age at death for 2006 are shown in Figure 3.1. To provide a point of comparison, the incidence rate by age at diagnosis is also indicated. While the incidence rate of breast cancer for women aged 70 years and over was lower than that observed for women in their 60s (as discussed in Chapter 2), this is not the case in regard to the mortality rate. Instead, the mortality rate increased with age, with the sharpest increase observed for women aged 80 years and over. Specifically, in 2006, the mortality rate from breast cancer was 133 (per 100,000 women) for women aged 80 to 84 years and 181 for women aged 85 years and over. This latter rate is more than double the rate observed for women aged 75 to 79 years (88 per 100,000 women) and more than five times the rate for those aged 50 to 54 years (35 per 100,000 women).



Note: The data for this figure are shown in Appendix Tables D2.1 and D3.1.

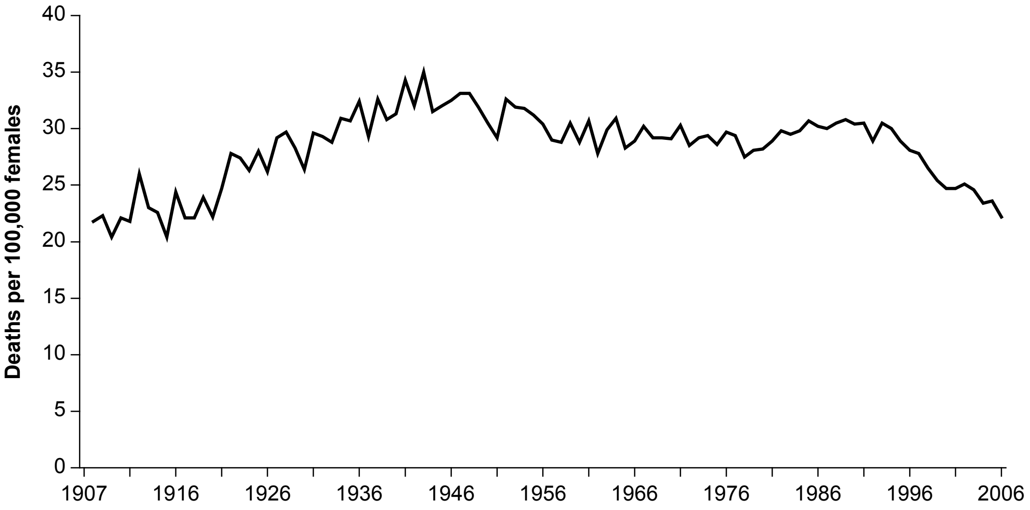
Source: Australian Cancer Database, AIHW; National Mortality Database, AIHW.

Figure 3.1: Breast cancer incidence and mortality by age group, females, 2006

Trends

In Figure 3.2, age-standardised mortality rates for women due to breast cancer are shown for the 100-year period from 1907 to 2006 according to year of *registration* of death. While mortality data according to year of death are generally shown in this chapter, year of registration data are shown here because such long-term trend data are not available for breast cancer mortality by year of death. As a result, the data in this figure are slightly different from the mortality data presented elsewhere in this report, but the overall trends are the same.

Numerous year-to-year fluctuations in the rate of death for women due to breast cancer are seen in the data. Nonetheless, the overall pattern indicates that mortality rates from breast cancer for women increased steadily during the first half of the 20th century, after which there was somewhat of a decline in the middle of the century. This was followed by a general levelling of rates until approximately the mid-1990s when the mortality rate began to decline again. By 2006, the rate of death of women from breast cancer was at the same level as that observed for the beginning of the 20th century.



Notes

1. The rates were age-standardised to the Australian population as at 30 June 2001. The 1968 to 1996 data were adjusted from earlier International Statistical Classification of Diseases and Related Health Problems (ICD) standards to ICD-10 standards using a factor of 0.98. The pre-1968 data were not adjusted.
2. These data are based on year of registration of death rather than year of death.
3. The data for this figure are shown in Appendix Table D3.2.

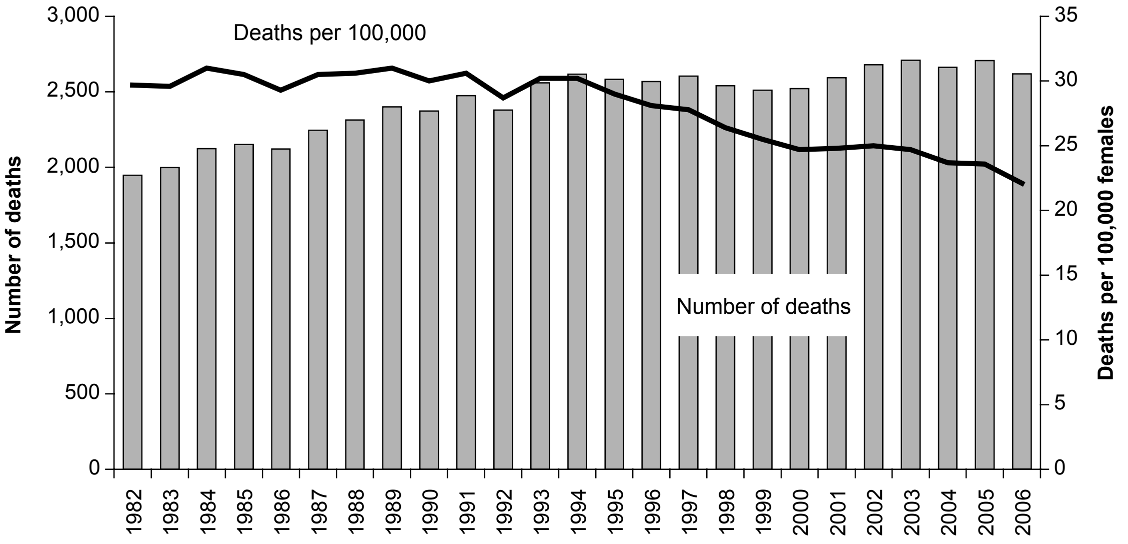
Source: National General Record of Incidence of Mortality (GRIM) Books, AIHW.

Figure 3.2: Mortality from breast cancer by year of death registration, females, 1907 to 2006

Trends from 1982 to 2006

Information on deaths of women from breast cancer for the 25-year period from 1982 to 2006 is presented in Figure 3.3 and Table 3.2. The number of deaths of women from breast cancer increased between 1982 (1,947 deaths) and 1994 (2,616 deaths). After this time, the number of deaths tended to fall for several years, with 2,512 deaths recorded in 1999, followed by some increase in the number of deaths from breast cancer in the 2000s. However, the number of breast cancer deaths recorded for 2006 (2,618 women) was lower than that recorded for each of the 4 previous years, with the largest number of deaths of women over the 25-year period having occurred in 2003 (2,710) and then 2005 (2,707).

When changes in age structure and population size are taken into account, the trend data indicate that the rate of death of women from breast cancer remained fairly level from 1982 to the early 1990s (at around 29 to 31 deaths per 100,000 women). After this time, there was an appreciable decline in mortality rates. Specifically, between 1994 (when mortality stood at 30 deaths per 100,000 women) and 2006 (22 per 100,000 women), the mortality rate of women from breast cancer decreased by 27%. The rate recorded for 2006 (22 per 100,000 women) was the lowest recorded since 1982, although it was not statistically significantly lower than the rate observed for the two previous years (24 per 100,000 women in both 2004 and 2005).



Notes

1. The rates were age-standardised to the Australian population as at 30 June 2001. The 1982 to 1996 data were adjusted from International Statistical Classification of Diseases and Related Health Problems, 9th revision (ICD-9) to ICD-10 standards using a factor of 0.98.
2. The data for this figure are shown in Table 3.2.

Source: National Mortality Database, AIHW.

Figure 3.3: Mortality from breast cancer, females, 1982 to 2006

This pattern of decrease in age-standardised mortality rates of women from breast cancer in recent decades is also observed in data from a number of other Westernised countries including Canada (CCSSC 2009), New Zealand (NZ Ministry of Health 2009), the United Kingdom (Cancer Research UK 2007) and the USA (ACS 2007). This decline is believed to be due mainly to increased availability and quality of screening mammography (and the related increase in diagnoses at an earlier stage), as well as improved treatment (ACS 2007; CCS & NCIC 2007; Chu et al. 1996; Stewart & Kleihues 2003). However, findings on the relative influence of these two key factors—i.e. screening mammography versus treatment—are inconsistent (e.g. Berry et al. 2005; Ragaz et al. 2005).

The proportion of cancer deaths of females that were due to breast cancer has fallen over the 25-year period from 1982 to 2006, but the proportion of deaths from all causes (not just cancer) that were due to breast cancer did not (Table 3.2). In 1982, deaths from breast cancer accounted for 18% of all *cancer* deaths, but this had fallen to 15% by 2006. In contrast, there was no noticeable trend in the proportion of female deaths from all causes that were due to breast cancer, with this figure approximating 4% for all of the years between 1982 and 2006.

Table 3.2: Mortality from breast cancer, females, 1982 to 2006

Year	Number of deaths	Per cent of all cancer deaths	Per cent of all deaths	Age-standardised rate (A)[(a)]	95% confidence interval	Age-standardised rate (W)[(b)]	95% confidence interval
1982	1,947	18.2	3.8	29.7	28.4–31.1	22.1	21.1–23.1
1983	1,999	17.9	4.0	29.6	28.3–31.0	22.1	21.2–23.2
1984	2,123	18.3	4.1	31.0	29.7–32.3	23.0	22.0–24.1
1985	2,152	18.1	4.0	30.5	29.2–31.9	22.9	21.9–23.9
1986	2,122	17.5	4.0	29.3	28.1–30.6	21.9	21.0–22.9
1987	2,247	18.1	4.2	30.5	29.3–31.8	22.8	21.8–23.7
1988	2,314	18.2	4.3	30.6	29.4–31.9	22.7	21.7–23.6
1989	2,400	18.3	4.1	31.0	29.8–32.3	23.1	22.1–24.0
1990	2,374	18.0	4.3	30.0	28.8–31.3	22.3	21.4–23.3
1991	2,475	18.0	4.5	30.6	29.4–31.9	22.8	21.9–23.8
1992	2,380	17.3	4.2	28.7	27.6–29.9	21.3	20.4–22.2
1993	2,559	17.9	4.6	30.2	29.0–31.4	22.3	21.4–23.3
1994	2,616	18.0	4.4	30.2	29.0–31.3	22.3	21.5–23.2
1995	2,582	17.3	4.4	29.0	27.9–30.1	21.4	20.6–22.3
1996	2,568	16.9	4.3	28.1	27.0–29.2	20.9	20.1–21.8
1997	2,604	17.0	4.2	27.8	26.7–28.9	20.7	19.9–21.6
1998	2,541	16.6	4.2	26.4	25.3–27.4	19.5	18.7–20.3
1999	2,512	16.3	4.1	25.5	24.5–26.5	19.0	18.2–19.8
2000	2,521	16.0	4.1	24.7	23.8–25.7	18.2	17.5–18.9
2001	2,594	16.0	4.2	24.8	23.8–25.8	18.2	17.5–19.0
2002	2,681	16.1	4.2	25.0	24.0–26.0	18.4	17.7–19.1
2003	2,710	16.3	4.2	24.7	23.8–25.6	18.2	17.5–18.9
2004	2,664	15.8	4.2	23.7	22.8–24.7	17.5	16.8–18.2
2005	2,707	15.8	4.2	23.6	22.7–24.5	17.4	16.7–18.1
2006	2,618	15.3	4.0	22.1	21.3–23.0	16.1	15.5–16.8

(a) Standardised to the Australian population as at 30 June 2001 and expressed per 100,000 females. The 1982 to 1996 data were adjusted from International Statistical Classification of Diseases and Related Health Problems, 9th revision (ICD-9) to ICD-10 standards using a factor of 0.98.

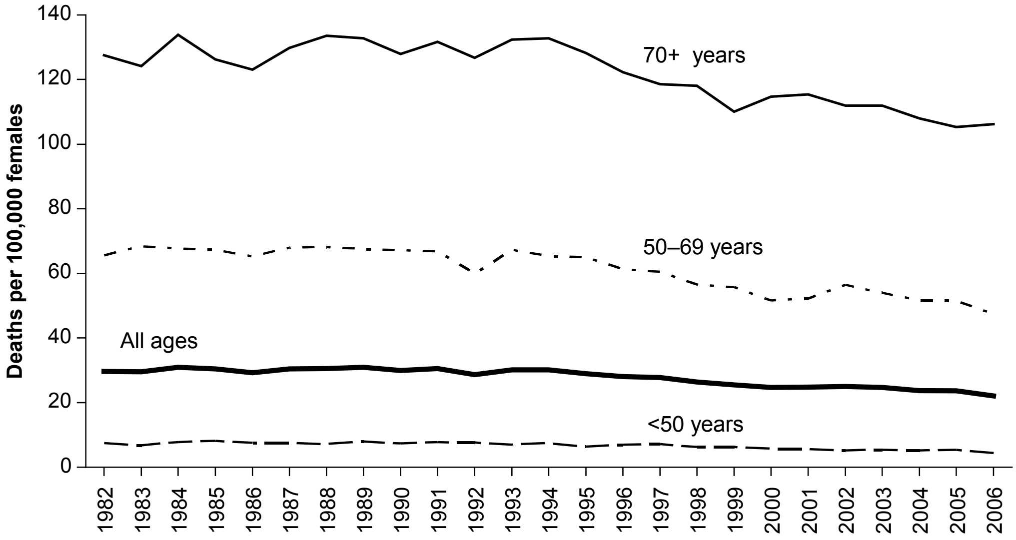
(b) Standardised using the World Health Organization 2000 World Standard Population and expressed per 100,000 females.

Source: National Mortality Database, AIHW.

Trends by age at death

Although the target group for mammographic screening is women aged 50 to 69 years, the effect of such screening on mortality rates would also be expected to be seen in women aged 70 years and over for two reasons. First, mortality rates generally reflect deaths in women diagnosed with breast cancer several years earlier (Cancer Council Victoria 2002) when some of these women would have been in the target group for screening. Second, although not in the target group, women age 70 years and over are eligible for, and participate in, the screening mammography program (see Chapter 7).

The data in Figure 3.4 show that for women aged 70 years and over, the mortality rate began to decrease in the mid-1990s and continued to do so over the following years, with a decrease of 20% between 1994 and 2006 (133 and 106 deaths per 100,000 women, respectively). For those aged 50 to 69 years, a decrease in mortality rates was also found, with a fall in rates of 30% from 1993 (67 per 100,000 women) to 2006 (48 per 100,000 women). Even though mortality from breast cancer for women aged less than 50 years old was relatively low throughout the period considered, the mortality rate also decreased for this group by 40% from 1994 to 2006 (8 and 5 deaths per 100,000 women, respectively).



Notes

1. The rates were age-standardised to the Australian population as at 30 June 2001. The 1982 to 1996 data were adjusted from International Statistical Classification of Diseases and Related Health Problems, 9th revision (ICD-9) to ICD-10 standards using a factor of 0.98.
2. The data for this figure are shown in Appendix Table D3.3.

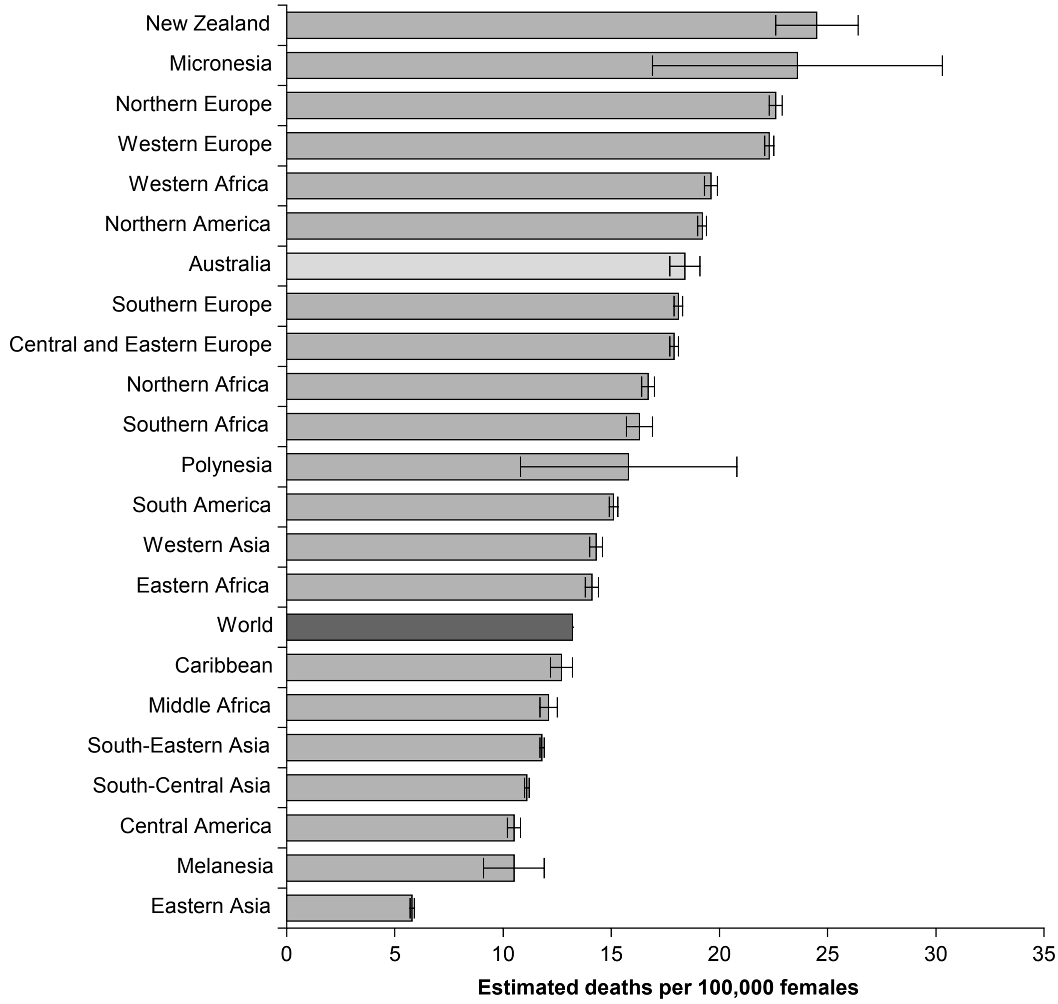
Source: National Mortality Database, AIHW.

Figure 3.4: Mortality from breast cancer by age at death, females, 1982 to 2006

International comparisons

As discussed in Chapter 1, caution must be taken when comparing international data on cancer mortality since observed differences may be due to a range of factors, not just differences in the underlying mortality rates. Data on breast cancer deaths for women from the GLOBOCAN database (Ferlay et al. 2004) are shown in Figure 3.5. These rates are estimates for 2002 and are based on data from around 3 to 5 years earlier.

The estimates suggest that the age-standardised mortality rate for women from breast cancer was significantly lower in Australia (18 deaths per 100,000 women) than in New Zealand (25 per 100,000 women), Northern Europe (23 per 100,000 women), Western Europe (22 per 100,000 women) and Western Africa (20 per 100,000 women). Meanwhile, it was estimated to be significantly higher than estimated for women in regions such as South America (15 per 100,000 women) and all of the Asian regions. Differences in mortality rates by country could relate to a number of factors including differences in incidence rates (see Chapter 2), features at diagnosis (e.g. stage at diagnosis, histology type and so forth), and availability and quality of treatment (CCS & NCIC 2008).



Notes

1. The data were estimated for 2002 and are based on data from approximately 3 to 5 years earlier.
2. The rates were age-standardised using the World Health Organization 2000 World Standard Population. The confidence intervals (as shown by the error bars) are approximations (see Appendix B).
3. The data for this figure are shown in Appendix Table D3.4.

Source: Ferlay et al. 2004.

Figure 3.5: International comparison of estimated mortality from breast cancer, females, 2002

Risk of death and average age at death

Based on 2006 data, the risk of a woman in the general population dying from breast cancer before the age of 75 years was 1 in 63; the corresponding risk for the age of 85 was 1 in 38 (Table 3.3). These risk levels are considerably lower than those observed in the 1980s and 1990s. For example, 1982 data indicated that the risk of a woman dying from breast cancer by the age of 75 was 1 in 46 and using 1990 data, the risk was calculated to be 1 in 45.

The average age at which women die from breast cancer has increased over time (Table 3.3). In 1982, the mean age of death of women who died from breast cancer was 64 years. It gradually increased over the following years and, in 2006, it stood at 68 years. Over this same period, the median age also increased from 64 years to 68 years.

Table 3.3: Risk of death and average age at death from breast cancer, females, 1982 to 2006

Year	Risk to age 75 years	Risk to age 85 years	Mean age at death	Median age at death
1982	1 in 46	1 in 30	64.2	64.0
1983	1 in 44	1 in 30	64.4	64.0
1984	1 in 43	1 in 28	64.6	65.0
1985	1 in 44	1 in 28	64.2	65.0
1986	1 in 46	1 in 30	64.5	65.0
1987	1 in 45	1 in 29	64.5	65.0
1988	1 in 45	1 in 28	65.3	66.0
1989	1 in 44	1 in 28	64.8	65.0
1990	1 in 45	1 in 29	65.0	66.0
1991	1 in 44	1 in 28	64.7	66.0
1992	1 in 48	1 in 30	65.0	66.0
1993	1 in 46	1 in 28	65.6	66.0
1994	1 in 46	1 in 28	65.3	66.0
1995	1 in 47	1 in 29	65.9	67.0
1996	1 in 49	1 in 30	65.3	66.0
1997	1 in 49	1 in 31	65.0	66.0
1998	1 in 53	1 in 33	65.9	66.0
1999	1 in 53	1 in 34	65.4	65.0
2000	1 in 56	1 in 35	66.3	67.0
2001	1 in 55	1 in 34	66.4	67.0
2002	1 in 56	1 in 34	66.6	67.0
2003	1 in 56	1 in 35	66.7	67.0
2004	1 in 57	1 in 35	66.9	67.0
2005	1 in 59	1 in 36	66.6	66.0
2006	1 in 63	1 in 38	67.7	68.0

Note: The 1982 to 1996 data were adjusted from International Statistical Classification of Diseases and Related Health Problems, 9th revision (ICD-9) to ICD-10 standards using a factor of 0.98.

Source: National Mortality Database, AIHW.

Differences across groups

In this section of the report, differences in mortality of women from breast cancer according to geographical area, socioeconomic status, Indigenous status and country of birth are presented. As with international differences in mortality rates (discussed previously), the observed differences according to these characteristics may be due to a number of reasons, including differences in incidence rates of breast cancer, stage at diagnosis, and access to and quality of treatment.

Differences by geographical area

During 2002 to 2006, the average number of deaths of women from breast cancer per year ranged from 914 in New South Wales to 11 in the Northern Territory (Table 3.4). The age-standardised rates indicate that the Northern Territory had the lowest mortality rate from breast cancer for females (19 deaths per 100,000 females) although this rate does not differ significantly from that of the other states and territories. The highest mortality rate from breast cancer for females was observed for South Australia, with 26 deaths from breast cancer per 100,000 women. This rate was significantly higher than the rate observed for Western Australia (23 per 100,000 women) and Queensland (22 per 100,000 women).

Table 3.4: Mortality from breast cancer by state and territory, females, 2002–2006

State or territory	Average annual number of cases[(a)]	Age-standardised rate[(b)]	95% confidence interval
New South Wales	914	23.9	23.2–24.6
Victoria	703	24.7	23.8–25.5
Queensland	460	22.3	21.4–23.2
Western Australia	232	22.5	21.2–23.8
South Australia	251	25.7	24.3–27.2
Tasmania	72	24.6	22.0–27.3
Australian Capital Territory	35	22.9	19.6–26.7
Northern Territory	11	19.1	13.7–25.7
Total	**2,676**	**23.8**	**23.4–24.2**

(a) Numbers may not sum to the total due to rounding.

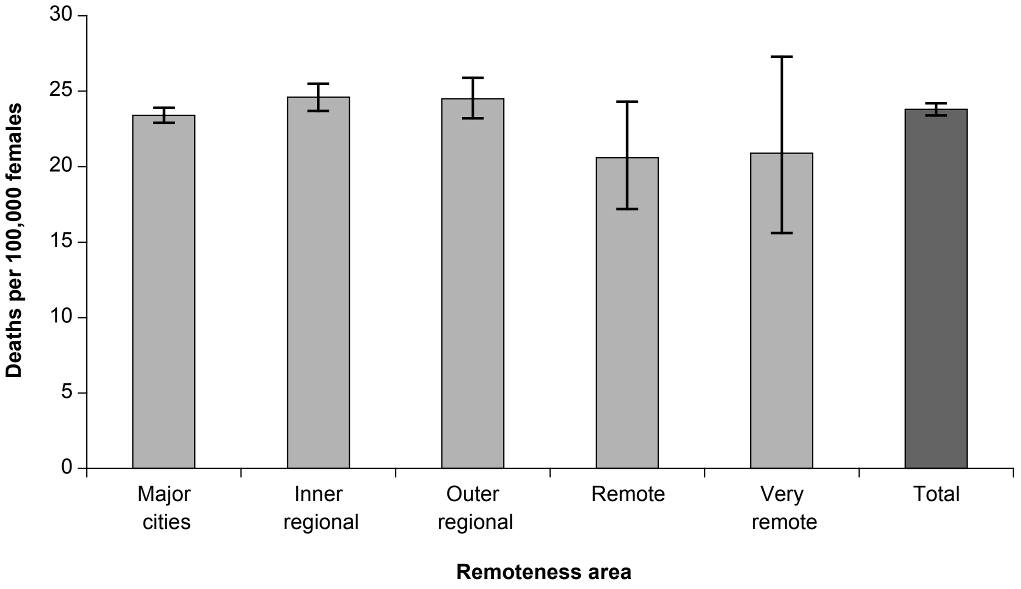
(b) Standardised to the Australian population as at 30 June 2001 and expressed per 100,000 females.

Source: National Mortality Database, AIHW.

Mortality rates due to breast cancer for the 2002 to 2006 period are presented in Figure 3.6 according to remoteness of usual residence of the women at time of death. While the mortality rates for women who lived in *Remote* and *Very remote* areas were lower than those for other women, the differences were not statistically significant. The same conclusion was reached in the previous edition of this report (AIHW & NBCC 2006).

Differences by socioeconomic status

As discussed in Chapter 2, the socioeconomic status measure used in this report pertains to the area in which the women lived. In the 2002 to 2006 period, women living in areas with the highest socioeconomic status had a significantly higher rate of mortality from breast cancer (27 deaths per 100,000 females) compared with women living in other areas (Figure 3.7). This contrasts with the finding in the previous edition of this report for 2000 to 2002 when no statistically significant differences by socioeconomic status were found (AIHW & NBCC 2006).

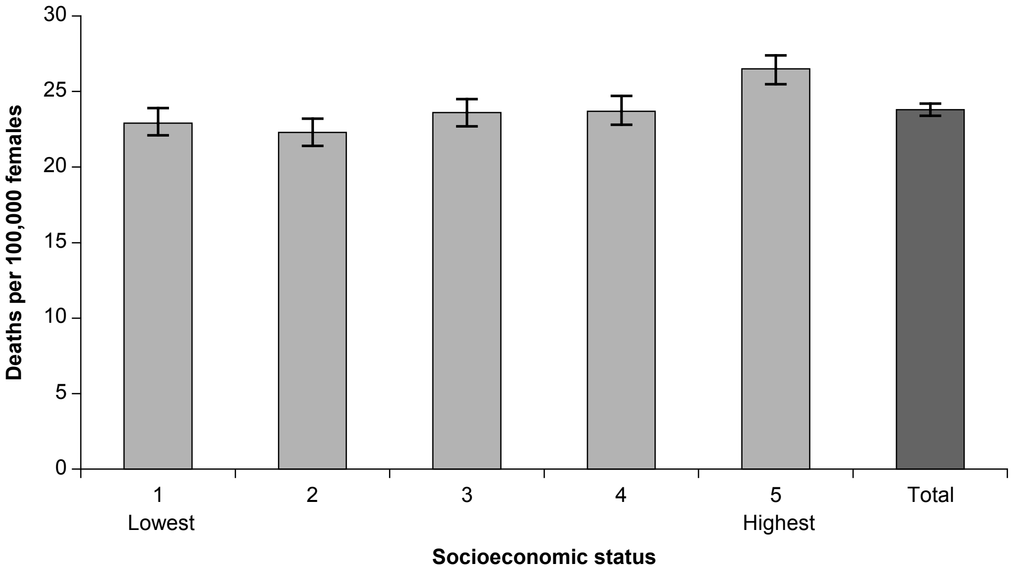


Notes

1. Remoteness area was measured using the Australian Standard Geographical Classification Remoteness Area classification.
2. The rates were age-standardised to the Australian population as at 30 June 2001.
3. The data for this figure are shown in Appendix Table D3.5.

Source: National Mortality Database, AIHW.

Figure 3.6: Mortality from breast cancer by remoteness area, females, 2002–2006



Notes

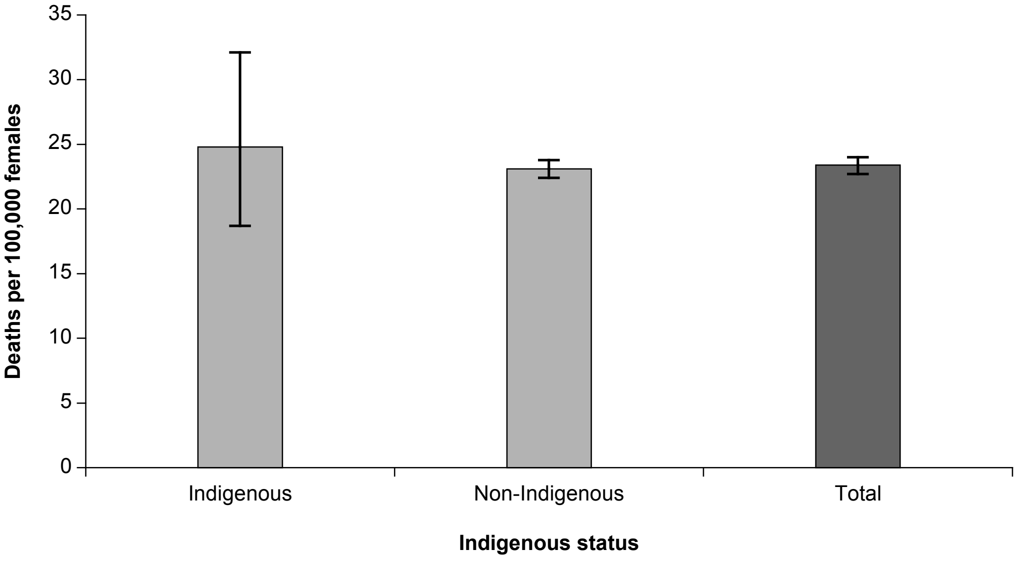
1. Socioeconomic status was measured using the ABS Socio-Economic Index for Areas (SEIFA) Index of Relative Socio-economic Disadvantage.
2. The rates were age-standardised to the Australian population as at 30 June 2001.
3. The data for this figure are shown in Appendix Table D3.6.

Source: National Mortality Database, AIHW.

Figure 3.7: Mortality from breast cancer by socioeconomic status, females, 2002–2006

Differences by Aboriginal and Torres Strait Islander status

Information on Indigenous status is considered to be of sufficient quality for use in the National Mortality Database for Queensland, Western Australia, South Australia and the Northern Territory. During 2002 to 2006, an average of 15 Indigenous women in these four jurisdictions died from breast cancer each year (Appendix Table D3.7). Despite having significantly lower incidence rates (as discussed in Chapter 2), Figure 3.8 illustrates that breast cancer mortality rates for Indigenous women in the four jurisdictions were not significantly different from those of their non-Indigenous counterparts (25 and 23 deaths per 100,000 women, respectively). This is consistent with findings from the first edition of this report which used data from the same four jurisdictions for 2000 to 2004 (AIHW & NBCC 2006).



Notes

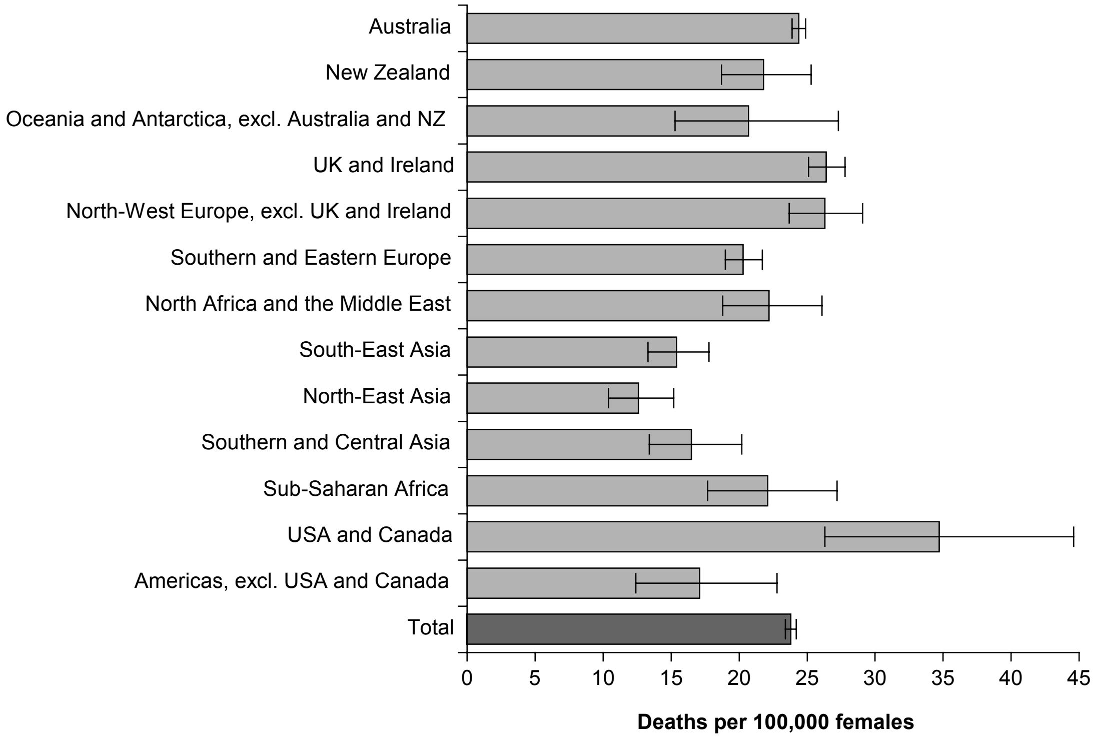
1. The rates were age-standardised to the Australian population as at 30 June 2001.
2. The 'Total' column includes deaths for which information on Indigenous status was not available.
3. The data for this figure are shown in Appendix Table D3.7.

Source: National Mortality Database, AIHW.

Figure 3.8: Mortality from breast cancer by Indigenous status, females, Queensland, Western Australia, South Australia and the Northern Territory, 2002–2006

Differences by country of birth

As shown in Figure 3.9, in the 2002 to 2006 period, women living in Australia who were born in the USA and Canada (35 deaths per 100,000 females) and those born in the UK and Ireland (26 per 100,000 females) had significantly higher age-standardised mortality rates than women born in Australia (24 per 100,000 females). In contrast, the lowest mortality rates were observed for women born in North-East Asia (13 deaths per 100,000 females) and South-East Asia (15 per 100,000 females); these rates were significantly lower than the rate observed for Australian-born women.



Notes

1. Country of birth is classified according to the Standard Australian Classification of Countries, 2nd edition (ABS 2008c).
2. The rates were age-standardised to the Australian population as at 30 June 2001.
3. The 'Total' category includes cases for which information on country of birth was not available.
4. The data for this figure are shown in Appendix Table D3.8.

Source: National Mortality Database, AIHW.

Figure 3.9: Mortality from breast cancer by country/region of birth, females, 2002–2006

Breast cancer as an associated cause of death

The data presented thus far in this chapter apply to deaths of women for which the underlying cause of death was breast cancer. In addition to an underlying cause of death, associated causes of death can be listed on a death certificate. An associated cause of death is any other condition or event that was not the underlying cause of death, but was considered to contribute to the individual's death. In this section, data are presented on deaths of women for which breast cancer was the associated (but not underlying) cause of death.

On average during 2002 to 2006, 673 of the women who died each year in Australia had breast cancer recorded as an associated cause of death (Table 3.5). For almost half these deaths (46%), the underlying cause was circulatory system disease (average of 307 women per year)—in particular, ischaemic heart disease (143 women per year) and cerebrovascular disease (90 women). For approximately one in five (19%) deaths, a cancer other than breast cancer was recorded as the underlying cause of death (130 women).

Differences by age at death, according to the underlying cause of death in which breast cancer was an associated cause, are also shown in Table 3.5. On average, the majority of women (85%) who died each year during 2002 to 2006 with breast cancer as an associated cause were aged 70 years and over. For half these women (50%), circulatory system disease

Table 3.5: Underlying cause of death where breast cancer was an associated cause by age group, females, annual average for 2002–2006

		<50 years		50–69 years		70+ years		All ages	
Underlying cause of death	**ICD-10[(a)] codes**	**Number of deaths[(b)]**	**% of deaths**	**Number of deaths[(b)]**	**% of deaths**	**Number of deaths[(b)]**	**% of deaths**	**Number of deaths[(b)]**	**% of deaths**
Circulatory system disease	I00–I99	2	18.8	18	20.5	287	50.1	307	45.7
Cancer (other than breast cancer)	C00–C97, D45–D46, D47.1, D47.3	3	35.4	38	42.2	89	15.6	130	19.4
Respiratory system disease	J00–J99	1	8.3	9	9.6	41	7.2	50	7.5
Nervous system disease	G00–G99	1	6.3	5	5.4	29	5.1	35	5.2
Endocrine, nutritional and metabolic disease	E00–E89	0	4.2	5	5.1	27	4.7	32	4.8
Digestive system disease	K00–K93	1	14.6	6	6.7	23	4.0	31	4.5
Mental and behavioural disorder	F00–F99	0	0.0	0	0.2	22	3.9	23	3.4
Other	all other codes	1	12.5	9	10.3	54	9.5	65	9.6
Total		**10**	**100.0**	**90**	**100.0**	**573**	**100.0**	**673**	**100.0**

(a) International Statistical Classification of Diseases and Related Health Problems, 10th revision.

(b) Equals the average annual number of deaths. Numbers may not sum to the total due to rounding.

Source: National Mortality Database, AIHW.

was the underlying cause of death (287 deaths per year). In comparison, for women in the two other age groups, a cancer other than breast cancer was the most common underlying cause of death (35% of deaths of those aged less than 50 years and 42% of deaths of those aged 50 to 69 years).

Mortality of males from breast cancer

While the number of men who die from breast cancer is much lower than the number of women who die from this disease, each year some men die from breast cancer. In 2006, 25 men died from invasive breast cancer (Table 3.6). Since 1982, the number of men who died from breast cancer has ranged from 10 in 2003 to 26 in 2001.

Table 3.6: Mortality from breast cancer, males, 1982 to 2006

Year	Number of deaths	% of all cancer deaths	ASR[(a)]	95% confidence interval	Mean age at death	Median age at death
1982	17	0.12	0.4	0.2–0.6	70.6	71.0
1983	13	0.09	0.3	0.1–0.5	72.4	71.0
1984	17	0.11	0.4	0.2–0.6	70.2	69.0
1985	11	0.07	0.2	0.1–0.3	68.9	71.0
1986	17	0.11	0.3	0.2–0.5	66.5	65.0
1987	20	0.12	0.3	0.2–0.5	64.8	64.5
1988	23	0.13	0.4	0.2–0.6	71.6	70.0
1989	18	0.10	0.3	0.2–0.5	68.4	70.0
1990	16	0.09	0.3	0.1–0.4	71.4	69.5
1991	15	0.08	0.2	0.1–0.4	70.1	70.0
1992	19	0.10	0.3	0.2–0.5	71.6	70.0
1993	15	0.08	0.2	0.1–0.4	74.0	74.0
1994	20	0.10	0.3	0.2–0.4	70.7	70.0
1995	23	0.12	0.3	0.2–0.5	67.1	67.0
1996	21	0.10	0.3	0.2–0.4	68.8	68.0
1997	19	0.10	0.3	0.2–0.4	75.3	77.0
1998	19	0.09	0.2	0.1–0.4	70.3	71.0
1999	21	0.10	0.2	0.1–0.4	62.7	66.0
2000	21	0.10	0.3	0.2–0.4	66.3	69.0
2001	26	0.12	0.3	0.2–0.4	70.1	72.5
2002	17	0.08	0.2	0.1–0.3	66.2	66.0
2003	10	0.05	0.1	0.1–0.2	67.3	72.5
2004	19	0.09	0.2	0.1–0.3	71.3	77.0
2005	19	0.09	0.2	0.1–0.3	69.9	71.0
2006	25	0.11	0.3	0.2–0.4	71.8	76.0

(a) Standardised to the Australian population as at 30 June 2001 and expressed per 100,000 males. The 1982 to 1996 data were adjusted from International Statistical Classification of Diseases and Related Health Problems, 9th revision (ICD-9) to ICD-10 standards using a factor of 0.98.

Source: National Mortality Database, AIHW.

In each of the years from 1982 to 2006, of all men who died from cancer, approximately 0.1% — that is, one in a thousand — died from breast cancer (Table 3.6). The age-standardised mortality rates for men from breast cancer have also remained relatively constant since 1982, ranging from 0.1 to 0.4 (per 100,000 males). In 2006, the mortality rate was 0.3 (per 100,000 males).

Over the years from 1982 to 2006, the mean age of death of men who died from breast cancer ranged from 63 years (in 1999) to 75 years (1997). In 2006, the mean age at death was 72 years and the median age was 76 years. Given the relatively small number of deaths of males from breast cancer each year, this year-to-year fluctuation in average age at death is not surprising.

As shown in Table 3.7, on average during 2002 to 2006, 10 out of 18 men who died from breast cancer were aged 70 years or over. The rate of death from breast cancer for those aged 70 to 79 years (1 per 100,000 males) and for those aged 80 years and over (2 per 100,000 males) was significantly higher than the rate for men in the other age groups.

Table 3.7: Mortality from breast cancer by age group, males, 2002–2006

Age group (years)	Average annual number of deaths[(a)]	Age-specific rate[(b)]	95% confidence interval
<50	1	<0.1	0.0–0.0
50–69	7	0.3	0.2–0.4
70–79	5	1.0	0.6–1.4
80+	5	2.0	1.3–3.0
Total[(c)]	**18**	**0.2**	**0.1–0.2**

(a) Numbers may not sum to the total due to rounding.

(b) Number of deaths per 100,000 males.

(c) The rate shown in this row is age-standardised to the Australian population as at 30 June 2001; it is expressed per 100,000 males.

Source: National Mortality Database, AIHW.

4 Survival after a diagnosis of breast cancer

Along with details on incidence and mortality, information on the survival of those who are diagnosed with breast cancer provides an indication of the effect of cancer and the success of cancer control programs and treatments. Survival estimates provide information on the probability that a person will still be alive at a specified point in time (such as 5 or 10 years) after the diagnosis of cancer. Survival is influenced by a range of factors including: the characteristics of those diagnosed with cancer (e.g. age, sex, additional illnesses and lifestyle); the nature of the tumours (e.g. stage at diagnosis and histology type); and the health-care system (e.g. its screening, diagnostic and treatment facilities and follow-up services) (Black et al. 1998; WCRF & AICR 2007).

Two different measures of survival from cancer can be presented, namely, crude survival and relative survival. Crude survival indicates the proportion of people alive at a specified point in time subsequent to diagnosis of cancer; it does not take into account the fact that some people diagnosed with cancer—for example, older persons—may have a relatively shorter lifespan than the rest of the population (regardless of their diagnosis of cancer) due to other illnesses. Relative survival takes this issue into account and it is thus a more meaningful measure of outcome from cancer. Relative survival involves the comparison of the survival of people diagnosed with cancer (i.e. observed survival) with that experienced by a population of equivalent age, sex and calendar year (i.e. expected survival). The ratio of observed to expected survival is used to estimate the proportion of people who would have survived their cancer. As detailed more fully in Appendix B, relative survival can be calculated in a number of different ways, with the 'cohort method' being used for this report.

Relative survival is generally presented as a proportion, with a value less than 100% suggesting that those with breast cancer had a lower chance of survival than the general population. For example, 5-year relative survival of 80% for women diagnosed with breast cancer means that these women had an 80% chance of surviving 5 years after diagnosis relative to the general population of Australian females.

Since relative survival estimates are based on the outcomes of a group of people with a diverse mix of breast cancer characteristics, they provide an indication of the *average* survival experience. They do not reflect an *individual's* chance of surviving since this may be affected by individual characteristics, such as the presence of other illnesses.

In this chapter, 1-, 5- and 10-year survival proportions are shown. One-year survival might indicate the net short-term effectiveness of treatment and the stage at which the cancer was detected.

Five- and 10-year survival estimates might indicate:

- the effectiveness of treatment
- whether long-term side effects of cancer treatment are associated with additional mortality
- the number of cancers needing ongoing monitoring rather than cancer treatment
- milestones when there has been an arrest in the disease process or a slower progression.

It should be noted, however, that these survival estimates may show early results only, since death from breast cancer can occur beyond 5- and 10-year time frames.

In this chapter, relative survival estimates are shown for females diagnosed with breast cancer, with comparisons made across time, by age group and by type of breast cancer. Where available from published reports, state-based findings on survival by stage at diagnosis are presented. In addition, international data on survival are provided (using mortality-to-incidence ratios as an indicator). Differences in relative survival for women with breast cancer were presented in an earlier report by socioeconomic status and remoteness of usual residence (AIHW, CA & AACR 2008). Key findings from those analyses are shown in this chapter. Data limitations and the lack of necessary life tables have precluded the calculation of relative survival proportions by Indigenous status and country of birth. However, *crude* survival estimates are shown by Indigenous status for women in four jurisdictions. The survival of males with breast cancer is also discussed in this chapter.

With the exception of the survival estimates obtained from the earlier AIHW report, the survival estimates shown in this chapter are based on the analysis of records of breast cancer cases diagnosed between 1982 and 2006 as held in the Australian Cancer Database (ACD). Data from the National Death Index on deaths (from any cause) that occurred up to 31 December 2008 were used to determine which persons with breast cancer had died and when this occurred.

Survival of females with breast cancer

Survival of females diagnosed in 2000 to 2006

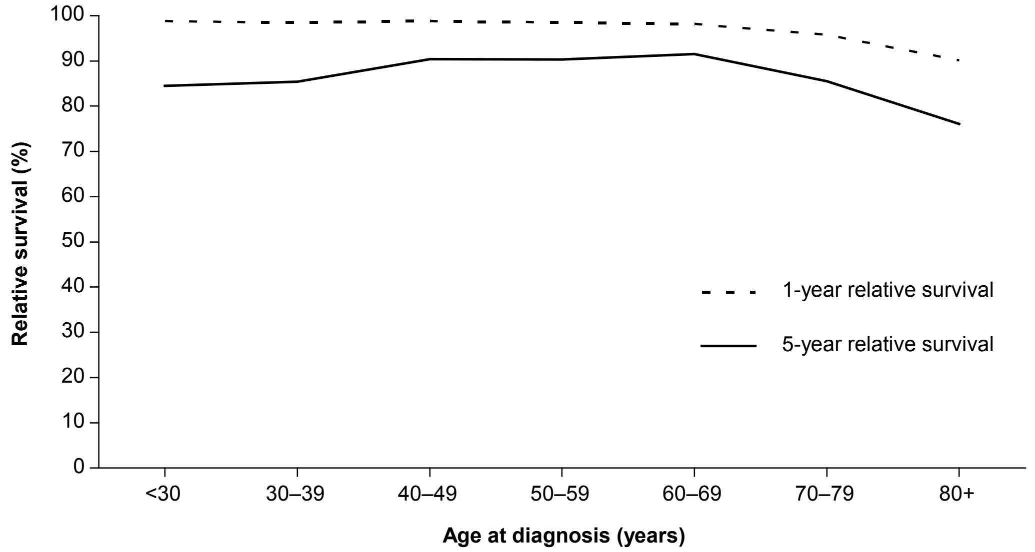
For women who were diagnosed with breast cancer in 2000 to 2006, 1-year relative survival was very high at 97%. The corresponding 5-year relative survival ratio was 88%. In other words, those women who were diagnosed with breast cancer between 2000 and 2006 were 88% as likely to live 5 years after diagnosis as were women of comparable age in the general population.

Differences by age at diagnosis

Differences in 1- and 5-year relative survival by age at diagnosis are shown in Figure 4.1 for women diagnosed with breast cancer during 2000 to 2006. While 1-year relative survival was consistently either 98% or 99% for those under the age of 70 years, it was significantly lower for the older women. That is, 1-year relative survival was 96% for those aged 70 to 79 years and 90% for those aged 80 years and over at diagnosis.

Those who were diagnosed between the ages of 60 to 69 years had the highest survival over a 5-year period (5-year relative survival of 92%) while the lowest survival was calculated for those aged 80 years and over (76%). Five-year relative survival for women below the age of 40 years at diagnosis (85%) and for those aged 70 to 79 years at diagnosis (86%) were also significantly lower than the figure for all ages combined.

Possible reasons for the poorer survival of women diagnosed at an older age include: less aggressive treatment; a smaller proportion of older people being entered into clinical trials; a greater likelihood of comorbidities with other diseases; and a lesser likelihood of being diagnosed with stage I tumours (as shown in Table 2.5).



Note: The data for this figure are shown in Appendix Table D4.1.

Source: Australian Cancer Database, AIHW.

Figure 4.1: Relative survival by age at diagnosis, females with breast cancer, 2000–2006

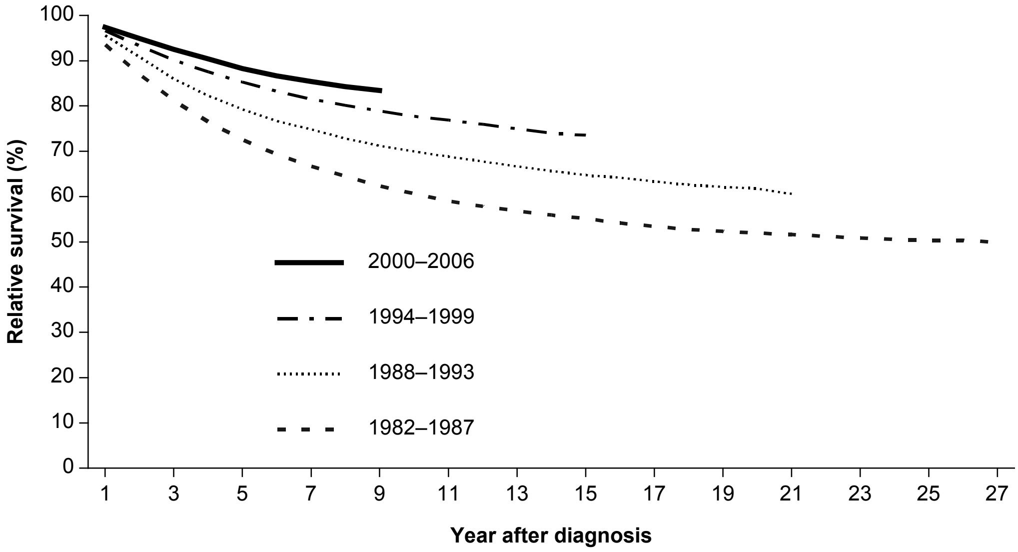
In contrast, lower survival of younger women is thought to be more closely aligned to the characteristics of the tumours. Past research suggests that breast cancer in younger women is a distinct disease where tumours are more likely than those diagnosed in older women to have characteristics associated with a poorer prognosis—for example, to show bilateral disease, be less well differentiated and be lymph-node positive (Bharat et al. 2009; Brennan et al. 2005). In addition, since routine mammography screening is thought to be less effective for women under the age of 40 years (see Chapter 7), it is more likely that tumours diagnosed in younger women would tend to be at a more advanced stage compared with those diagnosed in older women. This is supported by Queensland data on stage by age group as shown in Chapter 2 (Youlden et al. 2009).

Trends

Relative survival for women with breast cancer is presented in Table 4.1 for four time periods spanning from 1982–1987 to 2000–2006. Note that the method used to calculate the relative survival proportions shown in this chapter does not take into account differing age structures in the population over time. However, given there was little difference in the age distribution of females diagnosed with breast cancer across the years considered (see Table 2.2), the lack of age adjustment is not expected to have any substantial effect on the trends observed.

Also note that since mammographic screening is able to detect small cancers in women that were not yet diagnosable clinically, increased participation in screening can lead to an increase in survival for two reasons: better treatment outcomes; and artificially increasing survival time by simply moving the date of diagnosis earlier (i.e. by increasing the 'lead time'). The available data here cannot be used to investigate causes of changes in survival over time. However, past research has indicated that mammographic screening programs have resulted in improved survival over and above that attributable to lead time alone (Joensuu et al. 2004; Lawrence et al. 2009; Shen et al. 2005).

The relative survival proportions shown in Figure 4.2 (and the related data shown in Appendix Table D4.2) indicate that females survived significantly longer after a diagnosis of breast cancer in 2000 to 2006 than they did in the past. For example, between the first and the last of the four time periods considered, 1-year relative survival increased from 94% to 97%, while 5-year relative survival increased from 73% to 88%. In other words, females diagnosed with breast cancer in 1982 to 1987 were 73% as likely as other comparable women to be alive 5 years after their diagnosis, while the corresponding proportion for those diagnosed during 2000 to 2006 was 88%.



Note: The data for this figure are shown in Appendix Table D4.2.

Source: Australian Cancer Database, AIHW.

Figure 4.2: Relative survival by period of diagnosis, females with breast cancer, for 1982–1987 to 2000–2006

While caution should be used when interpreting longer-term survival estimates since they reflect past detection and treatment practices rather than more recent ones, 10-year and 15-years relative survival estimates support the conclusion that more recent cohorts of females with breast cancer are surviving longer than their counterparts diagnosed in earlier years. While 61% of women diagnosed with breast cancer in the 1982 to 1987 period could expect to survive 10 years, relative to other women of comparable age, this proportion had increased to 78% for those women diagnosed during 1994 to 1999. The corresponding figures for 15-year survival are 55% in 1982 to 1987 and 74% in 1994 to 1999.

The improvements over time in survival of women following a diagnosis of breast cancer may be due to a number of factors including the following:

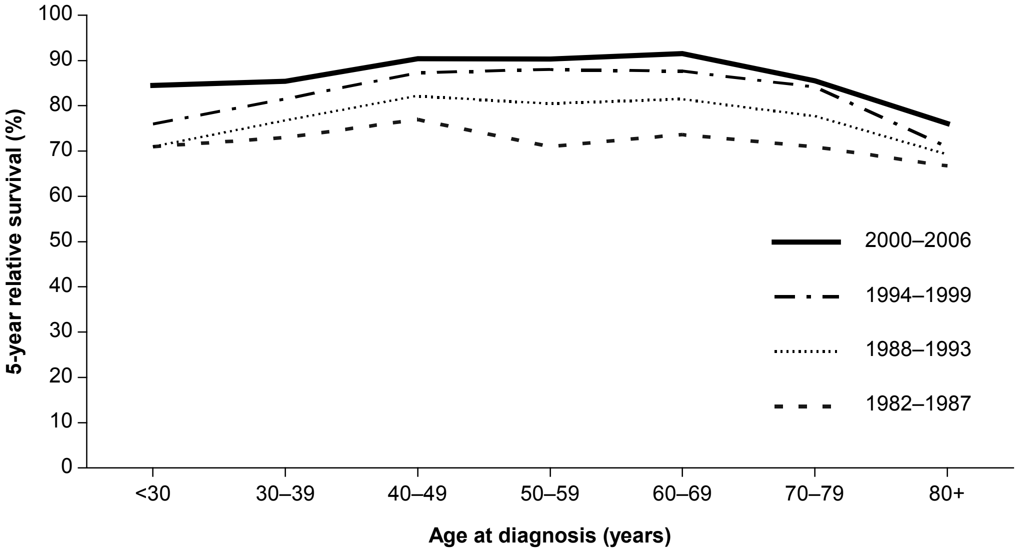
- earlier detection through screening mammogram programs, and public education about breast awareness and recognition of symptoms
- increased effectiveness of general practitioners in diagnosing and following up suspicious signs and symptoms

- improvements in appropriate referral
- more effective investigation and staging of disease
- the availability of up-to-date evidence-based guidelines for the management of breast cancer
- more widespread availability of treatment
- increasing subspecialisation of cancer treatment
- more effective treatment
- reduced levels of comorbidity among those with breast cancer (AIHW, CA & AACR 2008).

The finding of improved survival has also been observed in a number of other countries, including Canada (CCS & NCIC 2007), the United Kingdom (Cancer Research UK 2004) and the United States of America (Ries et al. 2008).

Trends by age at diagnosis

Although greater gains are seen for some age groups than others, the trend towards improved 5-year survival is evident at every age (Figure 4.3). Furthermore, the differences in the 5-year relative survival estimates between 1982–1987 and 2000–2006 are statistically significant for each age group (see Appendix Table D4.3). The largest gains between the first and the last time periods are observed in the age groups most affected by mammography screening, that is the 50 to 59 year age group (5-year relative survival increased from 71% to 90%) and the 60 to 69 year age group (74% to 92%). In contrast, although gains were made, a smaller improvement was observed for the oldest age group (those aged 80 years and over) where the 5-year relative survival increased from 67% in 1982–1987 to 76% in 2000–2006. These findings suggest that while women in all of the age groups have benefited from



Note: The data for this figure are shown in Appendix Table D4.3.

Source: Australian Cancer Database, AIHW.

Figure 4.3: Five-year relative survival by age at diagnosis, females with breast cancer, 1982–1987 to 2000–2006

improvements in the management of breast cancer, women in the target age group for mammographic screening have had an additional benefit that may have been from the introduction of the screening program.

International comparisons

In addition to the methodological challenges associated with comparing cancer statistics from different countries (as discussed in Chapter 1), additional uncertainties arise when comparing survival estimates. In particular, there tends to be wide variation across countries in the:

- years to which the relative survival estimates apply
- length of the follow-up period considered (e.g. 1-, 5-, 10-year and so forth)
- methods and age groups used to calculate the relative survival estimates (AIHW & AACR 2008:83–4).

For these reasons, relative survival estimates for different countries are not compared in this report.

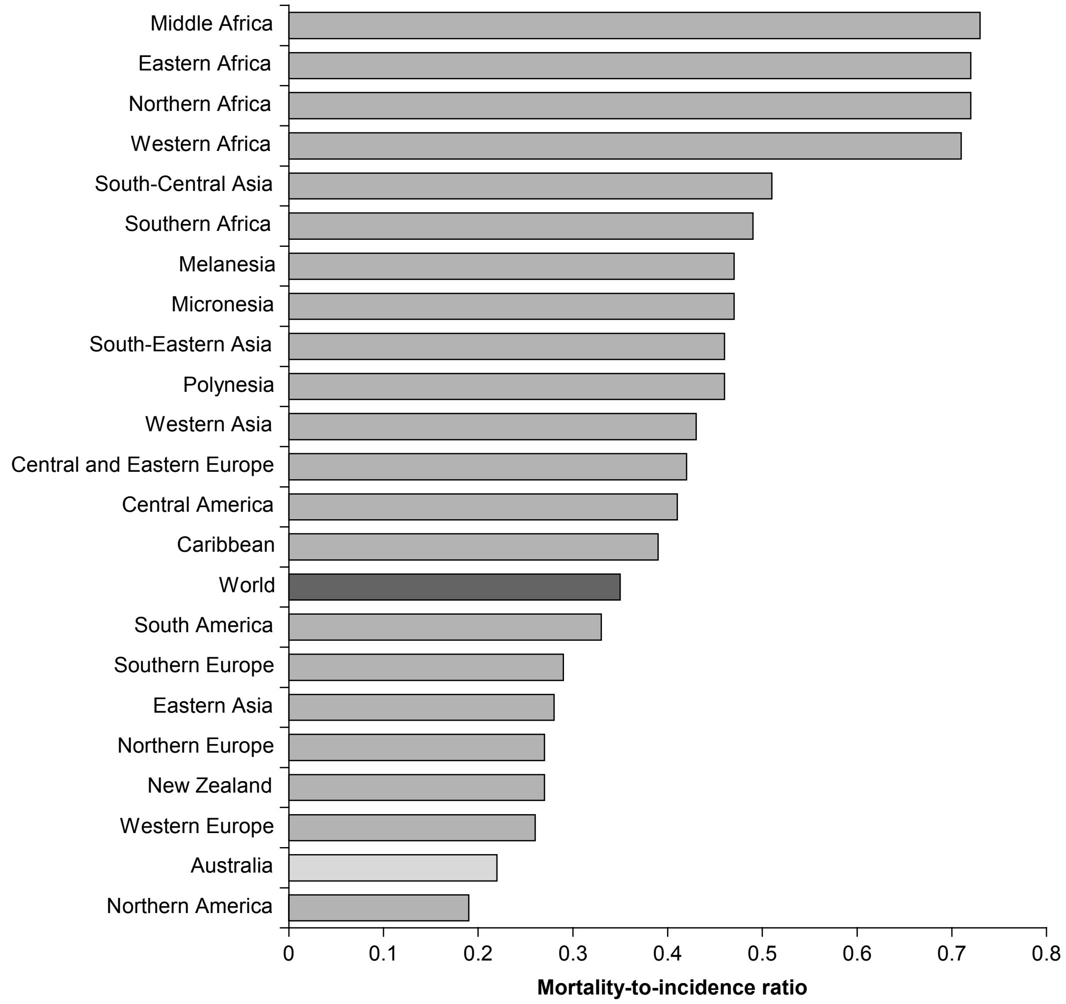
Although more rudimentary than relative survival estimates, a measure of cancer outcomes that is less fraught with difficulties when making international comparisons is the mortality-to-incidence ratio (MIR). This ratio describes how many deaths there were in a particular year due to a particular disease, relative to the number of new cases diagnosed that year (using age-standardised data). For example, a mortality-to-incidence ratio of 0.24 for breast cancer indicates that there were 24 deaths for every 100 new cases of breast cancer diagnosed in that year (though the deaths need not relate to the same people as the cases). If survival tends to be lower in a particular country relative to other countries, then the mortality-to-incidence ratio for that country generally would be expected to be higher (i.e. closer to 1.00). In contrast, if survival is higher, the ratio generally would be lower (i.e. closer to zero). Appendix B provides further information on interpreting mortality-to-incidence ratios.

For this report, mortality-to-incidence ratios were calculated for women using data from GLOBOCAN (Ferlay et al. 2004). The fact that the GLOBOCAN data were estimates that pertain to 2002 should be taken into account when interpreting the results shown in Figure 4.4.

According to the 2002 GLOBOCAN data, the MIR for Australia was 0.22, suggesting that the survival of women in Australia who were diagnosed with breast cancer was very high relative to women in many other regions and countries. The MIR for women with breast cancer who lived in Northern American countries (i.e. the USA and Canada) was the lowest (0.19), indicating the best survival prospects. By comparison, the MIR for women with breast cancer in each of the African regions was 0.49 or higher, suggesting relatively poor survival. Overall, the MIR ratios suggest that there is a wide disparity around the globe in the survival of women with breast cancer, with Australia ranking favourably.

Survival by type of breast cancer

Five-year survival for 2000 to 2006 by histology group is shown in Figure 4.5. Survival is significantly lower than average for women where the type of breast cancer was 'Group 9: unspecified' (i.e. 5-year relative survival of 50%). At least part of this can be explained by



Notes

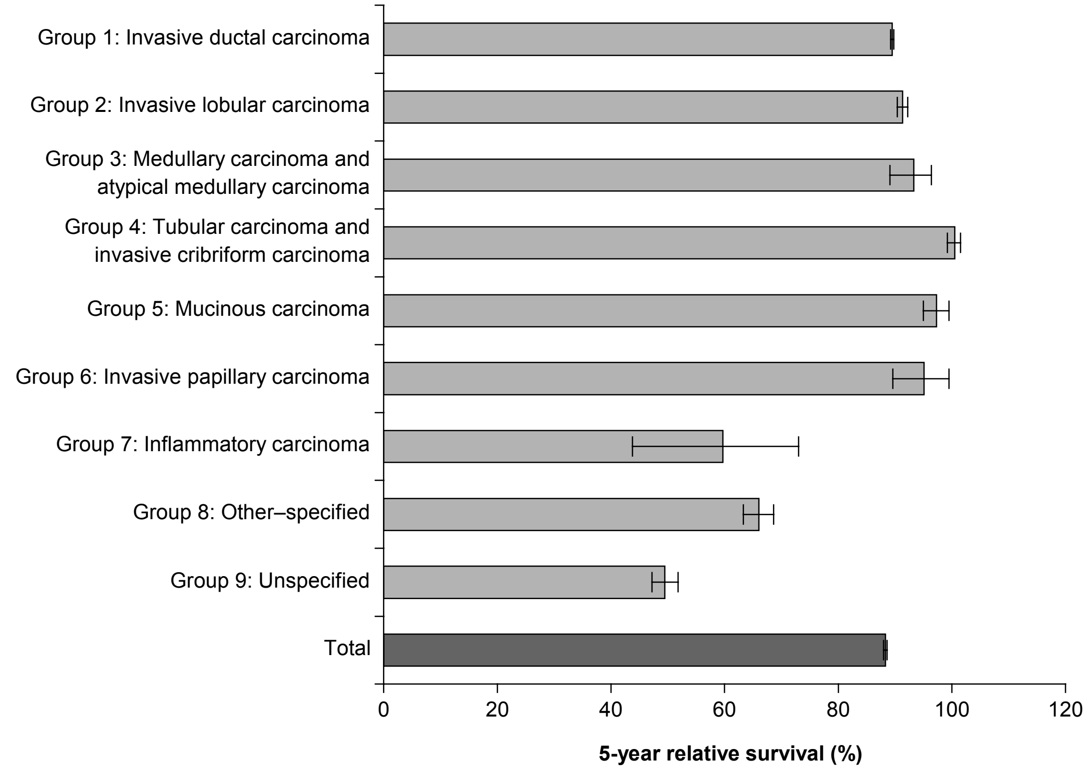
1. The ratios are based on estimated incidence and mortality data for 2002; those estimates were based on data from approximately 3 to 5 years earlier.
2. The mortality-to-incidence ratio equals the age-standardised mortality rate divided by the age-standardised incidence rate.
3. The data for this figure are shown in Appendix Table D4.4.

Source: Ferlay et al. 2004.

Figure 4.4: International comparison of mortality-to-incidence ratios for breast cancer, females, 2002

the fact that women with an 'unspecified' type of breast cancer tend to be older than average (as discussed in Chapter 2) and their prognosis tends to be poorer (as described previously in this chapter). This is examined further in Appendix Table D4.5 where 5-year relative survival is shown by age group for each of the nine histology groups.

Five-year relative survival was also significantly lower than average for women who were diagnosed with a breast cancer in 'Group 7: Inflammatory carcinoma' (60%) and in 'Group 8: Other specified types of breast cancer' (66%). Meanwhile, relative survival was estimated to be 101% for those with a breast cancer in 'Group 4: Tubular carcinoma and invasive cribriform carcinoma'. This suggests that the survival prospects of this group of women with breast cancer may be slightly better than for a comparable group of women in the general population. While this finding may be due to random variation, it may also be real, reflecting different lifestyle choices (e.g. improved diet and increased physical activity), increased medical surveillance or other factors.



Notes

1. Appendix Table D2.6 provides a list of the histology types included in each group.
2. The data for this figure are shown in Table 4.1.

Source: Australian Cancer Database, AIHW.

Figure 4.5: Five-year relative survival by type of breast cancer, females, 2000–2006

Change over time in 5-year relative survival for each of the histology groups is shown in Table 4.1. A significant improvement is observed across each of the time periods in the relative survival estimates for women diagnosed with a breast cancer in 'Group 1: Invasive ductal carcinoma', with a 5-year survival estimate of 74% for the 1982 to 1987 period compared with a corresponding estimate of 90% for 2000 to 2006. Improvements over time in survival—and significant increases from the first to the last time period—were also observed for women diagnosed with breast cancers in the following groups:

- 'Group 2: Invasive lobular carcinoma' (from 79% to 91% 5-year relative survival)
- 'Group 5: Mucinous carcinoma' (from 85% to 97%)
- 'Group 3: Medullary carcinoma and atypical medullary carcinoma' (from 85% to 93%).

In contrast, the 5-year relative survival estimate for those with an 'unspecified' type of breast cancer (i.e. Group 9) decreased over the four time periods considered (from 59% to 50%). Substantial fluctuation in the 5-year relative survival estimates is seen over time for those cases diagnosed as 'Group 7: Inflammatory carcinoma'. Since there are few cases of this type of breast cancer in each of the periods, these survival estimates must be used with caution.

Table 4.1: Incidence and 5-year relative survival (RS) by type of breast cancer[(a)], females, 1982–1987 to 2000–2006

	1982–1987			1988–1993			1994–1999			2000–2006		
Type of breast cancer[(a)]	**No. of cases**	**RS (%)**	**95% CI**	**No. of cases**	**RS (%)**	**95% CI**	**No. of cases**	**RS (%)**	**95% CI**	**No. of cases**	**RS (%)**	**95% CI**
Group 1: Invasive ductal carcinoma	21,464	74.4	73.8–75.1	32,429	81.0	80.5–81.6	46,183	86.7	86.4–87.1	65,393	89.5	89.2–89.8
Group 2: Invasive lobular carcinoma	2,127	79.4	77.3–81.4	3,920	87.0	85.6–88.4	6,403	90.3	89.3–91.3	9,127	91.3	90.4–92.2
Group 3: Medullary carcinoma and atypical medullary carcinoma	660	84.5	81.0–87.6	618	85.8	82.4–88.8	449	92.4	88.9–95.2	389	93.3	89.1–96.4
Group 4: Tubular carcinoma and invasive cribriform carcinoma	268	98.8	94.2–102.1	965	98.6	96.5–100.3	1,653	99.0	97.6–100.2	1,789	100.5	99.2–101.5
Group 5: Mucinous carcinoma	646	85.1	80.5–89.3	834	94.4	91.0–97.5	1,168	96.8	94.1–99.2	1,642	97.3	95.0–99.5
Group 6: Invasive papillary carcinoma	186	94.2	86.5–100.3	216	88.8	81.2–95.1	236	96.8	90.4–101.8	379	95.1	89.6–99.5
Group 7: Inflammatory carcinoma	29	18.2	6.6–34.5	41	45.7	29.7–60.6	47	26.3	14.6–39.6	55	59.7	43.8–73.0
Group 8: Other—specified	5,176	67.5	66.0–69.0	3,498	68.1	66.3–69.9	1,901	63.8	61.3–66.2	1,853	66.0	63.3–68.6
Group 9: Unspecified	3,963	58.6	56.7–60.4	3,281	52.6	50.5–54.6	2,756	46.5	44.3–48.7	2,870	49.5	47.2–51.8
Total	**34,519**	**72.6**	**72.0–73.1**	**45,802**	**79.3**	**78.9–79.8**	**60,796**	**85.3**	**84.9–85.6**	**83,497**	**88.3**	**88.0–88.6**

(a) Appendix Table D2.6 provides a list of the histology types included in each group.

Source: Australian Cancer Database, AIHW.

Survival by stage at diagnosis

Research in Australia (AIHW & NBCC 2007) and overseas (Michaelson et al. 2002) has uniformly shown that survival is considerably better for women diagnosed with small rather than large tumours. An Australian study examined the relative survival to 2006 of women who were diagnosed with breast cancer in 1997 and found that survival was significantly poorer for women with larger tumours at diagnosis (i.e. 30 mm or more) compared with those with smaller tumours. Specifically, 5-year relative survival was 98% for women with tumours of 10 mm in size or less and declined to 73% for women with cancers of 30 mm or more and to 49% for women with unknown tumour size at diagnosis (Table 4.2). In addition, the study found that survival was observed to be significantly higher for women whose lymph nodes were cancer-free (i.e. negative nodal status) compared with women whose cancer had spread to their lymph nodes (i.e. positive nodal status).

Table 4.2: Relative survival (RS) to 2006 by size of cancer and nodal status, females with breast cancer diagnosed in 1997

	1-year relative survival		5-year relative survival		9-year relative survival	
	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI
Size of cancer						
0–10 mm	99.6	99.0–100.0	98.2	96.9–99.4	96.0	94.2–97.7
11–15 mm	99.7	99.0–100.1	94.7	93.2–96.1	90.7	88.7–92.6
16–19 mm	99.6	98.6–100.3	93.0	90.6–95.1	87.7	84.6–90.7
20–29 mm	99.4	98.6–99.9	87.9	86.0–89.6	79.2	76.8–81.6
30+ mm	95.6	94.3–96.6	73.1	70.6–75.5	63.6	60.7–66.4
Unknown	74.0	71.1–76.6	49.1	45.7–52.5	39.0	35.5–42.5
Nodal status						
Nodes positive	97.7	96.9–98.3	80.2	78.5–81.7	69.7	67.7–71.6
Nodes negative	100.0	99.6–100.2	96.5	95.5–97.4	93.5	92.2–94.7
Unknown	87.2	85.6–88.6	70.7	68.4–72.9	63.4	60.8–66.0
Total	**96.3**	**95.8–96.7**	**85.6**	**84.7–86.4**	**79.3**	**78.2–80.4**

Source: AIHW & NBCC 2007.

While tumour size and nodal status are relevant to determining the stage of the tumour at diagnosis, they are insufficient for determining stage. Although no national data are available which allow one to calculate relative survival according to the stage of the breast cancer at diagnosis, other data—including state-based and overseas stage data—are available.

As mentioned in Chapter 2, the Queensland Cancer Registry holds sufficient data on stage to create a proxy measure of TNM stage (Youlden et al. 2009). These stage data indicate that in Queensland, survival is much higher for those women whose cancer was at a less advanced stage when diagnosed (Table 4.3). For the 2001 to 2006 period, 5-year relative survival for women in Queensland who were diagnosed with stage I breast cancer was 98%. This compares with 83% for those diagnosed at a more advanced stage (i.e. Stages II to IV) and 50% for those with an unknown stage at diagnosis.

Table 4.3: Five-year relative survival by stage at diagnosis[a], females, Queensland, 2001–2006

Stage at diagnosis[a]	Per cent of cases	Relative survival (%)[b]
Stage I	49	98
Stages II, III and IV	45	83
Unknown	6	50
Total	**100**	**89**

(a) Based on an approximation of the TNM staging system. Stage I tumours are defined as 'tumours of not more than 20 mm diameter, with no evidence of lymph node involvement or distant metastases'; Stage II to IV tumours are defined as 'cancers larger than 20 mm diameter, and/or evidence of spread to lymph nodes; or distant metastases' (Youlden et al. 2009:53).

(b) The period method of calculating relative survival was used.

Source: Youlden et al. 2009.

Summary stage data available from New South Wales also allow for the examination of survival by stage. Since separate estimates for females were not published, the NSW relative survival estimates pertain to both males and females. However, the data for females will be virtually identical to the data shown, since 99% of those with breast cancer in NSW during the period considered were female.

The data from NSW present a similar picture to that observed with the Queensland data. That is, 5-year relative survival for people in NSW diagnosed with breast cancer between 1999 and 2003 was lowest for those with 'distant' breast cancer at diagnosis (41%) and highest for those with 'localised' tumour (97%) (Table 4.4). Note that, while still relatively low, 5-year relative survival for those in NSW with an 'unknown' stage at diagnosis (74%) was not as low as that observed for Queensland.

Table 4.4: Five-year relative survival by stage at diagnosis[a], people with breast cancer[b], New South Wales, 1999–2003

Stage at diagnosis[a]	Per cent of cases	Relative survival (%)[c]
Localised	53	97
Regional	33	86
Distant	5	41
Unknown	9	74
Total	**100**	**88**

(a) Based on the 'SEER Summary Stage' system of classifying the stage at diagnosis. Briefly, localised tumours are those that were confined to the breast; regional tumours are those that had spread to surrounding tissue or nearby lymph nodes; and distant tumours had spread to distant organs (see Tracey et al. 2006:128).

(b) These data apply to males and females with the exception of the 'total' 5-year survival estimate which pertains to females only.

(c) The multiple-year cohort method of calculating relative survival was used.

Source: Tracey et al. 2007.

Information from the United States of America (USA)—as shown in Table 4.5—provides further insights on survival by stage at diagnosis (Ries et al. 2008). These data again highlight the substantial difference in 5-year relative survival between those women who were diagnosed with a 'localised' breast cancer (98%) and those with a 'distant' tumour (27%). The data also suggest that those with an unknown tumour stage at diagnosis had a relatively poor 5-year survival (57%), although this seems more evident among those aged 50 years and over than those aged less than 50 years (53% and 71%, respectively). However there is a notable difference between the NSW and the USA 5-year survival estimates for distant stage tumours, with a 41% survival estimate applying in NSW compared with 27% for the USA data.

Other countries which have published survival estimates by stage of breast cancer include the United Kingdom (Cancer Research UK 2003) and Canada (CCS & NCIC 2007). All of these data sources lead to the same well-recognised conclusion, that is, the stage at which breast cancer is diagnosed is an important determinant of survival, with the later the stage at diagnosis, the lower the survival estimate. Furthermore, the data show that survival is relatively poor for those with an 'unknown' stage at diagnosis.

Table 4.5: Five-year relative survival (RS) by stage at diagnosis[(a)] and age group, females with breast cancer, United States of America[(b)], 1996–2004

Stage at diagnosis[(a)]	<50 years		50+ years		All ages	
	% of cases	RS (%)[(c)]	% of cases	RS (%)[(c)]	% of cases	RS (%)[(c)]
Localised	54	95.5	63	98.9	61	98.1
Regional	39	83.1	28	84.2	31	83.8
Distant	5	33.9	6	24.8	6	27.1
Unknown	2	70.7	2	52.6	2	56.9
Total	**100**	**86.9**	**100**	**89.4**	**100**	**88.7**

(a) Based on the 'SEER Summary Stage' system of classifying the stage at diagnosis. Briefly, localised tumours are those that were confined to the breast; regional tumours are those that had spread to surrounding tissue or nearby lymph nodes; and distant tumours had spread to distant organs (see Ries et al. 2008:O-19).

(b) Data are from the 'SEER 17' areas which cover approximately a quarter of the USA (see Table IV–10 in Ries et al. 2008).

(c) The cohort method of calculating relative survival was used.

Source: Ries et al. 2008.

Differences across groups

In this section of the report, differences in relative survival are discussed in relation to geographical area and socioeconomic status. The source for this information is a report prepared by the AIHW in 2008 (AIHW, CA & AACR 2008). The data for the analyses on geographical area pertain to women who were diagnosed with breast cancer between 1997 and 2004, while the analyses on socioeconomic status relate to diagnoses that occurred between 2000 and 2004. For both of these analyses, cases were followed to the end of 2006. Note that the method used to calculate the survival estimates does not include an adjustment for age; thus, differences in relative survival between groups may be affected by differing age structures. Further information about the approach used to calculate the relative survival estimates can be found in the 2008 report (AIHW, CA & AACR 2008).

Differences by geographical area

Cancer survival outcomes might vary according to the level of remoteness of where women live because of differences in:

- the age at which women are diagnosed with breast cancer
- the stage of the disease at diagnosis
- cancer histology type
- access to health services.

In addition, differences in relative survival across regions might be influenced by the population composition in these regions. For example, Aboriginal and Torres Strait Islander peoples are more likely than other Australians to live in *Remote* and *Very remote* areas. Given the higher proportion of Indigenous populations in more remote areas, relative survival from cancer is more strongly affected by the health status of Indigenous Australians in these areas than in more urban centres.

For the purposes of examining the effect on survival of level of remoteness of where women lived at diagnosis, the Australian Standard Geographical Classification Remoteness Area classification (ABS 2001) was used. As noted in Chapter 2, this classification divides all areas of Australia into five categories—namely, *Major cities*, *Inner regional*, *Outer regional*, *Remote* and *Very remote*. However, due to the relatively low population numbers in the *Remote* and *Very remote* areas, these two categories were combined for the present survival analyses.

The analyses indicated that there were no statistically significant differences by geographical area in the 1-year relative survival estimates (Table 4.6). However, there was such a difference in 5-year estimates—those Australian women diagnosed with breast cancer between 1997 and 2004 who lived in *Major cities* or *Inner regional* areas had a significantly higher 5-year relative survival proportion (both 88%) than did those who lived in *Outer regional* areas (85%). Note that 5-year survival estimates for remoteness areas by age group are shown in Appendix Table D4.6.

Table 4.6: Relative survival by remoteness area[(a)], females with breast cancer, 1997–2004

	1-year relative survival		5-year relative survival	
Remoteness area[(a)]	**Relative survival (%)**	**95% confidence interval**	**Relative survival (%)**	**95% confidence interval**
Major cities	97.2	97.0–97.3	87.7	87.3–88.1
Inner regional	97.1	96.8–97.4	87.6	86.9–88.2
Outer regional	96.8	96.4–97.3	85.3	84.3–86.4
Remote and Very remote	96.7	95.3–97.7	85.0	82.3–87.4

(a) Measured using the Australian Standard Geographical Classification Remoteness Area classification.

Source: AIHW, CA & AACR 2008.

Research findings on the relationship between survival estimates and remoteness tend to be inconsistent. Analyses of data from Victoria suggested no significant differences by remoteness (English et al. 2007). Analyses by the AIHW of national data for the 1992 to 1997 period indicated there were statistically significant differences by remoteness such that women with breast cancer who lived in 'Other remote areas' had a significantly lower age-adjusted relative survival proportion (80%) than those living in 'Capital cities' (83%) and 'Large rural centres' (84%) (AIHW & AACR 2003). Furthermore, analyses of Queensland data for 1997 to 2006 also indicated significant differences by remoteness area, with those living outside of a *Major city* having lower relative survival proportions (Youlden et al. 2009). The reasons for the different findings on the association between remoteness and survival from breast cancer are not clear. They could relate to differences in the approaches used to calculate the survival proportions (e.g. methods used, years covered, whether the data were age-adjusted and so forth) and/or actual differences over time and between different areas of Australia.

Differences by socioeconomic status

Areas with high socioeconomic status are predominantly located in cities, have good access to health services and have populations with generally above-average education and income. These factors are expected to be associated with earlier detection and treatment of cancer and, therefore, increased relative survival. In contrast, poor access to health services and lower levels of education and income in areas with low socioeconomic status might contribute to later cancer detection and less than adequate treatment, leading to lower cancer survival. In addition, cancer survival outcomes might vary across socioeconomic status levels because of differences in the age at diagnosis, extent of the disease at diagnosis and the cancer histology types associated with various socioeconomic status levels.

For breast cancers diagnosed between 2000 and 2004, the woman's area of residence was categorised according to the social and economic characteristics of those that lived in that area. As discussed in Chapter 2, this information was used as a proxy for the socioeconomic status of people living in those areas.

Significant differences by socioeconomic status are seen for both the 1- and 5-year relative survival proportions for women diagnosed with breast cancer between 2000 and 2004 (Table 4.7). Although the difference between the 1-year relative survival proportions for those living in areas with the lowest socioeconomic status (97%) and those living in areas with the highest socioeconomic status (98%) is small, the difference is statistically significant. Five-year relative survival was 90% for women with breast cancer living in areas with the highest socioeconomic status, while it was 86% for their counterparts who lived in areas with the lowest socioeconomic status. Appendix Table D4.7 provides 5-year survival estimates according to socioeconomic status and age group.

Table 4.7: Relative survival by socioeconomic status[(a)], females with breast cancer, 2000–2004

	1-year relative survival		5-year relative survival	
Socioeconomic status[(a)]	**Relative survival (%)**	**95% confidence interval**	**Relative survival (%)**	**95% confidence interval**
1 (lowest)	96.6	96.2–97.0	86.1	85.1–87.0
2	97.0	96.6–97.4	87.4	86.5–88.3
3	97.1	96.7–97.5	88.2	87.4–89.1
4	97.6	97.2–97.9	88.9	88.0–89.7
5 (highest)	97.7	97.3–98.0	90.0	89.2–90.7

(a) Measured using the ABS Socio-Economic Index for Areas (SEIFA) Index of Relative Socio-economic Disadvantage.

Source: AIHW, CA & AACR 2008.

Statistically significant differences according to socioeconomic status were also observed in the survival analyses by the AIHW with data for 1992 to 1997 (AIHW & AACR 2003). Those data led to the same conclusion—5-year survival was higher for those who lived in the areas of highest socioeconomic status (85%) compared with those who lived in the areas of lowest socioeconomic status (81%). Since neither the 2009 Queensland report (Youlden et al. 2009) nor the 2007 Victorian report (English et al. 2007) included survival analyses by socioeconomic status, comparisons cannot be made with findings for those states. However, an earlier report using Queensland data from 1996 to 2002 did look at this topic. In that report, a modified Index of Relative Socio-economic Disadvantage was used such that survival from breast cancer was compared for three groups of women: 'Affluent' (which included the 10% of people in the areas that had the highest socioeconomic status);

'Disadvantaged' (which included the 10% that had the lowest socioeconomic status); and 'Middle' (which included the remaining 80%). Although the expected direction of effect was found (i.e. 88% 5-year relative survival for those in the 'Affluent' group compared with 85% for those in the 'Disadvantaged' group), the differences by socioeconomic status were not statistically significant (Baade et al. 2005). As was noted in relation to remoteness levels, the disparate findings across studies may be due to differences in methodology (and in particular, in this case, the way in which the measure of socioeconomic status was categorised) or actual differences across time or geographical areas.

Differences by Aboriginal and Torres Strait Islander status

As noted earlier in this chapter, relative survival proportions cannot be calculated according to Indigenous status due to data issues and the lack of necessary life tables. However, 5-year *crude* survival estimates can be derived and these are shown in Table 4.8. Note that these estimates show survival from death from any cause (not from breast cancer death specifically). Past research has shown that the life expectancy of Indigenous women is shorter than that of non-Indigenous women (ABS 2004, 2009e) which would predispose them to lower crude survival estimates in this study. The data apply to women in four Australian states and territories (Queensland, Western Australia, South Australia and the Northern Territory) for the period 2002 to 2006. While data by age group are also shown, the relatively small number of Indigenous women in each age group (especially in the age group of women 70 years and over) should be considered when making use of these data.

Based on the crude survival estimates for breast cancer diagnosed between 2002 and 2006, the data suggest that in the four jurisdictions considered, 5-year crude survival was significantly lower for Indigenous women (65% survival) than non-Indigenous women (82% survival) who were diagnosed with breast cancer.

Table 4.8: Five-year crude survival (CS) by Indigenous status and age group, females, Queensland, Western Australia, South Australia and the Northern Territory, 2002–2006

Age group (years)	Indigenous			Non-Indigenous		
	No. of cases	CS (%)	95% CI	No. of cases	CS (%)	95% CI
<50	87	72.2	58.9–81.9	5,033	88.8	87.7–89.8
50–59	68	62.1	46.4–74.5	5,590	88.4	87.4–89.4
60–69	48	62.6	43.9–76.6	4,693	87.5	86.4–88.6
70+	31	51.2	26.4–71.5	4,848	62.1	60.5–63.6
All ages	**234**	**64.7**	**56.6–71.7**	**20,164**	**82.0**	**81.3–82.6**

Source: Australian Cancer Database, AIHW.

Survival of males with breast cancer

For males diagnosed with breast cancer during 2000 to 2006, 1-year relative survival was 96% (Table 4.9). This is not significantly different from the 97% observed for women (see Table D4.1). However, when 5-year survival estimates are considered, survival estimates were significantly lower for men than women diagnosed with breast cancer in 2000 to 2006 (82%

and 88%, respectively), indicating that the prognosis for males diagnosed with breast cancer is poorer than for their female counterparts.

It is difficult to compare these findings for males with other research results since most studies have only considered survival of females from breast cancer (e.g. English et al. 2007; Ries et al. 2008; Tracey et al. 2007; Youlden et al. 2009). However, an exception is a study using USA data from 1973 to 1998 which indicated that relative survival for men was worse than that for women largely because men were more likely to be diagnosed with breast cancer at a later stage, with larger tumours and with more frequent lymph node involvement (Giordano et al. 2004). Within individual stage categories, survival differences by sex were no longer evident. The lack of national data on stage at diagnosis in Australia means that it cannot be determined whether the same would hold true in Australia.

Table 4.9: Relative survival (RS) by period of diagnosis, males with breast cancer, 1982–1987 to 2000–2006

	1982–1987		1988–1993		1994–1999		2000–2006	
Years after diagnosis	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI
1	91.4	87.2–94.6	92.9	89.2–95.7	94.4	91.2–96.7	96.1	93.8–97.9
5	78.9	72.0–85.1	79.7	73.4–85.4	81.6	76.2–86.5	82.3	77.4–86.7
10	65.3	56.7–73.7	65.9	57.9–73.7	73.0	66.1–79.6	. .	. .
15	56.2	46.4–66.4	62.9	53.4–72.5	56.5	41.2–72.3	. .	. .

Source: Australian Cancer Database, AIHW.

Change over time in relative survival for men is also presented in Table 4.9. Although some improvements are seen—for example, 5-year relative survival increased from 79% to 82% from the first to the last period considered—these differences were not statistically significant.

5 Prevalence of breast cancer

How many people alive in Australia today have had breast cancer? The answer to this question provides us with information on the prevalence of breast cancer. Prevalence (or complete prevalence as it is sometimes called) is defined as the number of people alive at a specified point in time who have ever been diagnosed with breast cancer regardless of how long ago. These people may or may not be undergoing treatment or be considered 'cured'.

Rather than include all people alive who have ever been diagnosed with breast cancer, 'limited-duration prevalence' provides information on the number of people alive who were diagnosed with breast cancer within a specified time period, such as the previous 1 or 5 years. One-year prevalence data, for example, would indicate the number of people alive on 31 December of a particular year who were diagnosed with breast cancer during that same year, while 5-year prevalence data would indicate the number of people alive on 31 December of a specified year who were diagnosed with breast cancer within the previous 5 years.

The prevalence of a disease in a given population is influenced by the incidence of the disease, survival from the disease and the age at which people are diagnosed (i.e. older people are more likely to die sooner due to age-related morbidity and frailty).

Along with information on incidence, mortality and survival (as discussed in earlier chapters), prevalence is another indicator of the burden of breast cancer in our society, both at the personal/familial level and societal level (particularly in terms of health-care services). While health-care needs can vary widely from one person to the next over the years following diagnosis, different types and intensities of health-care services may be required by those who were diagnosed with breast cancer recently (e.g. in the past year) compared with those diagnosed many years previously.

In Australia, as elsewhere, complete prevalence data are not available through cancer registry data collections since collections do not hold data for a long-enough period. The only source of complete prevalence data in Australia is surveys, such as the National Health Survey, where prevalence estimates are based on self-reported information of a sample of Australians (ABS 2009c). However, since the National Health Survey excludes people in hospitals, hospices, and nursing and convalescent homes, those data are incomplete. An additional deficiency of those data is the likelihood of the erroneous self-reporting of benign tumours or other non-invasive lesions as invasive breast cancer.

In this report, limited-duration prevalence is presented using data from the Australian Cancer Database (ACD), with information on deaths (from any cause) sourced from the National Death Index. Since national incidence data on breast cancer data are available from 1982 onwards, limited-duration prevalence data can be presented for a maximum of 25 years (from 1 January 1982 to 31 December 2006). In addition, information is provided in this chapter on differences in prevalence by age, geographical area and country of birth. Information on the prevalence of breast cancer for males is also presented.

In this chapter, no international comparisons are made. Making such comparisons is very difficult since prevalence data from other countries often differ from Australian data not only by the years to which they apply, but also by the number of years considered (e.g. 5, 10, 25 years) and the methods employed. In addition, some prevalence data—such as the GLOBOCAN data (Ferlay et al. 2004)—are presented as *counts* of persons rather than as *proportions* of all females alive at a specified time. Locating the relevant population data for each country and then calculating the prevalence proportions from such data are beyond the scope of this report.

Note that unlike incidence data, which pertain to the number of *cases* of breast cancer, the prevalence data presented in this report pertain to the number of *people* who have been diagnosed with breast cancer and are still alive. As mentioned in Chapter 2, since it is very rare that any one person would be diagnosed with more than one primary breast cancer during a 1-year period, the number of *cases* of breast cancer for a particular year would be very similar to the number of *people* diagnosed with breast cancer in that year.

Prevalence of breast cancer among females

Prevalence in 2006

Of all females alive at the end of 2006, almost 144,000 had been diagnosed with breast cancer in the previous 25 years (Table 5.1). This equates to 1.4% of women. Meanwhile, the 20-year prevalence was over 136,000 women, the 10-year prevalence was approximately 95,000 women and the 1-year prevalence was 12,284 women. This latter figure compares with an *incidence* rate for 2006 of 12,614 cases (Table 2.1). Note that those women who were both diagnosed with breast cancer and died in 2006 (approximately 330 women) may or may not have died as a result of breast cancer.

Table 5.1: Limited-duration prevalence of breast cancer, females, end of 2006

Time period	Number[(a)]	Per cent of population[(b)]
1-year prevalence	12,284	0.1
5-year prevalence	54,923	0.5
10-year prevalence	95,046	0.9
15-year prevalence	121,629	1.2
20-year prevalence	136,220	1.3
25-year prevalence	143,967	1.4

(a) Refers to the number of *females*, not *cases*, diagnosed with breast cancer.

(b) Based on the number of females in the Australian population at 31 December 2006.

Source: Australian Cancer Database, AIHW.

In order to compare prevalence across commonly diagnosed cancers in females, data from AIHW's 2008 publication on cancer survival and prevalence (AIHW, CA & AACR 2008) are shown in Table 5.2. When the 2008 report was prepared, the most recent national cancer data was for 2004 and thus 23 years of cancer incidence data were available.

Regardless of prevalence duration, breast cancer stood out as the most prevalent type of cancer among women (excluding non-melanoma skin cancer). For example, of all females alive at the end of 2004, almost 130,000 of them had been diagnosed with breast cancer in the previous 23 years. The second most prevalent form of reportable cancer among females over the 23-year period was melanoma of the skin (56,235), followed by bowel cancer (43,286). Likewise, when the 1-, 5- and 10-year prevalence data were considered, the most prevalent type of cancer among females was breast cancer (excluding non-melanoma skin cancer).

Table 5.2: Limited-duration prevalence[a] of the five most commonly diagnosed cancers[b], females, end of 2004

Cancer type (ICD-10 codes)	1-year prevalence	5-year prevalence	10-year prevalence	23-year prevalence
Breast (C50)	11,764	53,051	89,777	129,438
Bowel (C18–C20)	4,969	18,940	29,929	43,286
Melanoma of skin (C43)	4,151	18,697	33,303	56,235
Lung (C33–C34)	1,978	4,413	5,657	6,817
Lymphoma (C81–C85, C96)	1,644	6,516	10,434	14,581
All cancers[c]	**36,331**	**141,553**	**230,245**	**338,692**

(a) Data refer to the number of *females*, not *cases*, diagnosed with cancer.

(b) Excluding non-melanoma skin cancer (C44).

(c) Includes cancers coded in the International Statistical Classification of Diseases and Related Health Problems, 10th revision (ICD-10) as C00–C97 (except for C44), D45, D46, D47.1 and D47.3.

Source: AIHW, CA & AACR 2008.

The high prevalence of breast cancer among females, compared with other commonly diagnosed cancers, is due to a number of factors including:

- the large number of women diagnosed with breast cancer each year (see Chapter 2)
- high survival for those diagnosed with breast cancer compared with other cancers; for example, in 1998 to 2004, 5-year relative survival was 88% for women with breast cancer compared with 62% for their counterparts with bowel cancer and 14% for those with lung cancer (AIHW, CA & AACR 2008)
- the younger average age at diagnosis of women with breast cancer compared with many other types of cancers; for example, in 2004, the mean age at diagnosis of women was 60 years for breast cancer (Table 2.2) compared with 70 years for lung cancer and 71 years for bowel cancer (AIHW 2007).

Differences by age

Table 5.3 presents 25-year prevalence of breast cancer by age group. At the end of 2006, there were just over 40,000 women in the 60 to 69 year age group who had been diagnosed with breast cancer in the previous 25 years. This equates to 4 out of 100 women in this age group.

Table 5.3: Twenty-five-year prevalence of breast cancer by age group, females, end of 2006

Age group (years)	Number[a]	Per cent of population[b]
<30	169	0.0
30–39	2,628	0.2
40–49	14,434	0.9
50–59	33,793	2.5
60–69	40,204	4.4
70–79	30,127	4.8
80+	22,612	4.9
Total	**143,967**	**1.4**

(a) Refers to the number of *females*, not *cases*, diagnosed with breast cancer.

(b) Based on the number of females in the Australian population at 31 December 2006.

Source: Australian Cancer Database, AIHW.

In addition, there were over 30,000 women diagnosed with breast cancer in the previous 25 years in both the 50 to 59 year age group and the 70 to 79 year age group. When the total number of women in these age groups is considered, the data indicate that 3% of women in the 50 to 59 year age group and 5% of those in the 70 to 79 year age group had a breast cancer diagnosis at some point in the previous 25 years. In addition, 5% of those in the 80 years and over age group had been diagnosed with breast cancer in the 25-year period.

Differences across groups

As noted earlier in this chapter, the prevalence of breast cancer is influenced by the incidence of the disease, survival rates and the average age at diagnosis. Since these factors differ across subgroups (e.g. higher incidence in certain states and territories), prevalence is also expected to differ. In this section of the report, prevalence data by state and territory, and country of birth are presented.

Differences by geographical area

Table 5.4 presents prevalence data for the end of 2006 according to the state and territory in which the woman lived at the time of diagnosis. Since it is unknown whether the women lived in the same state and territory in 2006 as they did at the time of diagnosis, these data should be used with caution. The 25-year prevalence data indicate that about 49,100 women had been diagnosed with breast cancer in New South Wales during 1982 to 2006 and were alive at the end of 2006, with the corresponding figures for Victoria being almost 36,200 and for Queensland, almost 26,200.

Table 5.4: Limited-duration prevalence[(a)] by state and territory of diagnosis, females, end of 2006

State or territory	1-year prevalence	5-year prevalence	10-year prevalence	25-year prevalence
New South Wales	4,000	18,404	32,003	49,106
Victoria	3,065	13,444	23,474	36,181
Queensland	2,418	10,491	17,930	26,186
Western Australia	1,220	5,355	9,129	13,618
South Australia	1,023	4,580	8,072	12,337
Tasmania	294	1,440	2,365	3,513
Australian Capital Territory	203	938	1,605	2,359
Northern Territory	61	271	468	667
Total	**12,284**	**54,923**	**95,046**	**143,967**

(a) Data refer to the number of *females*, not *cases*, diagnosed with breast cancer.

Source: Australian Cancer Database, AIHW.

Differences by country of birth

Prevalence of breast cancer among women in Australia according to their country or region of birth is shown in Table 5.5. The 25-year prevalence data indicate that there was a relatively high proportion of women alive who had been diagnosed with breast cancer in the period from 1982 to 2006 among women born in 'North-West Europe excluding the UK and Ireland' (2.5% of the female population born in this region), the UK and Ireland (2.4%) and Southern and Eastern Europe (2.1%). Meanwhile, the lowest 25-year prevalence, as a proportion of the

Table 5.5: Limited-duration prevalence[a] by country/region of birth[b], females, end of 2006

	1-year		5-year		10-year		25-year	
Country/region of birth[b]	Prevalence	Per cent of population[c]	Prevalence	Per cent of population[c]	Prevalence	Per cent of population[c]	Prevalence	Per cent of population[c]
Australia	7,313	0.1	34,982	0.4	61,230	0.8	92,579	1.2
New Zealand (NZ)	222	0.1	1,035	0.5	1,744	0.8	2,474	1.1
Oceania and Antarctica, excl. Australia and NZ	69	0.1	304	0.5	486	0.7	685	1.0
United Kingdom (UK) and Ireland	1,068	0.2	5,135	0.9	9,280	1.6	14,454	2.4
North-West Europe excluding UK and Ireland	282	0.2	1,432	0.9	2,514	1.6	3,919	2.5
Southern and Eastern Europe	645	0.2	3,090	0.7	5,627	1.3	8,969	2.1
North Africa and the Middle East	147	0.1	720	0.5	1,152	0.8	1,630	1.2
South-East Asia	251	0.1	1,312	0.4	2,136	0.6	2,869	0.8
North-East Asia	156	0.1	720	0.3	1,162	0.5	1,620	0.6
Southern and Central Asia	118	0.1	487	0.3	837	0.6	1,207	0.8
Sub-Saharan Africa	99	0.1	432	0.4	713	0.7	1,010	0.9
United States of America (USA) and Canada	66	0.1	292	0.5	481	0.9	701	1.3
Americas excluding USA and Canada	51	0.1	232	0.4	375	0.7	580	1.1
Inadequately described, not stated or unknown	1,797	. .	4,750	. .	7,309	. .	11,270	. .
Total	**12,284**	**0.1**	**54,923**	**0.5**	**95,046**	**0.9**	**143,967**	**1.4**

(a) Data refer to the number of *females*, not *cases*, diagnosed with breast cancer.

(b) Country of birth is classified according to the Standard Australian Classification of Countries, 2nd edition (ABS 2008c).

(c) Based on the number of females in the Australian population born in each country/region as at 30 June 2006, except for the 'total' which is based on the number of females in the Australian population at 31 December 2006.

Source: Australian Cancer Database, AIHW.

respective female population, was observed among those born in North-East Asia (0.6%). It is likely that some of these differences relate to the different age structures of these populations, with immigrants from Europe being older, on average, than those from North-East Asia (ABS 2008d).

Prevalence of breast cancer among males

Of males in Australia alive at the end of 2006, 912 had been diagnosed with breast cancer in the previous 25 years (Table 5.6); this equates to less than 1% of the male population. Five-year prevalence was 414 men and 1-year prevalence was 98 men.

Table 5.6: Limited-duration prevalence of breast cancer, males, end of 2006

Time period	Number[(a)]
1-year prevalence	98
5-year prevalence	414
10-year prevalence	648
15-year prevalence	778
20-year prevalence	863
25-year prevalence	912

(a) Refers to the number of *males*, not *cases*, diagnosed with breast cancer.

Source: Australian Cancer Database, AIHW.

Table 5.7 shows differences in the 25-year prevalence of breast cancer in males by age group. At the end of 2006, 233 men aged 80 years and over had been diagnosed with breast cancer in the previous 25 years, compared with 54 men aged less than 50 years.

Table 5.7: Twenty-five-year prevalence of breast cancer by age group, males, end of 2006

Age group (years)	Number[(a)]	Per cent of population[(b)]
<50	54	0.0
50–69	344	0.0
70–79	281	0.1
80+	233	0.1
Total	**912**	**0.0**

(a) Refers to the number of *males*, not *cases*, diagnosed with breast cancer.

(b) Based on the number of males in the Australian population at 31 December 2006.

Source: Australian Cancer Database, AIHW.

6 Burden of disease due to breast cancer

The effect of breast cancer on the health of the population can be summarised by using a number of different measures that combine information on both mortality and non-fatal health outcomes into a single number. Such measures can be used for a range of purposes including:

- comparing the burden associated with different diseases
- comparing the effect of a particular disease among population groups or over time
- setting priorities for health planning, public health programs, as well as research and development (Murray et al. 1999).

Of the available summary measures, one of the most commonly used is the 'disability-adjusted life year' (DALY), also commonly referred to as 'burden of disease'. The DALY combines information on the extent of:

- premature death—which is measured by the years of life lost (YLL) due to disease or injury and
- non-fatal health outcomes—which is measured by years of 'healthy' life lost (YLD) due to disease, disability or injury.

In order to combine these two health measures into a summary measure, the DALY uses time as a common 'currency'. Hence, the DALY is a measure of the years of healthy life lost due to premature death (YLL) or disease, disability or injury (YLD), or a combination of the two, with one DALY equal to one lost year of 'healthy' life. The more DALYs associated with a particular disease, the greater the burden. Further information about DALYs can be found in AIHW's report on the burden of disease and injury (Begg et al. 2007a).

In this chapter, the burden of disease in Australia due to breast cancer is presented along with comparisons between other diseases that are also major contributors to the overall burden. As in other chapters, the emphasis is on females; however, information on males is also presented. The most recent burden of disease estimates for Australia are for 2003; some comparable data from 1993 and projections to 2013 are also available. These data have been published in an AIHW report by Begg and associates (2007a,b) and they form the basis of this chapter. Information on how the burden of disease estimates and projections were derived can be found in the report by Begg and associates.

Burden of disease due to breast cancer in females

Burden of disease in 2003

The total burden of disease for females in 2003 was estimated to be more than 1.2 million DALYs and the burden due to cancer was 235,034 DALYs. Table 6.1 presents the leading causes of disease burden in females, along with the three leading female cancers. Breast cancer was the sixth leading cause of burden of disease for females (60,520 DALYs). Furthermore, it accounted for 5% of all female burden of disease and one-quarter (26%) of all female burden due to cancer. Thus, breast cancer alone was responsible for about the same burden as the next leading cancer contributors together—namely, lung cancer (33,876

DALYs) and bowel cancer (28,962 DALYs). It was also roughly on par with the burden of disease caused by dementia (60,747 DALYs) and Type 2 diabetes (61,763 DALYs).

Table 6.1: Leading causes (including leading cancers) of burden of disease, females, 2003

Cause	Disability-adjusted life years (DALYs)	% of total DALYs	Rank
Anxiety and depression	126,464	10.0	1
Ischaemic heart disease	112,390	8.9	2
Stroke	65,166	5.1	3
Type 2 diabetes	61,763	4.9	4
Dementia	60,747	4.8	5
All cancers	*235,034*	*18.5*	. .
Breast cancer	60,520	4.8	6
Lung cancer	33,876	2.7	8
Bowel cancer	28,962	2.3	10
Chronic obstructive pulmonary disease	37,550	3.0	7
Asthma	33,828	2.7	9
Total for all causes	**1,268,156**	**100.0**	. .

Source: Begg et al. 2007a.

Table 6.2 and Figure 6.1 show the extent of the burden associated with the leading causes of disease burden for females that were due to both premature death (YLL) and disease, disability or injury (YLD). For breast cancer, causes of years of healthy life lost to disability include side effects during and after treatment (for example, after radiotherapy, chemotherapy or hormonal therapies), potential changes in menopause, the effects of lymphoedema and the psychosocial differences in 'life after therapy' (NBOCC 2008).

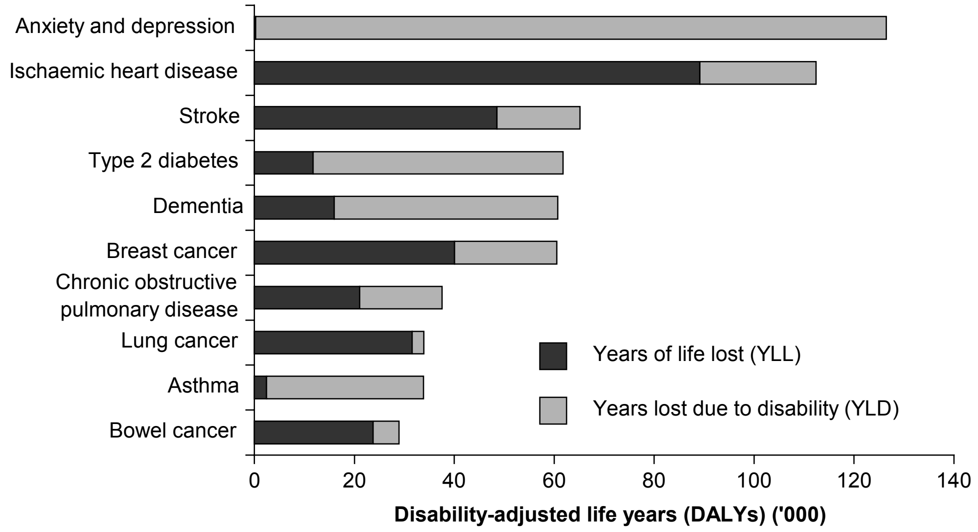
Due to the relatively poor prognosis from many cancers compared with the majority of other diseases, most cancers contribute more years of life lost (YLL) than years of healthy life lost to disability (YLD). Breast cancer is no exception, with an estimated two-thirds (66%) of the total DALYs for women being due to premature mortality (YLL). Furthermore, while this disease accounted for 3% of total years of healthy life lost to disability (YLD) from all diseases for females in 2003, it accounted for 7% of all years of life lost due to premature mortality (YLL). Thus, on this latter measure, it ranked third of all diseases, after ischaemic heart disease (16% of total YLL) and stroke (9% of total YLL). In regard to all cancers, breast cancer represented almost half (47%) of all years of healthy life lost to disability and 21% of the mortality burden.

While two-thirds of DALYs for breast cancer are due to premature mortality (YLL), the corresponding proportion for a number of other cancers is higher. For instance, 93% of DALYs for lung cancer for women were due to premature mortality rather than disability; the corresponding figure for bowel cancer was 82%. This corresponds with other research that has found lower relative survival for those with lung and bowel cancers compared with breast cancer (AIHW, CA & AACR 2008).

Table 6.2: Leading causes of burden of disease by fatal (YLL) and non-fatal (YLD) components, females, 2003

Cause	Fatal component Years of life lost (YLL)	 % of total YLL	Non-fatal component Years of life lost due to disability (YLD)	 % of total YLD	Total Disability-adjusted life years (DALYs)	% of DALYs due to YLL	% of DALYs due to YLD
Anxiety and depression	221	—	126,244	18.1	126,464	0.2	99.8
Ischaemic heart disease	89,152	15.7	23,238	3.3	112,390	79.3	20.7
Stroke	48,548	8.5	16,619	2.4	65,166	74.5	25.5
Type 2 diabetes	11,751	2.1	50,012	7.2	61,763	19.0	81.0
Dementia	16,009	2.8	44,738	6.4	60,747	26.4	73.6
All cancers	*191,794*	*33.7*	*43,240*	*6.2*	*235,034*	81.6	18.4
Breast cancer	40,080	7.0	20,440	2.9	60,520	66.2	33.8
Lung cancer	31,551	5.5	2,325	0.3	33,876	93.1	6.9
Bowel cancer	23,735	4.2	5,227	0.7	28,962	82.0	18.0
Chronic obstructive pulmonary disease	21,025	3.7	16,525	2.4	37,550	56.0	44.0
Asthma	2,423	0.4	31,405	4.5	33,828	7.2	92.8
Total for all causes	**569,181**	**100.0**	**698,975**	**100.0**	**1,268,156**	**44.9**	**55.1**

Source: Begg et al. 2007a.



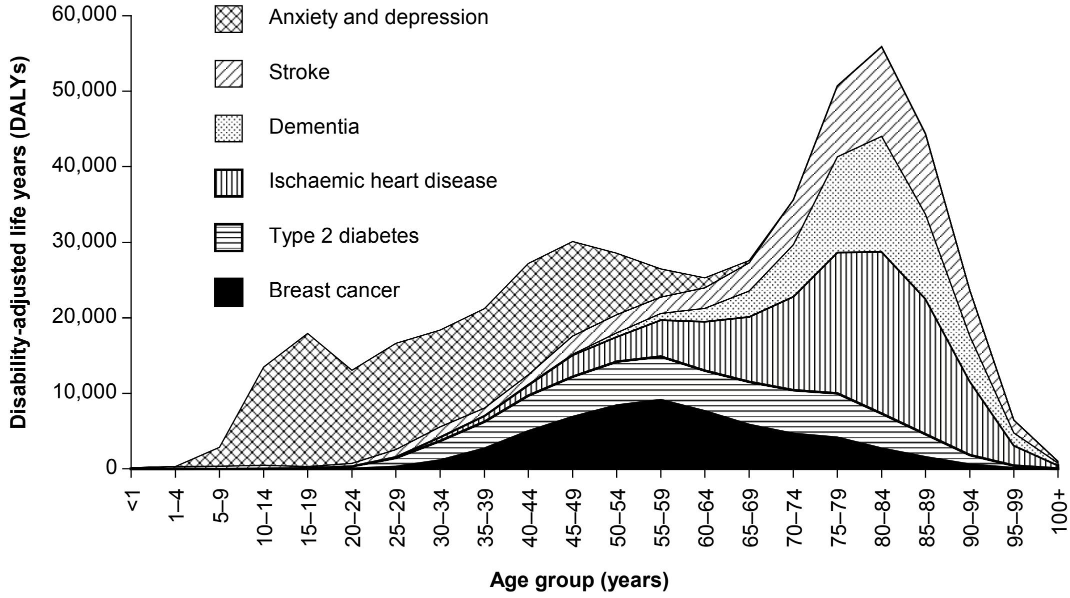
Source: Begg et al. 2007a.

Figure 6.1: Leading causes of burden of disease by fatal (YLL) and non-fatal (YLD) components, females, 2003

Other diseases that have acute and commonly fatal outcomes, such as stroke and ischaemic heart disease, also had a relatively high proportion of total DALYs due to years of life lost (79% and 75%, respectively). In contrast, while anxiety and depression contributed greatly to the total burden of disease for women in 2003 (10% of total DALYs), virtually all of that burden resulted from years lost to disability (100%), rather than premature mortality. The burden associated with Type 2 diabetes and dementia are also largely due to years lost to disability (81% and 74%, respectively).

Differences by age

The leading causes of the burden of disease tend to affect women at different stages of life. As shown in Figure 6.2, in 2003, anxiety and depression accounted for the highest burden of disease for females in the younger age groups (i.e. those less than 45 years of age). In contrast, stroke, dementia and ischaemic heart disease accounted for a relatively high proportion of the burden at older ages (for those aged 75 years and over). The burden on females from breast cancer tended to concentrate in women aged 40 to 69 years, with this disease accounting for 10% of the total burden of disease for women in that age range.



Note: The data for this figure are shown in Appendix Table D6.1.

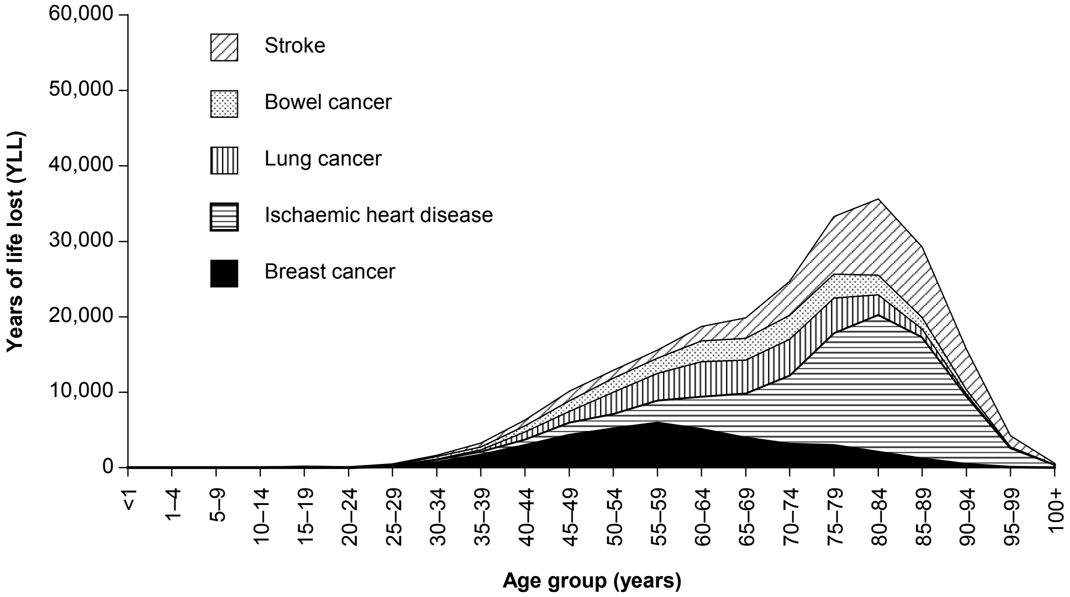
Source: Begg et al. 2007b.

Figure 6.2: Leading causes of burden of disease by age group, females, 2003

As noted earlier, the majority of the burden of disease due to breast cancer is due to premature mortality (YLL) rather than non-fatal burden. Figure 6.3 shows the burden of disease due only to premature mortality for the five leading causes of burden due to YLL according to age group. As indicated, breast cancer was the leading cause of premature mortality for middle-aged women in 2003. For example, it alone comprised 17% of all years of life lost for women aged 40 to 59 years. In contrast, the proportion of the burden due to years of life lost for women in that same age span from ischaemic heart disease and stroke was considerably less (7% and 4%, respectively).

Trends

While burden of disease estimates were also produced for 1993, they cannot be compared with the 2003 estimates due to substantial differences in the methodologies used to derive the estimates. Nonetheless, the rank of the various diseases at a particular time period can be compared (Begg et al. 2007a).



Note: The data for this figure are shown in Appendix Table D6.2.

Source: Begg et al. 2007b.

Figure 6.3: Leading causes of years of life lost by age group, females, 2003

As shown in Table 6.3, breast cancer was the fourth leading cause of female burden of disease in 1993. While this is a higher rank compared with its rank of sixth in 2003, the proportion of total DALYs accounted for by breast cancer were similar at the two time points (both 5%).

Projections in the ranking of diseases were also undertaken by Begg and associates (2007a). These projections were based on past incidence and mortality trends, as well as projected population estimates. As shown in Table 6.3, the projections suggest that breast cancer will remain the sixth leading cause of burden of disease into the future. However, these researchers also predicted a drop in the proportion of total DALYs from all diseases that are due to breast cancer—in 2013, the projected proportion of the total burden of disease for women that will be due to breast cancer is 4.3%, while the projected proportion for 2023 is 3.5%.

Burden of disease due to breast cancer in males

Among males, the total burden of disease in 2003 was estimated to be more than 1.3 million DALYs and the burden due to cancer was 264,382 DALYs (Table 6.4). Breast cancer contributed a total of 134 DALYs for males, with these DALYs comprised exclusively of years of life lost.

Considering the burden of disease from breast cancer for both males and females together, the total estimated number of DALYs from breast cancer in 2003 was 60,654.

Table 6.3: Leading[(a)] causes of burden of disease, females, estimated for 1993 and 2003 and projected for 2013 and 2023

	Rank				Per cent of total DALYs			
Cause	**1993**	**2003**	**2013**	**2023**	**1993**	**2003**	**2013**	**2023**
Anxiety and depression	2	1	1	1	9.8	10.0	9.6	8.7
Ischaemic heart disease	1	2	2	4	12.4	8.9	7.5	6.1
Stroke	3	3	5	5	5.9	5.1	4.4	3.8
Type 2 diabetes	6	4	3	2	3.7	4.9	6.4	8.0
Dementia	5	5	4	3	3.7	4.8	5.9	7.4
Breast cancer	4	6	6	6	5.1	4.8	4.3	3.5
Chronic obstructive pulmonary disease	7	7	8	8	3.1	3.0	2.9	2.8
Lung cancer	10	8	7	7	2.3	2.7	3.1	3.5
Asthma	8	9	9	9	2.9	2.7	2.5	2.4
Bowel cancer	9	10	10	12	2.6	2.3	2.2	1.9

(a) 'Leading' causes of burden of disease are based on number of disability-adjusted life years (DALYs) in 2003.

Source: Begg et al. 2007a,b.

Table 6.4: Leading causes (including selected cancers) of burden of disease by fatal (YLL) and non-fatal (YLD) components, males, 2003

	Fatal component		Non-fatal component		Total		
Cause	**Years of life lost (YLL)**	**% of total YLL**	**Years of life lost due to disability (YLD)**	**% of total YLD**	**Disability-adjusted life years (DALYs)**	**% of total DALYs**	**Rank**
Ischaemic heart disease	128,991	18.2	22,116	3.4	151,107	11.1	1
Type 2 diabetes	15,273	2.2	55,903	8.5	71,176	5.2	2
Anxiety and depression	113	0.0	65,208	10.0	65,321	4.8	3
Stroke	36,152	5.1	17,144	2.6	53,296	3.9	5
Chronic obstructive pulmonary disease	26,183	3.7	23,018	3.5	49,201	3.6	6
All cancers	*220,159*	*31.0*	*44,223*	*6.8*	*264,382*	*19.4*	. .
Lung cancer	51,505	7.3	3,523	0.5	55,028	4.0	4
Prostate cancer	23,175	3.3	13,372	2.0	36,547	2.7	9
Bowel cancer	27,997	3.9	6,646	1.0	34,643	2.5	10
Breast cancer	134	—	0	—	134	—	>100
Total for all causes	**709,597**	**100.0**	**655,017**	**100.0**	**1,364,614**	**100.0**	. .

Source: Begg et al. 2007a,b.

7 Mammography

Mammography involves an X-ray examination of the breast in order to determine if abnormalities (including tumours) exist. Mammography can be used either as a screening or a diagnostic tool. The aim of mammography for breast cancer screening purposes is to detect tumours early, before symptoms arise (i.e. at an earlier stage than would otherwise have been the case) in order to improve prospects for survival. In Australia, screening mammograms are available to eligible women at no charge through the BreastScreen Australia Program; medical referrals for such mammograms are not required.

In contrast, diagnostic mammography is undertaken to determine if cancer is present in a person with abnormal signs or symptoms—such as a breast lump or nipple discharge. The symptoms may have been noticed by the person, by a doctor or through screening. Compared with the two X-ray views usually taken when mammography is conducted for screening, diagnostic mammography generally involves additional views of the breast. Hence, diagnostic mammography is typically more time-consuming and costly than screening mammography. Following diagnostic mammography, women whose abnormalities remain suspicious may require additional breast imaging (with examinations such as ultrasound, magnetic resonance imaging or a ductogram) and/or a biopsy. In Australia, diagnostic mammograms are generally provided by organisations such as private radiology clinics and public hospital radiology departments. Rebates for mammograms are available through the Medicare Benefits Schedule (MBS). However, diagnostic mammograms are also undertaken in some states and territories through the BreastScreen Australia Program in response to abnormal screening mammograms.

In this chapter, information on the use of mammography in Australia is presented. The first section provides data on the number of women obtaining a screening mammogram through the BreastScreen Australia Program. Some women may choose to obtain a screening mammogram outside of the BreastScreen program (e.g. at a private radiology clinic) although the extent to which this occurs is unknown. Thus data on mammography as provided through the BreastScreen Australia Program provide a minimum count of the number of women who had a mammogram for screening purposes.

Data from Medicare Australia are presented in the second section. In Australia, the cost of mammograms that are provided by a registered provider for services that qualify for a Medicare benefit is subsidised by the Australian Government through the MBS. The MBS is managed by the Department of Health and Ageing and administered by Medicare Australia. Referrals from a general practitioner or other medical practitioner are required for eligibility for the subsidy.

The MBS distinguishes between two types of mammography services:

- mammography of both breasts (which is referred to as item number 59300)
- mammography of one breast (item number 59303).

Documentation about the MBS indicates that MBS-funded mammography should include both breasts unless the referral specifically requests a mammography of just one breast (DoHA 2009b). The MBS also notes that both types of mammography services are to be used in the investigation of clinical abnormalities—that is, for diagnostic purposes—and not for the screening of those who are asymptomatic. However, some screening mammograms—for example, for women with a family history of breast cancer—are also funded through the

MBS (Stieber 2005) and are coded to the same item numbers noted above. Note that no information is available on the proportion of MBS-funded mammograms undertaken for screening rather than diagnostic purposes.

Screening mammography

The BreastScreen Australia Program, which was established in 1991, is funded jointly by the Australian and the state and territory governments. The primary responsibility for implementing the program rests with the jurisdictions, while the Australian Government provides overall coordination of policy formulation, national data collection, quality improvement and evaluation (DoHA 2009a). As discussed in Chapter 2, screening mammography activities were rolled out at different times in each state and territory, with commencement dates ranging from 1989 to 1994.

The main objective of the BreastScreen Australia Program is to reduce mortality and morbidity from breast cancer. This is achieved through the provision of screening mammograms at the population level to 'healthy' (i.e. asymptomatic) women in order to detect masses or calcifications that are characteristic of breast cancer. Mammography is considered to be the single most effective population-based method of detecting breast cancer early since it can identify cancer several years before physical symptoms develop. Women with a breast cancer that was detected at an early stage, as discussed in Chapter 4, have a better chance of survival. Furthermore, early diagnosis can permit breast-conserving surgery, decrease complications related to intensive treatment and reduce the likelihood of recurrence (ACS 2007; Stewart & Kleihues 2003).

Women aged 40 years and over who are Australian citizens or have permanent residency status are eligible for mammograms through the BreastScreen Australia Program. However, women aged 50 to 69 years are the target group and they are actively recruited through, for example, the sending out of invitations and focused advertising (NQMC 2004). Women aged 50 to 69 years were chosen as the target group for two reasons: the incidence of breast cancer in this group is comparatively high (as illustrated in Chapter 2); and, in trials, screening mammography has been found to be effective in reducing mortality for these women (NQMC 2004). In contrast, mammographic screening for women aged less than 50 years is thought to be less effective due to biological differences in breast tissue (e.g. greater breast density of pre-menopausal women) which results in the need for additional investigations and a greater number of missed cancers (Irwig et al. 1997).

The BreastScreen Australia Program has eight performance indicators that cover the aspects of participation, cancer detection, sensitivity, detection of ductal carcinoma in situ (DCIS), recall to assessment and rescreening within the BreastScreen Australia Program, as well as incidence of breast cancer and DCIS, and mortality from breast cancer in Australia. Information relating to performance of the program against each of these indicators is covered in detail in the annual BreastScreen Australia Program monitoring reports produced by the AIHW (2009b).

In this report, data from the BreastScreen Australia Program that relate specifically to the number of women who obtained a screening mammogram are described. Since the BreastScreen Australia Program recommends that a woman in the target age group has a screening mammography every 2 years, the measure of participation used for the purposes of this report is the proportion of women in the eligible population (and the target population) who were screened though the BreastScreen Australia Program in a 24-month period (i.e. from 1 January of the first year to 31 December of second year).

The most recently published national data pertain to the 2-year period of 2005 and 2006, with trend data available from 1996. Data are shown for all women who participated in the program (who by definition must be aged 40 years or over) as well as for those in the target group. Given the active recruitment of women in the target age group, it is expected that participation of those women will be much higher than other women. Differences in participation by other characteristics—such as geographical location and Indigenous status—are also considered.

The data that were analysed for the purposes of this section of the report were provided to the AIHW by state and territory BreastScreen programs (see Appendix C for further information). Note that rates are expressed per 100 women (not per 100,000 women as was used for cancer incidence and mortality) and are often referred to as a percentage.

Screening mammography in 2005–2006

Over 1.6 million women had a screening mammogram through the BreastScreen Australia Program in the 2-year period from 1 January 2005 to 31 December 2006 (Table 7.1). This equates to one in three women (34%) aged 40 years and over being screened during that time period. Just over three in four (77%) of these women were in the target age group for the program. Overall, 57% of all Australian women aged 50 to 69 years had a screening mammogram during the 2005–2006 period.

Table 7.1: Participation in the BreastScreen Australia Program, females, 2005–2006[(a)]

	Number of females	Per cent of females[(b)]
50–69 years	1,241,796	56.9
Total (40+ years)	**1,622,481**	**34.0**

(a) Period covers 1 January 2005 to 31 December 2006.

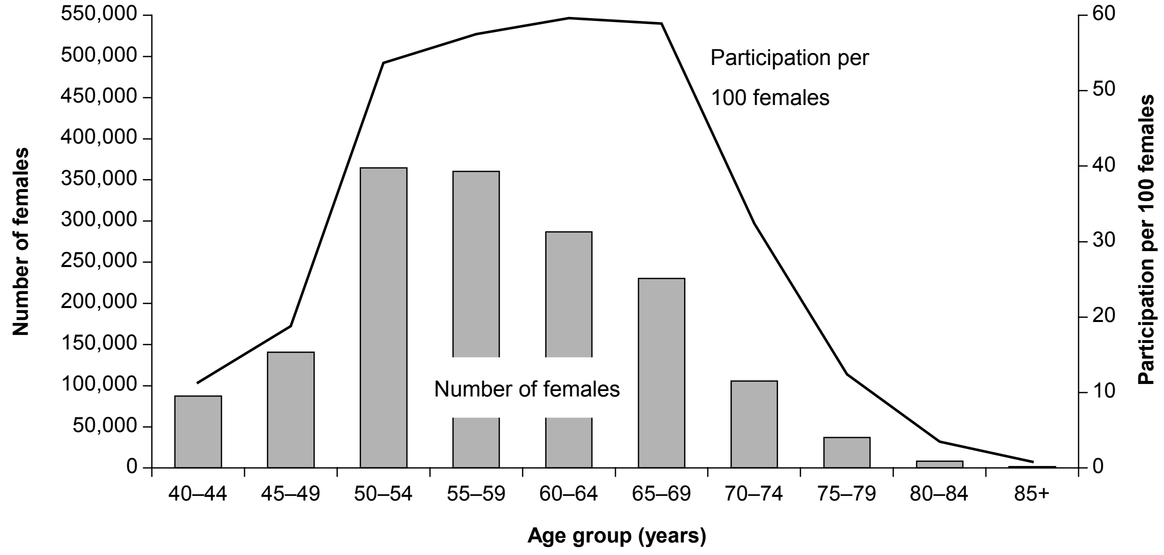
(b) Equals the number of females screened as a proportion of the average of the 2005 and 2006 ABS estimated resident population.

Source: AIHW analysis of BreastScreen Australia data.

Differences by age

The number of women at different ages who were screened through the BreastScreen Australia Program is shown in Figure 7.1. While over 1.2 million women who had a screening mammogram were in the target age group, around 228,000 women aged 40 to 49 years also had a screening mammogram, as did nearly 153,000 women aged 70 years and over.

Participation rates by age are also shown in Figure 7.1. In line with the active recruiting of women in the target age range for the BreastScreen Australia Program, relatively high participation rates were evident for women in each of the age groups from 50 to 54 years to 65 to 69 years. For those women, participation ranged from 54% (for those aged 50 to 54 years) to 60% (for those aged 60 to 64 years). In contrast, the rates were lowest for women in the oldest age groups—namely, those aged 80 to 84 years (4% of women were screened) and those aged 85 years and over (1%).



Notes

1. Period covers 1 January 2005 to 31 December 2006.
2. The participation rate equals the number of females screened as a proportion of the average of the 2005 and 2006 ABS estimated resident population.
3. The data for this figure are shown in Appendix Table D7.1.

Source: AIHW analysis of BreastScreen Australia data.

Figure 7.1: Participation in the BreastScreen Australia Program by age group, females, 2005–2006

Trends

Trends in the number of women who had a mammogram through the BreastScreen Australia Program are shown in Table 7.2. The number of women aged 50 to 69 years who were screened through the BreastScreen Australia Program increased by 47% between 1996–1997 and 2005–2006. Between the two most recent screening periods for which data are available (i.e. 2004–2005 and 2005–2006), there was a 4% increase in the number of these women who had a screening mammography. Participation rates are also shown in Table 7.2, with the screening rates for women aged 50 to 69 years peaking in the 2001–2002 screening period (57 per 100 females) and falling significantly to 56% in the 2003–2004 period. Since then, the rate increased again to 57%, with the difference statistically significant.

For all women aged 40 years and over, over 1.2 million participated in the BreastScreen Australia Program in 1996–1997 and this increased by 31% (to over 1.6 million) by 2005–2006. Much of this increase was seen in the earlier screening periods. In particular, between the 1996–1997 and 2001–2002 period, the number of women screened increased by 30%. Between the 2001–2002 period and 2005–2006, there was a 1% increase. When the age-standardised rates are considered, the data indicate that 33 out of 100 women (i.e. 33%) aged 40 years and over had a screening mammogram in the 1996–1997 period and this increased over the following periods, reaching 38% in the 2001–2002 period. The participation rate fell significantly over each of the following screening periods and, in 2005–2006, was down to 34%. This pattern differs from that observed for women in the target age group.

Table 7.2: Participation in the BreastScreen Australia Program, females, 1996–1997 to 2005–2006[(a)]

	Aged 50–69 years			Aged 40+ years		
Screening period[(a)]	Number of females	ASR[(b)]	95% confidence interval	Number of females	ASR[(b)]	95% confidence interval
1996–1997	844,444	51.4	51.3–51.5	1,239,911	33.1	33.0–33.2
1997–1998	926,932	54.6	54.5–54.7	1,375,348	35.7	35.6–35.7
1998–1999	975,309	55.6	55.5–55.8	1,451,549	36.6	36.5–36.7
1999–2000	1,011,322	55.9	55.8–56.0	1,495,675	36.7	36.7–36.8
2000–2001	1,063,373	56.9	56.8–57.0	1,566,909	37.4	37.4–37.5
2001–2002	1,101,782	57.1	57.0–57.2	1,610,885	37.5	37.4–37.6
2002–2003	1,118,007	56.1	56.0–56.2	1,617,960	36.7	36.7–36.8
2003–2004	1,144,283	55.7	55.6–55.8	1,627,014	36.1	36.0–36.1
2004–2005	1,188,380	56.1	56.0–56.2	1,614,532	34.9	34.9–35.0
2005–2006	1,241,796	56.9	56.8–57.0	1,622,481	34.2	34.2–34.3

(a) The screening periods cover 1 January of the initial year to 31 December of the latter year indicated.

(b) Rates were calculated as the number of females screened as a proportion of the average of the ABS estimated resident population in the respective 2-year period and standardised to the Australian population as at 30 June 2001. They are expressed per 100 females (i.e. as a percentage).

Source: AIHW analysis of BreastScreen Australia data.

Differences across groups

Women in various subgroups may experience a range of barriers—including geographical, language and/or cultural barriers—to accessing screening mammography. Thus, differences in participation in the BreastScreen Australia Program by geographical area, socioeconomic status, Aboriginal and Torres Strait Islander status and main language spoken at home are considered in this section. Note that one of the aims of the BreastScreen Australia Program is to ensure equitable access to the program for all women in the target population.

Differences by geographical area

The number of women who had a screening mammogram in each state and territory through the BreastScreen Australia Program in the 2005–2006 screening period is shown in Table 7.3, as is the age-standardised rate of participation expressed per 100 women. Note that these data relate to the state or territory in which the screening mammography was undertaken; in some cases, this may differ from the state or territory of the woman's usual residence. Due to this fact—as well as differences between the states and territories in terms of population characteristics, geographical structure, program structure and other factors—caution must be undertaken when considering the results.

For those aged 50 to 69 years, women in South Australia were significantly more likely than other women to have participated in the BreastScreen Australia Program in the 2005–2006 period (59%), while women in the Northern Territory were significantly less likely to have done so (41%). This relatively low rate may be at least partly due to the fact that BreastScreen Australia services are not provided in some remote areas of the Northern Territory.

When all women are considered, the data indicate that women in Queensland were significantly more likely than other women to have participated in the BreastScreen

Australia Program (42% of women aged 40 years and over). The second highest participation rate was evidenced by Tasmania (40%). On the other hand, women in the Northern Territory were significantly less likely than other women to have participated in the program (24%).

Table 7.3: Participation in the BreastScreen Australia Program by state and territory[(a)], females, 2005–2006[(b)]

	Aged 50–69 years			Aged 40+ years		
State or territory	Number of females	ASR[(c)]	95% confidence interval	Number of females	ASR[(c)]	95% confidence interval
New South Wales	402,543	55.9	55.8–56.1	468,729	29.7	29.6–29.8
Victoria	306,885	57.0	56.8–57.2	397,881	33.9	33.8–34.0
Queensland	246,913	58.0	57.7–58.2	385,437	42.4	42.3–42.6
Western Australia	121,709	57.3	57.0–57.7	157,351	34.1	33.9–34.3
South Australia	105,149	59.0	58.6–59.3	134,432	34.7	34.5–34.9
Tasmania	32,753	57.1	56.5–57.7	48,746	40.1	39.7–40.5
Australian Capital Territory	19,328	56.8	56.0–57.7	21,664	29.4	29.0–29.8
Northern Territory[(d)]	6,516	41.3	40.3–42.4	8,241	23.6	23.0–24.1
Total	**1,241,796**	**56.9**	**56.8–57.0**	**1,622,481**	**34.2**	**34.2–34.3**

(a) Relates to the state or territory in which the screening mammography was undertaken.

(b) Period covers 1 January 2005 to 31 December 2006.

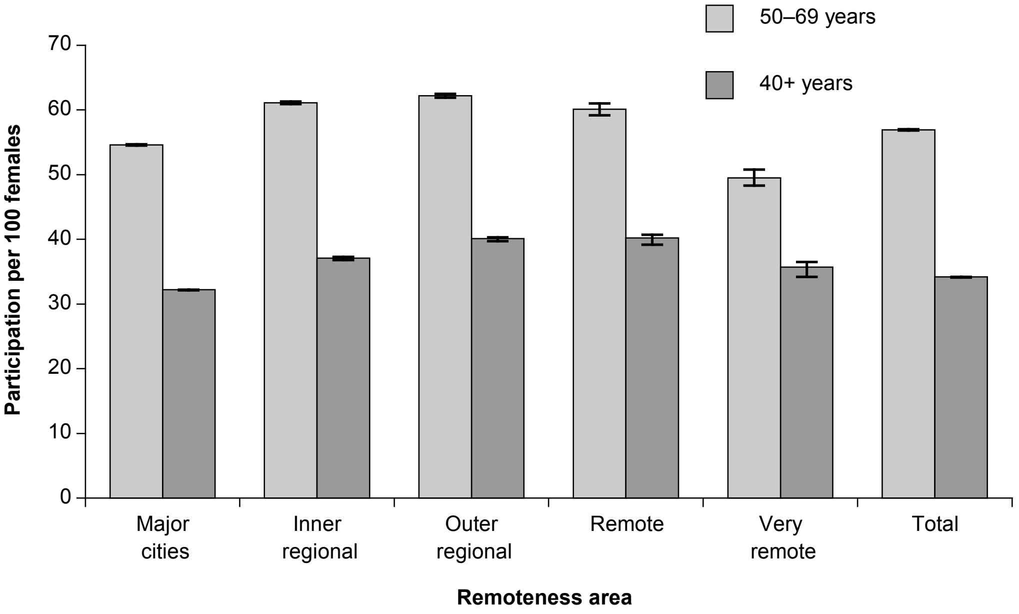
(c) Rates were calculated as the number of females screened to the average of the 2005 and 2006 ABS estimated resident population and standardised to the Australian population as at 30 June 2001. They are expressed per 100 females (i.e. as a percentage).

(d) BreastScreen Australia services are not provided in some remote areas of the Northern Territory; this may have affected the rate for Northern Territory.

Source: AIHW analysis of BreastScreen Australia data.

Participation in the BreastScreen Australia Program according to the remoteness status of the woman's usual residence is shown in Figure 7.2. For women aged 50 to 69 years, women living in *Outer regional* areas were significantly more likely than other women to have had a screening mammogram (62% participation rate) in the 2005–2006 period. Participation was 61% for women who lived in *Inner regional* areas and 60% for those in *Remote* areas. Meanwhile, women in the target age group who lived in *Very remote* areas had a significantly lower participation rate of 50%, with participation also significantly lower than average for those who lived in *Major cities* (55%).

Considering all women who had a screening mammogram through the program, the highest participation rates were observed for women who lived in *Remote* and in *Outer regional* areas (40% for both groups, which was significantly higher than that for women living in other areas). In contrast, those living in *Major cities* were significantly less likely than women from other areas to have been screened through the BreastScreen Australia Program (32%).



Notes

1. Remoteness area was measured using the Australian Standard Geographical Classification Remoteness Area classification.
2. Period covers 1 January 2005 to 31 December 2006.
3. Rates were calculated as the number of females screened to the average of the 2005 and 2006 ABS estimated resident population and standardised to the Australian population as at 30 June 2001. They are expressed per 100 females (i.e. as a percentage).
4. The data for this figure are shown in Appendix Table D7.2.

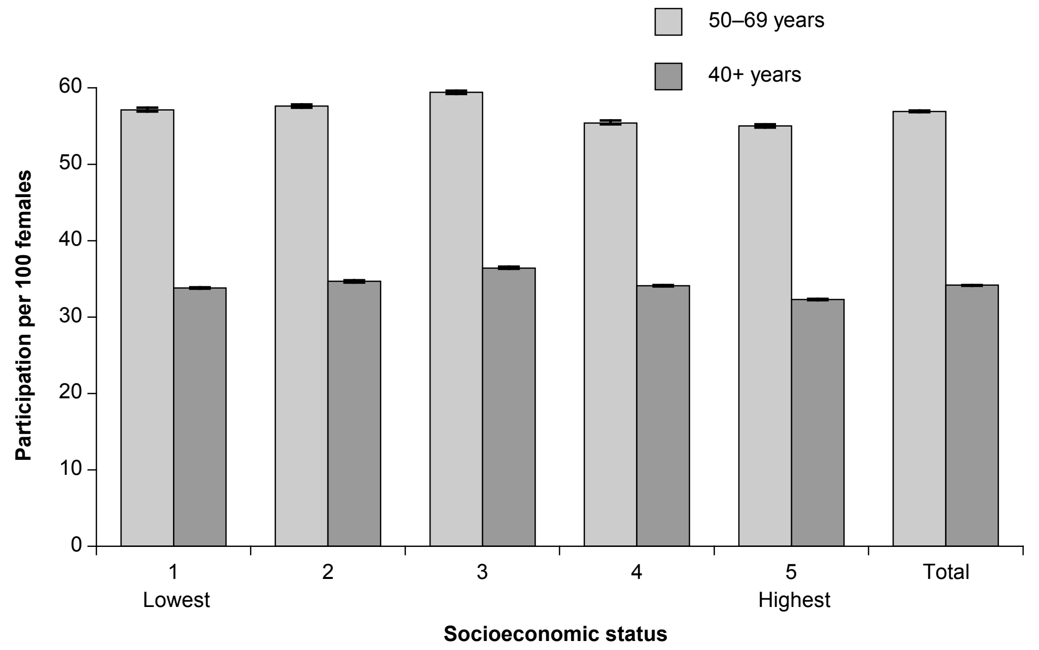
Source: AIHW analysis of BreastScreen Australia data.

Figure 7.2: Participation in the BreastScreen Australia Program by remoteness area, females, 2005–2006

Differences by socioeconomic status

Participation in the BreastScreen Australia Program according to socioeconomic status is shown in Figure 7.3. As discussed in Chapter 2, the measure of socioeconomic status pertains to the area in which the women lived. For those women in the target age range of 50 to 69 years, the participation rate in the 2005–2006 period was significantly higher for women in the middle socioeconomic status group (59%) compared with women in the other groups, while participation rates were lowest, and significantly so, for those women in the two highest socioeconomic status groups (55% for both groups).

In regard to all women who participated in the program, women in the middle socioeconomic status group were significantly more likely than other women to have had a screening mammogram through the BreastScreen Australia Program (36%). On the other hand, those in the highest socioeconomic status group were significantly less likely than other women to have participated (32%), followed by those in the lowest socioeconomic status group (34%).



Notes

1. Socioeconomic status was measured using the ABS Socio-Economic Index for Areas (SEIFA) Index of Relative Socio-economic Disadvantage.
2. Period covers 1 January 2005 to 31 December 2006.
3. Rates were calculated as the number of females screened to the average of the 2005 and 2006 ABS estimated resident population and standardised to the Australian population as at 30 June 2001. They are expressed per 100 females (i.e. as a percentage).
4. The data for this figure are shown in Appendix Table D7.3.

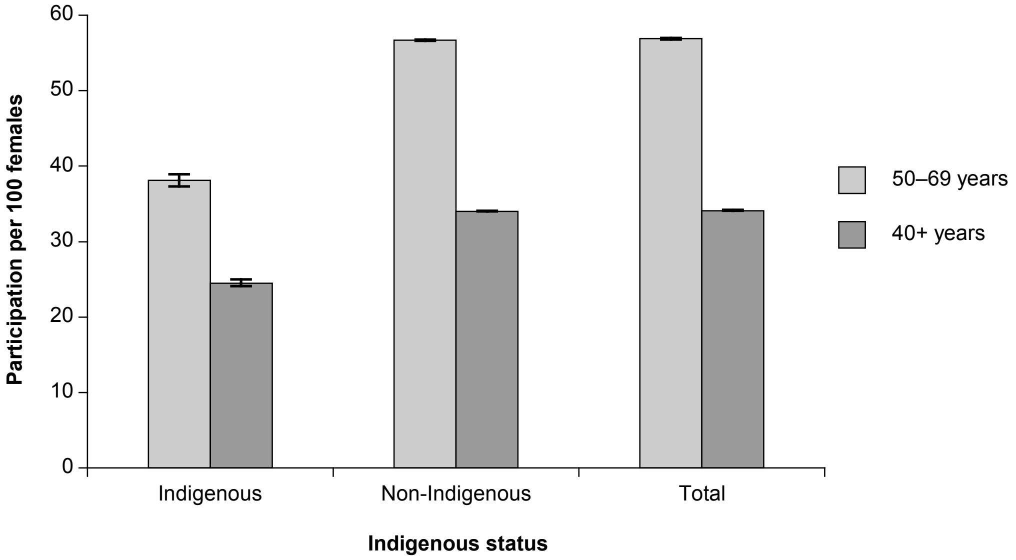
Source: AIHW analysis of BreastScreen Australia data.

Figure 7.3: Participation in the BreastScreen Australia Program by socioeconomic status, females, 2005–2006

Differences by Aboriginal and Torres Strait Islander status

Women who attend for a screening mammogram are asked to indicate if they are of Aboriginal and/or Torres Strait Islander descent. Among all participants in the 2005–2006 period, 1% identified as Indigenous, 1% did not provide an answer to this question and the remainder identified as non-Indigenous. Note, however, that some jurisdictions automatically code cases with missing information to the non-Indigenous category. Therefore, it is likely that some Indigenous women were incorrectly assigned to the non-Indigenous category. This means that the analysis based on Indigenous status should be interpreted with caution.

Non-Indigenous women were significantly more likely to have had a mammogram through the BreastScreen Australia Program than were Indigenous women (Figure 7.4). Specifically, the age-standardised participation rate for non-Indigenous women aged 50 to 69 years was 57% compared with 38% for Indigenous women in that age range. Likewise, for women aged 40 years and above, there was also a significant difference by Indigenous status in participation rates (34% for non-Indigenous women compared with 25% for Indigenous women).



Notes

1. Defined by whether or not a woman self-identified as being of Aboriginal and/or Torres Strait Islander descent.
2. Period covers 1 January 2005 to 31 December 2006.
3. Rates were calculated as the number of females screened to the average of the 2005 and 2006 ABS estimated resident population and standardised to the Australian population as at 30 June 2001. They are expressed per 100 females (i.e. as a percentage).
4. The data for this figure are shown in Appendix Table D7.4.

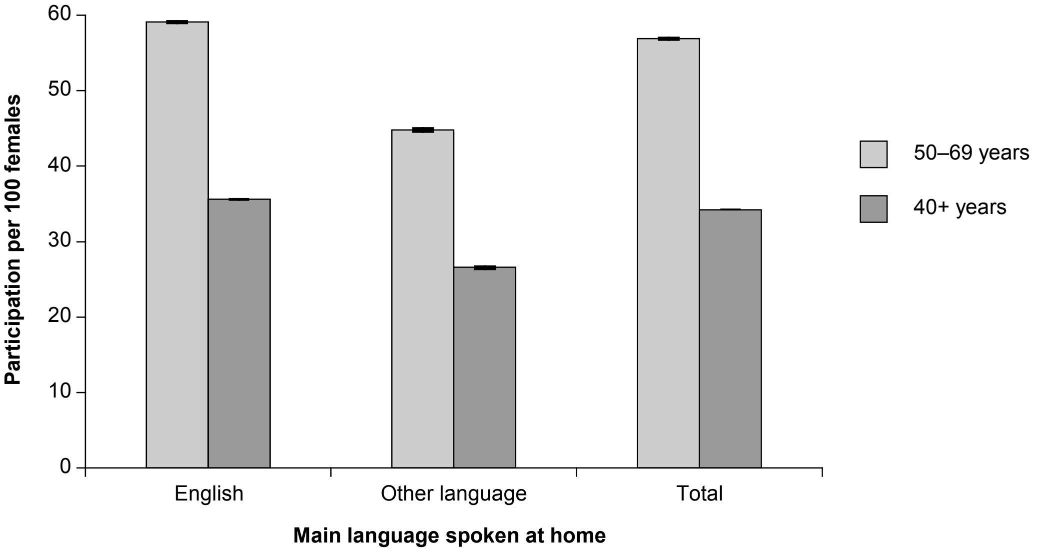
Source: AIHW analysis of BreastScreen Australia data.

Figure 7.4: Participation in the BreastScreen Australia Program by Indigenous status, females, 2005–2006

Differences by main language spoken at home

Women who participate in the BreastScreen Australia Program are also asked about the main language they speak at home. The majority (86%) of women who had a screening mammography in the 2005–2006 period indicated that English was the main language they spoke at home, while 13% said it was a language other than English, and this information was missing for 0.4% of women. Note, however, that some jurisdictions do not include the 'Not stated' category and there may be differences in how these data are collected. Hence, the analysis based upon main language spoken at home should be interpreted with caution.

When age-standardised participation rates were compared, the results indicated that women aged 50 to 69 years who mainly spoke English at home were significantly more likely than other women to have participated in the BreastScreen Australia Program (59% and 45%, respectively) (Figure 7.5). Similarly, a significant difference was observed for women aged 40 years and above, with a participation rate of 36% for women whose main language spoken at home was English, compared with 27% for other women.



Notes

1. Defined by whether or not a woman indicated that English was her main language spoken at home.
2. Period covers 1 January 2005 to 31 December 2006.
3. Rates were calculated as the number of females screened to the average of the 2005 and 2006 ABS estimated resident population and standardised to the Australian population as at 30 June 2001. They are expressed per 100 females (i.e. as a percentage).
4. The data for this figure are shown in Appendix Table D7.5.

Source: AIHW analysis of BreastScreen Australia data.

Figure 7.5: Participation in the BreastScreen Australia Program by main language spoken at home, females, 2005–2006

Medicare Benefits Schedule–funded mammography

In this section of the report, data are provided on the number of mammograms that were subsidised through the MBS. For women, differences by age and geographical area are considered. Although men are not eligible for screening mammography through the BreastScreen Australia Program, they are eligible for reimbursement for mammograms through the MBS. Hence, data on MBS-funded mammograms are also presented for men. When rates are presented in this section of the report, they are expressed per 1,000 persons (not per 100 persons as in the previous section). The data source was the statistics provided on the Medicare Australia website (Medicare Australia 2009). The latest available annual data are for the financial year of 2007–08, while trend information is available from 1993–94. Further information about this data source can be found in Appendix C.

MBS-funded mammography for females

MBS-funded mammography in 2007–08

The number of mammography services provided to females that were subsidised through the MBS in the 2007–08 financial year is shown in Table 7.4. Over 350,000 MBS-funded mammography services were provided to women in 2007–08, with almost nine out of ten of these services (88%) involving mammograms of both breasts rather than one breast.

Table 7.4: Medicare Benefits Schedule–funded mammography services, females, 2007–08

Service type	Number of Services	Per cent of mammography services	Age-standardised rate[(a)]	95% confidence interval
Mammography of both breasts	313,716	88.5	28.2	28.1–28.3
Mammography of one breast	40,895	11.5	3.5	3.5–3.6
Total mammography	**354,611**	**100.0**	**31.8**	**31.7–31.9**

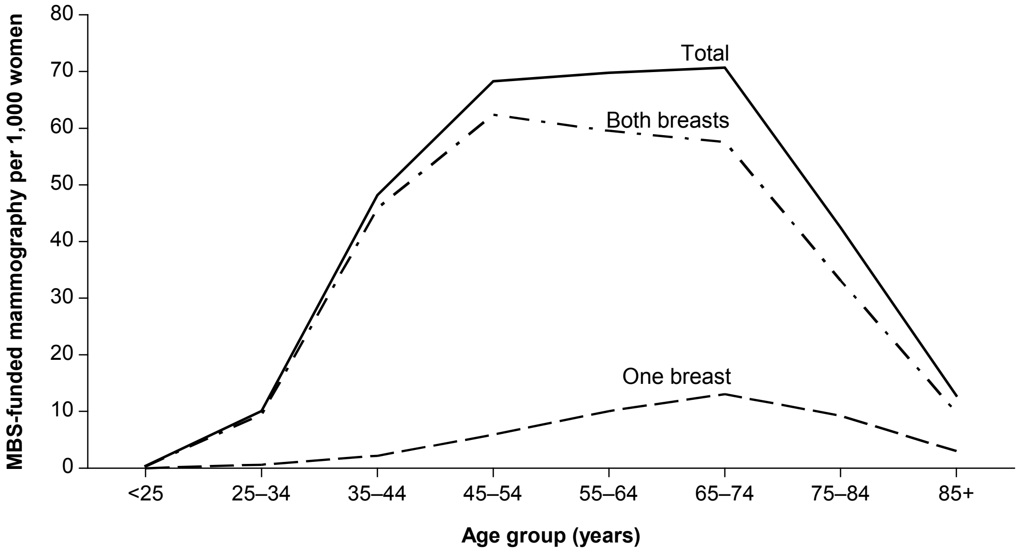
(a) Standardised to the Australian population as at 30 June 2001 and expressed per 1,000 females.

Source: Medicare Australia Statistics, Australian Government Department of Health and Ageing.

The total number of MBS-funded services for all types of services provided to females in the 2007–08 financial year was 163,309,173 (Medicare Australia 2009). Thus, mammographic services represented 0.2% of all services to females subsidised by MBS in that year. The age-standardised rate indicates that 32 per 1,000 women had an MBS-funded mammogram in 2007–08.

Differences by age

Differences by age in the rate of MBS-funded mammography services in 2007–08 are shown in Figure 7.6. Women aged 65 to 74 years (71 per 1,000 women) and those aged 55 to 64 years (70 per 1,000) were significantly more likely than women in the other age groups to have had an MBS-funded mammogram. When the rates for those who had a mammogram of one breast versus both breasts are considered, the patterns by age differ. In particular, of all the age groups, those aged 45 to 54 years had the highest rate of mammography of both breasts (62 per 1,000 women); the corresponding group who had the highest rate of mammography of one breast was those aged 65 to 74 years (13 per 1,000).



Note: The data for this figure are shown in Appendix Table D7.6.

Source: Medicare Australia Statistics, Australian Government Department of Health and Ageing.

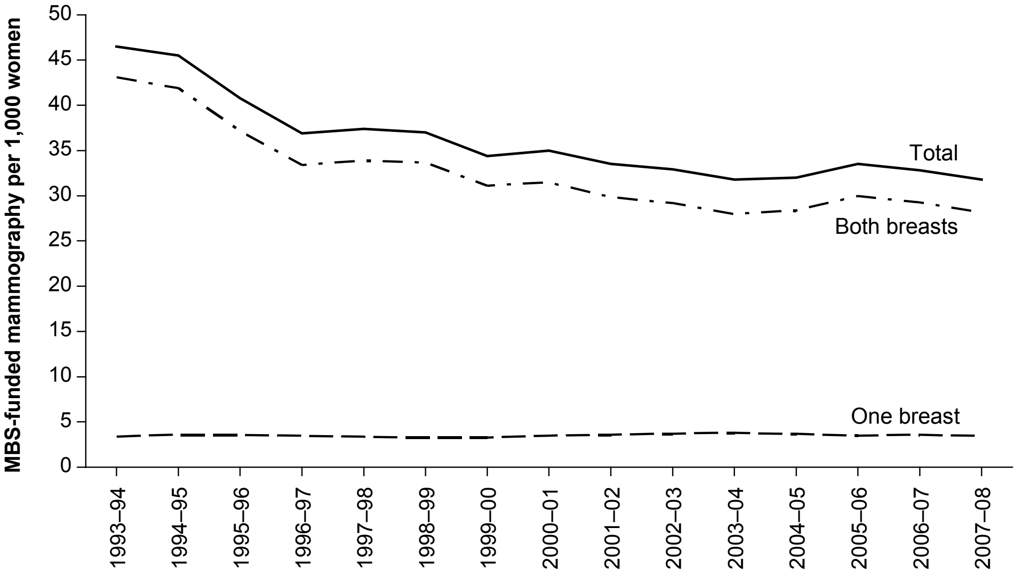
Figure 7.6: Medicare Benefits Schedule–funded mammography services by age group, females, 2007–08

Trends

The number of MBS-funded mammograms provided to women fell from 385,108 in 1993–94 to 354,611 in 2007–08, which is a decrease of 8% (Appendix Table D7.7).

Trends in the age-standardised rates of MBS-funded mammography are illustrated in Figure 7.7. While, overall, there has been a downward trend in the rate of women having MBS-funded mammograms, the sharpest decrease occurred between 1994–95 and 1996–97 (46 to 37 per 1,000 women, respectively). This decrease in the mid-1990s could be related to the greater availability of mammography services through the BreastScreen Australia Program as this program continued to extend across more regions of Australia.

All of the decrease in the rate of women having MBS-funded mammograms pertained to mammograms of both breasts, with the rate of women having an MBS-funded mammogram of one breast virtually stable (ranging from 3 to 4 per 1,000 women over the time period considered).



Note: The data for this figure are shown in Appendix Table D7.7.

Source: Medicare Australia Statistics, Australian Government Department of Health and Ageing.

Figure 7.7: Medicare Benefits Schedule–funded mammography services, females, 1993–94 to 2007–08

Differences by geographical area

Information on the provision of MBS-funded mammography services is available according to the state or territory in which the person lived at the time of claiming for the service.

As shown in Table 7.5, of all of MBS-funded mammography services provided to women, 39% were provided to women living in New South Wales and 25% were provided to women in Victoria. The age-standardised rates indicate that a significantly higher proportion of women in New South Wales had an MBS-funded mammography service in 2007–08 (38 services per 1,000 women). Meanwhile, a significantly lower proportion of women in the Northern Territory did so (15 per 1,000). Note that the observed differences by states and territories may relate to different jurisdictional practices in regard to who provides mammography services.

Table 7.5: Medicare Benefits Schedule–funded mammography services by state and territory, females, 2007–08

State or territory	Number of services	Age-standardised rate[(a)]	95% confidence interval
New South Wales	138,955	37.9	37.7–38.1
Victoria	87,298	31.4	31.1–31.6
Queensland	64,519	29.4	29.2–29.7
Western Australia	24,463	22.3	22.0–22.6
South Australia	26,348	30.3	29.9–30.6
Tasmania	6,785	24.6	24.1–25.2
Australian Capital Territory	4,903	28.4	27.6–29.2
Northern Territory	1,340	14.8	13.9–15.7
Total	**354,611**	**31.8**	**31.7–31.9**

(a) Standardised to the Australian population as at 30 June 2001 and expressed per 1,000 females.

Source: Medicare Australia Statistics, Australian Government Department of Health and Ageing.

MBS-funded mammography for males

Men are also eligible for MBS-funded mammography services, with 749 such services provided to males in 2007–08 (Table 7.6.). An additional 539 services were provided to persons for whom the sex of the recipient was not recorded. Thus, in total, 355,899 MBS-funded mammography services were provided in 2007–08.

Table 7.6: Medicare Benefits Schedule–funded mammography services by sex, 2007–08

	Mammography of both breasts		Mammography of one breast		Total mammography	
	Number of services	Per cent	Number of services	Per cent	Number of services	Per cent
Males	592	0.2	157	0.4	749	0.2
Females	313,716	99.7	40,895	99.3	354,611	99.6
Unknown	407	0.1	132	0.3	539	0.2
Total	**314,715**	**100.0**	**41,184**	**100.0**	**355,899**	**100.0**

Source: Medicare Australia Statistics, Australian Government Department of Health and Ageing.

8 Hospitalisations for breast cancer

People with breast cancer may require hospitalisation as an admitted patient for a variety of reasons including diagnostic procedures, treatments (e.g. surgery, chemotherapy, the management of associated conditions) and reconstructive surgery. The number of such hospitalisations for breast cancer in any 1 year is related to a range of factors, including the number of people with breast cancer and the number of these requiring health services as an admitted patient in a hospital. Other factors include the availability of alternative health-care services, relative accessibility of hospital care, admission criteria and administrative policies.

In this chapter, details are provided on the number and characteristics of admitted patient hospitalisations that are related to the care and/or treatment of persons with invasive breast cancer, with the term 'hospitalisations' used interchangeably with 'separations'.

Identifying those hospitalisations within the admitted patient data that are due specifically to breast cancer is not straightforward. Due to the method in which the principal diagnosis for hospitalisations of cancer patients is coded, it is insufficient to simply select those hospitalisations for which breast cancer was the principal diagnosis. Most importantly, when a patient receives same-day chemotherapy as a treatment for cancer, the Australian Coding Standards (NCCH 2008a) indicate that the principal diagnosis is to be coded to reflect the fact that the patient received chemotherapy, with the type of cancer listed as an additional diagnosis. The same coding practice is used for a number of other same-day cancer-related interventions—such as the implanting of chemotherapy ports. Hence, the number of hospitalisations would be greatly underestimated if only those for which the principal diagnosis was listed as invasive breast cancer (i.e. ICD-10 code of C50) were included. For this reason, 'breast cancer–related hospitalisations' are defined in this report as those admitted patient hospitalisations in which:

(i) the principal diagnosis was breast cancer (i.e. ICD-10 code of C50)

or

(ii) breast cancer (i.e. ICD-10 code of C50) was recorded as an *additional* diagnosis and the principal diagnosis code related specifically to the treatment or care of a cancer patient (see Appendix E for a list of these codes).

The number of hospitalisations that pertained to each of the inclusions in the definition of breast cancer–related hospitalisations is shown in Appendix Table E.1. The principal diagnosis was 'breast cancer' for one in four (25%) of all breast cancer–related hospitalisations. Thus, if one were to define breast cancer hospitalisations based solely on this disease being classified as the principal diagnosis, 75% of hospitalisations due to this disease would be missed. For over two in three (69%) breast cancer–related hospitalisations, the principal diagnosis was 'pharmacotherapy session for neoplasm' (e.g. chemotherapy) with breast cancer listed as an additional diagnosis.

The data source for this chapter was the National Hospital Morbidity Database (NHMD) which contains data on admitted patient separations. The most recent data available pertain to the 2007–08 financial year. Note that the data from the NHMD refer to hospitalisations and not individuals; any one person may have multiple hospitalisations during the course of a year but data on the number of people hospitalised for a particular disease are not available. Further information about this data source can be found in Appendix C.

Over the course of the past decade, a number of hospitals (mainly in the public sector) in New South Wales, South Australia and the Australian Capital Territory changed their admissions practices so that not all patients who receive same-day chemotherapy services are admitted to hospital. Instead, these hospitals provide chemotherapy treatment on an outpatient (i.e. non-admitted patient) basis. This change in process, which is discussed in more detail in Appendix E, must be taken into account when examining change over time in the number of hospitalisations due to breast cancer since the data are not comparable over time. However, since the change applies largely to same-day hospitalisations (and not to overnight ones), separate information is provided in this chapter on the number and rate of same-day and overnight hospitalisations. Ideally, data on the number of chemotherapy services provided to breast cancer patients on an outpatient basis would be included in this chapter, but such data are not available.

In this chapter, as indicated in the notes for each table, rates of hospitalisations of women are presented per 1,000 females; for men, they are presented per 100,000 males.

Hospitalisations of females for breast cancer

Hospitalisations in 2007–08

In the 2007–08 financial year, there were just over 106,000 hospitalisations of female patients due to breast cancer (Table 8.1); these accounted for 3% of all hospitalisations of women. The age-standardised rate of breast cancer–related hospitalisations was 9 (per 1,000 females).

Table 8.1: Hospitalisations for breast cancer and all reasons, females, 2007–08

	Number	Per cent of all hospitalisations	Age-standardised rate[(a)]	95% confidence interval
Breast cancer	106,067	2.6	9.3	9.3–9.4
All hospitalisations	4,149,381	100.0	370.0	369.6–370.3

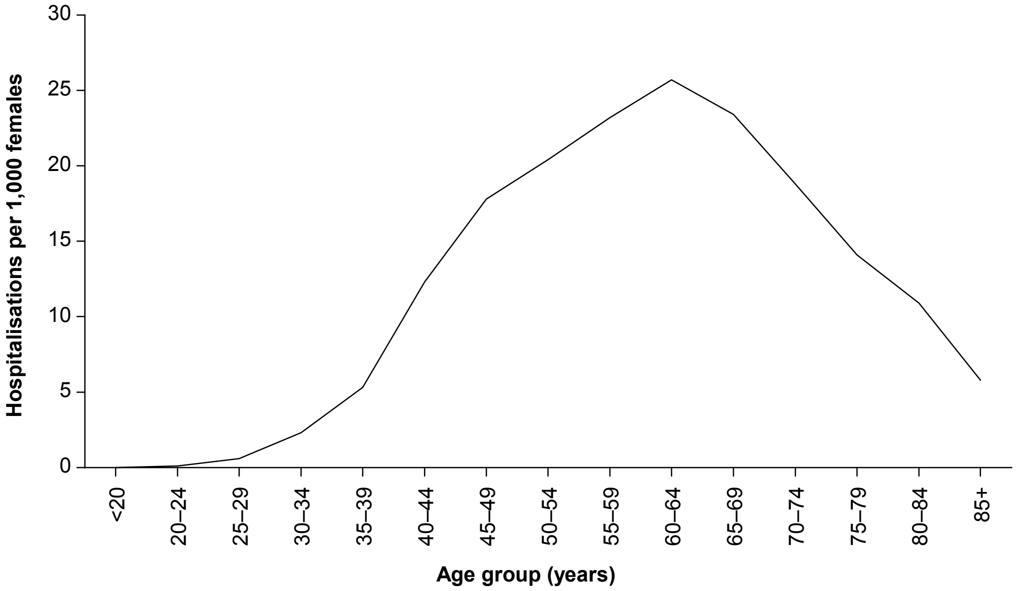
(a) Standardised to the Australian population as at 30 June 2001 and expressed per 1,000 females.

Source: National Hospital Morbidity Database, AIHW.

Of the total number of hospitalisations for breast cancer, over eight out of ten (83%) were same-day hospitalisations (87,561), while the remainder were overnight hospitalisations (18,506).

Differences by age

Differences in the hospitalisation rate for breast cancer–related care according to age are shown in Figure 8.1. An inverted 'U-shaped' pattern is observed with the youngest and oldest age groups having the lowest rates, and those aged 50 to 70 years having the highest rates. In particular, women in the 60 to 64 year age group had a significantly higher hospitalisation rate for breast cancer (28 hospitalisations per 1,000 females) than the overall average (9 per 1,000). The next highest rates were for women aged 55 to 59 years and those aged 65 to 69 years (both had 25 hospitalisations per 1,000 females).



Note: The data for this figure are shown in Appendix Table D8.1.

Source: National Hospital Morbidity Database, AIHW.

Figure 8.1: Hospitalisations for breast cancer by age group, females, 2007–08

Average length of stay

Data on the total number of days that patients stayed in hospital are collected in the NHMD, with a length of stay of 1 day allocated to all same-day hospitalisations. By using those data, as well as information on the *number* of hospitalisations, the average length of stay (ALOS) can be derived. In 2007–08, the average length of stay for breast cancer–related hospitalisations was 1.5 days (Table 8.2). When same-day hospitalisations are excluded, the average length of stay was 4.1 days.

Table 8.2: Average length of stay (ALOS) for breast cancer–related hospitalisations by same-day and overnight status and by age group, females, 2007–08

Age group (years)	ALOS of overnight hospitalisations (days)	ALOS of same-day hospitalisations (days)	Total ALOS (days)
<30	3.3	1.0	1.4
30–39	3.3	1.0	1.4
40–49	3.3	1.0	1.4
50–59	3.8	1.0	1.4
60–69	3.6	1.0	1.5
70–79	5.3	1.0	2.0
80+	6.8	1.0	3.2
Total	**4.1**	**1.0**	**1.5**

Source: National Hospital Morbidity Database, AIHW.

The average length of stay was longer for hospitalisations of women aged 70 years and over. Considering only those hospitalisations that involved an overnight stay, the average length of stay for women aged 70 to 79 years was 5.3 days, and for those aged 80 years and over, it was 6.8 days. This compares with an average length of an overnight hospitalisation of 3.3 days for those under the age of 50 years.

Trends

The total number of hospitalisations of females for breast cancer increased by 74% over the years from 1999–00 (60,833 hospitalisations) to 2007–08 (106,067 hospitalisations) (Table 8.3). While there was some increase in the number of overnight hospitalisations (an increase of 21% over the years considered), the majority of change was related to the number of same-day hospitalisations which increased by 73% between 1999–00 and 2007–08. This is despite the fact that, as noted earlier, during this time, changes occurred in hospital admission procedures such that by 2007–08, some cancer patients in three jurisdictions who received same-day chemotherapy were not classified as admitted patients and thus not included in the data.

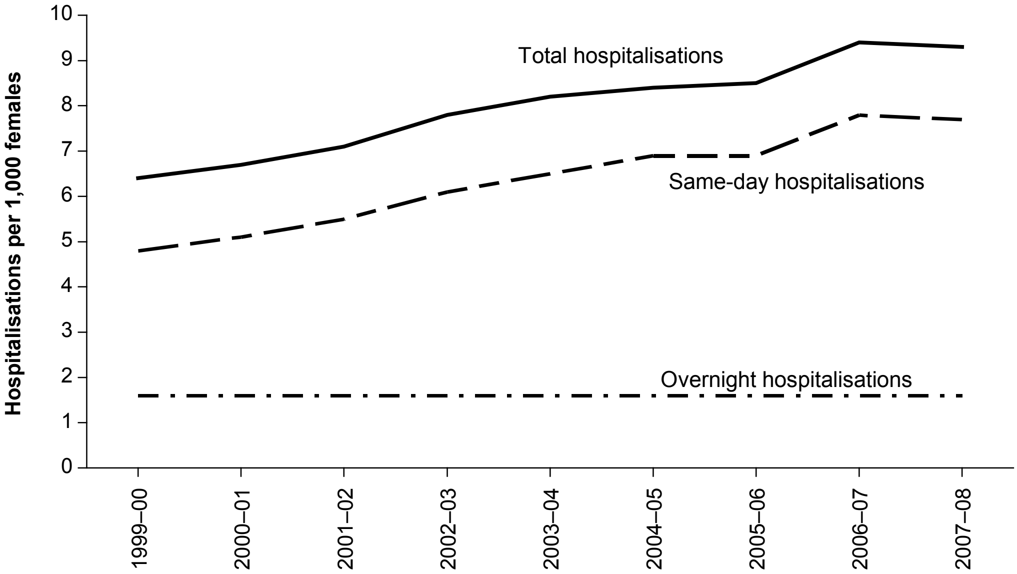
Table 8.3: Hospitalisations for breast cancer by same-day or overnight status, females, 1999–00 to 2007–08

Year	Number of same-day hospitalisations	Number of overnight hospitalisations	Total number of hospitalisations
1999–00	45,499	15,334	60,833
2000–01	49,031	15,943	64,974
2001–02	54,489	16,271	70,760
2002–03	62,238	16,962	79,200
2003–04	67,674	17,220	84,894
2004–05	72,975	16,914	89,889
2005–06	74,444	18,148	92,592
2006–07	86,404	18,250	104,654
2007–08	87,561	18,506	106,067

Source: National Hospital Morbidity Database, AIHW.

In Figure 8.2, trends in the age-standardised rate of breast cancer–related hospitalisations of women are shown. For all breast cancer–related hospitalisations, the rate increased from 6 hospitalisations per 1,000 females in 1999–00 to 9 hospitalisations per 1,000 females in 2007–08. As shown, the increase over time was driven primarily by changes in the number of same-day hospitalisations of women, with the rate of overnight hospitalisations remaining stable over the period considered.

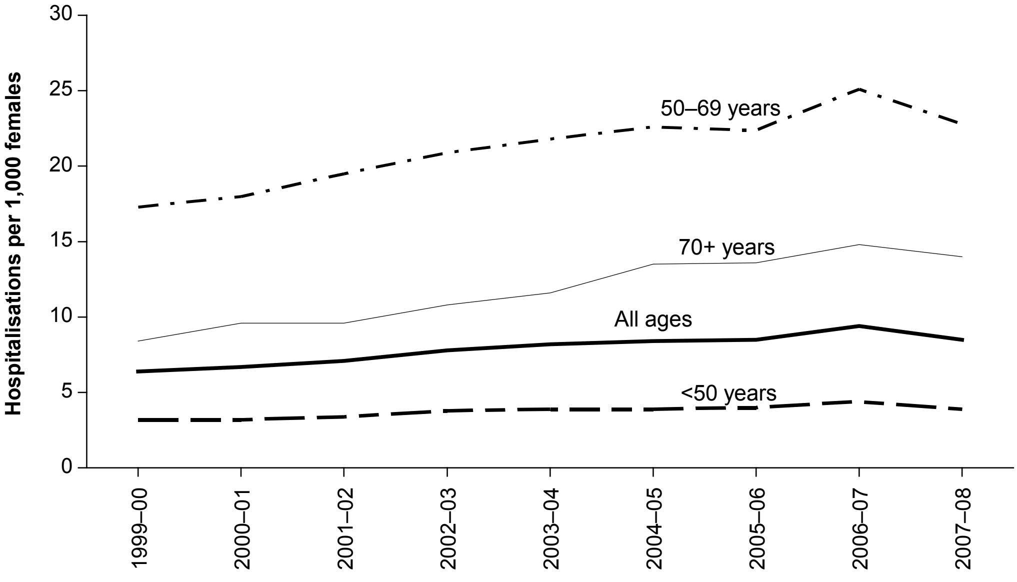
Trends in the rate of hospitalisations for breast cancer by age group are shown in Figure 8.3. For each of the age groups, the rate increased over the period from 1999–00 to 2007–08, with the largest increase in percentage terms observed for those aged 70 years and over (a 76% increase from 8 per 1,000 females in 1999–00 to 15 per 1,000 in 2007–08).



Note: The data for this figure are shown in Appendix Table D8.2.

Source: National Hospital Morbidity Database, AIHW.

Figure 8.2: Hospitalisations for breast cancer by same-day and overnight status, females, 1999–00 to 2007–08



Notes

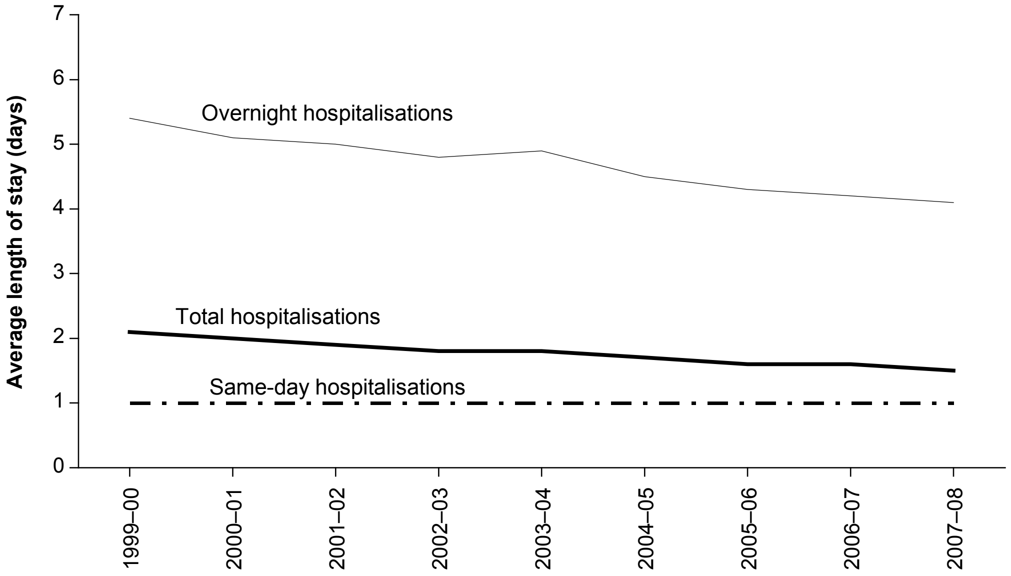
1. The rates are age-standardised to the Australian population as at 30 June 2001 and are expressed per 1,000 females.
2. The data for this figure are shown in Appendix Table D8.3.

Source: National Hospital Morbidity Database, AIHW.

Figure 8.3: Hospitalisations for breast cancer by age group, females, 1999–00 to 2007–08

Trends in average length of stay

Trends in the average length of stay of women who were hospitalised for breast cancer are shown in Figure 8.4. In 1999–00, the average length of stay for breast cancer–related hospitalisations that involved an overnight stay was 5.4 days, which is longer than the 4.1 days observed in 2007–08.



Notes

1. 'Total hospitalisations' includes same-day and overnight hospitalisations for breast cancer.
2. The data for this figure are shown in Appendix Table D8.4.

Source: National Hospital Morbidity Database, AIHW.

Figure 8.4: Average length of stay for breast cancer–related hospitalisations by same-day and overnight status, females, 1999–00 to 2007–08

Procedures undertaken during hospitalisations

Procedures undertaken in hospitals include surgical procedures, non-surgical procedures for investigative and therapeutic purposes (such as chemotherapy), and client support interventions (e.g. anaesthesia). One or more procedures can be reported for each hospitalisation, but procedures are not undertaken during all hospitalisations; thus, only some hospitalisations include data on procedures. The classification system that was used to code the 2007–08 procedures' data was the fifth edition of the Australian Classification of Health Interventions (ACHI) (NCCH 2006).

Data on the proportion of breast cancer–related hospitalisations of females that included specific procedures during 2007–08 are shown in Table 8.4. The majority of these hospitalisations included the 'Administration of pharmacotherapy' (i.e. chemotherapy); this procedure was undertaken in well over half (58%) of all breast cancer–related hospitalisations of females. In addition, 17% of the hospitalisations involved the provision of general anaesthesia and sedation (which is referred to as 'Cerebral anaesthesia') and a further 16% included the 'Loading of a drug delivery device'.

Table 8.4: Most common procedures for breast cancer–related hospitalisations, females, 2007–08

Procedure description (ACHI[(a)] code)	Count of hospitalisations[(b,c)]	Per cent[(c)]
Administration of pharmacotherapy (1920)	62,017	58.5
Cerebral anaesthesia (1910)	18,190	17.1
Loading of drug delivery device (1921)	16,551	15.6
Excision procedures on lymph node of axilla (808)	12,564	11.8
Excision of lesion of breast (1744)	10,035	9.5
Generalised allied health professions (1916)	8,614	8.1
Vascular infusion device and pump (766)	5,480	5.2
Simple mastectomy (1748)	5,187	4.9
Examination procedures on breast (1740)	2,731	2.6
Other circulatory system nuclear medicine imaging study (2005)	2,500	2.4
Transfusion of blood and gamma globulin (1893)	2,089	2.0
Therapeutic interventions on cardiovascular system (1890)	1,753	1.7
Postprocedural analgesia (1912)	863	0.8
Reconstruction procedures on breast (1756)	775	0.7
Immunisation (1884)	711	0.7
Biopsy of breast (1743)	633	0.6
Computerised tomography of chest, abdomen and pelvis (1961)	480	0.5
Venous catheterisation (738)	463	0.4
Whole body bone nuclear medicine imaging study (2011)	426	0.4
Megavoltage radiation treatment (1915)	363	0.3
Total breast cancer–related hospitalisations	**106,067**	**100.0**

(a) Australian Classification of Health Interventions.

(b) Indicates the number of hospitalisations in which the indicated procedure was undertaken.

(c) The sum of the count of hospitalisations does not equal the total number of hospitalisations since no procedures, or multiple procedures, may be undertaken during each hospitalisation. For the same reason, the sum of the percentages does not equal 100.

Source: National Hospital Morbidity Database, AIHW.

Hospitalisations of males for breast cancer

There were 420 breast cancer–related hospitalisations for male patients in 2007–08. This equates to 4 hospitalisations per 100,000 males. The majority (64%) of the hospitalisations for males were on a same-day basis (269), while the remainder (151) involved an overnight stay in hospital.

Table 8.5: Hospitalisations for breast cancer and all reasons, males, 2007–08

	Number	Age-standardised rate[(a)]	95% confidence interval
Breast cancer	420	3.9	3.5–4.3
All hospitalisations	3,724,423	35,335.3	35,299.2–35,371.4

(a) Standardised to the Australian population as at 30 June 2001 and expressed per 100,000 males.

Source: National Hospital Morbidity Database, AIHW.

Hospitalisations of males for breast cancer by age group are shown in Table 8.6. The majority of these hospitalisations were for men aged 50 to 69 years (48%), followed by those aged 70 years and over (38%). Meanwhile, the highest hospitalisation rate was observed for those aged 70 years and over (19 hospitalisations per 100,000 males), with a significantly lower rate for those aged 50 to 69 years (9 per 100,000 males) and those aged less than 50 years (1 per 100,000 males).

Table 8.6: Hospitalisations for breast cancer by age group, males, 2007–08

Age group (years)	Number of hospitalisations	Age-standardised rate[(a)]	95% confidence interval
<50	57	0.8	0.6–1.0
50–69	202	8.6	7.4–9.8
70+	161	18.6	15.9–21.7
Total	**420**	**3.9**	**3.5–4.3**

(a) Standardised to the Australian population as at 30 June 2001 and expressed per 100,000 males.

Source: National Hospital Morbidity Database, AIHW.

Change over time in breast cancer–related hospitalisations of male patients is shown in Table 8.7. Over the years considered, the number of hospitalisations ranged from a low of 293 (in 2001–02) to a high of 543 (in 2006–07).

Table 8.7: Hospitalisations for breast cancer, males, 1999–00 to 2007–08

Year	Number of hospitalisations	Age-standardised rate[(a)]	95% confidence interval
1999–00	368	4.1	3.7–4.5
2000–01	309	3.4	3.0–3.8
2001–02	293	3.1	2.7–3.5
2002–03	396	4.0	3.6–4.4
2003–04	432	4.3	3.9–4.7
2004–05	501	4.9	4.5–5.4
2005–06	449	4.4	4.0–4.9
2006–07	543	5.2	4.7–5.6
2007–08	420	3.9	3.5–4.3

(a) Standardised to the Australian population as at 30 June 2001 and expressed per 100,000 males.

Source: National Hospital Morbidity Database, AIHW.

The most common procedures for males for breast cancer–related hospitalisations in 2007–08 are shown in Table 8.8. Similar to females, the most common procedure for males was 'Administration of pharmacotherapy', with half (50%) of the hospitalisations for males involving this procedure. The second most common procedure included the provision of general anaesthesia and sedation (i.e. 'Cerebral anaesthesia') (34% of hospitalisations).

Table 8.8: Most common procedures for breast cancer–related hospitalisations, males, 2007–08

Procedure description (ACHI[(a)] code)	Count of hospitalisations[(b,c)]	Per cent[(c)]
Administration of pharmacotherapy (1920)	210	50.0
Cerebral anaesthesia (1910)	142	33.8
Excision procedures on lymph node of axilla (808)	105	25.0
Simple mastectomy (1748)	99	23.6
Generalised allied health professions (1916)	77	18.3
Excision of lesion of breast (1744)	31	7.4
Loading of drug delivery device (1921)	21	5.0
Other circulatory system nuclear medicine imaging study (2005)	16	3.8
Megavoltage radiation treatment (1788)	11	2.6
Transfusion of blood and gamma globulin (1893)	8	1.9
Total breast cancer–related hospitalisations	**420**	**100.0**

(a) Australian Classification of Health Interventions.

(b) Indicates the number of hospitalisations in which the indicated procedure was undertaken.

(c) The sum of the count of hospitalisations does not equal the total number of hospitalisations since no procedures, or multiple procedures, may be undertaken during each hospitalisation. For the same reason, the sum of the percentages does not equal 100.

Source: National Hospital Morbidity Database, AIHW.

9 Expenditure on breast cancer

Due to the large number of people diagnosed with breast cancer and the high burden of disease related to it, breast cancer is associated with substantial health-care costs. Such costs can be divided into four broad categories:

- direct health-care costs, which include recurrent and capital expenditure on hospital treatment, medications, visits to general practitioners, allied health and specialist care, use of screening and diagnostic services, and medical research
- direct non-health-care costs, including transport to and from medical services, child care and home care
- indirect costs, such as lost productivity and income, disability and lost years of life
- intangible costs, including the effect on quality of life.

The focus of this chapter is on direct health-care costs for breast cancer—that is, money spent by all levels of government, private health insurers, companies, households and individuals to screen for, diagnose and treat breast cancer. Very little information is available on the other types of costs (e.g. direct non-health-care costs and indirect costs) associated with breast cancer and, therefore, no data on the total economic effect of breast cancer in Australia can be presented. Furthermore, only information on *recurrent* health expenditure (i.e. expenditure on health goods and services) and not on capital health expenditure (i.e. health-related investment) is shown.

The latest data that are available in regard to expenditure on breast cancer pertain to the 2004–05 financial year, with comparable data available for 2000–01. The data presented in this chapter were sourced from the Disease Expenditure Database which is maintained by the AIHW; Appendix C provides further information about this data set.

It is not possible to allocate all expenditure on health goods and services to a specific disease such as breast cancer. For example, data on cancer research are not available for separate types of cancers. In addition, expenditure on non-admitted patient hospital services, over-the-counter drugs and services by 'other health practitioners' are not allocated by disease in the Disease Expenditure Database. Thus, the expenditure figures presented in this chapter provide a minimum estimate of all direct health-care costs for breast cancer.

The specific sectors of health expenditure which are covered in this chapter are as follows:

- hospital admitted patient services—expenditure on services provided to an admitted patient in a hospital, including medical services delivered to private admitted patients in hospitals
- out-of-hospital medical expenses—expenditure on medical services funded under the Medicare Benefits Schedule, such as visits to general practitioners and specialists, as well as pathology services
- prescription pharmaceuticals—expenditure on prescriptions subsidised under government schemes (such as the Pharmaceutical Benefits Scheme) and those that are paid for privately; excludes pharmaceuticals dispensed in hospitals (these are included in the 'hospital admitted patient services' category)
- cancer screening—expenditure by the Australian Government and state and territory governments for mammographic screening through the BreastScreen Australia Program and cervical screening through the National Cervical Screening Program.

In order to allow for meaningful comparisons, only expenditure for these four sectors is considered when comparisons are made in this chapter between expenditure on breast cancer and expenditure on all cancers and then all diseases.

In the Disease Expenditure Database (and unlike the approach taken in Chapter 8 of this report), breast cancer hospitalisations are defined as those hospitalisations for which the principal diagnosis was invasive breast cancer. Therefore, hospitalisations that involved same-day chemotherapy administration for breast cancer patients (with invasive breast cancer coded as an additional diagnosis rather than a principal diagnosis) are not included. In turn, any spending related to those hospitalisations is not included in the expenditure data for hospital admitted patient services for breast cancer. Thus, the data shown are a minimum estimate of total admitted patient services expenditure on breast cancer patients. Note that in future expenditure analysis work done by the AIHW, further work to identify the costs of chemotherapy that are due to specific types of cancer, such as breast cancer, may be undertaken.

Further information about each of the four sectors considered in this chapter, as well as the Disease Expenditure Database and how the expenditure estimates were derived, can be found in the health expenditure reports which are produced annually by the AIHW (AIHW 2008c).

Expenditure on breast cancer for females

Expenditure in 2004–05

Considering the four health expenditure sectors shown in Table 9.1, allocated health expenditure on breast cancer for females was estimated to be $331 million in the 2004–05 financial year. The corresponding value for expenditure for all cancers was $1,403 million and for all diseases, it was $24,274 million. Hence, funding for breast cancer for females comprised almost a quarter (24%) of all cancer expenditure for females and 1.4% of expenditure for all diseases for females.

Table 9.1: Allocated health expenditure by disease and by sector, females, 2004–05

	Breast cancer		All cancers[(a)]		All diseases	
Sector	**$ (million)**	**Per cent**	**$ (million)**	**Per cent**	**$ (million)**	**Per cent**
Hospital admitted patient services[(b)]	92	27.8	884	63.0	12,688	52.3
Out-of-hospital medical expenses	68	20.6	218	15.5	6,921	28.5
Prescription pharmaceuticals	53	16.0	80	5.7	4,443	18.3
Cancer screening	118	35.7	222	15.8	222	0.9
Total allocated expenditure[(c)]	**331**	**100.0**	**1,403**	**100.0**	**24,274**	**100.0**

(a) Includes cancers coded in the International Statistical Classification of Diseases and Related Health Problems, 10th edition (ICD-10) as C00–C97. Does not include cancers coded as D45, D46, D47.1 and D47.3.

(b) Expenditure for hospital admitted patient services for breast cancer pertains to those hospitalisations for which the principal diagnosis was breast cancer (ICD-10 code of C50). It does not pertain to hospitalisations for which breast cancer was an additional diagnosis and the principal diagnosis related specifically to the type of cancer treatment or care received.

(c) Values may not sum to the total due to rounding.

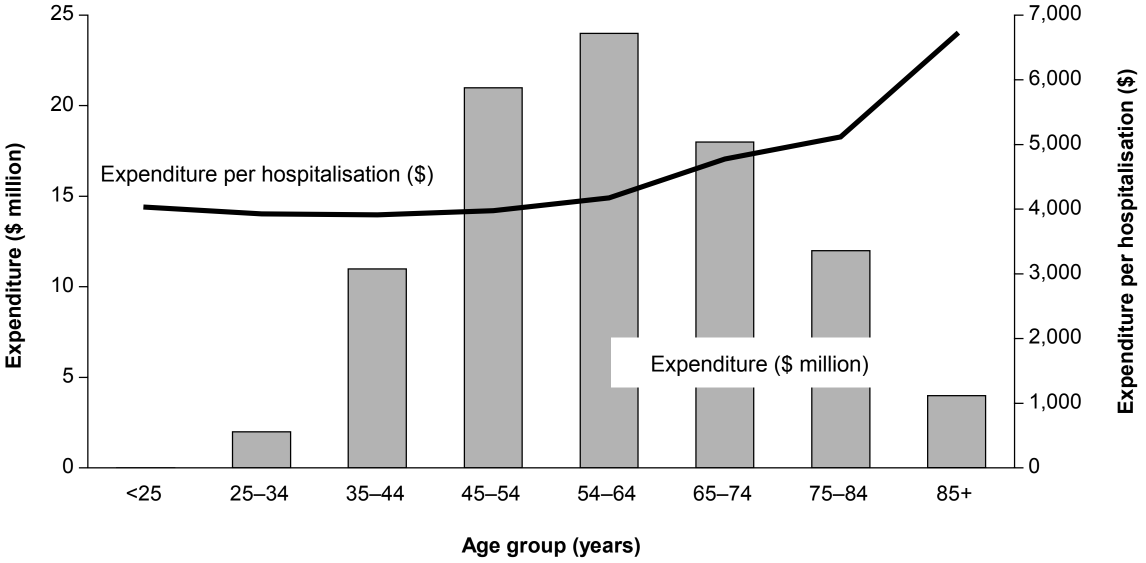
Source: Disease Expenditure Database, AIHW.

Of the total allocated expenditure on breast cancer for females, over a third (36%) was spent on screening mammography services ($118 million), over a quarter (28%) on hospital admitted patient services ($92 million) and 21% on out-of-hospital medical expenses ($68 million). The amount spent on prescription pharmaceuticals for breast cancer for females was $53 million, which made up two-thirds (66%) of expenditure on prescription pharmaceuticals for all cancers for females ($80 million) and 1.2% for all diseases for females ($4,443 million).

The proportion of female health expenditure that consisted of hospital admitted patient services differed markedly for breast cancer compared with all cancers and with all diseases—that is, it equalled 28% of health expenditure on breast cancer compared with 63% for all cancers and 52% for all diseases.

Differences by age

Information is available on differences by age in breast cancer expenditure for one of the four sectors considered—namely, admitted hospital patient services (Figure 9.1). Of the total $92 million expended for admitted hospital patient services on women for breast cancer in 2004–05, one quarter (26%) was spent on women aged 54 to 64 years ($24 million), with an additional $21 million (23%) spent on women aged 45 to 54 years and $18 million (20%) on those aged 65 to 74 years.



Notes

1. Includes those hospitalisations for which the principal diagnosis was breast cancer (ICD-10 code of C50). Does not include hospitalisations for which breast cancer was an additional diagnosis and the principal diagnosis related specifically to the type of cancer treatment or care received.
2. The data for this figure are shown in Appendix Table D9.1.

Source: Disease Expenditure Database, AIHW.

Figure 9.1: Hospital admitted patient expenditure on breast cancer by age group, females, 2004–05

Average expenditure on breast cancer per hospitalisation in 2004–05 was highest for women in the older age groups. In particular, average expenditure for those aged 85 years and over was $6,701 per hospitalisation and for those aged 75 to 84 years, it was $5,119. In comparison, expenditure was lowest for those women aged 35 to 44 years ($3,913 per hospitalisation), followed by those aged 25 to 34 years ($3,926).

Trends

Change over time in health expenditure on breast cancer for females is shown in Table 9.2. After prices were adjusted for inflation (with all prices shown in 2004–05 dollars), the data indicate that expenditure on breast cancer grew by 32% from $252 million in 2000–01 to $331 million in 2004–05. While growth in expenditure on hospital admitted patient services was relatively modest (10%), there was a particularly large increase in expenditure in the areas of out-of-hospital medical expenses (173%) and prescription pharmaceuticals (71%). This finding is likely related to changes in admission procedures in some states and territories in regard to the administration of chemotherapy. As discussed in Chapter 8, in three states and territories, there has been a move away from admitting patients to hospital for same-day chemotherapy services and, instead, providing such services as an outpatient basis—either as a public or private outpatient service.

Table 9.2 also shows that the overall increase in expenditure on breast cancer for females (32%) is in line with the increase for all cancers (31%) but larger than the increase observed in expenditure (in the four sectors considered) for all diseases (20%).

Table 9.2: Allocated health expenditure[(a)] by disease and sector, constant prices[(b)], females, 2000–01 and 2004–05

Sector	2000–01 $ (million)[(b)]	2004–05 $ (million)	Change (%)
Breast cancer			
Hospital admitted patient services[(c)]	84	92	9.7
Out-of-hospital medical expenses	25	68	172.5
Prescription pharmaceuticals	31	53	70.9
Cancer screening	112	118	5.5
Total allocated expenditure on breast cancer[(d)]	**252**	**331**	**31.5**
All cancers[(e)]	2,199	2,876	30.8
All diseases	37,176	44,486	19.7

(a) Comprised of 'hospital admitted patient services', 'out-of-hospital medical expenses', 'prescription pharmaceuticals' and 'cancer screening'.

(b) Constant price health expenditure for 2000–01 is shown in terms of 2004–05 dollars.

(c) Pertains to those hospitalisations for which the principal diagnosis was breast cancer (ICD10 code of C50). It does not pertain to hospitalisations for which breast cancer was an additional diagnosis and the principal diagnosis related specifically to the type of cancer treatment or care received.

(d) Values may not sum to the total due to rounding.

(e) Includes cancers coded in ICD-10 as C00–C97. Does not include cancers coded as D45, D46, D47.1 and D47.3.

Source: Disease Expenditure Database, AIHW.

Expenditure on breast cancer for males

In 2004–05, health expenditure on breast cancer for males was $8 million, with the majority of this funding being directed to prescription pharmaceuticals ($7 million) (Table 9.3).

Table 9.3: Allocated health expenditure on breast cancer by sector and by sex, persons, 2004–05

	Males		Females		Total	
Sector	**$ (million)**	**Per cent**	**$ (million)**	**Per cent**	**$ (million)**	**Per cent**
Hospital admitted patient services[(a)]	1	9.7	92	27.8	93	27.3
Out-of-hospital medical expenses	0	5.8	68	20.6	69	20.2
Prescription pharmaceuticals	7	84.5	53	16.0	60	17.7
Cancer screening	. .	. .	118	35.7	118	34.8
Total allocated expenditure[(b)]	**8**	**100.0**	**331**	**100.0**	**340**	**100.0**

(a) Pertains to those hospitalisations for which the principal diagnosis was breast cancer (ICD10 code of C50). It does not pertain to hospitalisations for which breast cancer was an additional diagnosis and the principal diagnosis related specifically to the type of cancer treatment or care received.

(b) Values may not sum to the total due to rounding.

Source: Disease Expenditure Database, AIHW.

Considering health expenditure on breast cancer for both males and females, total expenditure for this disease, considering the four sectors noted in Table 9.3, was $340 million in 2004–05.

Appendix A: Classifications

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 in response to the recognition of new diseases (for example, acquired immunodeficiency syndrome (AIDS)), increased knowledge of diseases and changing terminology in the description of diseases. Comparability factors are sometimes required between revisions to make comparisons valid if a disease definition changed between the revisions. For breast cancer, a comparability factor of 0.98 applies to convert ICD-9 mortality data to ICD-10 data (ABS 2007), while a comparability factor of '1' applies to convert such data from ICD-8 to ICD-9 standards (ABS 1981).

The latest version, ICD-10, 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. The Australian modification of ICD-10, which is referred to as the ICD-10-AM (NCCH 2008b), has been used for classifying diagnoses in hospital records in all states and territories since 1999–00 (AIHW 2000).

Australian Classification of Health Interventions

The current version of the ICD does not incorporate a classification system for coding health interventions (i.e. procedures). In Australia, a health intervention classification system was designed to be implemented at the same time as ICD-10-AM (in July 1998). The system was based on the Medicare Benefits Schedule (MBS) coding system and was originally called MBS-Extended. The name was changed to the Australian Classification of Health Interventions (ACHI) with the release of the third revision of the ICD-10-AM in July 2002 (NCCH 2008c). ACHI and ICD-10-AM are used together for classifying morbidity, surgical procedures and other health interventions in Australian hospital records.

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 ICD-9 revision 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, and in this classification, cancers were coded by both morphology (histology type and behaviour) and topography (site).

Since the first edition, 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) and is currently used by most state and territory cancer registries and by the AIHW in regard to the Australian Cancer Database.

Appendix B: 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 them multiplying the result by a constant (e.g. 100,000) to derive the rate. Age-specific rates are often expressed per 100,000 population.

Age-standardised rates

A crude rate provides information on the number of, for example, new cases of cancer or deaths from cancer by the population at risk in a specified period. No age adjustments are made when calculating a crude rate. Since the risk of cancer is heavily dependent on age, crude rates are not suitable for looking at trends or making comparisons across groups in cancer incidence and mortality.

More meaningful comparisons can be made by the use of age-standardised rates, with such rates adjusted for age in order to facilitate comparisons between populations that have different age structures, for example, between Indigenous peoples and other Australians.

There are two methods commonly used to adjust for age: direct and indirect standardisation. In this report, the direct standardisation approach presented by Jensen and colleagues (1991) is used. To calculate age-standardised rates, age-specific rates (usually grouped in 5-year intervals) are multiplied against a constant population—either the Australian population as at 30 June 2001 or the World Health Organization (WHO) 2000 World Standard Population. This effectively removes the influence of age structure on the summary rate and it is described as the age-standardised rate.

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 which is too small to allow differentiation between a real difference and one which is due to chance variation. It can, therefore, only be stated 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.

With one exception, the confidence intervals presented in this report were calculated using a method developed by Dobson and associates (1991). This method calculates approximate confidence intervals for a weighted sum of Poisson parameters.

The one exception applies to the confidence intervals that were calculated for the international comparisons of incidence and mortality data using GLOBOCAN data, as shown in Figures 2.5 and 3.5. For those data, the lack of the required data meant that the Dobson method could not be used and the AIHW approximated the confidence intervals using the following formula:

$$\text{95\% CI approximation} = \text{AS rate} \pm 1.96 \times \frac{\text{AS rate}}{\sqrt{\text{Number of cases}}}$$

Since the GLOBOCAN data are based on the estimates of the number of new cases and deaths from breast cancer, the associated confidence intervals indicate the range of random variation that might be expected, should those estimates be 100% accurate.

Note that statistical independence of observations is assumed in the calculations of the confidence intervals for this report. This assumption may not always be valid for episode-based data (such as data from the National Hospital Morbidity Database and Medicare Australia).

Incidence projections

To calculate the incidence projections shown in Chapter 2, breast cancer incidence data for females for the 10-year period from 1997 to 2006 were divided into 18 series—one for each 5-year age group. The incidence numbers were divided by the age-specific mid-year populations to obtain the age-specific incidence rates. Least squares linear regression was used to find the straight line of best fit through the 1997 to 2006 rates and to compute the various quantities needed for the 95% prediction intervals. The projected incidence rates were then multiplied by the estimated resident population to obtain the projected incidence numbers. The populations used were the Australian Bureau of Statistics (ABS) projected populations from Series 29(B) (ABS 2008b).

Mortality-to-incidence ratio

Both mortality-to-incidence ratios (MIRs) and relative survival ratios can be used to estimate survival from a particular disease, such as breast cancer, for a population. Although MIRs are the cruder of the two ratios, deriving MIRs is far less complicated. Thus, the MIR is considered to be a better measure when comparing survival between countries.

The MIR is defined as the age-standardised mortality rate divided by the age-standardised incidence rate. For example, an MIR of 0.42 in a given year for all types of cancers means that for every 100 new cancer cases diagnosed that year, there were 42 deaths due to cancer in the same year (though the deaths need not be of the same people as the cases). If people tend to die relatively soon after diagnosis from a particular cancer (that is, the death rate is nearly as high as the incidence rate for that cancer), then the MIR will be close to 1.00. In contrast, if people tend to survive a long time after being diagnosed, then the MIR will be close to zero.

The MIR only gives a valid measure of the survival experience in a population if:

- cancer registration and death registration are complete or nearly so, and
- the incidence rate, mortality rate and survival proportion are not undergoing rapid change.

The incidence and mortality data used to calculate the MIRs in Chapter 4 were extracted from the 2002 GLOBOCAN database (Ferlay et al. 2004).

Relative survival analysis

Relative survival estimates compare the survival of persons diagnosed with breast cancer (i.e. 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 (i.e. the expected survival). Note that the actual cause of death (whether it is from breast cancer or another cause) is not of importance in these analyses. Thus, relative survival is defined as follows:

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

The resulting value is usually given as a proportion. For example, if the observed 5-year survival of a particular cohort diagnosed with breast cancer was 0.80 (that is, 80% 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 0.8/0.9 = 0.89 or 89%. One way to interpret this figure is that the ‘average’ person in the cancer cohort has an 89% chance of being alive 5 years after diagnosis *relative to others of the same sex and age*.

In order for the relative survival estimate to be a valid approximation of the probability that a person will not die of their diagnosed cancer within the given time interval, the presence of the cancer is assumed to be the only factor that distinguishes the cancer cohort from the general population (Ries et al. 2008). The degree to which this is true is not known.

Relative survival proportions have traditionally been calculated using the ‘cohort method’ and National Breast and Ovarian Cancer Centre preferred the use of that method for this report. In the cohort method, a cohort of people diagnosed with cancer is followed over time to estimate the proportion surviving for a selected time frame (e.g. 1, 5 or 10 years). An alternative approach to calculating relative survival is 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 calendar 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. However, the cohort method is thought to provide more precise estimates (i.e. estimates with narrower confidence intervals).

An alternative to the calculation of relative survival proportions is to use the 'cause-specific model' to derive survival estimates. This model calculates survival based on deaths due to cancer-related causes alone. There are various advantages and disadvantages to using the cause-specific model (Le Teuff et al. 2005). Because the 2006 version of the Australian Cancer Database (ACD) that was utilised for this report included a limited amount of cause of death information, this approach could not be used to calculate survival estimates.

Data from the ACD on the incidence of breast cancer were used to calculate observed survival proportions. These incidence data were linked to the National Death Index in order to obtain information on those people with breast cancer who died and the date on which this occurred (see Appendix C for more information on these data sources). In order to calculate the expected survival belonging to the age-, sex- and calendar-year matched population, life tables for the population under study were used. These life tables were obtained from the Australian Bureau of Statistics (ABS 2009b).

The software used to calculate the 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 the relative survival estimates, including rules which were applied during data preparation, can be found in the 2008 report prepared by the AIHW on cancer survival and prevalence (AIHW, CA & AACR 2008).

Risk to age 75 and 85 years

The calculations of risk shown in this report are measures that approximate the risk of developing (or dying from) breast cancer before a given age, assuming that the risks at the time of estimation remained throughout life. It is based on a mathematical relationship with the cumulative rate. Note that in these risk factors, no account is taken of specific breast cancer risk factors. Further details on how the risks were calculated can be found in the 2008 *Cancer in Australia* report (AIHW & AACR 2008).

Appendix C: Data sources

To provide a comprehensive picture of national breast cancer statistics in this report, a range of data sources were used, including AIHW and external data sources. These data sources are described in this appendix.

Australian Cancer Database

The Australian Cancer Database (ACD) is a database that holds information about 1.8 million cancer cases of Australians who were diagnosed with cancer (other than basal call and squamous cell carcinomas of the skin) between 1982 and 2006. Data from this source are used in a number of chapters including Chapters 2, 4 and 5.

Each Australian state and territory has legislation that makes the reporting of all cancers (excluding basal call and squamous cell carcinomas of the skin) mandatory. Pathology laboratories and Registrars of Births, Deaths and Marriages across Australia must report on cancer cases, while in some (but not all) jurisdictions, hospitals, radiation oncology units and nursing homes must also report on cancer cases.

The data from the pathology laboratories, Registrars and other sources (as applicable) are sent to state and territory cancer registries. On an annual basis, these registries provide data to the AIHW. The AIHW compiles and maintains the ACD, in partnership with the Australasian Association of Cancer Registries.

The data provided to the AIHW by the states and territories 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 C.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 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 and, 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.

Table C.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, 3rd edition.

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

Source: AIHW 2009c.

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 cancers 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 (e.g. Merkel cell lesions, Kaposi sarcoma and cutaneous lymphoma) and these are reportable cancers.

In the past, the agreed approach was to exclude all NMSC cases from the incidence data produced by the AIHW. However, for the first time this year, a new approach is used whereby all cases that pertain to reportable forms of NMSC are included in the data; as previously, no data on BCC and SCC are included. To implement this change, the state and territory registries were asked to supply, along with the usual data, information on all NMSC cases other than BCC and SCC for 2006 and for all previous years, where possible. All of the registries were able to provide such data for 2001 to 2006, with only some being able to provide data for earlier years. Thus the data on non-melanoma skin cancers other than BCC and SCC may be incomplete before 2001.

BreastScreen Australia Program data

Data from the BreastScreen Australia Program were used in Chapter 7 to indicate the number of women who had a screening mammogram through the BreastScreen Australia Program.

These data are supplied annually to the AIHW by individual state and territory BreastScreen programs for monitoring purposes. They are compiled by the AIHW and reports are produced annually (AIHW 2009b).

Disease Expenditure Database

Expenditure data are used in Chapter 9 of this report to describe health expenditure on breast cancer. These data were obtained from the Disease Expenditure Database which is maintained by the AIHW.

Since 1998, the AIHW has had responsibility for developing estimates of national health expenditure. Data for this purpose are obtained from a wide variety of sources in the public and private sectors, with the Australian Bureau of Statistics, the Australian Government Department of Health and Ageing, and state and territory health authorities providing most of the basic data. Other major sources are the Department of Veterans' Affairs, the Private Health Insurance Administration Council, Comcare, and the major workers compensation and compulsory third-party motor vehicle insurers in each state and territory.

The definition of 'all cancers' used in Chapter 9 is somewhat different from that used in earlier chapters as it only includes ICD-10 'C' codes and excludes those malignant cancers with ICD-10 'D' codes (such as polycythaemia vera). Separate expenditure data were not readily available for the required set of ICD-10 'D' cancers. Since the forms of malignant cancers covered by the ICD-10 'D' codes are not common (see AIHW & AACR 2008), their exclusion is not expected to have a large effect on the health expenditure estimates shown in this report.

Further information about the Disease Expenditure Database can be found in the annual health expenditure reports published by the AIHW (AIHW 2008c).

Ductal carcinoma in situ data

Data on the number of cases of ductal carcinoma in situ (DCIS) in females are provided in Chapter 2. These data relate to the period from 1995 to 2005. The first year in which national data are available is 1997 since the 1996 Northern Territory data on the number of DCIS cases was of uncertain quality, as was the 1995 and 1996 data for South Australia.

Cancer registries in Australia generally apply a '4-month' rule to DCIS data. That is, if a woman is diagnosed with invasive breast cancer in the same site of the breast within 4 months of being diagnosed with DCIS, it is assumed that she had invasive breast cancer at the time of the DCIS diagnosis. In such cases, the DCIS case is deleted and recoded as invasive breast cancer by the cancer registries.

The DCIS data presented in Chapter 2 were provided to the AIHW by the state and territory cancer registries. Checks on the data were completed at the AIHW to remove duplicate cases. In addition, AIHW checked for inconsistencies in the application of the '4-month' rule. When an invasive breast cancer was recorded for the same woman within 4 months of the DCIS being diagnosed, the AIHW removed that DCIS case from the database. This led to the removal of 125 DCIS cases, or less than 1% of DCIS cases, from the database. Ideally, the 4-month rule would only have been applied by the AIHW in cases where the invasive breast cancer was recorded as being in the same anatomical site of the breast as the DCIS, but this information was not available and thus could not be taken into account.

Medicare Australia data

Data from Medicare Australia were used in Chapter 7 to provide information on the annual number of mammograms subsidised under the Medicare Benefits Schedule (MBS). These data are available from the Medicare Australia website at: <www.medicareaustralia.gov.au/statistics/mbs_item.shtml>.

Medicare Australia's statistics are based on the items and groups in the MBS and can be broken down by gender and age group. As mammography reimbursement is available for both females and males, data were provided for both sexes in this report. The relevant MBS item numbers are 59300 (mammography of both breasts) and 59303 (mammography of one breast).

The Medicare Australia statistics include data on only those services that were performed by a registered provider for services that qualify for a Medicare Benefit and for which a claim had been processed by Medicare Australia. They do not include services provided by hospital doctors to public patients in public hospitals or services that qualify for a benefit under the Department of Veterans' Affairs National Treatment Account.

The month and year of the procedure is determined by the date on which the service was processed by Medicare Australia, not the date on which the service was provided.

National Death Index

Cancer incidence data were linked to the National Death Index (NDI) in order to provide survival and prevalence information (Chapters 4 and 5). The NDI is a database that is maintained by the AIHW; it contains information on all deaths that have occurred in Australia since 1980.

The NDI database comprises the following variables for each deceased person: name; alternative names (including maiden names); date of birth (or estimated year of birth); age at death; sex; date of death; marital status; Indigenous status; state or territory of registration; and registration number. Cause of death information in a coded form is also available. For records to 1996, only the code for underlying cause of death is available. For records from 1997, the codes for the underlying cause of death and all other causes of death mentioned on the death certificate are available.

This database exists solely for research linkage purposes such as to gain epidemiological mortality information on individuals in a particular cohort, or with a known disease state. Ethics approval is required for the NDI to be utilised for any particular research project.

National Hospital Morbidity Database

Data from the National Hospital Morbidity Database (NHMD) are used in Chapter 8 of this report to examine the number of breast cancer–related hospitalisations. The NHMD contains demographic, diagnostic, procedural and duration of stay information on episodes of care for patients admitted to hospital. This annual collection is compiled and maintained by the AIHW, using data supplied by state and territory health authorities. Information from almost all hospitals in Australia is included in the database: public acute and public psychiatric hospitals, private acute and psychiatric hospitals, and private free-standing day hospital facilities. The database is episode-based and it is not possible to count patients individually.

Data are held for the years from 1993–94 to 2007–08. However, around 1998–99, hospitals across Australia began to implement a change in the classification system used to code the diagnosis for hospitalisations (i.e. from ICD-9 to ICD-10). The first full year for which national data are available using ICD-10 is 1999–00. Hence, in Chapter 8, only those data that were coded using ICD-10 are presented.

Note that the hospitalisations data presented in this report exclude those hospitalisations for which the care type was reported as *newborn*, *hospital boarder* or *posthumous organ procurement*. Thus, it includes all other admitted care hospitalisations including those with a care type of *acute care*, *rehabilitation care* and *palliative care.*

Comprehensive hospital statistics from this database are released by the AIHW on an annual basis (AIHW 2009a). Further information about this data source is available in those annual reports.

National Mortality Database

Data from the National Mortality Database are used in Chapter 3 of this report to provide statistical information on mortality in Australia due to breast cancer.

The registration of deaths has been compulsory since the mid-1850s and this information is registered with the relevant state and territory Registrar of Births, Deaths and Marriages. Since 1906, the Commonwealth Statistician has compiled the information collected by the Registrars and published national death information.

The National Mortality Database, which is maintained by the AIHW, currently contains information for all deaths in Australia registered from 1964 to 2006. Data back to 1906 are also available for a number of causes of death.

Information is provided to the AIHW by the Registrars of Births, Deaths and Marriages and coded nationally by the Australian Bureau of Statistics (ABS). Death certificate information is standardised and coded according to rules set forward in various versions of the ICD. The deaths have been coded to reflect the underlying cause of death. As well, in recent years, multiple causes of death have been added to the mortality data.

Over time, changes have been made to the coding and processing of mortality data that affect comparability of the data. For instance, data for holdings for 1987 to 1996 were manually coded using the ninth revision of the ICD. Data holdings for 1997 onwards were coded using ICD-10, using an automated system with slightly different coding rules. The change to the coding and processing of mortality data introduced a break in the time series. The ABS has developed comparability factors so that a time series may still be derived (ABS

2009d). As noted in Appendix A, for breast cancer, the comparability factor for ICD-9 to ICD-10 is 0.98.

In the National Mortality Database, the number of deaths is based on the ‘year of death’, except for the most recent year, where ‘year of registration of death’ is used. While for the most part, year of death and its registration coincide, deaths at the end of each calendar year may be held over until the following year, as will deaths whose cause requires further examination by a coroner (e.g. possible suicides).

Population data

Throughout this report, population data were used to derive rates of, for example, cancer incidence and mortality. The population data were sourced from the ABS 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 D: Additional tables

Additional tables for Chapter 2: Incidence of breast cancer

Table D2.1: Incidence of breast cancer by age at diagnosis, females, 2006

Age group (years)	Number of cases	Age-specific rate [(a)]	95% confidence interval
<20	1	0.0	0.0–0.2
20–24	9	1.2	0.6–2.4
25–29	56	8.0	6.1–10.4
30–34	188	25.1	21.7–29.0
35–39	473	61.7	56.2–67.5
40–44	981	127.1	119.3–135.4
45–49	1,375	182.3	172.8–192.2
50–54	1,573	229.7	218.4–241.3
55–59	1,737	273.2	260.5–286.3
60–64	1,722	349.2	332.9–366.1
65–69	1,366	345.6	327.5–364.4
70–74	973	297.3	278.9–316.6
75–79	821	273.8	255.4–293.2
80–84	708	295.5	274.2–318.1
85+	631	289.8	267.6–313.3
Total[(b)]	**12,614**	**112.4**	**110.4–114.4**

(a) Number of new cases per 100,000 females.

(b) The rate shown in this row is age-standardised to the Australian population as at 30 June 2001; it is expressed per 100,000 females.

Source: Australian Cancer Database, AIHW.

Table D2.2: Incidence of breast cancer, females, 1982 to 2006

Year	Number of cases	% of all cancer cases[(a)]	Age-standardised rate (A)[(b)]	95% confidence interval	Age-standardised rate (W)[(c)]	95% confidence interval
1982	5,289	24.1	80.7	78.5–83.0	63.4	61.7–65.2
1983	5,361	23.7	80.6	78.4–82.8	63.0	61.3–64.8
1984	5,699	24.0	83.4	81.2–85.6	65.3	63.6–67.0
1985	5,903	24.1	84.2	82.0–86.4	66.0	64.3–67.7
1986	6,079	24.2	85.1	82.9–87.3	66.3	64.6–68.0
1987	6,687	25.1	91.2	89.0–93.4	71.6	69.9–73.4
1988	6,730	24.8	89.6	87.4–91.8	70.3	68.6–72.0
1989	7,166	25.7	93.4	91.3–95.6	73.3	71.6–75.1
1990	7,406	25.8	94.7	92.5–96.9	74.3	72.6–76.1
1991	8,042	26.3	100.4	98.2–102.6	78.8	77.0–80.6
1992	8,034	25.6	98.3	96.1–100.5	77.3	75.6–79.1
1993	8,785	27.1	105.3	103.1–107.5	83.2	81.4–85.0
1994	9,746	28.5	114.1	111.9–116.5	90.3	88.4–92.1
1995	10,050	28.4	115.6	113.3–117.9	91.2	89.4–93.1
1996	9,745	27.4	109.3	107.1–111.5	86.4	84.6–88.2
1997	10,194	27.7	111.5	109.3–113.7	88.0	86.3–89.8
1998	10,722	28.3	114.5	112.3–116.7	90.5	88.8–92.3
1999	10,652	27.7	111.2	109.1–113.3	88.3	86.6–90.0
2000	11,347	28.3	115.6	113.5–117.8	91.8	90.1–93.5
2001	11,803	28.7	117.3	115.2–119.4	93.1	91.4–94.9
2002	12,065	28.2	117.2	115.1–119.3	93.2	91.5–95.0
2003	11,845	27.9	112.4	110.4–114.4	89.4	87.7–91.0
2004	12,186	27.7	113.3	111.3–115.3	90.0	88.4–91.7
2005	12,213	27.2	111.2	109.2–113.2	88.6	87.0–90.2
2006	12,614	27.7	112.4	110.4–114.4	89.7	88.1–91.3

(a) Includes cancers coded in ICD-10 as C00–C97, D45, D46, D47.1 and D47.3 with the exception of those C44 codes which indicate a basal or squamous cell carcinoma of the skin. Due to changes over time in which cancers were reportable, the data on cancers that begin with an ICD-10 code of 'D' may be incomplete before 2003 and data on C44 codes (other than basal or squamous cell carcinomas) may be incomplete before 2001.

(b) Standardised to the Australian population as at 30 June 2001 and expressed per 100,000 females.

(c) Standardised using the World Health Organization 2000 World Standard Population and expressed per 100,000 females.

Source: Australian Cancer Database, AIHW.

Table D2.3: Incidence of breast cancer by age at diagnosis, females, 1982 to 2006

	<40 years		40–49 years		50–69 years		70+ years		All ages	
Year	**ASR(a)**	**95% CI**	**ASR(a)**	**95% CI**	**ASR(a)**	**95% CI**	**ASR(a)**	**95% CI**	**ASR(a)**	**95% CI**
1982	11.8	10.8–12.9	118.3	110.8–126.1	174.0	167.1–181.2	249.8	237.0–263.1	80.7	78.5–83.0
1983	11.4	10.4–12.5	122.8	115.2–130.7	167.3	160.5–174.3	258.3	245.5–271.6	80.6	78.4–82.8
1984	11.0	10.1–12.0	123.1	115.7–130.8	178.6	171.5–185.8	266.7	254.0–279.9	83.4	81.2–85.6
1985	12.0	11.0–13.0	122.9	115.7–130.6	180.4	173.4–187.6	265.4	253.0–278.4	84.2	82.0–86.4
1986	11.0	10.1–12.0	118.9	111.8–126.3	184.1	177.0–191.5	279.6	267.0–292.6	85.1	82.9–87.3
1987	13.1	12.1–14.1	136.1	128.7–143.7	196.8	189.5–204.2	279.0	266.6–291.8	91.2	89.0–93.4
1988	11.7	10.8–12.7	133.8	126.7–141.2	194.5	187.3–201.8	279.0	266.7–291.6	89.6	87.4–91.8
1989	11.8	10.8–12.8	136.8	129.7–144.1	207.9	200.5–215.5	287.0	274.7–299.6	93.4	91.3–95.6
1990	12.1	11.1–13.1	139.5	132.5–146.7	209.3	201.9–216.9	291.7	279.5–304.3	94.7	92.5–96.9
1991	12.7	11.7–13.7	140.3	133.5–147.5	230.1	222.4–238.0	304.5	292.3–317.2	100.4	98.2–102.6
1992	12.0	11.0–12.9	148.6	141.7–155.8	222.0	214.5–229.7	289.4	277.7–301.6	98.3	96.1–100.5
1993	12.5	11.5–13.5	148.7	141.9–155.7	250.6	242.6–258.7	301.7	289.8–313.9	105.3	103.1–107.5
1994	12.6	11.6–13.6	153.2	146.4–160.2	282.7	274.4–291.2	322.1	310.0–334.5	114.1	111.9–116.5
1995	12.4	11.5–13.4	154.5	147.8–161.5	285.2	276.9–293.7	331.5	319.4–343.9	115.6	113.3–117.9
1996	12.3	11.4–13.3	147.9	141.4–154.6	269.1	261.1–277.2	307.5	296.1–319.3	109.3	107.1–111.5
1997	12.6	11.7–13.6	144.1	137.7–150.6	277.2	269.3–285.3	319.2	307.7–331.0	111.5	109.3–113.7
1998	12.5	11.6–13.5	148.3	141.9–154.9	288.4	280.4–296.5	322.0	310.6–333.7	114.5	112.3–116.7
1999	12.4	11.5–13.4	142.3	136.1–148.7	286.9	279.1–294.9	298.6	287.8–309.8	111.2	109.1–113.3
2000	12.6	11.6–13.5	150.5	144.2–157.1	295.2	287.4–303.1	315.6	304.6–326.9	115.6	113.5–117.8
2001	12.2	11.3–13.2	150.2	143.9–156.7	304.8	297.0–312.8	316.1	305.2–327.3	117.3	115.2–119.4
2002	12.6	11.7–13.6	152.9	146.6–159.3	304.4	296.8–312.2	309.2	298.5–320.3	117.2	115.1–119.3
2003	13.0	12.1–14.0	150.3	144.1–156.7	285.7	278.3–293.1	298.1	287.7–308.9	112.4	110.4–114.4
2004	12.7	11.8–13.7	149.2	143.1–155.5	289.2	281.9–296.6	304.3	293.7–315.1	113.3	111.3–115.3
2005	13.0	12.1–14.0	157.0	150.8–163.4	279.7	272.7–286.9	287.2	277.0–297.7	111.2	109.2–113.2
2006	12.9	12.0–13.9	153.6	147.4–159.9	287.7	280.6–294.8	288.9	278.7–299.3	112.4	110.4–114.4

(a) Standardised to the Australian population as at 30 June 2001 and expressed per 100,000 females.

Source: Australian Cancer Database, AIHW.

Table D2.4: Projected[(a)] breast cancer incidence, females, 2007 to 2015

Year	Number of cases	95% prediction interval	Age-standardised rate (A)[(b)]	95% prediction interval	Age-standardised rate (W)[(c)]	95% prediction interval
2007	13,021	12,615–13,427	113.2	109.7–116.7	90.4	87.5–93.2
2008	13,307	12,869–13,745	113.1	109.5–116.7	90.4	87.4–93.4
2009	13,599	13,127–14,071	113.0	109.2–116.9	90.4	87.2–93.6
2010	13,898	13,388–14,408	112.9	108.9–117.0	90.4	87.1–93.8
2011	14,204	13,653–14,756	112.8	108.6–117.1	90.4	86.9–94.0
2012	14,509	13,917–15,101	112.8	108.3–117.3	90.5	86.7–94.2
2013	14,814	14,177–15,451	112.7	108.0–117.4	90.5	86.6–94.4
2014	15,111	14,426–15,797	112.6	107.6–117.6	90.5	86.4–94.6
2015	15,409	14,672–16,145	112.5	107.3–117.7	90.5	86.2–94.8

(a) The projections are based on breast cancer incidence data for females for 1997 to 2006.

(b) Standardised to the Australian population as at 30 June 2001 and expressed per 100,000 females.

(c) Standardised using the World Health Organization 2000 World Standard Population and expressed per 100,000 females.

Source: Australian Cancer Database, AIHW.

Table D2.5: International comparison of estimated incidence of breast cancer, females, 2002[(a)]

Region or country	Estimated number of cases	Age-standardised rate[(b)]	95% confidence interval[(c)]
Northern America	229,631	99.4	99.0–99.8
New Zealand	2,330	91.9	88.2–95.6
Western Europe	125,604	84.6	84.1–85.1
Australia	***11,176***	***83.2***	***81.7–84.7***
Northern Europe	62,425	82.5	81.9–83.1
Southern Europe	72,458	62.4	61.9–62.9
Micronesia	99	50.4	40.5–60.3
South America	75,907	46.0	45.7–46.3
Central and Eastern Europe	100,262	42.6	42.3–42.9
World	***1,151,298***	***37.4***	***37.3–37.5***
Polynesia	84	34.2	26.9–41.5
Southern Africa	6,474	33.4	32.6–34.2
Western Asia	25,163	33.3	32.9–33.7
Caribbean	6,424	32.9	32.1–33.7
Western Africa	21,397	27.8	27.4–28.2
Central America	14,240	25.9	25.5–26.3
South-Eastern Asia	58,495	25.5	25.3–25.7
Northern Africa	16,588	23.2	22.8–23.6
Melanesia	474	22.2	20.2–24.2
South-Central Asia	133,802	21.8	21.7–21.9
Eastern Asia	167,525	20.6	20.5–20.7
Eastern Africa	15,564	19.5	19.2–19.8
Middle Africa	5,173	16.5	16.1–16.9

(a) The data were estimated for 2002 and are based on data from approximately 3 to 5 years earlier.

(b) Standardised using the World Health Organization 2000 World Standard Population and expressed per 100,000 females.

(c) The confidence intervals are approximations (see Appendix B).

Source: Ferlay et al. 2004.

Table D2.6: Incidence of breast cancer by histology group and type[(a)], females, 2006

Type of breast cancer (ICD-O-3 codes)	Number of cases	% of total breast cancers
Group 1: Invasive ductal carcinoma	**9,933**	**78.7**
Infiltrating duct carcinoma, not otherwise specified (8500)	9,414	74.6
Infiltrating duct and lobular carcinoma (8522)	271	2.1
Infiltrating duct mixed with other types of carcinoma (8523)	125	1.0
Paget disease and intraductal carcinoma of breast (8543)	53	0.4
Paget disease and infiltrating duct carcinoma of breast (8541)	50	0.4
Infiltrating ductular carcinoma (8521)	20	0.2
Carcinoma simplex (8231)[(b)]	0	0.0
Group 2: Invasive lobular carcinoma	**1,354**	**10.7**
Lobular carcinoma, not otherwise specified (8520)	1,332	10.6
Infiltrating lobular mixed with other types of carcinoma (8524)	22	0.2
Group 3: Medullary carcinoma and atypical medullary carcinoma	**49**	**0.4**
Medullary carcinoma, not otherwise specified (8510)	32	0.3
Atypical medullary carcinoma (8513)	17	0.1
Medullary carcinoma with lymphoid stroma (8512)	0	0.0
Group 4: Tubular carcinoma and invasive cribriform carcinoma	**193**	**1.5**
Tubular adenocarcinoma (8211)	179	1.4
Cribriform carcinoma, not otherwise specified (8201)	14	0.1
Group 5: Mucinous carcinoma	**235**	**1.9**
Mucinous adenocarcinoma (8480)	231	1.8
Mucin-producing adenocarcinoma (8481)	3	0.0
Other[(c)]	1	0.0
Group 6: Invasive papillary carcinoma	**58**	**0.5**
Intraductal papillary adenocarcinoma with invasion (8503)	31	0.2
Papillary adenocarcinoma, not otherwise specified (8260)	16	0.1
Papillary carcinoma, not otherwise specified (8050)	11	0.1
Papillary cystadenocarcinoma, not otherwise specified (8450)	0	0.0
Group 7: Inflammatory carcinoma	**9**	**0.1**
Inflammatory carcinoma (8530)	9	0.1

(continued)

Table D2.6 (continued): Incidence of breast cancer by histology group and type[(a)], females, 2006

Type of breast cancer (ICD-O-3 codes)	Number of cases	% of total breast cancers
Group 8: Other—specified	**269**	**2.1**
Adenocarcinoma, not otherwise specified (8140)	96	0.8
Metaplastic carcinoma, not otherwise specified (8575)	38	0.3
Phyllodes tumour, malignant (9020)	25	0.2
Paget disease, mammary (8540)	16	0.1
Intraductal micropapillary carcinoma, invasive (8507)	14	0.1
Intracystic carcinoma, not otherwise specified (8504)	12	0.1
Apocrine adenocarcinoma (8401)	10	0.1
Neuroendocrine carcinoma, not otherwise specified (8246)	5	0.0
Other[(d)]	53	0.4
Group 9: Unspecified	**514**	**4.1**
Carcinoma, not otherwise specified (8010)	310	2.5
Neoplasm, malignant (8000)	204	1.6
Tumour cells, malignant (8001)	0	0.0
Total	**12,614**	**100.0**

(a) For the purpose of this study, breast cancer histology types have been categorised by National Breast and Ovarian Cancer Centre (NBOCC) as shown in this table. The relevant ICD-O-3 histology codes are indicated. All cases were coded by cancer registries as primary site breast cancers. A number of the histology types shown are no longer in general use but were employed in cancer registration in earlier years. All were used by the registries for invasive cancer.

(b) While approximately 100 breast cancer cases were assigned this code each year in the early 1980s, it has been infrequently assigned since the mid-1980s.

(c) Includes Signet ring cell carcinoma (8490) and Mucoepidermoid carcinoma (8430).

(d) Includes all other specified histology types that are not included elsewhere.

Source: Australian Cancer Database, AIHW.

Table D2.7: Incidence of breast cancer by remoteness area[(a)], females, 2002–2006

Remoteness area[(a)]	Average annual number of cases[(b)]	Age-standardised rate[(c)]	95% confidence interval
Major cities	8,340	117.4	116.2–118.5
Inner regional	2,569	107.8	105.9–109.7
Outer regional	1,085	99.8	97.2–102.5
Remote	134	95.0	87.9–102.5
Very remote	48	76.6	66.7–87.2
Not stated	9	. .	. .
Total	**12,185**	**113.2**	**112.3–114.2**

(a) Measured using the Australian Standard Geographical Classification Remoteness Area classification.

(b) Numbers may not sum to the total due to rounding.

(c) Standardised to the Australian population as at 30 June 2001 and expressed per 100,000 females.

Source: Australian Cancer Database, AIHW.

Table D2.8: Incidence of breast cancer by socioeconomic status[(a)], females, 2002–2006

Socioeconomic status(a)	Average annual number of cases(b)	Age-standardised rate(c)	95% confidence interval
1 (lowest)	2,320	108.2	106.2–110.2
2	2,448	109.9	107.9–111.9
3	2,365	112.9	110.9–115.0
4	2,352	113.6	111.5–115.6
5 (highest)	2,669	120.0	117.9–122.0
Not stated	30	. .	. .
Total	**12,185**	**113.2**	**112.3–114.2**

(a) Measured using the ABS Socio-Economic Index for Areas (SEIFA) Index of Relative Socio-economic Disadvantage.

(b) Numbers may not sum to the total due to rounding.

(c) Standardised to the Australian population as at 30 June 2001 and expressed per 100,000 females.

Source: Australian Cancer Database, AIHW.

Table D2.9: Incidence of breast cancer by Indigenous status, females, Queensland, Western Australia, South Australia and the Northern Territory, 2002–2006

Indigenous status	Average annual number of cases(a)	Age-standardised rate(b)	95% confidence interval
Indigenous	47	69.1	59.5–79.7
Non-Indigenous	4,046	103.1	101.7–104.6
Not stated	460	. .	. .
Total	**4,553**	**113.9**	**112.4–115.4**

(a) Numbers may not sum to the total due to rounding.

(b) Standardised to the Australian population as at 30 June 2001 and expressed per 100,000 females.

Source: Australian Cancer Database, AIHW.

Table D2.10: Incidence of breast cancer by country/region of birth[(a)], females, 2002–2006

Country/region of birth[(a)]	Average annual number of cases[(b)]	Age-standardised rate[(c)]	95% confidence interval
Australia	7,823	108.2	107.2–109.3
New Zealand (NZ)	223	105.2	98.7–112.0
Oceania and Antarctica excl. Australia and NZ	67	111.3	98.6–125.2
United Kingdom (UK) and Ireland	1,164	110.6	107.7–113.6
North-West Europe, excl. UK and Ireland	326	111.4	105.4–117.6
Southern and Eastern Europe	694	82.7	79.6–85.9
North Africa and the Middle East	156	102.3	95.1–109.9
South-East Asia	281	77.9	73.5–82.5
North-East Asia	154	71.3	66.1–76.8
Southern and Central Asia	108	85.2	78.1–92.7
Sub-Saharan Africa	92	95.9	87.0–105.5
United States of America (USA) and Canada	62	130.3	114.8–147.0
Americas, excl. USA and Canada	49	80.9	70.5–92.3
Inadequately described, not stated or unknown	987	. .	. .
Total	**12,185**	**113.2**	**112.3–114.2**

(a) Country of birth is classified according to the Standard Australian Classification of Countries, 2nd edition (ABS 2008c).

(b) Numbers may not sum to the total due to rounding.

(c) Standardised to the Australian population as at 30 June 2001 and expressed per 100,000 females.

Source: Australian Cancer Database, AIHW.

Table D2.11: Incidence of ductal carcinoma in situ, females, 1995 to 2005

Year	Number of cases	Age-standardised rate[(a)]	95% confidence interval
1995[(b)]	824	10.7	9.9–11.4
1996[(b)]	832	10.4	9.7–11.1
1997	1,042	11.7	11.0–12.4
1998	1,179	12.8	12.1–13.6
1999	1,200	12.8	12.1–13.5
2000	1,309	13.6	12.9–14.4
2001	1,447	14.7	13.9–15.4
2002	1,390	13.8	13.0–14.5
2003	1,436	13.9	13.1–14.6
2004	1,532	14.5	13.8–15.2
2005	1,558	14.4	13.7–15.1

(a) Standardised to the Australian population as at 30 June 2001 and expressed per 100,000 females.

(b) No data for South Australia and the Northern Territory were provided for 1995 and no data for South Australia were provided for 1996. The rates for those years apply to females in the states and territories for which data were provided.

Source: AIHW analyses of data supplied by state/territory cancer registries.

Table D2.12: Incidence of ductal carcinoma in situ by age at diagnosis, females, 1995 to 2005

	<50 years		50–69 years		70+ years		All ages	
Year	ASR[a]	95% CI	ASR[a]	95% CI	ASR[a]	95% CI	ASR[a]	95% CI
1995[b]	3.6	3.1–4.1	31.4	28.5–34.4	21.4	18.2–24.9	10.7	9.9–11.4
1996[b]	3.9	3.4–4.4	30.3	27.5–33.2	18.9	16.0–22.2	10.4	9.7–11.2
1997	4.4	3.9–5.0	35.1	32.3–38.0	18.1	15.5–21.1	11.7	11.0–12.4
1998	4.3	3.9–4.9	38.3	35.5–41.4	24.4	21.3–27.8	12.8	12.1–13.6
1999	4.1	3.7–4.7	40.3	37.4–43.4	21.3	18.5–24.5	12.8	12.1–13.5
2000	4.2	3.7–4.7	42.4	39.4–45.5	25.6	22.5–29.1	13.6	12.9–14.4
2001	4.2	3.8–4.8	47.3	44.3–50.5	25.9	22.8–29.3	14.7	13.9–15.4
2002	4.4	3.9–4.9	43.1	40.2–46.1	24.1	21.1–27.4	13.8	13.1–14.5
2003	4.0	3.5–4.5	42.9	40.1–45.9	28.5	25.2–32.1	13.9	13.1–14.6
2004	4.5	4.1–5.1	45.1	42.3–48.1	26.7	23.5–30.1	14.5	13.8–15.3
2005	4.4	4.0–5.0	44.4	41.7–47.4	27.5	24.3–31.0	14.4	13.7–15.1

(a) Standardised to the Australian population as at 30 June 2001 and expressed per 100,000 females.

(b) No data for South Australia and the Northern Territory were provided for 1995 and no data for South Australia were provided for 1996. The rates for those years apply to females in the states and territories for which data were provided.

Source: AIHW analyses of data supplied by state/territory cancer registries.

Table D2.13: Incidence of breast cancer by type of breast cancer[a], males, 2002–2006

Type of breast cancer	Average annual number of cases[b]	% of total breast cancers
Group 1: Invasive ductal carcinoma	85	86.0
Infiltrating duct carcinoma, not otherwise specified	80	81.5
Group 2: Invasive lobular carcinoma	2	1.8
Group 3: Medullary carcinoma and atypical medullary carcinoma	0	0.0
Group 4: Tubular carcinoma and invasive cribriform carcinoma	0	0.0
Group 5: Mucinous carcinoma	1	0.8
Group 6: Invasive papillary carcinoma	3	2.8
Group 7: Inflammatory carcinoma	0	0.0
Group 8: Other–specified	4	4.5
Group 9: Unspecified	4	4.1
Total	**98**	**100.0**

(a) Appendix Table D2.6 provides a list of the histology types included in each group.

(b) Numbers may not sum to the total due to rounding.

Source: Australian Cancer Database, AIHW.

Additional tables for Chapter 3: Mortality from breast cancer

Table D3.1: Mortality from breast cancer and all cancers by age at death, females, 2006

	Breast cancer			All cancers		
Age group (years)	**Number of deaths**	**Age-specific rate[(a)]**	**95% confidence interval**	**Number of deaths**	**Age-specific rate[(a)]**	**95% confidence interval**
<20	0	0	. .	69	2.6	2.0–3.3
20–24	2	0.3	0.0–1.0	26	3.6	2.3–5.3
25–29	3	0.4	0.1–1.3	39	5.6	4.0–7.7
30–34	13	1.7	0.9–3.0	78	10.4	8.2–13.0
35–39	53	6.9	5.2–9.0	169	22.0	18.8–25.6
40–44	107	13.9	11.4–16.8	303	39.3	35.0–43.9
45–49	153	20.3	17.2–23.8	563	74.7	68.6–81.1
50–54	237	34.6	30.3–39.3	849	124.0	115.8–132.6
55–59	302	47.5	42.3–53.2	1,226	192.8	182.2–203.9
60–64	286	58.0	51.5–65.1	1,409	285.7	271.0–301.0
65–69	236	59.7	52.3–67.8	1,647	416.7	396.8–437.3
70–74	249	76.1	66.9–86.1	1,951	596.2	570.0–623.2
75–79	263	87.7	77.4–99.0	2,559	853.4	820.6–887.1
80–84	319	133.2	118.9–148.6	2,833	1,182.5	1,139.4–1,226.9
85+	395	181.4	164.0–200.2	3,402	1,562.4	1,510.4–1,615.8
Total[(b)]	**2,618**	**22.1**	**21.3–23.0**	**17,123**	**141.0**	**138.9–143.2**

(a) Number of deaths per 100,000 females.

(b) The rates shown in this row are age-standardised to the Australian population as at 30 June 2001; they are expressed per 100,000 females.

Source: National Mortality Database, AIHW.

Table D3.2: Mortality from breast cancer by year of death registration[a], females, 1907 to 2006

Year	ASR[b]	Year	ASR[b]	Year	ASR[b]
1907	21.8	1941	34.3	1975	28.6
1908	22.3	1942	32.0	1976	29.7
1909	20.4	1943	35.0	1977	29.4
1910	22.1	1944	31.5	1978	27.5
1911	21.8	1945	32.0	1979	28.1
1912	26.0	1946	32.5	1980	28.2
1913	23.0	1947	33.1	1981	28.9
1914	22.6	1948	33.1	1982	29.8
1915	20.4	1949	31.9	1983	29.5
1916	24.4	1950	30.5	1984	29.8
1917	22.1	1951	29.2	1985	30.7
1918	22.1	1952	32.6	1986	30.2
1919	23.9	1953	31.9	1987	30.0
1920	22.2	1954	31.8	1988	30.5
1921	24.7	1955	31.2	1989	30.8
1922	27.8	1956	30.4	1990	30.4
1923	27.4	1957	29.0	1991	30.5
1924	26.3	1958	28.8	1992	28.9
1925	28.0	1959	30.5	1993	30.5
1926	26.2	1960	28.8	1994	30.0
1927	29.2	1961	30.7	1995	28.9
1928	29.7	1962	27.8	1996	28.1
1929	28.3	1963	29.9	1997	27.8
1930	26.4	1964	30.9	1998	26.5
1931	29.6	1965	28.3	1999	25.4
1932	29.3	1966	28.9	2000	24.7
1933	28.8	1967	30.2	2001	24.7
1934	30.9	1968	29.2	2002	25.1
1935	30.7	1969	29.2	2003	24.6
1936	32.4	1970	29.1	2004	23.4
1937	29.3	1971	30.3	2005	23.6
1938	32.6	1972	28.5	2006	22.2
1939	30.8	1973	29.2		
1940	31.3	1974	29.4		

(a) These data are based on year of registration of death rather than year of death.

(b) Standardised to the Australian population as at 30 June 2001 and expressed per 100,000 females. The 1968 to 1996 data were adjusted from earlier ICD standards to ICD-10 standards using a factor of 0.98. The pre-1968 data were not adjusted.

Source: National General Record of Incidence of Mortality (GRIM) Books, AIHW.

Table D3.3: Mortality from breast cancer by age at death, females, 1982 to 2006

	<50 years		50–69 years		70+ years		All ages	
Year	ASR[(a)]	95% CI	ASR[(a)]	95% CI	ASR[(a)]	95% CI	ASR[(a)]	95% CI
1982	7.5	6.7–8.4	65.6	61.3–70.0	127.6	118.4–137.3	29.7	28.4–31.1
1983	6.9	6.2–7.8	68.5	64.2–73.0	124.2	115.4–133.6	29.6	28.3–31.0
1984	7.8	7.0–8.7	67.8	63.5–72.3	133.9	124.8–143.4	31.0	29.7–32.3
1985	8.2	7.4–9.1	67.4	63.1–71.8	126.3	117.7–135.4	30.5	29.2–31.9
1986	7.6	6.8–8.4	65.3	61.1–69.6	123.1	114.8–131.9	29.3	28.1–30.6
1987	7.6	6.9–8.4	68.0	63.7–72.5	129.8	121.3–138.7	30.5	29.3–31.8
1988	7.2	6.5–8.0	68.2	64.0–72.6	133.6	125.1–142.5	30.6	29.4–31.9
1989	8.0	7.3–8.8	67.7	63.5–72.0	132.8	124.4–141.5	31.0	29.8–32.3
1990	7.4	6.7–8.1	67.3	63.2–71.6	127.9	119.9–136.4	30.0	28.8–31.3
1991	7.8	7.1–8.6	66.9	62.8–71.2	131.7	123.7–140.2	30.6	29.4–31.9
1992	7.7	7.0–8.5	60.0	56.1–64.0	126.8	119.1–134.9	28.7	27.6–29.9
1993	7.0	6.3–7.7	67.4	63.4–71.7	132.4	124.6–140.5	30.2	29.0–31.4
1994	7.5	6.8–8.2	65.4	61.4–69.5	132.8	125.1–140.8	30.2	29.0–31.3
1995	6.5	5.8–7.1	65.1	61.2–69.2	128.2	120.8–136.0	29.0	27.9–30.1
1996	7.0	6.4–7.7	61.4	57.6–65.3	122.3	115.1–129.7	28.1	27.0–29.2
1997	7.2	6.6–7.9	60.6	56.9–64.4	118.6	111.7–125.9	27.8	26.7–28.9
1998	6.4	5.8–7.0	56.6	53.1–60.3	118.1	111.3–125.2	26.4	25.3–27.4
1999	6.4	5.8–7.1	55.8	52.4–59.4	110.1	103.6–116.9	25.5	24.5–26.5
2000	5.9	5.4–6.5	51.7	48.5–55.1	114.7	108.1–121.5	24.7	23.8–25.7
2001	5.8	5.2–6.3	52.3	49.1–55.6	115.4	109.0–122.2	24.8	23.8–25.8
2002	5.3	4.8–5.9	56.5	53.2–59.9	111.9	105.6–118.5	25.0	24.0–26.0
2003	5.5	5.0–6.1	54.1	51.0–57.4	111.9	105.6–118.4	24.7	23.8–25.6
2004	5.3	4.8–5.9	51.8	48.8–55.0	108.0	101.9–114.4	23.7	22.8–24.7
2005	5.5	5.0–6.0	51.6	48.6–54.7	105.3	99.3–111.6	23.6	22.7–24.5
2006	4.5	4.0–5.0	47.5	44.7–50.5	106.2	100.2–112.4	22.1	21.3–23.0

(a) Standardised to the Australian population as at 30 June 2001 and expressed per 100,000 females. The 1982 to 1996 data were adjusted from ICD-9 to ICD-10 standards using a factor of 0.98.

Source: National Mortality Database, AIHW.

Table D3.4: International comparison of estimated mortality from breast cancer, females, 2002[(a)]

Region or country	Estimated number of cases	Age-standardised rate[(b)]	95% confidence interval[(c)]
New Zealand	670	24.5	22.6–26.4
Micronesia	47	23.6	16.9–30.3
Northern Europe	19,789	22.6	22.3–22.9
Western Europe	39,297	22.3	22.1–22.5
Western Africa	14,833	19.6	19.3–19.9
Northern America	48,239	19.2	19.0–19.4
Australia	***2,667***	***18.4***	***17.7–19.1***
Southern Europe	24,617	18.1	17.9–18.3
Central and Eastern Europe	45,310	17.9	17.7–18.1
Northern Africa	11,751	16.7	16.4–17.0
Southern Africa	3,130	16.3	15.7–16.9
Polynesia	38	15.8	10.8–20.8
South America	24,681	15.1	14.9–15.3
Western Asia	10,738	14.3	14.0–14.6
Eastern Africa	10,974	14.1	13.8–14.4
World	***410,712***	***13.2***	***13.2–13.2***
Caribbean	2,478	12.7	12.2–13.2
Middle Africa	3,711	12.1	11.7–12.5
South-Eastern Asia	26,818	11.8	11.7–11.9
South-Central Asia	67,165	11.1	11.0–11.2
Central America	5,679	10.5	10.2–10.8
Melanesia	220	10.5	9.1–11.9
Eastern Asia	47,866	5.8	5.7–5.9

(a) The data were estimated for 2002 and are based on data from approximately 3 to 5 years earlier.

(b) Standardised using the World Health Organization 2000 World Standard Population and expressed per 100,000 females.

(c) The confidence intervals are approximations (see Appendix B).

Source: Ferlay et al. 2004.

Table D3.5: Mortality from breast cancer by remoteness area[(a)], females, 2002–2006

Remoteness area[(a)]	Average annual number of deaths[(b)]	Age-standardised rate[(c)]	95% confidence interval
Major cities	1,747	23.4	22.9–23.9
Inner regional	615	24.6	23.7–25.5
Outer regional	275	24.5	23.2–25.9
Remote	27	20.6	17.2–24.3
Very remote	11	20.9	15.6–27.3
Total	**2,676**	**23.8**	**23.4–24.2**

(a) Measured using the Australian Standard Geographical Classification Remoteness Area classification.

(b) Numbers may not sum to the total due to rounding.

(c) Standardised to the Australian population as at 30 June 2001 and expressed per 100,000 females.

Source: National Mortality Database, AIHW.

Table D3.6: Mortality from breast cancer by socioeconomic status[(a)], females, 2002–2006

Socioeconomic status[(a)]	Average annual number of deaths[(b)]	Age-standardised rate[(c)]	95% confidence interval
1 (lowest)	517	22.9	22.1–23.9
2	526	22.3	21.4–23.2
3	512	23.6	22.7–24.5
4	505	23.7	22.8–24.7
5 (highest)	615	26.5	25.5–27.4
Total	**2,676**	**23.8**	**23.4–24.2**

(a) Measured using the ABS Socio-Economic Index for Areas (SEIFA) Index of Relative Socio-economic Disadvantage.

(b) Numbers may not sum to the total due to rounding.

(c) Standardised to the Australian population as at 30 June 2001 and expressed per 100,000 females.

Source: National Mortality Database, AIHW.

Table D3.7: Mortality from breast cancer by Indigenous status, females, Queensland, Western Australia, South Australia and the Northern Territory, 2002–2006

Indigenous status	Average annual number of deaths[(a)]	Age-standardised rate[(b)]	95% confidence interval
Indigenous	15	24.8	18.7–32.1
Non-Indigenous	930	23.1	22.4–23.8
Not stated	9	. .	. .
Total	**953**	**23.4**	**22.7–24.0**

(a) Numbers may not sum to the total due to rounding.

(b) Standardised to the Australian population as at 30 June 2001 and expressed per 100,000 females.

Source: National Mortality Database, AIHW.

Table D3.8: Mortality from breast cancer by country/region of birth[(a)], females, 2002–2006

Country/region of birth[(a)]	Average annual number of deaths[(b)]	Age-standardised rate[(c)]	95% confidence interval
Australia	1,867	24.4	23.9–24.9
New Zealand (NZ)	40	21.8	18.7–25.3
Oceania and Antarctica, excl. Australia and NZ	13	20.7	15.3–27.3
United Kingdom (UK) and Ireland	305	26.4	25.1–27.8
North-West Europe, excl. UK and Ireland	86	26.3	23.7–29.1
Southern and Eastern Europe	193	20.3	19.0–21.7
North Africa and the Middle East	31	22.2	18.8–26.1
South-East Asia	47	15.4	13.3–17.8
North-East Asia	24	12.6	10.4–15.2
Southern and Central Asia	20	16.5	13.4–20.2
Sub-Saharan Africa	19	22.1	17.7–27.2
United States of America (USA) and Canada	14	34.7	26.3–44.6
Americas, excl. USA and Canada	10	17.1	12.4–22.8
Inadequately described, not stated or unknown	8	. .	. .
Total	**2,676**	**23.8**	**23.4–24.2**

(a) Country of birth is classified according to the Standard Australian Classification of Countries, 2nd edition (ABS 2008c).

(b) Numbers may not sum to the total due to rounding.

(c) Standardised to the Australian population as at 30 June 2001 and expressed per 100,000 females.

Source: National Mortality Database, AIHW.

Additional tables for Chapter 4: Survival after a diagnosis of breast cancer

Table D4.1: Relative survival (RS) by age at diagnosis, females with breast cancer, 2000–2006

	1-year relative survival		5-year relative survival	
Age at diagnosis (years)	**RS (%)**	**95% CI**	**RS (%)**	**95% CI**
<30	98.9	97.2–99.5	84.5	80.2–88.0
30–39	98.5	98.1–98.8	85.4	84.2–86.5
40–49	98.9	98.8–99.1	90.4	89.8–90.9
50–59	98.6	98.4–98.7	90.3	89.9–90.8
60–69	98.2	98.0–98.5	91.5	91.0–92.0
70–79	95.8	95.3–96.2	85.5	84.6–86.4
80+	90.2	89.3–91.1	76.1	74.1–78.0
All ages	**97.4**	**97.2–97.5**	**88.3**	**88.0–88.6**

Source: Australian Cancer Database, AIHW.

Table D4.2: Relative survival (RS), females with breast cancer, 1982–1987 to 2000–2006

	1982–1987		1988–1993		1994–1999		2000–2006	
Years after diagnosis	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI
1	93.6	93.3–93.9	95.6	95.3–95.8	96.7	96.5–96.8	97.4	97.2–97.5
2	87.0	86.6–87.4	90.9	90.6–91.2	93.4	93.1–93.6	94.9	94.7–95.1
3	81.2	80.7–81.7	86.0	85.6–86.4	90.2	89.9–90.5	92.5	92.2–92.7
4	76.5	75.9–77.0	82.3	81.9–82.8	87.6	87.3–87.9	90.4	90.1–90.6
5	72.6	72.0–73.1	79.3	78.9–79.8	85.3	84.9–85.6	88.3	88.0–88.6
6	69.4	68.8–70.0	76.7	76.3–77.2	83.3	82.9–83.7	86.7	86.4–87.1
7	66.7	66.1–67.3	74.9	74.4–75.4	81.6	81.2–82.0	85.4	85.0–85.8
8	64.5	63.8–65.1	72.9	72.4–73.4	80.2	79.8–80.6	84.3	83.8–84.8
9	62.4	61.7–63.0	71.3	70.8–71.9	79.0	78.6–79.4	83.4	82.7–84.0
10	60.7	60.0–61.3	70.0	69.4–70.5	77.8	77.3–78.2	. .	. .
11	59.1	58.5–59.8	68.9	68.4–69.5	76.9	76.4–77.3	. .	. .
12	57.9	57.2–58.6	67.8	67.2–68.4	76.0	75.5–76.5	. .	. .
13	56.9	56.2–57.6	66.7	66.1–67.3	75.0	74.4–75.5	. .	. .
14	56.0	55.3–56.7	65.7	65.1–66.3	74.0	73.4–74.7	. .	. .
15	55.2	54.4–55.9	64.8	64.1–65.4	73.6	72.9–74.4	. .	. .
16	54.2	53.5–55.0	64.2	63.5–64.8	. .	. .	. .	. .
17	53.5	52.7–54.2	63.4	62.8–64.1	. .	. .	. .	. .
18	52.8	52.1–53.6	62.7	62.0–63.4	. .	. .	. .	. .
19	52.4	51.6–53.2	62.2	61.5–63.0	. .	. .	. .	. .
20	52.0	51.2–52.8	61.8	60.9–62.6	. .	. .	. .	. .
21	51.7	50.8–52.5	60.6	59.4–61.7	. .	. .	. .	. .
22	51.3	50.4–52.1	. .	. .	. .	. .	. .	. .
23	50.9	50.0–51.8	. .	. .	. .	. .	. .	. .
24	50.6	49.7–51.6	. .	. .	. .	. .	. .	. .
25	50.4	49.4–51.4	. .	. .	. .	. .	. .	. .
26	50.4	49.3–51.5	. .	. .	. .	. .	. .	. .
27	50.0	48.6–51.4	. .	. .	. .	. .	. .	. .

Source: Australian Cancer Database, AIHW.

Table D4.3: Five-year relative survival (RS) by age at diagnosis, females with breast cancer, 1982–1987 to 2000–2006

Age at diagnosis (years)	1982–1987		1988–1993		1994–1999		2000–2006	
	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI
<30	71.0	65.7–75.7	71.0	65.9–75.5	76.0	71.3–80.0	84.5	80.2–88.0
30–39	73.0	71.3–74.6	76.8	75.3–78.2	81.5	80.2–82.8	85.4	84.2–86.5
40–49	77.0	75.9–78.0	82.2	81.4–83.0	87.3	86.7–88.0	90.4	89.8–90.9
50–59	71.0	69.8–72.0	80.5	79.7–81.4	88.1	87.6–88.7	90.3	89.9–90.8
60–69	73.7	72.6–74.7	81.5	80.7–82.4	87.7	87.0–88.3	91.5	91.0–92.0
70–79	71.0	69.5–72.5	77.8	76.6–79.0	84.2	83.2–85.1	85.5	84.6–86.4
80+	66.8	63.7–69.8	69.3	66.8–71.8	70.9	68.7–73.0	76.1	74.1–78.0
All ages	**72.6**	**72.0–73.1**	**79.3**	**78.9–79.8**	**85.3**	**84.9–85.6**	**88.3**	**88.0–88.6**

Source: Australian Cancer Database, AIHW.

Table D4.4: International comparison of mortality-to-incidence ratios for breast cancer, females, 2002[(a)]

Region or country	Mortality: ASR[(b)]	Incidence: ASR[(b)]	Mortality-to-incidence ratio[(c)]
Middle Africa	12.1	16.5	0.73
Eastern Africa	14.1	19.5	0.72
Northern Africa	16.7	23.2	0.72
Western Africa	19.6	27.8	0.71
South Central Asia	11.1	21.8	0.51
Southern Africa	16.3	33.4	0.49
Melanesia	10.5	22.2	0.47
Micronesia	23.6	50.4	0.47
South-Eastern Asia	11.8	25.5	0.46
Polynesia	15.8	34.2	0.46
Western Asia	14.3	33.3	0.43
Central and Eastern Europe	17.9	42.6	0.42
Central America	10.5	25.9	0.41
Caribbean	12.7	32.9	0.39
World	***13.2***	***37.4***	***0.35***
South America	15.1	46.0	0.33
Southern Europe	18.1	62.4	0.29
Eastern Asia	5.8	20.6	0.28
Northern Europe	22.6	82.5	0.27
New Zealand	24.5	91.9	0.27
Western Europe	22.3	84.6	0.26
Australia	***18.4***	***83.2***	***0.22***
Northern America	19.2	99.4	0.19

(a) The mortality and incidence rates were derived from estimates of the number of new breast cancer cases and deaths for 2002; those estimates were based on data from approximately 3 to 5 years earlier.

(b) Standardised using the World Health Organization 2000 World Standard Population and expressed per 100,000 females.

(c) Equals the age-standardised mortality rate divided by the age-standardised incidence rate.

Source: Ferlay et al. 2004.

Table D4.5: Five-year relative survival (RS) by type of breast cancer[(a)] and age at diagnosis, females with breast cancer, 1982–2006

	<50 years		50–59 years		60–69 years		70+ years		All ages	
Type of breast cancer[(a)]	**RS (%)**	**95% CI**	**RS (%)**	**95% CI**	**RS (%)**	**95% CI**	**RS (%)**	**95% CI**	**RS (%)**	**95% CI**
Group 1: Invasive ductal carcinoma	84.1	83.7–84.4	85.8	85.4–86.2	86.7	86.3–87.1	83.2	82.6–83.8	84.9	84.7–85.1
Group 2: Invasive lobular carcinoma	89.3	88.3–90.2	90.2	89.3–91.1	90.6	89.6–91.6	85.6	84.0–87.2	88.9	88.3–89.5
Group 3: Medullary carcinoma and atypical medullary carcinoma	89.2	86.9–91.1	87.8	84.4–90.6	85.7	80.9–89.6	89.8	82.4–96.3	88.3	86.5–89.9
Group 4: Tubular carcinoma and invasive cribriform carcinoma	99.1	98.0–99.8	100.3	99.4–100.8	98.7	97.1–100.0	99.2	95.6–102.3	99.4	98.6–100.1
Group 5: Mucinous carcinoma	94.2	91.9–95.9	93.8	91.1–95.9	96.3	94.0–98.1	94.4	91.7–97.1	94.7	93.2–96.1
Group 6: Invasive papillary carcinoma	88.7	81.7–93.2	88.1	81.0–93.0	97.1	92.1–100.3	96.5	90.7–101.7	94.1	91.0–96.9
Group 7: Inflammatory carcinoma	38.2	26.7–49.6	41.3	28.1–54.1	44.0	22.0–64.8	29.6	8.5–58.7	39.0	31.3–46.7
Group 8: Other—specified	72.7	71.1–74.3	69.7	67.8–71.5	67.4	65.5–69.3	59.6	57.5–61.7	66.8	65.9–67.8
Group 9: Unspecified	73.8	71.8–75.7	64.7	62.5–66.9	57.6	55.4–59.8	38.4	36.8–40.0	52.5	51.5–53.5
Total	**83.9**	**83.6–84.2**	**85.2**	**84.9–85.5**	**85.3**	**85.0–85.7**	**78.0**	**77.5–78.5**	**83.0**	**82.8–83.2**

(a) Appendix Table D2.6 provides a list of the histology types included in each group.

Source: Australian Cancer Database, AIHW.

Table D4.6: Five-year relative survival (RS) by remoteness area[(a)] and age at diagnosis, females with breast cancer, 1997–2004

Age at diagnosis (years)	Major cities		Inner regional		Outer regional		Remote and Very remote		Total[(b)]	
	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI
<50	88.8	88.2–89.3	86.1	84.9–87.2	86.3	84.5–87.9	86.4	82.3–89.7	88.0	87.5–88.5
50–59	90.3	89.7–90.8	90.4	89.4–91.3	88.5	86.8–90.0	88.1	83.6–91.6	90.1	89.7–90.6
60–69	90.4	89.8–91.1	91.2	90.1–92.2	88.2	86.2–90.0	85.6	79.2–90.6	90.4	89.9–90.9
70+	81.5	80.5–82.5	82.9	81.1–84.6	77.9	74.8–80.9	76.4	67.3–84.5	81.6	80.8–82.4
All ages	**87.7**	**87.3–88.1**	**87.6**	**86.9–88.2**	**85.3**	**84.3–86.4**	**85.0**	**82.3–87.4**	**87.5**	**87.2–87.8**

(a) Measured using the Australian Standard Geographical Classification Remoteness Area classification.

(b) Includes unknown remoteness area.

Source: Australian Cancer Database, AIHW.

Table D4.7: Five-year relative survival by socioeconomic status[(a)] and age at diagnosis, females with breast cancer, 2000–2004

Age at diagnosis (years)	1 (lowest)		2		3		4		5 (highest)		Total[(b)]	
	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI	RS (%)	95% CI
<50	86.5	84.9–88.0	87.5	85.9–89.0	89.0	87.5–90.3	89.4	88.0–90.7	90.4	89.1–91.5	88.7	88.1–89.3
50–59	88.1	86.5–89.6	90.7	89.3–91.9	89.5	88.1–90.9	90.9	89.6–92.1	92.0	90.9–93.0	90.4	89.8–91.0
60–69	89.2	87.4–90.9	91.5	89.9–92.9	92.0	90.4–93.4	91.4	89.7–92.9	92.3	90.9–93.6	91.4	90.7–92.0
70+	80.5	77.9–83.1	80.3	77.8–82.8	82.7	80.1–85.2	83.5	80.9–86.1	85.3	83.1–87.5	82.5	81.4–83.6
All ages	**86.1**	**85.1–87.0**	**87.4**	**86.5–88.3**	**88.2**	**87.4–89.1**	**88.9**	**88.0–89.7**	**90.0**	**89.2–90.7**	**88.2**	**87.8–88.6**

(a) Measured using the ABS Socio-Economic Index for Areas (SEIFA) Index of Relative Socio-economic Disadvantage.

(b) Includes unknown socioeconomic status.

Source: Australian Cancer Database, AIHW.

Additional tables for Chapter 6: Burden of disease due to breast cancer

Table D6.1: Leading causes of burden of disease by age group, females, 2003

Age group (years)	Anxiety and depression	Ischaemic heart disease	Stroke	Type 2 diabetes	Dementia	Breast cancer	Total
	Number (Disability-adjusted life years)						
<1	0	1	115	4	32	0	33,648
1–4	0	3	216	23	63	0	17,102
5–9	2,482	4	280	44	31	0	17,509
10–14	13,025	5	372	58	30	0	28,468
15–19	17,612	77	147	58	30	0	46,769
20–24	12,333	43	332	340	1	25	47,308
25–29	14,050	180	943	1,193	1	260	47,468
30–34	12,827	487	1,309	2,586	29	1,132	51,204
35–39	13,154	821	1,007	3,561	5	2,680	53,994
40–44	14,740	1,375	1,285	4,749	83	4,971	62,561
45–49	12,538	2,843	2,421	5,348	97	6,878	68,753
50–54	8,149	3,314	2,419	5,796	495	8,382	72,671
55–59	3,719	4,845	2,169	5,746	861	9,135	76,883
60–64	1,339	6,487	2,685	5,409	1,770	7,618	80,796
65–69	300	8,653	3,712	5,682	3,389	5,835	85,204
70–74	21	12,399	5,923	5,835	6,848	4,610	99,501
75–79	29	18,661	9,370	5,922	12,627	4,102	123,380
80–84	56	21,409	11,855	4,657	15,278	2,686	116,171
85–89	63	17,922	10,643	3,078	11,184	1,524	83,590
90–94	18	9,758	6,045	1,297	5,979	554	42,345
95–99	8	2,668	1,693	330	1,632	115	11,107
100+	0	436	225	46	283	14	1,721
All ages[(a)]	**126,464**	**112,390**	**65,166**	**61,763**	**60,747**	**60,520**	**1,268,156**

(a) Numbers may not sum to the total due to rounding.

Source: Begg et al. 2007b.

Table D6.2: Leading causes of years of life lost by age group, females, 2003

Age group (years)	Ischaemic heart disease	Stroke	Breast cancer	Lung cancer	Bowel cancer	Total
	Number of years of life lost (YLLs)					
0–1	0	62	0	0	0	15,963
1–4	0	0	0	0	0	3,639
5–9	0	1	0	0	0	1,761
10–14	1	89	0	0	1	2,165
15–19	73	147	0	0	2	5,242
20–24	24	61	3	29	32	6,032
25–29	107	155	158	30	63	6,758
30–34	363	170	734	83	332	9,907
35–39	480	487	1,714	188	396	12,735
40–44	821	771	2,964	969	820	18,068
45–49	1,709	1,292	4,320	1,426	1,396	24,130
50–54	2,002	1,029	5,180	2,828	1,878	28,458
55–59	3,001	1,046	5,960	3,559	2,007	36,117
60–64	4,349	1,923	5,093	4,623	2,742	41,742
65–69	5,923	2,700	3,937	4,434	2,884	46,533
70–74	9,119	4,482	3,147	4,781	3,176	57,117
75–79	14,882	7,610	2,981	4,643	3,180	74,389
80–84	18,207	10,112	2,088	2,604	2,623	76,046
85–89	16,116	9,354	1,213	1,056	1,512	59,969
90–94	9,040	5,391	473	259	575	32,384
95–99	2,517	1,483	104	34	113	8,696
100+	418	179	12	5	5	1,328
All ages[(a)]	**89,152**	**48,548**	**40,080**	**31,551**	**23,735**	**569,181**

(a) Values may not sum to the total due to rounding.

Source: Begg et al. 2007b.

Additional tables for Chapter 7: Mammography

Table D7.1: Participation in the BreastScreen Australia Program by age group, females, 2005–2006[(a)]

Age group (years)	Number of females	Per cent of females[(b)]	95% confidence interval
40–44	87,300	11.3	11.2–11.4
45–49	140,685	18.8	18.7–18.9
50–54	364,520	53.7	53.5–53.9
55–59	360,138	57.5	57.3–57.7
60–64	287,073	59.6	59.4–59.8
65–69	230,065	58.9	58.7–59.2
70–74	105,715	32.4	32.2–32.6
75–79	37,107	12.4	12.3–12.5
80–84	8,205	3.5	3.4–3.5
85+	1,673	0.8	0.7–0.8
Total (aged 40+)[(c)]	**1,622,481**	**34.2**	**34.2–34.3**

(a) Period covers 1 January 2005 to 31 December 2006.

(b) Equals the number of females screened as a proportion of the average of the 2005 and 2006 ABS estimated resident population.

(c) The rate shown in this row is age-standardised to the Australian population as at 30 June 2001.

Source: AIHW analysis of BreastScreen Australia data.

Table D7.2: Participation in the BreastScreen Australia Program by remoteness area[(a)], females, 2005–2006[(b)]

	Aged 50–69 years			Aged 40+ years		
Remoteness area[(a)]	Number of females[(c)]	ASR[(d)]	95% confidence interval	Number of females[(c)]	ASR[(d)]	95% confidence interval
Major cities	781,318	54.6	54.5–54.7	1,006,291	32.2	32.2–32.3
Inner regional	297,555	61.1	60.9–61.3	389,145	37.1	36.9–37.2
Outer regional	139,070	62.2	61.9–62.5	191,656	40.1	39.9–40.3
Remote	17,595	60.1	59.2–61.0	25,494	40.2	39.7–40.7
Very remote	6,258	49.5	48.3–50.8	9,896	35.7	34.9–36.4
Total	**1,241,796**	**56.9**	**56.8–57.0**	**1,622,481**	**34.2**	**34.2–34.3**

(a) Measured using the Australian Standard Geographical Classification Remoteness Area classification.

(b) Period covers 1 January 2005 to 31 December 2006.

(c) Values may not sum to the total due to rounding.

(d) Rates were calculated as the number of females screened to the average of the 2005 and 2006 ABS estimated resident population and standardised to the Australian population as at 30 June 2001. They are expressed per 100 females (i.e. as a percentage).

Source: AIHW analysis of BreastScreen Australia data.

Table D7.3: Participation in the BreastScreen Australia Program by socioeconomic status[(a)], females, 2005–2006[(b)]

	Aged 50–69 years			Aged 40+ years		
Socioeconomic status[(a)]	Number of females[(c)]	ASR[(d)]	95% confidence interval	Number of females[(c)]	ASR[(d)]	95% confidence interval
1 (lowest)	232,563	57.1	56.9–57.4	298,778	33.8	33.7–33.9
2	257,248	57.6	57.4–57.8	335,997	34.7	34.6–34.9
3	253,594	59.4	59.2–59.6	338,252	36.4	36.2–36.5
4	239,256	55.4	55.2–55.7	320,044	34.1	34.0–34.2
5 (highest)	259,134	55.0	54.8–55.2	329,411	32.3	32.2–32.4
Total	**1,241,796**	**56.9**	**56.8–57.0**	**1,622,481**	**34.2**	**34.2–34.3**

(a) Measured using the ABS Socio-Economic Index for Areas (SEIFA) Index of Relative Socio-economic Disadvantage.

(b) Period covers 1 January 2005 to 31 December 2006.

(c) Values may not sum to the total due to rounding.

(d) Rates were calculated as the number of females screened to the average of the 2005 and 2006 ABS estimated resident population and standardised to the Australian population as at 30 June 2001. They are expressed per 100 females (i.e. as a percentage).

Source: AIHW analysis of BreastScreen Australia data.

Table D7.4: Participation in the BreastScreen Australia Program by Indigenous status[(a)], females, 2005–2006[(b)]

	Aged 50–69 years			Aged 40+ years		
Indigenous status[(a)]	Number of females	ASR[(c)]	95% confidence interval	Number of females	ASR[(c)]	95% confidence interval
Indigenous	9,155	38.1	37.3–38.9	13,263	24.5	24.1–25.0
Non-Indigenous	1,223,626	56.7	56.6–56.8	1,598,313	34.0	34.0–34.1
Not stated	9,015	. .	. .	10,905	. .	. .
Total	**1,241,796**	**56.9**	**56.8–57.0**	**1,622,481**	**34.1**	**34.1–34.2**

(a) Defined by whether or not a woman self-identified as being of Aboriginal and/or Torres Strait Islander descent.

(b) Period covers 1 January 2005 to 31 December 2006.

(c) Rates were calculated as the number of females screened to the average of the 2005 and 2006 ABS estimated resident population and standardised to the Australian population as at 30 June 2001. They are expressed per 100 females (i.e. as a percentage).

Source: AIHW analysis of BreastScreen Australia data.

Table D7.5: Participation in the BreastScreen Australia Program by main language spoken at home[(a)], females, 2005–2006[(b)]

	Aged 50–69 years			Aged 40+ years		
Main language spoken at home[(a)]	**Number of females**	**ASR[(c)]**	**95% confidence interval**	**Number of females**	**ASR[(c)]**	**95% confidence interval**
English	1,072,956	59.1	59.0–59.2	1,406,252	35.6	35.6–35.7
Other language	163,889	44.8	44.6–45.0	209,875	26.6	26.4–26.7
Not stated	4,951	. .	. .	6,354	. .	. .
Total	**1,241,796**	**56.9**	**56.8–57.0**	**1,622,481**	**34.2**	**34.2–34.3**

(a) Defined by whether or not a woman indicated that English was her main language spoken at home.

(b) Period covers 1 January 2005 to 31 December 2006.

(c) Rates were calculated as the number of females screened to the average of the 2005 and 2006 ABS estimated resident population and standardised to the Australian population as at 30 June 2001. They are expressed per 100 females (i.e. as a percentage).

Source: AIHW analysis of BreastScreen Australia data.

Table D7.6: Medicare Benefits Schedule-funded mammography services by age group, females, 2007–08

	Mammography of both breasts			Mammography of one breast			Total mammography		
Age group (years)	**No. of services**	**Rate[(a)]**	**95% CI**	**No. of services**	**Rate[(a)]**	**95% CI**	**No. of services**	**Rate[(a)]**	**95% CI**
<25	1,095	0.3	0.3–0.3	166	0.0	0.0–0.1	1,261	0.4	0.3–0.4
25–34	13,936	9.5	9.3–9.6	871	0.6	0.6–0.6	14,807	10.1	9.9–10.2
35–44	71,676	45.9	45.6–46.3	3,503	2.2	2.2–2.3	75,179	48.2	47.8–48.5
45–54	92,391	62.4	62.0–62.8	8,740	5.9	5.8–6.0	101,131	68.3	67.9–68.7
55–64	70,939	59.6	59.2–60.1	12,026	10.1	9.9–10.3	82,965	69.8	69.3–70.2
65–74	43,433	57.6	57.1–58.2	9,841	13.1	12.8–13.3	53,274	70.7	70.1–71.3
75–84	17,939	33.1	32.7–33.6	5,041	9.3	9.1–9.6	22,980	42.5	41.9–43.0
85+	2,307	9.8	9.4–10.2	707	3.0	2.8–3.2	3,014	12.8	12.4–13.3
Total[(b)]	**313,716**	**28.2**	**28.1–28.3**	**40,895**	**3.5**	**3.5–3.6**	**354,611**	**31.8**	**31.7–31.9**

(a) These rates are age-specific rates and are expressed per 1,000 females.

(b) The rates shown in this row are age-standardised to the Australian population as at 30 June 2001; they are expressed per 1,000 females.

Source: Medicare Australia Statistics, Australian Government Department of Health and Ageing.

Table D7.7: Medicare Benefit Schedule–funded mammography services, females, 1993–94 to 2007–08

	Mammography of both breasts			Mammography of one breast			Total mammography		
Year	No. of services	ASR[(a)]	95% CI	No. of services	ASR[(a)]	95% CI	No. of services	ASR[(a)]	95% CI
1993–94	356,919	43.1	43.0–43.3	28,189	3.4	3.3–3.4	385,108	46.5	46.3–46.6
1994–95	355,999	41.9	41.7–42.0	30,986	3.6	3.6–3.7	386,985	45.5	45.3–45.6
1995–96	323,708	37.2	37.0–37.3	31,445	3.6	3.5–3.6	355,153	40.8	40.6–40.9
1996–97	298,196	33.4	33.3–33.6	31,229	3.5	3.4–3.5	329,425	36.9	36.8–37.1
1997–98	309,994	33.9	33.8–34.1	31,627	3.4	3.4–3.5	341,621	37.4	37.3–37.5
1998–99	314,444	33.7	33.6–33.8	31,002	3.3	3.3–3.3	345,446	37.0	36.9–37.1
1999–00	296,527	31.1	31.0–31.2	31,671	3.3	3.3–3.3	328,198	34.4	34.3–34.5
2000–01	305,984	31.5	31.4–31.6	34,548	3.5	3.5–3.6	340,532	35.0	34.9–35.1
2001–02	296,168	29.9	29.8–30.0	35,971	3.6	3.5–3.6	332,139	33.5	33.4–33.6
2002–03	294,185	29.2	29.1–29.3	38,550	3.7	3.7–3.8	332,735	32.9	32.8–33.0
2003–04	287,699	28.0	27.9–28.1	40,100	3.8	3.8–3.8	327,799	31.8	31.7–31.9
2004–05	296,788	28.4	28.3–28.5	39,404	3.7	3.6–3.7	336,192	32.0	31.9–32.1
2005–06	319,013	30.0	29.9–30.1	39,002	3.5	3.5–3.6	358,015	33.5	33.4–33.6
2006–07	318,440	29.3	29.2–29.4	40,031	3.6	3.5–3.6	358,471	32.8	32.7–33.0
2007–08	313,716	28.2	28.1–28.3	40,895	3.5	3.5–3.6	354,611	31.8	31.7–31.9

(a) Standardised to the Australian population as at 30 June 2001 and expressed per 1,000 females.

Source: Medicare Australia Statistics, Australian Government Department of Health and Ageing.

Additional tables for Chapter 8: Hospitalisations for breast cancer

Table D8.1: Hospitalisations for breast cancer by age group, females, 2007–08

Age group (years)	Number of hospitalisations	Age-specific rate[(a)]	95% confidence interval
<20	2	0.0	0.0–0.0
20–24	67	0.1	0.1–-0.1
25–29	461	0.6	0.6–-0.7
30–34	1,906	2.6	2.5–-2.7
35–39	4,684	5.9	5.7–-6.0
40–44	10,056	13.2	12.9–-13.4
45–49	15,228	19.6	19.3–-19.9
50–54	15,810	22.4	22.1–-22.8
55–59	16,330	25.4	25.1–-25.8
60–64	15,555	28.4	28.0–-28.9
65–69	10,463	25.3	24.8–-25.8
70–74	6,790	20.0	19.5–-20.5
75–79	4,507	15.1	14.7–-15.6
80–84	2,826	11.6	11.2–-12.0
85+	1,382	5.9	5.6–-6.2
Total[(b)]	**106,067**	**9.3**	**9.3–9.4**

(a) Number of cases per 1,000 females.

(b) The rate shown in this row is age-standardised to the Australian population as at 30 June 2001; it is expressed per 100,000 females.

Source: National Hospital Morbidity Database, AIHW.

Table D8.2: Hospitalisations for breast cancer by same-day and overnight status, females, 1999–00 to 2007–08

	Same-day hospitalisations			Overnight hospitalisations			Total hospitalisations		
Year	Number	ASR[(a)]	95% CI	Number	ASR[(a)]	95% CI	Number	ASR[(a)]	95% CI
1999–00	45,499	4.8	4.8–4.9	15,334	1.6	1.6–1.6	60,833	6.4	6.4–6.5
2000–01	49,031	5.1	5.0–5.1	15,943	1.6	1.6–1.6	64,974	6.7	6.6–6.7
2001–02	54,489	5.5	5.5–5.5	16,271	1.6	1.6–1.6	70,760	7.1	7.1–7.2
2002–03	62,238	6.1	6.1–6.2	16,962	1.6	1.6–1.7	79,200	7.8	7.7–7.8
2003–04	67,674	6.5	6.5–6.6	17,220	1.6	1.6–1.7	84,894	8.2	8.1–8.2
2004–05	72,975	6.9	6.8–6.9	16,914	1.6	1.5–1.6	89,889	8.4	8.4–8.5
2005–06	74,444	6.9	6.8–6.9	18,148	1.6	1.6–1.7	92,592	8.5	8.5–8.6
2006–07	86,404	7.8	7.7–7.9	18,250	1.6	1.6–1.6	104,654	9.4	9.4–9.5
2007–08	87,561	7.7	7.7–7.8	18,506	1.6	1.6–1.6	106,067	9.3	9.3–9.4

(a) Standardised to the Australian population as at 30 June 2001 and expressed per 1,000 females.

Source: National Hospital Morbidity Database, AIHW.

Table D8.3: Hospitalisations for breast cancer by age group, females, 1999–00 to 2007–08

	Age group (years)							
	<50		50–69		70+		All ages	
Year	ASR[(a)]	95% CI	ASR[(a)]	95% CI	ASR[(a)]	95% CI	ASR[(a)]	95% CI
1999–00	3.2	3.1–3.2	17.3	17.1–17.5	8.4	8.3–8.6	6.4	6.4–6.5
2000–01	3.2	3.2–3.2	18.0	17.8–18.2	9.6	9.4–9.8	6.7	6.6–6.7
2001–02	3.4	3.3–3.4	19.5	19.3–19.7	9.6	9.4–9.8	7.1	7.1–7.2
2002–03	3.8	3.7–3.8	20.9	20.7–21.1	10.8	10.6–11.0	7.8	7.7–7.8
2003–04	3.9	3.9–4.0	21.8	21.6–22.0	11.6	11.4–11.8	8.2	8.1–8.2
2004–05	3.9	3.9–3.9	22.6	22.4–22.8	13.5	13.3–13.8	8.4	8.4–8.5
2005–06	4.0	4.0–4.1	22.4	22.2–22.6	13.6	13.4–13.8	8.5	8.5–8.6
2006–07	4.4	4.4–4.5	25.1	24.9–25.3	14.8	14.5–15.0	9.4	9.4–9.5
2007–08	4.3	4.3–4.4	25.0	24.8–25.2	14.8	14.6–15.1	9.3	9.3–9.4

(a) Standardised to the Australian population as at 30 June 2001 and expressed per 1,000 females.

Source: National Hospital Morbidity Database, AIHW.

Table D8.4: Average length of stay (ALOS) for breast cancer–related hospitalisations by same-day and overnight status, females, 1999–00 to 2007–08

Year	ALOS of overnight hospitalisations (days)	ALOS of same-day hospitalisations (days)	ALOS (days)
1999–00	5.4	1.0	2.1
2000–01	5.1	1.0	2.0
2001–02	5.0	1.0	1.9
2002–03	4.8	1.0	1.8
2003–04	4.9	1.0	1.8
2004–05	4.5	1.0	1.7
2005–06	4.3	1.0	1.6
2006–07	4.2	1.0	1.6
2007–08	4.1	1.0	1.5

Source: National Hospital Morbidity Database, AIHW.

Additional tables for Chapter 9: Expenditure on breast cancer

Table D9.1: Expenditure on hospital admitted patient services and number of hospitalisations for breast cancer by age group, females, 2004–05

Age group (years)	Hospital admitted patient expenditure ($ million)	Hospital admitted patient expenditure Per cent	Number of admitted patient hospitalisations[(a)]	Average expenditure per hospitalisation ($)
<25	0	0.1	16	4,034
25–34	2	2.0	461	3,926
35–44	11	11.8	2,774	3,913
45–54	21	23.2	5,360	3,978
54–64	24	25.7	5,658	4,174
65–74	18	19.5	3,765	4,779
75–84	12	13.4	2,408	5,119
85+	4	4.4	604	6,701
Total	**92**	**100.0**	**21,046**	**4,373**

(a) Defined as those hospitalisations for which the principal diagnosis was breast cancer (ICD-10 code of C50). Does not include hospitalisations for which breast cancer was an additional diagnosis and the principal diagnosis related specifically to the type of cancer treatment or care received.

Source: Disease Expenditure Database, AIHW

Appendix E: Definition of breast cancer–related hospitalisations

For the purposes of examining the number of admitted patient separations that arose specifically due to invasive breast cancer and were directly related to treatment/care for breast cancer, 'breast cancer–related hospitalisations' were identified in this report as follows:

Either a *principal* diagnosis of invasive breast cancer (ICD-10 code of C50)

OR an *additional* diagnosis of breast cancer (ICD-10 code of C50) **AND** a principal diagnosis of one of the following ICD-10 'Z' codes (with these Z codes falling within ICD-10 Chapter 21 'Factors influencing health status and contact with health services'):

- Follow-up examination after treatment for malignant neoplasms (Z08)
- Prophylactic immunotherapy (Z29.1)
- Other prophylactic immunotherapy (Z29.2)
- Prophylactic surgery for risk-factors related to malignant neoplasm—breast (Z40.00)
- Follow-up care involving plastic surgery of breast (Z42.1)
- Fitting and adjustment of external breast prosthesis (Z44.3)
- Adjustment and management of drug delivery or implanted device (Z45.1)
- Adjustment and management of vascular access device (Z45.2)
- Radiotherapy session (Z51.0)
- Pharmacotherapy session for neoplasm (Z51.1)
- Convalescence following radiotherapy (Z54.1)
- Convalescence following chemotherapy (Z54.2)
- Acquired absence of breast(s), not elsewhere classified (Z90.1).

Using data from the National Hospital Morbidity Database (NHMD) for 2007–08, Table E.1 shows the number of hospitalisations for each of the relevant 'Z' code principal diagnoses, as well as for those hospitalisations in which breast cancer was the principal diagnosis.

As noted in Chapter 8, not all hospitals in all states and territories formally admit patients for same-day chemotherapy services. Instead, in some states and territories, some patients are provided same-day chemotherapy on an outpatient (or non-admitted patient) basis. Such services are not captured in the NHMD. In particular, during the 1990s, hospitals in New South Wales began to apply this change in admission processes. In addition, hospitalisations data for the Australian Capital Territory from approximately 2003–04 reflect changed admission practices, as do data for South Australia from approximately 2007–08. Thus, the recorded data on this type of admitted patient service is not comparable over time.

Table E.1: Hospitalisations for breast cancer by same-day and overnight status, females, 2007–08

	Same-day hospitalisations		Overnight hospitalisations		Total hospitalisations	
Diagnosis	**Number**	**Per cent**	**Number**	**Per cent**	**Number**	**Per cent**
Invasive breast cancer as principal diagnosis	5,722	6.5	18,066	97.6	23,788	24.5
Invasive breast cancer as additional diagnosis AND principal diagnosis of:						
Follow-up examination after treatment for malignant neoplasms	3	0.0	1	0.0	4	0.0
Prophylactic immunotherapy	9	0.0	0	0.0	9	0.0
Other prophylactic immunotherapy	87	0.1	0	0.0	87	0.1
Prophylactic surgery for risk-factors related to malignant neoplasm—breast	2	0.0	13	0.1	15	0.0
Follow-up care involving plastic surgery of breast	23	0.0	173	0.9	196	0.2
Fitting and adjustment of external breast prosthesis	0	0.0	1	0.0	1	0.0
Adjustment and management of implantable infusion device or pump	4,115	4.7	158	0.9	4,273	4.1
Adjustment and management of vascular access device	2,025	2.3	16	0.1	2,041	2.0
Radiotherapy session	253	0.3	0	0.0	253	0.3
Pharmacotherapy session for neoplasm	75,314	86.0	21	0.1	75,335	68.8
Convalescence following radiotherapy	3	0.0	7	0.0	10	0.0
Convalescence following chemotherapy	4	0.0	49	0.3	53	0.1
Acquired absence of breast(s)	1	0.0	1	0.0	2	0.0
Total breast cancer–related hospitalisations	**87,561**	**100.0**	**18,506**	**100.0**	**106,067**	**100.0**

Source: National Hospital Morbidity Database, AIHW.

To illustrate the effect on the data of this change in admission processes, data on the number of hospitalisations of women for same-day chemotherapy sessions (referred to as 'Pharmacotherapy sessions for neoplasms' in ICD-10) are shown for each state and territory over time in Table E.2. While the number of such sessions more than doubled over the period from 1999–00 to 2007–08 in Victoria (111% increase), Queensland (109%), Western Australia (122%), Tasmania (214%) and the Northern Territory (482%), the level of change is much smaller for the other three states and territories (73% increase in New South Wales and a 17% increase in South Australia, with an overall decrease of 16% in the Australian Capital Territory).

Table E.2: Number of same-day 'Pharmacotherapy sessions for neoplasm'[(a)] for breast cancer–related hospitalisations by state and territory, females, 1999–00 to 2007–08

Year	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Total
1999–00	5,682	13,101	9,174	4,787	4,439	336	1,229	119	**38,867**
2000–01	4,939	13,553	11,293	5,604	5,935	143	1,731	136	**43,334**
2001–02	5,657	14,460	12,419	6,570	6,070	566	1,538	176	**47,456**
2002–03	6,096	16,428	13,802	8,326	6,592	743	1,580	455	**54,022**
2003–04	6,175	18,365	14,739	8,868	6,690	945	1,541	585	**57,908**
2004–05	7,533	24,090	14,741	9,946	7,079	1,007	876	523	**65,795**
2005–06	7,316	23,865	15,170	9,827	7,131	1,251	928	522	**66,010**
2006–07	8,866	27,311	17,684	11,240	7,815	1,236	880	781	**75,813**
2007–08	9,814	27,702	19,215	10,620	5,178	1,054	1,038	693	**75,314**

(a) ICD-10 code of Z51.1.

Source: National Hospital Morbidity Database, AIHW.

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.

Additional diagnosis: a condition or complaint either coexisting with the principal diagnosis or arising during the episode of care.

Administrative databases: observations about events that are routinely recorded or required by law to be recorded. Such events include births, deaths, hospital separations and cancer incidence. Administrative databases include the Australian Cancer Database, the National Mortality Database and the National Hospital Morbidity Database.

Admitted patient: a person who undergoes a hospital's formal admission process to receive treatment and/or care. Such treatment or care can occur in hospital and/or in the person's home (as a 'hospital-in-home' patient).

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.

Average length of stay: the average (mean) number of patient days for admitted patient episodes. Patients admitted and separated on the same date are allocated a length of stay of one day.

Benign: 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 such as the breast.

Confidence interval: 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.

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

Crude survival: the proportion of people alive at a specified point in time subsequent to the diagnosis of breast cancer.

DALYs (disability-adjusted life years): the sum of the years of life lost due to premature mortality (YLL) in the population and the equivalent years of 'healthy' life lost due to disability (YLD) for all new breast cancer cases.

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

Diagnostic mammography: an X-ray exam of the breasts that is performed in order to evaluate a breast complaint or abnormality detected by a physical exam or screening mammography.

Ductal carcinoma in situ: a non-invasive tumour of the mammary gland (breast) arising from cells lining the ducts.

Heath expenditure: includes expenditure on health goods and services (e.g. medications, aids and appliances, medical treatment, public health, research) which collectively are termed current expenditure; and on health-related investment which is often referred to as capital expenditure.

Hospitalisation: see *Separation*.

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. ICD-10-AM is the Australian modification of ICD-10; it is used for diagnoses and procedures recorded for patients admitted to hospitals.

Invasive: see *Malignant*.

Lead time: the interval between the time a breast cancer is diagnosed by screening and the time when the breast cancer would otherwise have been diagnosed in the absence of screening.

Length of stay: duration of hospital stay, calculated by subtracting the date the patient was admitted from the day of separation. All leave days, including the day the patient went on leave, are excluded. A same-day patient is allocated a length of stay of 1 day.

Limited-duration prevalence: the number of people alive at a specific time who have been diagnosed with breast cancer over a specified period (such as the previous 5 or 25 years).

Lymph nodes: masses of lymphatic tissue, often bean-shaped, that produce lymphocytes and through which lymph filters. These are located throughout the body.

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

Mammogram: the X-ray image that is created during mammography.

Mammography: the process of using low-dose X-rays to visualise the internal structure of the breast; mammography can be used for screening or diagnostic purposes.

Metastasis: see *Secondary cancer*.

Mortality due to cancer: the number of deaths which occurred during a specified period (usually a year) for which the underlying cause of death was recorded as cancer.

Mortality-to-incidence ratio: the ratio of the age-standardised mortality rate for breast cancer to the age-standardised incidence rate for breast cancer.

New cancer case: see *Incidence*.

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

Nodal status: indicates whether excised lymph nodes were found to have cancer in them (positive) or not (negative) (see Marr et al. 1997).

Overnight patient: an admitted patient who receives hospital treatment for a minimum of 1 night (that is, is admitted to, and separates from, hospital on different dates).

Patient days: the total number of days for admitted patients who separated during a specified reference period. A same-day patient is allocated a length of stay of 1 day.

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.

Prevalence (or complete prevalence): the total number of people alive at a specific date who have ever been diagnosed with a particular disease such as breast cancer.

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

Principal diagnosis: the diagnosis established after study to be chiefly responsible for occasioning an episode of admitted patient care.

Procedure: a clinical intervention that is surgical in nature, carries a procedural risk, carries an anaesthetic risk, requires specialised training and/or requires special facilities or equipment available only in the acute care setting.

Relative survival: the ratio of observed survival of a group of persons diagnosed with breast 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, protective factors, risk factors are known as 'determinants'.

Same-day patient: a patient who is admitted to, and separates from, hospital on the same date.

Screening: the performance of tests on apparently well people in order to detect a medical condition at an earlier stage than would otherwise be the case.

Screening mammography: an X-ray exam of the breasts on 'healthy' asymptomatic women in order to detect tumours at an earlier stage than would otherwise be the case.

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

Separation: An episode of care for an admitted patient, which may include a total hospital stay (from admission to discharge, transfer or death) or a portion of a hospital stay that begins or ends in a change of type of care (e.g. from acute to rehabilitation). In this report, separations are also referred to as hospitalisations.

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 B for more information.

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.

Symptom: any indication of a disorder that is apparent to the person affected.

Tumour size: the largest diameter of the invasive part of the breast tumour.

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

YLD (years of healthy life lost due to disability): for each new case of breast cancer, YLD equals the average duration of the breast cancer (to remission or death) multiplied by a severity weight for breast cancer (which depends upon its disabling effect over the disease duration).

YLL (years of life lost): for each new case, YLL equals the number of years between premature death and the standard life expectancy for the individual.

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