



**Australian Government**

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# BreastScreen Australia monitoring report 2010–2011

BreastScreen  
AUSTRALIA

A joint Commonwealth/State and Territory Program

CANCER SERIES NO. 77



**Australian Government**

**Australian Institute of  
Health and Welfare**

*Authoritative information and statistics  
to promote better health and wellbeing*

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# **BreastScreen Australia monitoring report 2010–2011**

Australian Institute of Health and Welfare  
Canberra

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**Please note that there is the potential for minor revisions of data in this report. Please check the online version at <[www.aihw.gov.au](http://www.aihw.gov.au)> for any amendments.**

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# Abbreviations

|       |   |
|-------|---|
| ABS   | Australian Bureau of Statistics               |
| ACT   | Australian Capital Territory                  |
| AIHW  | Australian Institute of Health and Welfare    |
| AS    | age-standardised                              |
| ASGC  | Australian Standard Geographic Classification |
| CI    | confidence interval                           |
| DCIS  | ductal carcinoma in situ                      |
| ICD   | International Classification of Disease       |
| NAS   | National Accreditation Standards              |
| NSW   | New South Wales                               |
| NT    | Northern Territory                            |
| Qld   | Queensland                                    |
| SA    | South Australia                               |
| SEIFA | Socioeconomic Indexes for Areas               |
| Tas   | Tasmania                                      |
| Vic   | Victoria                                      |
| WA    | Western Australia                             |

# Symbols

|   |                               |
|---|-------------------------------|
| ..  | not applicable                |
| ≤   | less than or equal to         |
| <   | less than                     |
| >   | greater than                  |
|  | positive (favourable) trend   |
|  | negative (unfavourable) trend |
|  | no trend, or not applicable   |

# Summary

BreastScreen Australia aims to reduce illness and death resulting from breast cancer through organised screening to detect cases of unsuspected breast cancer in women, thus enabling early intervention. BreastScreen Australia targets women aged 50–69 for free 2-yearly screening mammograms.

This report is the latest in the *BreastScreen Australia monitoring report* series, which is published annually to provide regular monitoring of national participation and performance for BreastScreen Australia. The report provides data for the 2010–2011 period of participation in BreastScreen Australia, as well as the latest available data on breast cancer incidence (2009) and mortality (2010).

The following statistics refer to the latest data available for women aged 50–69.

## **How many women were diagnosed with, or died from, breast cancer?**

In 2009, there were 7,022 new cases of invasive breast cancer diagnosed in Australian women aged 50–69. This is equivalent to 288 new cases per 100,000 women.

Breast cancer incidence has remained steady at around 290 per 100,000 women since 2003.

In 2010, a total of 1,098 women aged 50–69 died from breast cancer, equivalent to 43 deaths per 100,000 women. This makes breast cancer the second most common cause of cancer-related death for Australian women after lung cancer.

Breast cancer mortality decreased from 68 to 43 per 100,000 women between 1991 (when BreastScreen Australia began) and 2010. This has been attributed to the early detection of cancers through BreastScreen Australia, along with advances in management and treatment.

## **How many women participated in BreastScreen Australia?**

In 2010 and 2011, more than 1.3 million women aged 50–69 had a screening mammogram through BreastScreen Australia. This was 55% of women in the target age group.

Lower participation occurred in *Very remote* areas, among Indigenous women, and among women who reported that they speak a language other than English at home.

While participation increased with improving socioeconomic status, this trend was small, with all socioeconomic groups recording participation rates between 53% and 55%.

The difference between Aboriginal and Torres Strait Islander and non-Indigenous women was greater, with 36% of Aboriginal and Torres Strait Islander women having a screening mammogram in 2010–2011, compared with 54% of non-Indigenous women.

## **How many women were recalled for further investigation?**

In 2011, 11% of women screening for the first time were recalled for further investigation; 4% of women attending subsequent screens were recalled.

## **How many women had a small breast cancer detected?**

Small breast cancers ( $\leq 15$  mm in diameter) are associated with better treatment options and improved survival. A high proportion of invasive breast cancers detected were small in 2011: 50% of invasive breast cancers detected in those attending their first screen, and 63% in those attending subsequent screens.

# Data at a glance

The following summary table provides a 'snapshot' of the latest national data for BreastScreen Australia against key performance indicators for women in the target age group, 50–69 years. Summary statistics for the previous and the latest reporting periods are presented, along with the relevant standard from the BreastScreen Australia National Accreditation Standards (NAS), which provides a benchmark for the data shown.

Definitions for the performance indicators are given under each indicator in Section 2.

## Key performance indicators for BreastScreen Australia, women aged 50–69

| Performance indicator                       | NAS <sup>(a)</sup> | Previous data <sup>(b)</sup> |           | Latest data      |           | Change  |
|---|--------------------|------------------------------|-----------|------------------|-----------|---|
|   |                    | Reporting period             | Statistic | Reporting period | Statistic |   |
| <b>Participation</b>                        | >70%               | 2009–2010                    | 55.0      | 2010–2011        | 54.6      |    |
| <b>Rescreening</b>                          |                    |                              |           |                  |           |    |
| After first screening round                 | >75%               | 2008                         | 59.9      | 2009             | 59.4      |   |
| After second screening round                | >90%               | 2008                         | 71.2      | 2009             | 69.8      |   |
| After third and subsequent screening rounds | >90%               | 2008                         | 81.6      | 2009             | 82.3      |   |
| <b>Recall to assessment</b>                 |                    |                              |           |                  |           |   |
| First screening round                       | <10%               | 2010                         | 11.1      | 2011             | 10.7      |   |
| Subsequent screening rounds                 | <5%                | 2010                         | 4.2       | 2011             | 3.8       |   |
| <b>Invasive breast cancer detection</b>     |                    |                              |           |                  |           |  |
| After first screening round                 | >50                | 2010                         | 91.6      | 2011             | 82.1      |   |
| After second screening round                | >35                | 2010                         | 44.4      | 2011             | 42.9      |   |
| Small-size cancer detection                 | >25                | 2010                         | 29.2      | 2011             | 28.4      |   |
| <b>Ductal carcinoma in situ detection</b>   |                    |                              |           |                  |           |  |
| After first screening round                 | ≥12                | 2010                         | 17.9      | 2011             | 20.9      |   |
| After second screening round                | ≥7                 | 2010                         | 11.5      | 2011             | 11.2      |   |
| <b>Invasive breast cancer incidence</b>     | ..                 | 2008                         | 295.3     | 2009             | 288.2     |  |
| <b>Mortality</b>                            | ..                 | 2009                         | 46.0      | 2010             | 43.3      |  |

(a) The NAS were developed by the National Quality Management Committee and represent minimum standards that represent the ability of an individual BreastScreen service to meet the aims and objectives of BreastScreen Australia. The NAS are used as benchmarks for these data only, since this is a different purpose to that for which these standards were developed, and differences in definitions or data may exist.

(b) For the *BreastScreen Australia monitoring report 2009–2010*, New South Wales data for rescreening, recall to assessment, invasive breast cancer detection, ductal carcinoma in situ (DCIS) detection, and sensitivity were not available. This report presents these missing data as well as the latest data.

### Notes

1. All rates are for women aged 50–69 and are age-standardised.
2. Participation is the percentage of screened women in the population.
3. Rescreening is the percentage of women who rescreen within 27 months.
4. Recall to assessment is the percentage of women screened who are recalled for further investigation.
5. Invasive breast cancer detection and DCIS detection data are the number of women diagnosed per 10,000 women screened.
6. Invasive breast cancer incidence is the number of new cases per 100,000 women.
7. Mortality is the number of deaths from invasive breast cancer per 100,000 women.



# Section 1 Introduction

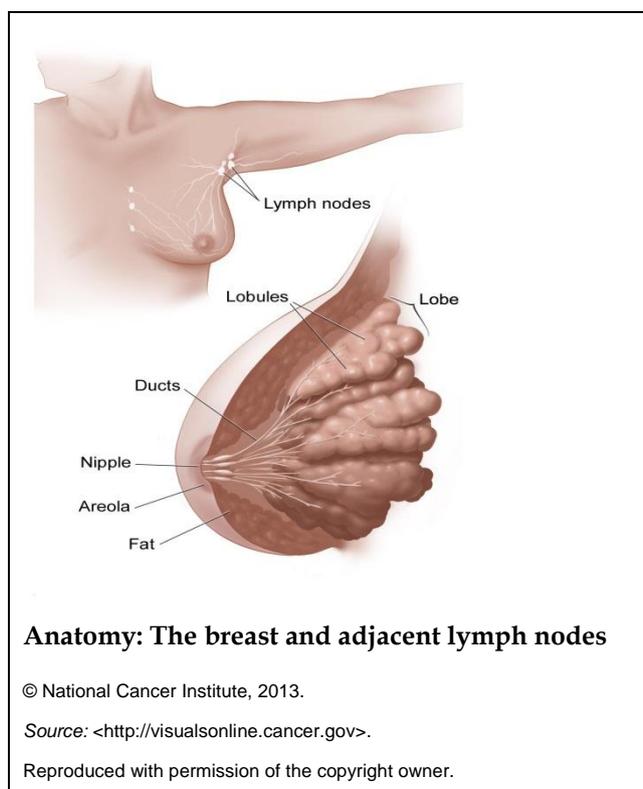
## This report

The first section of this report presents an overview of breast cancer in Australia; it also outlines the process of breast cancer screening, and describes the development and management of BreastScreen Australia. As well, it details the performance indicators used for monitoring the program, and provides a brief summary of technical issues that should be considered when interpreting information in this report.

The second section of this report presents the latest national data against the eight BreastScreen Australia performance indicators. Each performance indicator section starts with a summary that includes a definition of the performance indicator and its rationale; this is followed by key results indicating the main findings. More detailed analyses, as well as background information where appropriate, follow this summary material.

More detailed data than those shown in this report are available in the *BreastScreen Australia monitoring report 2010–2011: supplementary data tables*. These tables can be downloaded for free from the AIHW website <[www.aihw.gov.au/publications](http://www.aihw.gov.au/publications)>.

The *BreastScreen Australia monitoring report 2010–2011* is part of an annual series. Earlier editions and any published subsequently can be downloaded for free from the AIHW website <<http://www.aihw.gov.au/publications>>. The website also includes information on ordering printed copies.



# Overview

## What is breast cancer?

Breast cancer occurs when abnormal cells grow and multiply out of control. Breast cancer most commonly originates in the ducts of the breast (which carry milk from the lobules to the nipple) but can also originate in the lobules (small lobes of the breast that produce milk).

For more information on breast cancer see the Cancer Australia website <[www.canceraustralia.gov.au](http://www.canceraustralia.gov.au)>.

## How common is breast cancer in Australia?

Breast cancer is the most common cancer affecting Australian women (excluding basal and squamous cell carcinoma of the skin). In 2009, 13,668 new cases were diagnosed, or 113.5 new cases per 100,000 women. It is the second most common cause of cancer mortality in Australian women after lung cancer, with 2,840 deaths, or 21.6 deaths per 100,000 women, in 2010.

Aboriginal and Torres Strait Islander women have lower rates of breast cancer diagnosed than their non-Indigenous counterparts (82.1 and 103.6 new cases per 100,000 women in 2004–2008, respectively). Despite this, death rates do not differ between Aboriginal and Torres Strait Islander and non-Indigenous women (for more details see indicators 7a and 8).

Men can also develop breast cancer, but women are about 100 times more likely to develop the disease. Breast cancer in men is not covered in this report.

### What is ductal carcinoma in situ?

Ductal carcinoma in situ (DCIS) is a non-invasive tumour arising from the milk ducts. The changes to the cells lining the milk ducts seen in DCIS are similar to those for invasive breast cancer. However, unlike invasive breast cancer, DCIS does not invade the surrounding breast tissue; instead, it is contained entirely within the milk duct.

Although the precise relationship between DCIS and invasive breast cancer remains unclear, there is general consensus that DCIS represents an intermediate step between normal breast tissue and invasive breast cancer (Virnig et al. 2010).

There are other types of carcinoma in situ of the breast, such as lobular carcinoma in situ (also known as LCIS), which begins in the milk-making glands (lobules). LCIS is not a true cancer or pre-cancer but is a risk factor for invasive breast cancer, as is age or having a family history of breast cancer (American Cancer Society 2011; Cancer Australia 2009).

## What are the known risk factors for breast cancer?

Many risk factors, both established and probable, have been identified for breast cancer in women. Age is the biggest risk factor in developing breast cancer, with most breast cancers occurring in women over the age of 50. A family history of breast cancer can also increase a woman's risk, although most women who develop breast cancer do not have a family history of the disease. Other factors that may increase a woman's risk of developing breast cancer include not having carried or given birth to any children, late age at birth of first child, early menstruation and late menopause. Oral contraception use can cause a small increase in the

risk of breast cancer, as can hormone replacement therapy, which causes an increase in risk consistent with late menopause (De et al. 2010; McPherson et al. 2000).

### **Family history of breast cancer**

Women are considered to have about twice the risk of breast cancer if they have a first-degree relative (mother, sister or daughter) diagnosed with breast cancer before the age of 50 (McPherson et al. 2000). The more relatives a woman has with breast cancer – and the younger they are when they develop the disease – the higher is the risk to the woman of developing breast cancer. Other factors increasing risk include a family history of bilateral breast cancer, breast cancer before the age of 40 and male breast cancer (NBCC 2006).

Genetic predisposition accounts for up to 10% of breast cancers in Western countries (McPherson et al. 2000). Harmful mutations in two identified breast cancer genes, called BRCA1 and BRCA2, are involved in many cases of hereditary breast cancer, and a woman's risk of developing breast cancer is greatly increased if she inherits a harmful BRCA1 or BRCA2 mutation (McPherson et al. 2000).

### **How do we screen for breast cancer?**

Mammography (X-ray of the breast) is the test used in breast cancer screening. In screening mammography, two views are taken of each breast, and the images are reviewed by radiologists to look for suspicious characteristics that require further investigation. Screening mammography, like the screening tests used in other programs such as bowel and cervical screening, is not intended to be diagnostic; rather, it aims to identify people who are more likely to have breast cancer, and therefore require further investigation from diagnostic tests. In contrast to screening mammography, diagnostic mammography targets a specific area of the breast using multiple views, which makes it appropriate for women with symptoms that may indicate the presence of breast cancer.

### **Why screen for breast cancer?**

Organised breast cancer screening aims to detect cases of unsuspected breast cancer in women, thus enabling intervention when the cancer is at an early stage. Finding breast cancer early often means that the cancer is small, which is associated with increased treatment options (NBOCC 2009) and improved survival (AIHW & NBCC 2007).

Twenty-eight per cent (28%) of the breast cancers detected outside BreastScreen Australia are small; in comparison, 61% of breast cancers detected by BreastScreen Australia are small. As well, treatment of breast cancers detected by BreastScreen Australia is more likely to be breast-conserving surgery (74% compared with 56% outside the program) (NBOCC 2009), which is associated with decreased morbidity.

Further, it was recently estimated that 8.8 and 5.7 breast cancer deaths were prevented per 1,000 women screened using data from the Swedish Two-Country Trial and England's breast cancer screening program, respectively (Duffy et al. 2010), and a recent evaluation of BreastScreen Australia estimated that breast cancer mortality has been reduced by 21–28% (BreastScreen Australia EAC 2009a).

## **How is breast cancer screening managed in Australia?**

Australia's national breast cancer screening program was established in 1991 as the National Program for the Early Detection of Breast Cancer. This program is now known as BreastScreen Australia, and is a joint program of the Australian and state and territory governments. BreastScreen Australia aims to reduce mortality and morbidity from breast cancer. A list of its aims and objectives is presented in the box on the following page.

BreastScreen Australia provides free biennial breast cancer screening to women through dedicated screening and assessment services. Women have a screening mammogram performed at a screening unit (which may be fixed, relocatable or mobile). Women whose images are suspicious for breast cancer are recalled for further investigation by a multidisciplinary team at an assessment centre. Further investigation may include clinical examination, mammography, ultrasound and biopsy procedures. Most women who are recalled for assessment are found not to have breast cancer.

## **Who is eligible to participate in BreastScreen Australia?**

BreastScreen Australia actively invites women aged 50–69 to have free biennial breast cancer screening. Women aged 40–49 and 70 or over are also eligible to attend. Women aged 50–69 are targeted because they have a relatively high incidence of breast cancer, and screening mammography is known to be effective in reducing mortality in this age group (BreastScreen Australia 2004). Screening mammography is less effective in women aged under 50 because of biological differences in the breast tissue of pre-menopausal women. This results in more investigations and missed breast cancers (false negative results) due to the lower sensitivity of screening mammography in this age group (Irwig et al. 1997).

## **Aims and objectives of BreastScreen Australia**

### **Aims**

- To ensure that the program is implemented in such a way that statistically significant reductions can be achieved in morbidity and mortality attributable to breast cancer.
- To maximise the early detection of breast cancer in the target population.
- To ensure that screening for breast cancer in Australia is provided in dedicated and accredited screening and assessment services as part of the BreastScreen Australia Program.
- To ensure equitable access for women aged 50–69 years to the program.
- To ensure that services are acceptable and appropriate to the needs of the eligible population.
- To achieve high standards of program management, service delivery, monitoring and evaluation, and accountability.

### **Objectives**

- To achieve a 70 per cent participation rate in the BreastScreen Australia Program by women in the target group (50–69) and access to the program for women aged 40–49 years and 70–79 years.
- To rescreen all women in the program at two-yearly intervals.
- To achieve agreed performance outcomes which minimise recall rates, retake images, invasive procedures, 'false negatives' and 'false positives', and maximise the number of cancers detected, particularly the number of small cancers.
- To refer to appropriate treatment services and collect information about the outcome of treatment.
- To fund, through state coordination units, screening and assessment services which are accredited according to agreed National Accreditation Standards and to ensure that those standards are monitored and reviewed by appropriate national and state and territory accreditation committees.
- To recognise the real costs to women of participation in the program and to minimise those costs. This includes the provision of services at minimal or no charge, and free to eligible women who would not attend if there was a charge.
- To make information about mammographic screening and the BreastScreen Australia program available in a variety of easily comprehensible and appropriate forms, to women and health-care providers in particular.
- To achieve patterns of participation in the program which are representative of the socioeconomic, ethnic and cultural profiles of the target population.
- To provide services in accessible, non-threatening and comfortable environments by staff with appropriate expertise, experience and training.
- To provide appropriate service in that: the provision of counselling, education and information is an integral part of the program; sensitive procedures for notification of recall are in place; and the time between the initial screen and assessment is minimised.
- To achieve high levels of participation in the development and management of the program by members of significant professional and client groups.
- To collect and analyse data sufficient to monitor the implementation of the program, to evaluate its effectiveness and efficiency and to provide the basis for future policy and program development decisions (BreastScreen Australia 2004).

## How is BreastScreen Australia monitored?

### Performance indicators

The performance of a population-based cancer screening program such as BreastScreen Australia needs to be assessed as it relates to the underlying aims of the program. At the national level, this is achieved by reporting data against a series of performance indicators to allow screening outcomes to be monitored, and positive and negative trends identified early.

BreastScreen Australia has been monitored since 1996–1997 using performance indicators developed and endorsed by the former National Screening Information Advisory Group and by jurisdictional BreastScreen programs. These national performance indicators represent key measures of the progress BreastScreen Australia is making towards reducing morbidity and mortality from breast cancer; they are listed in the table below.

| BreastScreen Australia performance indicators |   |
|---|---|
| 1 Participation                               | The percentage of women aged 50–69 who have a screening mammogram through BreastScreen Australia in a 2-year period |
| 2 Rescreening                                 | The proportion of women screened who return for a rescreen within 27 months   |
| 3 Recall to assessment                        | The proportion of women screened who are recalled for further investigation   |
| 4 Invasive breast cancer detection            | The number of women with invasive breast cancer detected through BreastScreen Australia                             |
| 5 Ductal carcinoma in situ detection          | The number of women with DCIS detected through BreastScreen Australia   |
| 6 Sensitivity                                 | The ability of screening mammography to successfully detect cancers   |
| 6a Interval cancers                           |   |
| 6b Program sensitivity                        |   |
| 7 Incidence                                   | The number of new cases of invasive breast cancer or DCIS   |
| 7a Invasive breast cancer incidence           |   |
| 7b Ductal carcinoma in situ incidence         |   |
| 8 Mortality                                   | The number of deaths from invasive breast cancer  |

### Accreditation standards

The NAS were developed by the National Quality Management Committee for accreditation of individual BreastScreen services. The NAS represent minimum standards to measure a service's performance against the aims and objectives of BreastScreen Australia (BreastScreen Australia 2004).

A number of NAS are consistent with the performance indicators in this report. For this reason, where appropriate, the data in this report are benchmarked against the NAS. These benchmarks are useful in helping to interpret the data presented, since the NAS were not designed to be used as standards for the BreastScreen Australia performance indicators.

See <[www.cancerscreening.gov.au](http://www.cancerscreening.gov.au)> for further information about BreastScreen Australia.

# Data

## Data sources

The main sources of data for performance indicators are the state and territory BreastScreen registers. Analyses of these data allow monitoring of participation, rescreening, recall to assessment, detection of invasive breast cancer, detection of DCIS, and sensitivity (Indicators 1 to 6). State and territory BreastScreen registers are 'live' registers. As such, the data in this report can be viewed as accurately describing the data held by the registers only at a particular moment in time, since any results or clinical information received by the BreastScreen registers after data are provided to the Australian Institute of Health and Welfare (AIHW) are unable to be captured. Data in this report can be considered accurate as at December 2012.

Additional to these sources are the AIHW Australian Cancer Database, which is the source of breast cancer incidence data (Indicator 7a); the state and territory cancer registries, which are the source of DCIS incidence data (Indicator 7b); and the National Mortality Database, which is the source of breast cancer mortality data (Indicator 8). More detail on these data sources and classifications is provided at Appendix C.

Note that for each performance indicator, the latest available national data are used, which differ depending on both the data source and specifications of each performance indicator.

## New South Wales data available for all performance indicators

Last year, New South Wales data for participation by main language spoken at home (a disaggregation of participation), rescreening, recall to assessment, invasive breast cancer detection, DCIS detection, and sensitivity were not available for 2009–2010. This was due to issues related to implementing a new business information system in New South Wales. Where New South Wales data were not included, a total for the other states and territories was provided.

This report presents these New South Wales data for 2009–2010 as well as the latest data for 2010–2011, with the exception that New South Wales data were not available for interval cancers and program sensitivity for women screened in 2008 with 13–24 months follow-up.

## Aboriginal and Torres Strait Islander women

Of the performance indicators used to monitor BreastScreen Australia, participation, incidence and mortality are disaggregated by Indigenous status.

Women who attend for a screening mammogram at a BreastScreen Australia service are asked to complete a form that includes personal and demographic details, as well as personal and family history of breast cancer. The form also contains a question on Indigenous status, where women can identify as being 'Aboriginal', 'Torres Strait Islander', 'both Aboriginal and Torres Strait Islander', or 'neither Aboriginal nor Torres Strait Islander'. This information is recorded by the state and territory BreastScreen registers, with the responses aggregated into the categories of 'Aboriginal and Torres Strait Islander' and 'non-Indigenous', with a third 'not stated' category for women who choose not to answer this question (see Appendix B for data definitions and quality concerns).

Other performance indicators based on BreastScreen register data are not routinely disaggregated by Indigenous status due to concerns about stability and comparability of rates from small numbers. However, further data on Aboriginal and Torres Strait Islander women can be found in more detailed analyses of BreastScreen Australia performance indicators conducted to inform the BreastScreen Australia Evaluation (BreastScreen Australia EAC 2009b).

## Reporting women with symptoms

In principle, women who have symptoms that could indicate the presence of invasive breast cancer or DCIS (such as a lump, or clear or bloody discharge from the nipple) at the time of a breast cancer screen should be excluded from all performance indicators reported, since these women are more likely to have a breast cancer or DCIS detected by the screening process. However, the management policy of women with symptoms is not uniform across states and territories, with some women with symptoms screened. Therefore, in practice, data in this report include that for both symptomatic and asymptomatic women.

## Terminology and concepts

### Reporting periods

This report presents monitoring data in 1-year, 2-year, 3-year and 5-year reporting periods.

- Most data are presented over a 1-year period, including rescreening, recall to assessment, detection of invasive breast cancer, detection of DCIS, and invasive breast cancer incidence and mortality.
- Participation data are presented in a 2-year reporting period in line with the recommended 2-year screening interval of BreastScreen Australia.
- Sensitivity data are presented in a 3-year reporting period. A 5-year reporting period is used when invasive breast cancer incidence and mortality data are disaggregated into different population groups. A 5-year reporting period is also used for DCIS incidence. These 3- and 5-year reporting periods are used to improve stability and comparability of rates due to small numbers.

### Age groups

Data are presented for women aged 50–69 who, as the target age group of BreastScreen Australia, are actively invited to participate in the program. Where appropriate, data are also presented for women aged 40–49 and 70 and over, who are also eligible to have free screening mammograms through BreastScreen Australia. More detailed data for these age groups can be accessed in the *BreastScreen Australia monitoring report 2010–2011: supplementary data tables*.

### Crude versus age-standardised

This report presents crude and age-standardised rates. Crude is the ‘true’ proportion or rate, and is appropriate when a single year or reporting period is reported (for example, crude participation in 2010–2011 was 55.0%). However, comparisons over time, or across states/territories or population subgroups require that crude rates are age-standardised to

remove the underlying differences in age structure over time or between groups. These allow analyses of trends and differentials, and are therefore preferentially reported in these situations (for example, participation in 2010–2011, age-standardised using the Australian population in 2001, was 54.6%).

## **Confidence intervals**

Confidence intervals are presented in this report only where it has been deemed important to show the degree of error due to rare events in small populations; this is done to avoid potential misinterpretation of data and/or to present data consistent with other publications. This includes breast cancer and DCIS detection, interval cancers, incidence of breast cancer and DCIS, and mortality from breast cancer.

Where shown, 95% confidence intervals can be used to determine if a statistically significant difference exists between compared values: where the confidence intervals do not overlap, the difference between rates is greater than that which could be explained by chance and is regarded as statistically significant. Because overlapping confidence intervals do not imply that the difference between two rates is definitely due to chance, it can be stated only that no statistically significant differences were found, and not that no differences exist.

Judgment should be exercised in deciding whether or not any differences shown are of clinical significance.

# Section 2 Performance indicators

## Indicator 1 Participation

### What you need to know about participation

**Definition:** The percentage of women aged 50–69 screened through BreastScreen Australia in a 2-year period.

**Rationale:** BreastScreen Australia aims to maximise the early detection of breast cancer in the target population, women aged 50–69. High attendance for screening by women in this age group maximises the reductions in mortality from breast cancer (BreastScreen Australia 2004). The NAS recommend that at least 70% of women aged 50–69 participate in screening in the most recent 24-month period (NAS 1.1.1) (BreastScreen Australia 2004).

**Guide to interpretation:** Participation is measured over 2 years to align with the recommended screening interval of BreastScreen Australia. Participation is based on the number of women screened, not the number of screening mammograms performed.

Data are presented for women aged 50–69 (the target age group), as well as for women aged 40–49 and 70 and over where appropriate. No attempt has been made to adjust the population for women who have previously had breast cancer and are therefore not eligible for breast cancer screening through BreastScreen Australia. It should be noted that states and territories have different policies on screening women who have previously been diagnosed with breast cancer.

The most recent participation data are for the 2010–2011 reporting period.

### What the data tell us about participation

#### Trend

Participation has remained steady, between 55% and 57%, for most years from 1996–1997, when reporting began, to 2010–2011, despite a steady increase in the number of women participating over this time.

The age-standardised participation rate was 54.6% in 2010–2011 which was similar to that in 2008–2009, at 55.2%.

#### 2010–2011

In 2010–2011, a total of 1,726,099 women participated in BreastScreen Australia, of whom 1,373,731 (79.6%) were aged 50–69. This is 55.0% of women in the target age group which, when age-standardised to allow analyses of trends, equates to a participation rate of 54.6%.

While participation progressively increased with improving socioeconomic status, this trend was small, with participation ranging between 53.1% and 54.9%.

Participation was lower for Aboriginal and Torres Strait Islander women (36.2%) than for non-Indigenous women (53.9%).

## Detailed analyses

### Participation in 2010–2011

In 2010–2011, 1,726,099 women participated in BreastScreen Australia (that is, they had at least one screening mammogram over the 2 years), of whom 1,373,731 were aged 50–69. These 1,373,731 women represent 55.0% of women in the target age group which, when age-standardised to allow analysis of trends and differentials, equates to a participation rate of 54.6%.

Although the NAS for participation has not been met at the national level (NAS 1.1.1 being that *at least 70% of women aged 50–69 participate in screening in the most recent 24-month period*), a reduction in breast cancer mortality has been observed with the current participation rate of around 55%.

### Participation trends

Table 1.1 shows the trend in participation nationally, from 1996–1997, when reporting began, to 2010–2011, for which the most recent national data are available.

**Table 1.1: Number and age-standardised rate of women aged 50–69 participating in BreastScreen Australia, 1996–1997 to 2010–2011**

| Reporting period | Participants <sup>(a)</sup> | Population <sup>(b)</sup> | AS rate <sup>(c)</sup> |
|------------------|-----------------------------|---------------------------|------------------------|
| 1996–1997        | 845,143                     | 1,645,331                 | 51.5                   |
| 1997–1998        | 927,735                     | 1,700,951                 | 54.6                   |
| 1998–1999        | 976,182                     | 1,754,254                 | 55.7                   |
| 1999–2000        | 1,012,184                   | 1,809,735                 | 55.9                   |
| 2000–2001        | 1,064,246                   | 1,868,832                 | 57.0                   |
| 2001–2002        | 1,102,642                   | 1,928,878                 | 57.1                   |
| 2002–2003        | 1,118,823                   | 1,989,802                 | 56.2                   |
| 2003–2004        | 1,145,008                   | 2,051,480                 | 55.7                   |
| 2004–2005        | 1,188,955                   | 2,114,036                 | 56.1                   |
| 2005–2006        | 1,242,210                   | 2,177,660                 | 56.9                   |
| 2006–2007        | 1,262,334                   | 2,242,133                 | 56.1                   |
| 2007–2008        | 1,273,317                   | 2,308,680                 | 54.9                   |
| 2008–2009        | 1,319,771                   | 2,376,559                 | 55.2                   |
| 2009–2010        | 1,352,112                   | 2,444,680                 | 55.0                   |
| 2010–2011        | 1,373,731                   | 2,497,963                 | 54.6                   |

(a) Participants are the number of women screened through BreastScreen Australia in each 2-year reporting period. The screening periods cover 1 January of the initial year to 31 December of the latter year indicated.

(b) Population is the average of the Australian Bureau of Statistics (ABS) estimated resident population for women aged 50–69 for the 2 reporting years.

(c) Age-standardised (AS) rate is the number of women aged 50–69 screened in each 2-year reporting period as a percentage of the ABS estimated resident population for women aged 50–69, age-standardised to the Australian population at 30 June 2001.

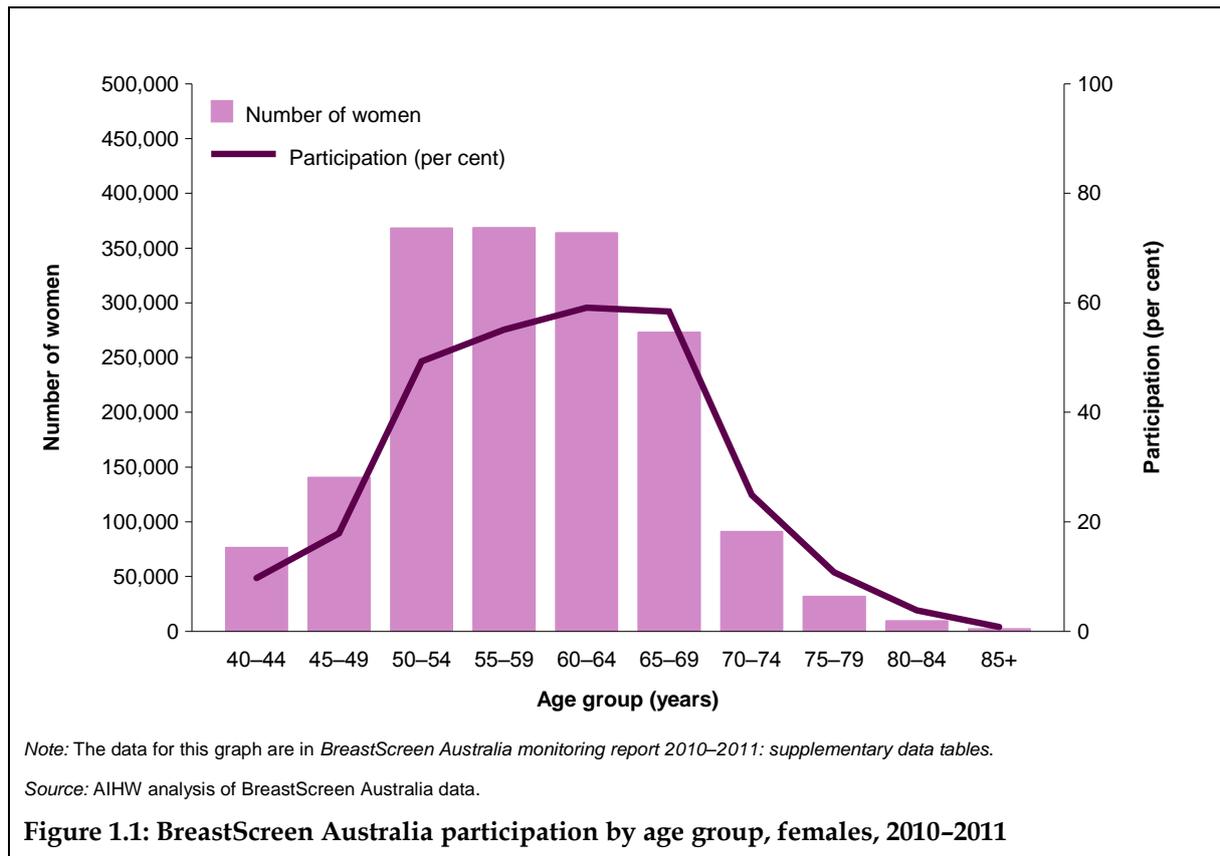
Source: AIHW analysis of BreastScreen Australia data.

The age-standardised rate of participation for women aged 50–69 was 51.5% in 1996–1997 when reporting began. This increased to a peak of 57.1% in 2001–2002 and thereafter remained steady at about 56% before decreasing slightly to about 55% from 2007–2008. In 2010–2011, the age-standardised rate of participation was 54.6% (Table 1.1).

## Participation by age

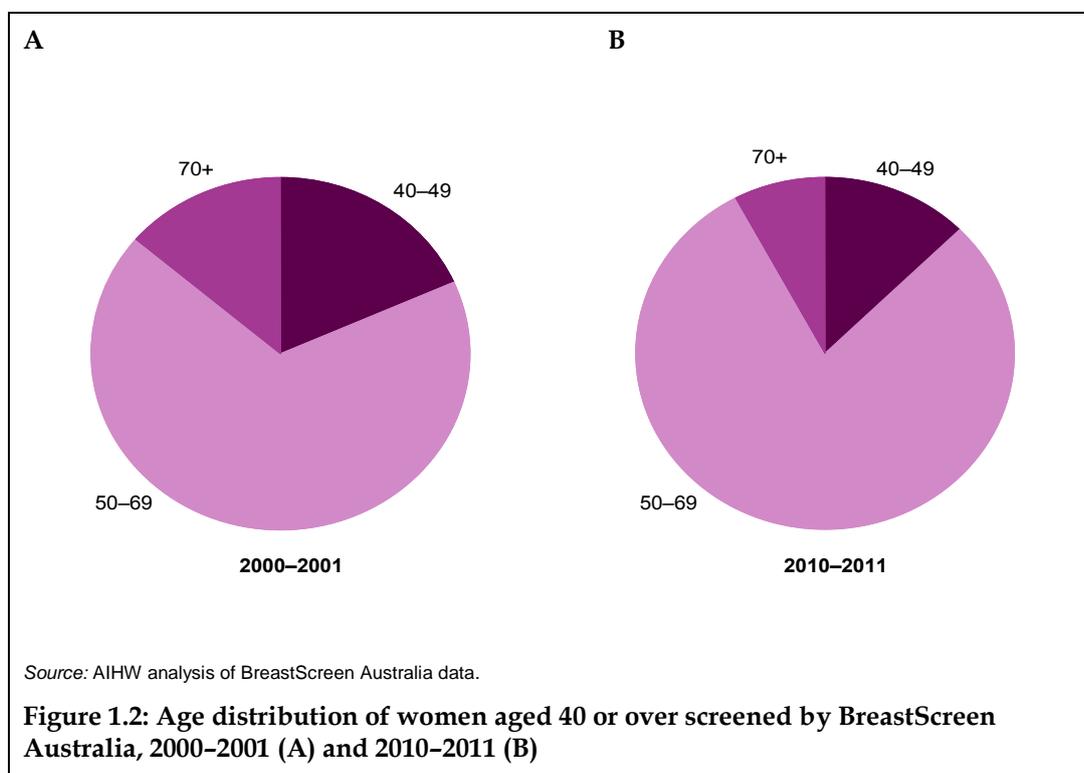
In 2010–2011, the proportion of women screened was highest in women aged 50–69, in line with aim of BreastScreen Australia to maximise the proportion of women in the target age group who are screened every 2 years. Further, the proportion of women participating was equal to or above 49.3% for all 5-year age groups within the target age group, peaking at 59.1% in women aged 60–64 (Figure 1.1).

The proportion of women screened outside the target age group dropped away steeply, with 13.8% of women aged 40–49 and 11.5% of women aged 70 and over screening in 2010–2011, compared with 55.0% of women aged 50–69 (all crude rates) (Figure 1.1).



The breakdown of women screened into the age groups 40–49, 50–69 and 70 and over is shown in Figure 1.2 for the reporting periods 2000–2001 and 2010–2011.

Between 2000–2001 and 2010–2011, women in the target age group have comprised an increasing proportion of all women screened, from 67.9% in 2000–2001 to 79.6% in 2010–2011. Concurrent to this has been a decrease in the 40–49 age group from 18.4% to 12.6% and in the 70 and over age group from 13.8% to 7.8% (Figure 1.2).



### Participation by state and territory

In 2010–2011, participation across all states and territories was within 12.7 percentage points of the national average of 54.6%, ranging from 41.9% to 58.1% (Table 1.2; Figure 1.3).

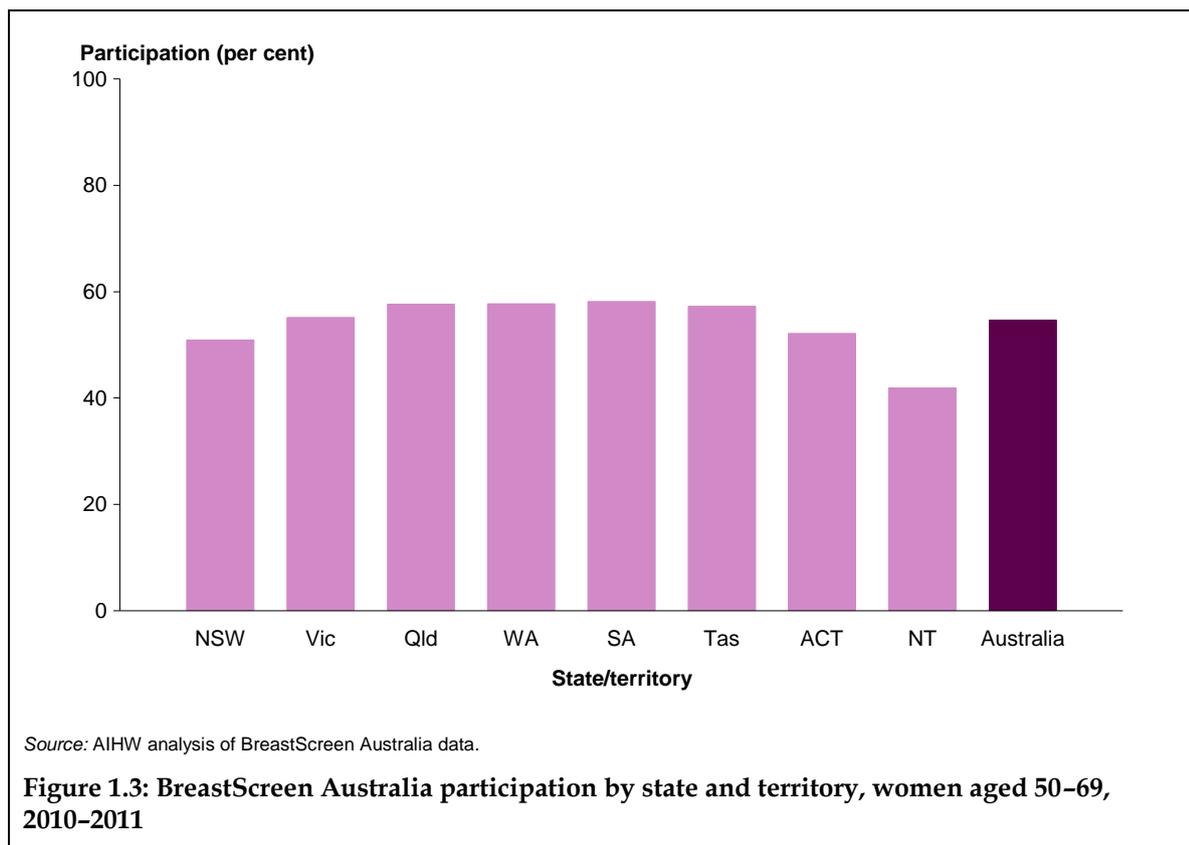
**Table 1.2: BreastScreen Australia participation by state and territory, women aged 50–69, 2010–2011**

|         | NSW     | Vic     | Qld     | WA      | SA      | Tas    | ACT    | NT    | Australia |
|---------|---------|---------|---------|---------|---------|--------|--------|-------|-----------|
| Number  | 419,012 | 340,286 | 285,886 | 146,271 | 116,040 | 37,706 | 20,342 | 8,188 | 1,373,731 |
| AS rate | 50.9    | 55.1    | 57.6    | 57.7    | 58.1    | 57.2   | 52.1   | 41.9  | 54.6      |

#### Notes

1. Participants are the number of women screened through BreastScreen Australia in each 2-year reporting period. The screening periods cover 1 January of the initial year to 31 December of the latter year indicated.
2. Rates are the number of women screened as a percentage of the eligible female population, calculated as the average of the ABS's estimated resident population and age-standardised to the Australian population at 30 June 2001.
3. Direct comparisons between the states and territories of Australia are not advised due to the substantial differences that exist between the jurisdictions including for population, geographic size and structure, policies and other factors.

Source: AIHW analysis of BreastScreen Australia data.



### Participation by remoteness area

In 2010–2011, participation was highest in *Outer regional* areas (58.5%), and lowest in *Very remote* areas (45.8%) (Table 1.3; Figure 1.4A).

To improve access for women in *Remote* and *Very remote* locations, states and territories use relocatable screening services, mobile screening vans and community buses to overcome transport barriers. A 4-wheel drive digital mobile screening service – a first of its kind – was introduced in 2010, providing better access to BreastScreen Australia for women in isolated and hard-to-reach locations in Queensland.

**Table 1.3: BreastScreen Australia participation by remoteness area, women aged 50–69, 2010–2011**

|         | Major cities | Inner regional | Outer regional | Remote | Very remote | Australia |
|---------|--------------|----------------|----------------|--------|-------------|-----------|
| Number  | 888,605      | 316,160        | 143,482        | 18,256 | 6,824       | 1,373,731 |
| AS rate | 53.2         | 57.2           | 58.5           | 55.2   | 45.8        | 54.6      |

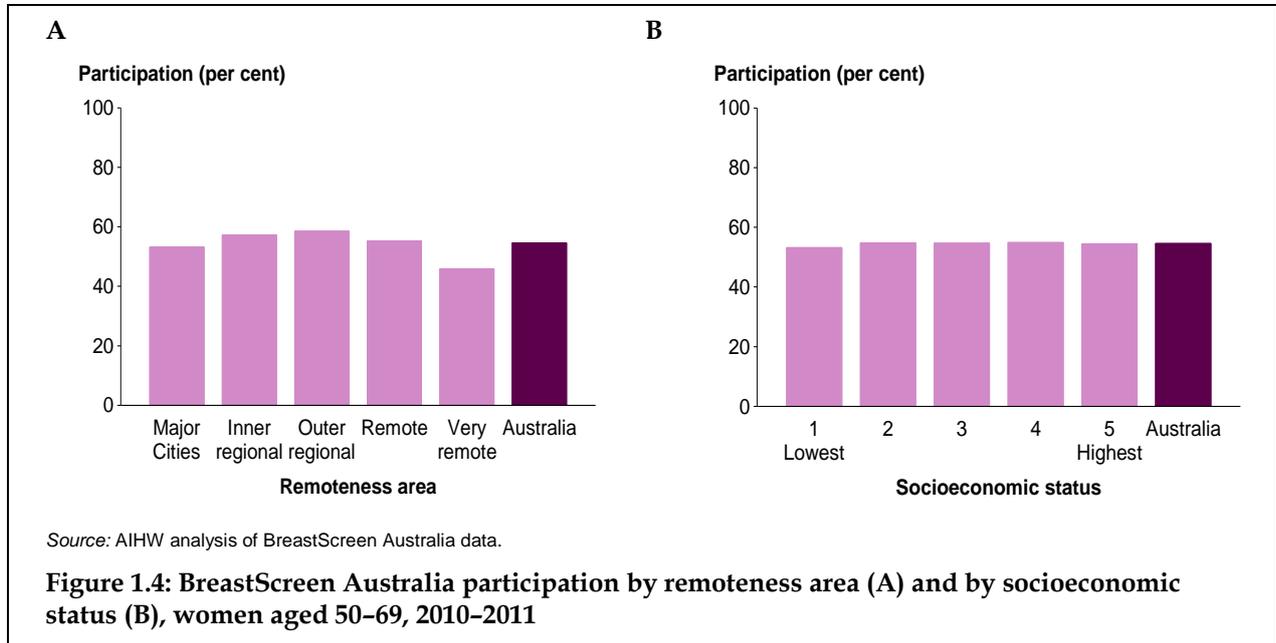
*Notes*

1. Rates are the number of women screened as a percentage of the eligible female population calculated as the average of the ABS's estimated resident population and age-standardised to the Australian population at 30 June 2001. Period covers 1 January 2010 to 31 December 2011.
2. Remoteness areas were assigned using the woman's residential postcode according to the Australian Standard Geographical Classification for 2006. Not all postcodes can be assigned to a remoteness area therefore, categories do not add to Australia.

Source: AIHW analysis of BreastScreen Australia data.

## Participation by socioeconomic status

There was little variation in participation across socioeconomic groups, with all groups having participation rates between 53.1% and 54.9%. There was a slight trend of increasing participation with increasing socioeconomic status (Figure 1.4B; Table 1.4).



**Table 1.4: BreastScreen Australia participation by socioeconomic status, women aged 50-69, 2010-2011**

|         | 1 (Lowest) | 2       | 3       | 4       | 5 (Highest) | Australia |
|---------|------------|---------|---------|---------|-------------|-----------|
| Number  | 263,735    | 284,354 | 273,906 | 268,655 | 277,917     | 1,373,731 |
| AS rate | 53.1       | 54.8    | 54.7    | 54.9    | 54.4        | 54.6      |

### Notes

1. Rates are the number of women screened as a percentage of the eligible female population calculated as the average of the ABS's estimated resident population and age-standardised to the Australian population at 30 June 2001. Period covers 1 January 2010 to 31 December 2011.
2. Socioeconomic status was assigned using the woman's residential postcode according to the Socioeconomic Index for Areas (SEIFA) Index of Relative Socioeconomic Disadvantage for 2006; 1 (lowest socioeconomic group) corresponds to the most disadvantaged socioeconomic status and 5 (highest socioeconomic group) to the least disadvantaged socioeconomic status. Not all postcodes could be assigned to a socioeconomic category, therefore, categories do not add to Australia.

Source: AIHW analysis of BreastScreen Australia data.

## Participation by Indigenous status

Aboriginal and Torres Strait Islander women participate in BreastScreen Australia at a lower rate than non-Indigenous women.

In 2010-2011, the participation rate of Aboriginal and Torres Strait Islander women aged 50-69 was 36.2% compared with that for non-Indigenous women of 53.9% – a difference of 17.7 percentage points (Table 1.5).

Many of the state and territory BreastScreen programs have developed, and continue to develop, strategies and initiatives to encourage greater participation by Aboriginal and Torres Strait Islander women. These strategies and initiatives are based on research to ensure

that they are sensitive and appropriate to the knowledge, attitudes and beliefs of Aboriginal and Torres Strait Islander women (see, for example, BreastScreen SA 2003; BreastScreen WA 2008).

Strategies to encourage participation include dedicated and appropriate communication resources, and block and group bookings. BreastScreen programs also liaise closely with Aboriginal Health Workers and Aboriginal and Torres Strait Islander community groups to increase acceptance of screening.

**Table 1.5: BreastScreen Australia participation by Indigenous status, women aged 50–69, 2010–2011**

|         | Aboriginal and Torres Strait Islander | Non-Indigenous | Australia <sup>(a)</sup> |
|---------|---------------------------------------|----------------|--------------------------|
| Number  | 11,971                                | 1,341,869      | 1,373,731                |
| AS rate | 36.2                                  | 53.9           | 54.6                     |

(a) Includes women in the 'not stated' category for Indigenous status. Therefore, columns may not sum to the Australia column.

*Notes*

1. Limitations of Aboriginal and Torres Strait Islander data are detailed at Appendix B.
2. Rates are the number of women screened as a percentage of the eligible female population calculated as the average of the ABS's estimated resident population and age-standardised to the Australian population at 30 June 2001. The screening periods cover 1 January of the initial year to 31 December of the latter year indicated.

Source: AIHW analysis of BreastScreen Australia data.

### Participation by main language spoken at home

In 2010–2011, the difference in participation between English-speaking women (55.8%) and those who reported that they speak a language other than English at home (47.3%) was 8.5 percentage points (Table 1.6).

**Table 1.6: BreastScreen Australia participation by main language spoken at home, women aged 50–69, 2010–2011**

|         | English-speaking | Non-English-speaking | Australia <sup>(a)</sup> |
|---------|------------------|----------------------|--------------------------|
| Number  | 1,174,236        | 193,812              | 1,373,731                |
| AS rate | 55.8             | 47.3                 | 54.6                     |

(a) Includes women in the 'not stated' category for main language other than English spoken at home. Therefore, columns may not sum to the Australia column. Data may differ from that published in the *BreastScreen Australia monitoring report 2009–2010* due to updates to the database.

*Notes*

1. Some jurisdictions do not use the 'not stated' category, and there may also be differences in how these data are collected. This means that the analysis based on main language spoken at home should be interpreted with caution. Limitations are detailed at Appendix B.
2. Rates are the number of women screened as a percentage of the eligible female population calculated as the average of the ABS's estimated resident population and age-standardised to the Australian population at 30 June 2001. The screening periods cover 1 January of the initial year to 31 December of the latter year indicated.

Source: AIHW analysis of BreastScreen Australia data.

## Indicator 2 Rescreening

### What you need to know about rescreening

**Definition:** The proportion of women screened in a given year, whose screening outcome was a recommendation to return for screening in 2 years, and who returned for a screen within 27 months.

**Rationale:** A high rescreen rate is important to increase the likelihood of breast cancers being detected early and to maintain overall participation. The NAS for rescreening require that at least 75% of women aged 50–67 who attend for their first screen are rescreened within 27 months (NAS 1.2.1). The NAS also recommend that at least 90% of women aged 50–67 who attend for their second and subsequent screens are rescreened within 27 months (NAS 1.2.2) (BreastScreen Australia 2004).

**Guide to interpretation:** The screening interval of 27 months is used instead of the recommended screening interval of 2 years to allow for potential delays in screening availability and data transfer.

Note that although the BreastScreen Australia target age group is 50–69, only women aged 50–67 are reported for the rescreen rate because women aged 68–69 in the index year will be outside the target age group 27 months after their index screen.

The denominator (the number of women screened in each index year) has not been adjusted to remove women who died or developed an interval cancer after their screen in the index year and therefore would not go on to rescreen.

The most recent rescreening data are for women screened in the index year 2008 and 2009. This small lag in data availability is because 27 months needs to have passed since a woman's last screen to know whether or not she has rescreened within this interval.

### What the data tell us about rescreening

#### Trend

There was very little difference between rescreening after a screen in 2008 compared with rescreening after a screen in 2009, regardless of the screening round.

#### **Women rescreening after a screen in 2008**

The proportion of women aged 50–67 who screened in 2008 and rescreened within 27 months ranged from 59.9% after the first screening round and 71.2% after the second screening round to 81.6% after the third and subsequent screening rounds.

#### **Women rescreening after a screen in 2009**

The proportion of women aged 50–67 who screened in 2009 and rescreened within 27 months ranged from 59.4% after the first screening round and 69.8% after the second screening round to 82.3% after the third and subsequent screening rounds.

## More information about rescreening

The rescreening indicator measures the proportion of women who return for screening at a BreastScreen service within the recommended interval. The interval between screens is an important factor influencing the level of cancer detection. BreastScreen Australia national policy states that women should be screened every 2 years. It has been shown that screening intervals longer than 2 years reduce mortality benefits from screening and result in an increase in interval cancers (BreastScreen Australia 2004). This is because increased time between screening may allow a tumour to grow to the point where symptoms become evident, thus eliminating the advantage of screening.

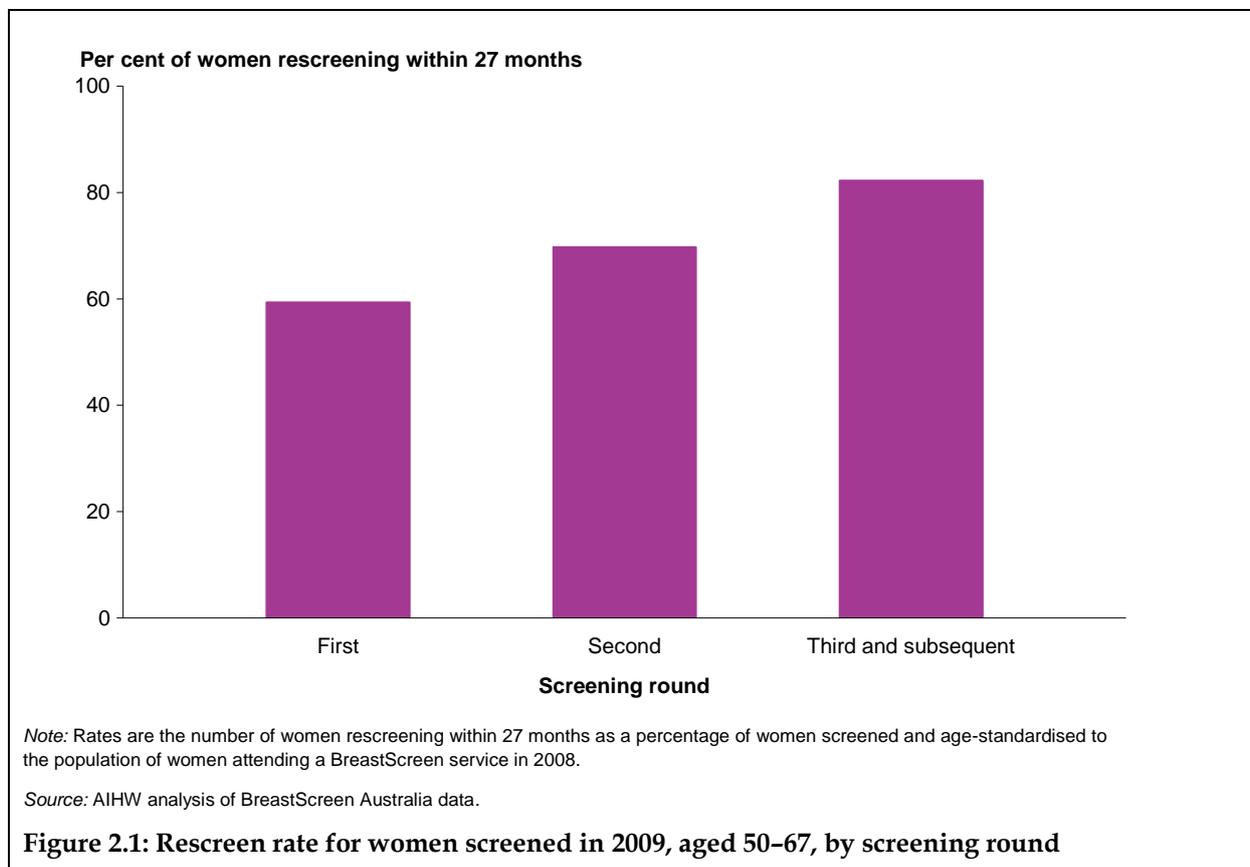
### Box 2.1: Terminology

**Screening round:** the first screening round is a woman's first visit to a mammography screening service; a subsequent screening round is any visit to a mammography screening service after this first visit (that is, a subsequent screening round means that she has been screened before).

## Detailed analyses

### Rescreening after a screen in 2008 and 2009

The proportion of women aged 50–67 who returned for a rescreen within 27 months increased with the number of screens or 'screening rounds' (see Box 2.1) previously attended (Figure 2.1; only 2008 data are shown in Figure 2.1).



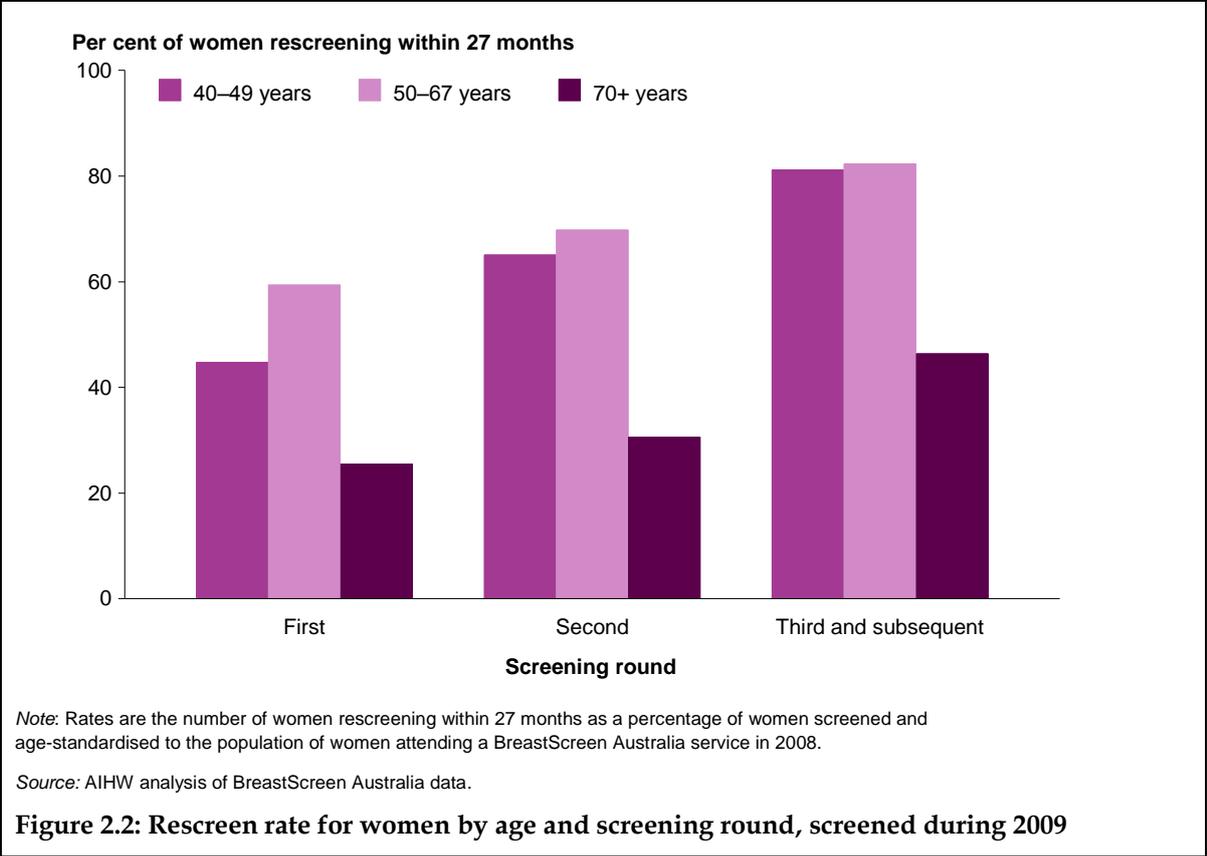
The proportion of women aged 50–67 who were screened in 2008 and returned within 27 months increased from 59.9% after the first screening round and 71.2% after the second screening round to 81.6% after the third and subsequent screening rounds.

The data for 2009 show a similar trend, with 59.4% of women aged 50–67 returning within 27 months after the first screening round, 69.8% returning after the second screening round, and 82.3% after the third and subsequent screening rounds (Figure 2.1).

The NAS for rescreening have not been met at the national level for 2008 and 2009 (NAS 1.2.1 being that *at least 75% of women aged 50–67 who attend for their first screening round are rescreened within 27 months*, and NAS 1.2.2 being that *at least 90% of women aged 50–67 who attend for their second and subsequent screens are rescreened within 27 months*).

**Rescreening by age in 2008 and 2009**

In 2008 and 2009, the highest rescreen rates were for women aged 50–67, followed by women aged 40–49 in all three screening rounds. Women aged 70 and over had far lower rescreen rates regardless of the screening round (Figure 2.2).



In 2008, as screening round increased, women aged 50–67 comprised a greater proportion of women rescreening – 63.8% of those attending their first screen, 74.3% of those attending their second screen and 84.0% of those attending their third or subsequent screen (see *BreastScreen Australia monitoring report 2010–2011: supplementary data tables*).

The same trend was also seen in 2009 with women aged 50–67 comprising 64.8% of those attending their first screen, 74.0% of those attending their second screen and 84.0% of those attending their third or subsequent screen (see *BreastScreen Australia monitoring report 2010–2011 supplementary data tables*).

### Rescreening by state and territory in 2008 and 2009

In 2008 and 2009, although there was some variation among the data for states and territories, all mirrored the national trend of increasing rescreen rates with increased number of screens previously attended (Table 2.1).

**Table 2.1: Rescreen rate for women aged 50–67, screened during 2008 and 2009**

|  | NSW  | Vic  | Qld  | WA   | SA   | Tas  | ACT  | NT   | Australia |
|--|------|------|------|------|------|------|------|------|-----------|
| <b>2008</b>                                  |      |      |      |      |      |      |      |      |           |
| <b>First screening round</b>                 |      |      |      |      |      |      |      |      |           |
| AS rate                                      | 60.7 | 52.2 | 62.6 | 61.8 | 64.9 | 71.9 | 49.2 | 52.2 | 59.9      |
| <b>Second screening round</b>                |      |      |      |      |      |      |      |      |           |
| AS rate                                      | 73.8 | 63.8 | 71.3 | 69.0 | 66.5 | 78.3 | 61.4 | 66.1 | 71.2      |
| <b>Third and subsequent screening rounds</b> |      |      |      |      |      |      |      |      |           |
| AS rate                                      | 80.0 | 77.8 | 85.6 | 84.2 | 82.4 | 88.5 | 74.4 | 80.2 | 81.6      |
| <b>2009</b>                                  |      |      |      |      |      |      |      |      |           |
| <b>First screening round</b>                 |      |      |      |      |      |      |      |      |           |
| AS rate                                      | 59.0 | 59.8 | 59.9 | 62.0 | 63.6 | 67.9 | 32.8 | 54.5 | 59.4      |
| <b>Second screening round</b>                |      |      |      |      |      |      |      |      |           |
| AS rate                                      | 70.4 | 67.3 | 70.3 | 70.7 | 68.8 | 73.3 | 43.1 | 70.2 | 69.8      |
| <b>Third and subsequent screening rounds</b> |      |      |      |      |      |      |      |      |           |
| AS rate                                      | 79.4 | 83.7 | 84.6 | 85.2 | 83.2 | 86.1 | 62.8 | 82.7 | 82.3      |

*Note:* Rates are the number of women rescreening within 27 months as a percentage of women screened and age-standardised to the population of women attending a BreastScreen Australia service in 2008.

*Source:* AIHW analysis of BreastScreen Australia data.

## Indicator 3 Recall to assessment

### What you need to know about assessment

**Definition:** The proportion of women screened in a given year who are recalled for assessment.

**Rationale:** Women are recalled to assessment for further investigation if their screening mammogram is found to be suspicious for breast cancer. BreastScreen Australia aims to maximise the number of cancers detected while minimising the number of unnecessary investigations. Recall to assessment can cause anxiety as a result of uncertainty and the requirement to undergo additional procedures. The NAS recommend that less than 10% of women aged 50–69 who attend for their first screen are recalled for assessment (NAS 2.6.1), and that less than 5% of women aged 50–69 who attend for their second or subsequent screen are recalled for assessment (NAS 2.6.2) (BreastScreen Australia 2004).

**Guide to interpretation:** Recall to assessment is disaggregated into first and subsequent screening rounds because a woman is more likely to be recalled to assessment the first time she visits a BreastScreen service than at subsequent visits. This is for two reasons: firstly, a woman is more likely to have an invasive breast cancer detected on her first visit; secondly, with no previous images with which to compare her first screening mammography images, it is more difficult to distinguish between what is normal and what might be suspicious (BreastScreen WA 2008).

Changes to recall to assessment rates should be considered alongside corresponding invasive cancer detection rates, as a higher recall to assessment rate may be considered acceptable if it leads to higher breast cancer detection rates.

The most recent recall to assessment data are for women screened in 2010 and 2011.

### What the data tell us about recall to assessment

#### Trend

Recall to assessment decreased only slightly between 2010 and 2011, from 11.1% to 10.7% for the first screening round and from 4.2% to 3.8% for subsequent screening rounds.

#### **Women screened in 2010**

For women aged 50–69, 11.1% of women screened for the first time were recalled to assessment, while 4.2% of women who attended subsequent screens were recalled.

#### **Women screened in 2011**

For women aged 50–69, 10.7% of women screened for the first time were recalled to assessment, while 3.8% of women who attended subsequent screens were recalled.

## More information on recall to assessment

A woman is recalled to assessment for mammographic reasons because her screening mammography images are found to be suspicious for breast cancer.

Assessment of women recalled involves further investigation by a multidisciplinary team at an assessment centre. This may include clinical examination, additional mammography, ultrasound and, if required, a biopsy. Most women recalled to assessment are found not to have breast cancer (BreastScreen SA 2010).

## Detailed analyses

### Recall to assessment after a screen in 2010 and 2011

In 2010, of the 79,971 women aged 50–69 attending their first screen, 9,110 (11.4%) were recalled to assessment. This equates to 11.1% when age-standardised. In 2011, of the 75,999 women aged 50–69 attending their first screen, 8,420 (11.1%) were recalled to assessment, equating to 10.7% when age-standardised. The NAS for recall to assessment for women who attend for their first screen were not met at the national level for 2010 or 2011 (NAS 2.6.1 being that *less than 10% of women aged 50–69 who attend for their first screen are recalled for assessment*).

Of the 627,902 women aged 50–69 attending a subsequent screen in 2010, 25,880 (4.1%) were recalled to assessment. This equates to 4.2% when age-standardised. Of the 644,766 women aged 50–69 attending a subsequent screen in 2011, 24,022 (3.7%) were recalled to assessment, equating to 3.8% when age-standardised. These rates are well within the NAS for women attending a subsequent screen (NAS 2.6.2 being that *less than 5% of women aged 50–69 who attend for their second or subsequent screen are recalled for assessment*).

### Recall to assessment trends

Recall to assessment rates for women screened for the first time increased, while this remained constant for women attending a subsequent screening round (Table 3.1; Figure 3.1).

For women aged 50–69 attending for the first time, recall to assessment increased to around 11% of women screened in 2009, 2010 and 2011 (Table 3.1).

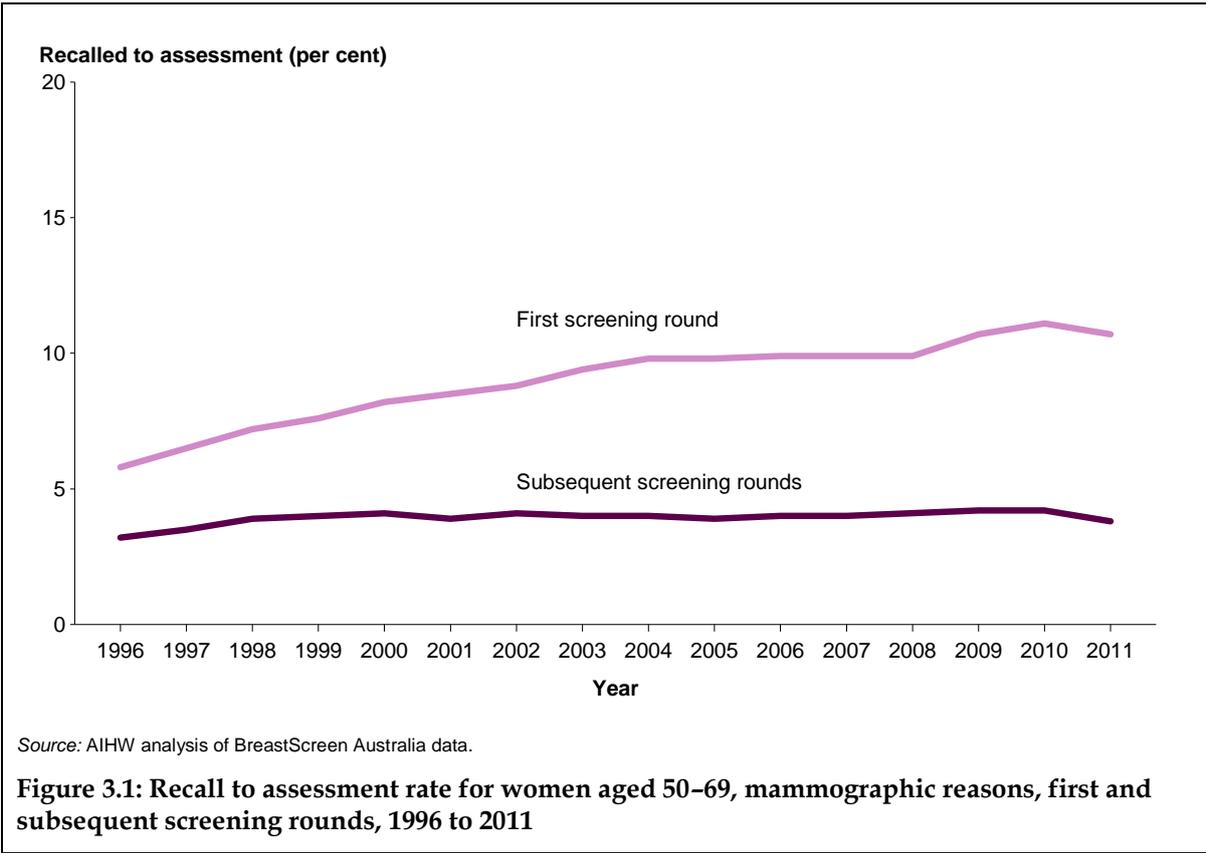
Recall to assessment for women aged 50–69 attending subsequent screening rounds, remained at about 4% of women screened for all years to 2011 (Table 3.1).

**Table 3.1: Recall to assessment rate for women aged 50–69, mammographic reasons, first and subsequent screening rounds, 2000 to 2011**

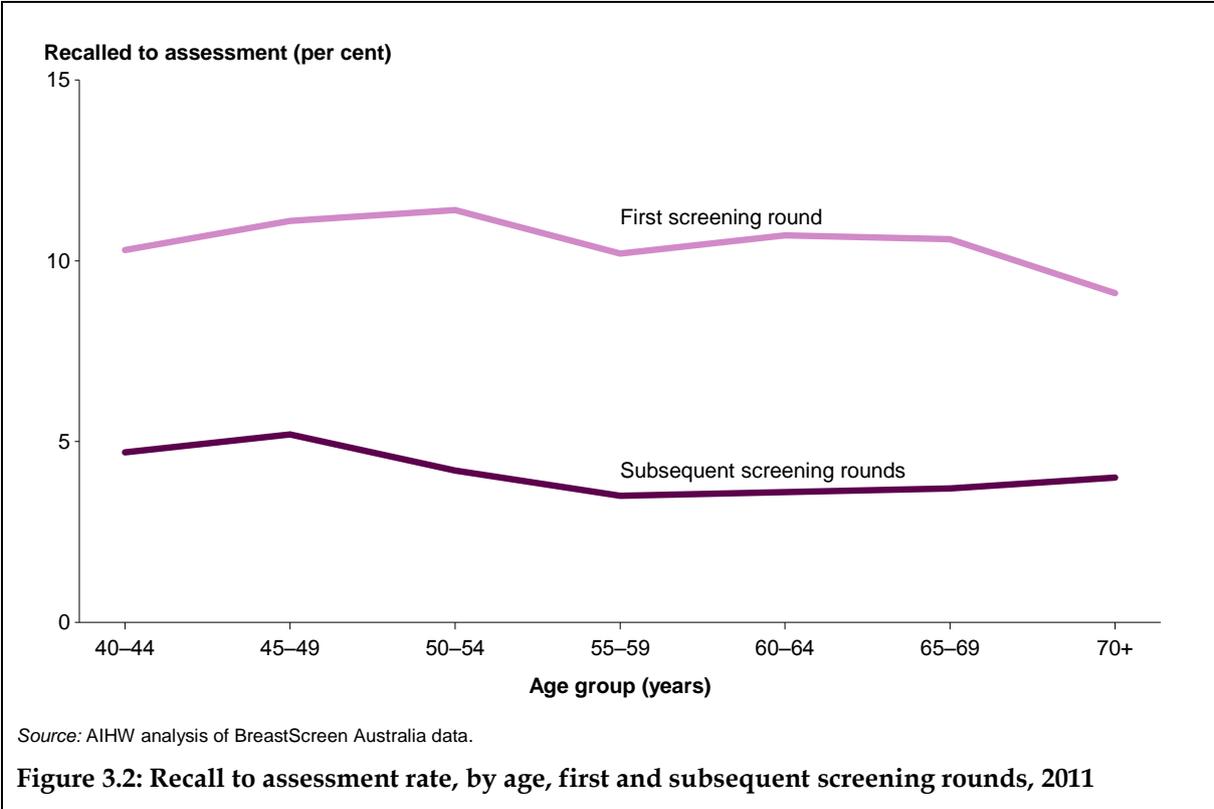
|                                    | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|------------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| <b>First screening round</b>       |      |      |      |      |      |      |      |      |      |      |      |      |
| AS rate                            | 8.2  | 8.5  | 8.8  | 9.4  | 9.8  | 9.8  | 9.9  | 9.9  | 9.9  | 10.7 | 11.1 | 10.7 |
| <b>Subsequent screening rounds</b> |      |      |      |      |      |      |      |      |      |      |      |      |
| AS rate                            | 4.1  | 3.9  | 4.1  | 4.0  | 4.0  | 3.9  | 4.0  | 4.0  | 4.1  | 4.2  | 4.2  | 3.8  |

*Note:* Rates are the number of women recalled for assessment as a percentage of women screened and age-standardised to the population of women attending a BreastScreen Australia service in 2008.

*Source:* AIHW analysis of BreastScreen Australia data.



**Recall to assessment by age**



In 2010, recall to assessment rates for the first screening round were highest for women aged 45–49 at 12.0% and lowest for women aged 40–44 at 10.5%. In subsequent screening rounds, recall to assessment rates were highest for women aged 45–49 at 5.9% and lowest for women aged 55–59 and 60–64 at 3.9% (Figure 3.2).

In 2011, recall to assessment rates for the first screening round were highest for women aged 50–54 at 11.4% and lowest for women aged 70 or over at 9.1%. In subsequent screening rounds, recall to assessment rates were highest for women aged 45–49 at 5.2% and lowest for women aged 55–59 at 3.5% (Figure 3.2).

**Recall to assessment by state and territory**

In 2010 and 2011, recall to assessment for women aged 50–69 varied considerably across states and territories (only 2011 data are shown in Figure 3.3).



In 2010, recall to assessment rates for women aged 50–69 by state and territory, attending their first screen, ranged between 6.9% and 14.9%. The corresponding rates for women aged 50–69 attending subsequent screens ranged between 1.9% and 5.1% (Table 3.2).

In 2011, recall to assessment rates for women aged 50–69 attending their first screen ranged between 6.2% and 14.3%. The corresponding rates for women aged 50–69 attending subsequent screens ranged between 1.8% and 4.4% (Table 3.2).

**Table 3.2: Recall to assessment rate for women aged 50–69, by state and territory, first and subsequent screening rounds, 2010 and 2011**

|                                    | NSW   | Vic   | Qld   | WA    | SA    | Tas | ACT  | NT   | Australia |
|------------------------------------|-------|-------|-------|-------|-------|-----|------|------|-----------|
| <b>2010</b>                        |       |       |       |       |       |     |      |      |           |
| <b>First screening round</b>       |       |       |       |       |       |     |      |      |           |
| Number                             | 2,716 | 3,053 | 1,850 | 834   | 297   | 148 | 107  | 105  | 9,110     |
| AS rate                            | 9.7   | 12.9  | 14.9  | 9.1   | 6.9   | 9.3 | 9.4  | 11.1 | 11.1      |
| <b>Subsequent screening rounds</b> |       |       |       |       |       |     |      |      |           |
| Number                             | 8,538 | 6,670 | 6,856 | 1,821 | 985   | 601 | 283  | 126  | 25,880    |
| AS rate                            | 4.4   | 4.6   | 5.1   | 2.7   | 1.9   | 3.4 | 3.2  | 3.8  | 4.2       |
| <b>2011</b>                        |       |       |       |       |       |     |      |      |           |
| <b>First screening round</b>       |       |       |       |       |       |     |      |      |           |
| Number                             | 2,644 | 2,764 | 1,556 | 769   | 294   | 168 | 140  | 85   | 8,420     |
| AS rate                            | 10.0  | 12.3  | 14.3  | 8.9   | 6.2   | 9.7 | 11.7 | 8.3  | 10.7      |
| <b>Subsequent screening rounds</b> |       |       |       |       |       |     |      |      |           |
| Number                             | 8,545 | 6,068 | 5,827 | 1,531 | 1,037 | 518 | 391  | 105  | 24,022    |
| AS rate                            | 4.4   | 4.1   | 4.2   | 2.2   | 1.8   | 2.9 | 4.0  | 2.9  | 3.8       |

*Note:* Rates are the number of women recalled for assessment as a percentage of women screened and age-standardised to the population of women attending a BreastScreen Australia service in 2008.

*Source:* AIHW analysis of BreastScreen Australia data.

## Indicator 4 Invasive breast cancer detection

### What you need to know about invasive breast cancer detection

**Definition:** The number of women with invasive breast cancer detected through BreastScreen Australia per 10,000 women screened. The rate is reported for breast cancers of all sizes, as well as for a subset of breast cancers that are small (having a diameter less than or equal to 15 mm).

**Rationale:** The overarching aim of BreastScreen Australia is to reduce morbidity and mortality from breast cancer. This can be achieved by detecting cases of unsuspected breast cancer before women have symptoms, enabling early intervention. BreastScreen Australia strives to maximise the detection of invasive breast cancers, particularly small cancers, to achieve the desired reductions in morbidity and mortality.

The NAS outline that at least 50 per 10,000 women screened aged 50–69 who attend for their first screen are diagnosed with invasive breast cancer (NAS 2.1.1), at least 35 women per 10,000 women screened aged 50–69 who attend for subsequent screens are diagnosed with invasive breast cancer (NAS 2.1.2), and that at least 25 women per 10,000 women screened aged 50–69 who attend for screening are diagnosed with small ( $\leq 15$  mm) invasive breast cancer (NAS 2.2.1) (BreastScreen Australia 2004).

**Guide to interpretation:** Detection of invasive breast cancers is disaggregated into first and subsequent screening rounds because a woman is more likely to have a breast cancer detected the first time she visits a BreastScreen service than in subsequent visits. This is because a woman's first visit detects prevalent cancers that may have been present for some time rather than incident cancers that have grown between screens (Kavanagh et al. 1999). Detection of small invasive cancers is presented for all screening rounds combined.

The most recent cancer detection data are for women screened in 2010 and 2011.

### What the data tell us about invasive breast cancer detection

#### Trend

Invasive breast cancer detection in the first screening round increased to a peak of 91.6 per 10,000 women screened in 2010 before decreasing slightly to 82.1 in 2011.

Detection in subsequent rounds remained steady at around 43–44 per 10,000 women screened for most years.

#### 2010

In 2010, 91.6 per 10,000 women aged 50–69 screened were diagnosed with invasive breast cancer in the first screening round, and 44.4 in subsequent screening rounds.

For women aged 50–69, 60.2% of all invasive breast cancers detected were small ( $\leq 15$  mm).

#### 2011

In 2011, 82.1 women aged 50–69 were diagnosed with invasive breast cancer per 10,000 women screened in the first screening round, and 42.9 in subsequent screening rounds.

For women aged 50–69, 61.1% of all invasive breast cancers detected were small ( $\leq 15$  mm).

## Detailed analyses

### Invasive breast cancer detection after a screen in 2010 and 2011

In 2010, 4,472 women were diagnosed with invasive breast cancer, of whom 3,460 (77.4%) were aged 50–69, 375 (8.4%) were aged 40–49, and 637 (14.2%) were aged 70 or over.

Of the 3,460 women aged 50–69 diagnosed with invasive breast cancer in 2010, 581 were attending their first screen (equivalent to 72.7 women diagnosed per 10,000 women screened) and 2,879 were attending a subsequent screen (equivalent to 45.9 per 10,000). When age-standardised to allow analyses of trends, these rates are 91.6 per 10,000 in the first screening round and 44.4 per 10,000 in subsequent rounds (Table 4.1).

In 2011, 4,391 women were diagnosed with invasive breast cancer of whom 3,399 (77.4%) were aged 50–69, 336 (7.7%) were aged 40–49 and 656 (14.9%) were aged 70 or over.

Of the 3,399 women aged 50–69 diagnosed with invasive breast cancer in 2011, 537 were attending their first screen (equivalent to 70.7 women diagnosed per 10,000 women screened) and 2,862 were attending a subsequent screen (equivalent to 44.4 women per 10,000). When age-standardised to allow analyses of trends, these rates are 82.1 per 10,000 women screened in the first screening round and 42.9 per 10,000 women screened in subsequent rounds (Table 4.1).

**Table 4.1: All-size and small invasive breast cancer detection in women aged 50–69, first and subsequent screening rounds for all-size cancers, and all screening rounds for small cancers, 2010 and 2011**

|                             | Number | AS rate | 95% CI     |
|-----------------------------|--------|---------|------------|
| <b>2010</b>                 |        |         |            |
| <b>All size</b>             |        |         |            |
| First screening round       | 581    | 91.6    | 82.6–101.2 |
| Subsequent screening rounds | 2,879  | 44.4    | 42.8–46.1  |
| <b>Small size</b>           |        |         |            |
| All screening rounds        | 2,082  | 29.2    | 27.9–30.4  |
| <b>2011</b>                 |        |         |            |
| <b>All size</b>             |        |         |            |
| First screening round       | 537    | 82.1    | 73.5–91.3  |
| Subsequent screening rounds | 2,862  | 42.9    | 41.3–44.5  |
| <b>Small size</b>           |        |         |            |
| All screening rounds        | 2,077  | 28.4    | 27.2–29.7  |

#### Notes

1. The 2010 data may differ from that published in the *BreastScreen Australia monitoring report 2009–2010* due to updates to the database.
2. Rates are the number of women with invasive breast cancer detected per 10,000 women screened and age-standardised to the population of women attending a BreastScreen Australia service in 2008.

Source: AIHW analysis of BreastScreen Australia data.

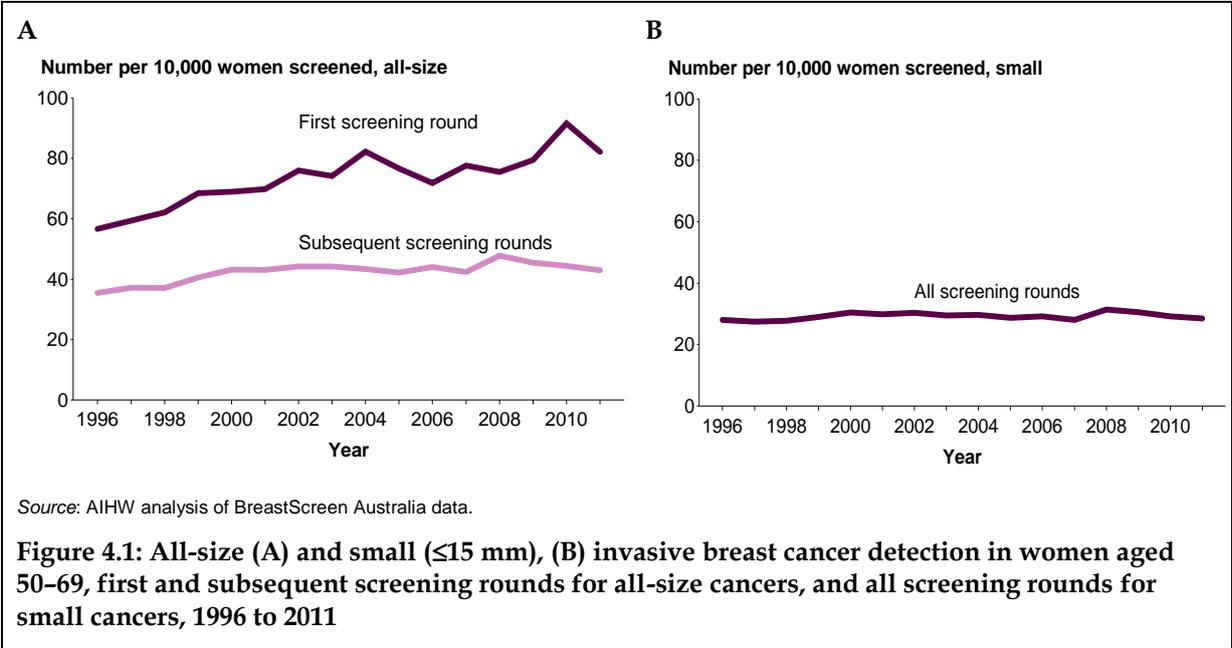
In 2010, of the 3,460 women aged 50–69 diagnosed with invasive breast cancer, 2,082 had a small ( $\leq 15$  mm) cancer diagnosed (29.4 per 10,000 women screened). This is 60.2% of all cancers diagnosed in women aged 50–69. Age-standardised, this is 29.2 per 10,000 women screened.

In 2011, of the 3,399 women aged 50–69 diagnosed with invasive breast cancer, 2,077 had a small ( $\leq 15$  mm) cancer diagnosed (28.8 per 10,000 women screened), equating to 61.1% of all cancers diagnosed in women aged 50–69. Age-standardised, this is 28.4 per 10,000 women screened.

These met the NAS for the detection of invasive breast cancer (NAS 2.1.1 being that *at least 50 women per 10,000 women screened aged 50–69 who attend for their first screen are diagnosed with invasive breast cancer*, and NAS 2.1.2 being that *at least 35 women per 10,000 women screened aged 50–69 who attend for their second or subsequent screen are diagnosed with invasive breast cancer*), as well as the NAS for the detection of small invasive breast cancer (NAS 2.2.1) being that *at least 25 women per 10,000 women screened aged 50–69 who attend for screening are diagnosed with small ( $\leq 15$  mm) invasive breast cancer*).

**Invasive breast cancer detection trends**

Detection of invasive breast cancers through BreastScreen Australia has increased over time (Figure 4.1).



Detection of invasive breast cancer in the first screening round increased from 69.0 women diagnosed per 10,000 women screened in 2000 to 91.6 in 2010; it then decreased slightly to 82.1 per 10,000 women screened (Figure 4.1A and Table 4.2).

Detection of invasive breast cancer in subsequent screening rounds increased from 43.1 per 10,000 women screened in 2000 to 44.4 in 2010; it then decreased slightly to 42.9 per 10,000 women screened (Figure 4.1A and Table 4.2).

Detection of small cancers for all screening rounds combined was 28 to 30 per 10,000 women screened for most years between 2000 and 2011 (Figure 4.1B and Table 4.3).

**Table 4.2: All-size invasive breast cancer detection in women aged 50–69, first and subsequent screening rounds, 2000 to 2011**

|                                    | 2000          | 2001          | 2002          | 2003          | 2004          | 2005          | 2006          | 2007          | 2008          | 2009          | 2010           | 2011          |
|------------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|----------------|---------------|
| <b>First screening round</b>       |               |               |               |               |               |               |               |               |               |               |                |               |
| AS rate                            | 69.0          | 69.8          | 76.0          | 74.2          | 82.2          | 76.6          | 71.8          | 77.6          | 75.5          | 79.5          | 91.6           | 82.1          |
| 95% CI                             | 62.2–<br>76.2 | 63.1–<br>76.9 | 68.3–<br>84.2 | 66.0–<br>82.9 | 73.3–<br>91.8 | 68.4–<br>85.4 | 63.8–<br>80.4 | 69.8–<br>86.0 | 68.5–<br>82.9 | 71.7–<br>87.7 | 82.6–<br>101.2 | 73.5–<br>91.3 |
| <b>Subsequent screening rounds</b> |               |               |               |               |               |               |               |               |               |               |                |               |
| AS rate                            | 43.1          | 43.0          | 44.2          | 44.2          | 43.3          | 42.1          | 44.0          | 42.3          | 47.8          | 45.4          | 44.4           | 42.9          |
| 95% CI                             | 41.2–<br>45.1 | 41.2–<br>44.9 | 42.4–<br>46.1 | 42.4–<br>46.1 | 41.5–<br>45.1 | 40.5–<br>43.9 | 42.3–<br>45.7 | 40.7–<br>44.0 | 46.0–<br>49.6 | 43.8–<br>47.1 | 42.8–<br>46.1  | 41.3–<br>44.5 |

Note: Rates are the number of women with invasive breast cancer detected per 10,000 women screened and age-standardised to the population of women attending a BreastScreen Australia service in 2008.

Source: AIHW analysis of BreastScreen Australia data.

**Table 4.3: Small ( $\leq 15$  mm) invasive breast cancer detection rates in women aged 50–69, all screening rounds, 2000 to 2011**

|                             | 2000          | 2001          | 2002          | 2003          | 2004          | 2005          | 2006          | 2007          | 2008          | 2009          | 2010          | 2011          |
|-----------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| <b>All screening rounds</b> |               |               |               |               |               |               |               |               |               |               |               |               |
| AS rate                     | 30.5          | 29.8          | 30.3          | 29.4          | 29.6          | 28.7          | 29.2          | 28.0          | 31.4          | 30.5          | 29.2          | 28.4          |
| 95% CI                      | 29.0–<br>32.0 | 28.4–<br>31.3 | 28.9–<br>31.8 | 28.0–<br>30.9 | 28.3–<br>31.0 | 27.4–<br>30.1 | 27.9–<br>30.5 | 26.7–<br>29.3 | 30.1–<br>32.8 | 29.2–<br>31.8 | 27.9–<br>30.4 | 27.2–<br>29.7 |

Note: Rates are the number of women with small invasive breast cancer detected per 10,000 women screened and age-standardised to the population of women attending a BreastScreen Australia service in 2008.

Source: AIHW analysis of BreastScreen Australia data.

## Proportion of invasive breast cancers detected that are small

A woman is more likely to be diagnosed with a small cancer in subsequent screening visits than her first visit, since her first screening mammogram detects prevalent cancers that may have been present for some time, whereas subsequent screens detect incident cancers that have grown between screens (Kavanagh et al. 1999). Because they have had less time to grow, incident cancers are more likely to be small.

### Box 4.1: Terminology

**Prevalent cancers:** the number of cases of invasive breast cancer that are present in the population at a given time.

**Incident cancers:** the number of new cancers diagnosed in a given time period, in this case 1 year.

Accordingly, the proportion of small cancers detected was lower in the first screening round (48.2% in 2010 and 49.5% in 2011) than in subsequent screening rounds (62.6% in 2010 and 63.4% in 2011).

The proportion of small invasive breast cancers in 2010 was lower in younger age groups: 51.2% of cancers for women aged 40–49 compared with 60.2% for women aged 50–69 and 59.7% for women aged 70 and over (*BreastScreen Australia monitoring report 2010–2011: supplementary data tables, Table S4.7*). This trend was also seen in 2011 with 50.9% for women

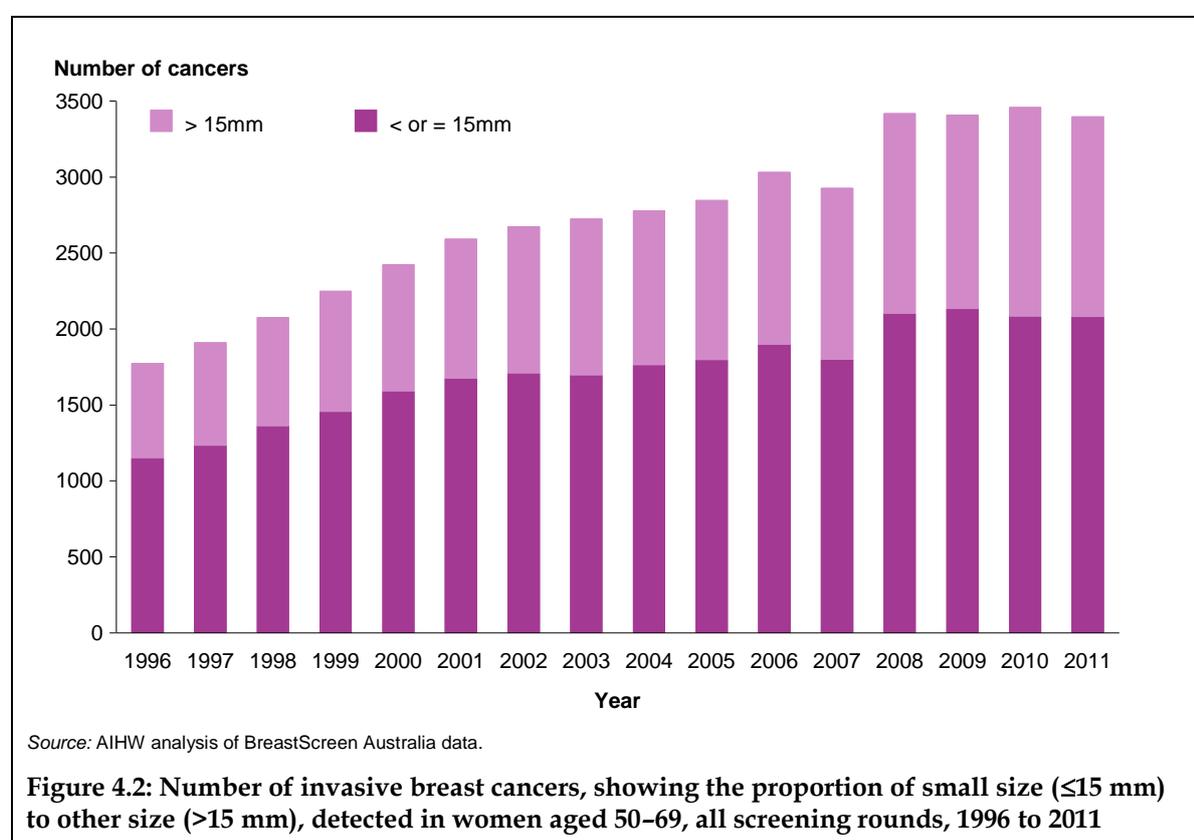
aged 40–49, 61.1% for women aged 50–69 and 65.1% for women aged 70 and over (*BreastScreen Australia monitoring report 2010–2011: supplementary data tables, Table S4.7*). The lower proportion of small invasive cancers in young age groups may be related to greater breast density in younger women, which makes small invasive breast cancers more difficult to visualise using screening mammography (Irwig et al. 1997). More than half of all invasive breast cancers detected through BreastScreen Australia in women aged 50–69 were small ( $\leq 15$  mm), with rates above 60% for all years between 2000 and 2011 (Table 4.4; Figure 4.2).

**Table 4.4: Proportion of small ( $\leq 15$  mm) invasive breast cancers detected in women aged 50–69, all screening rounds, 2000 to 2011**

|          | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|----------|------|------|------|------|------|------|------|------|------|------|------|------|
| Per cent | 65.6 | 64.5 | 63.8 | 62.2 | 63.5 | 63.1 | 62.6 | 61.4 | 61.5 | 62.6 | 60.2 | 61.1 |

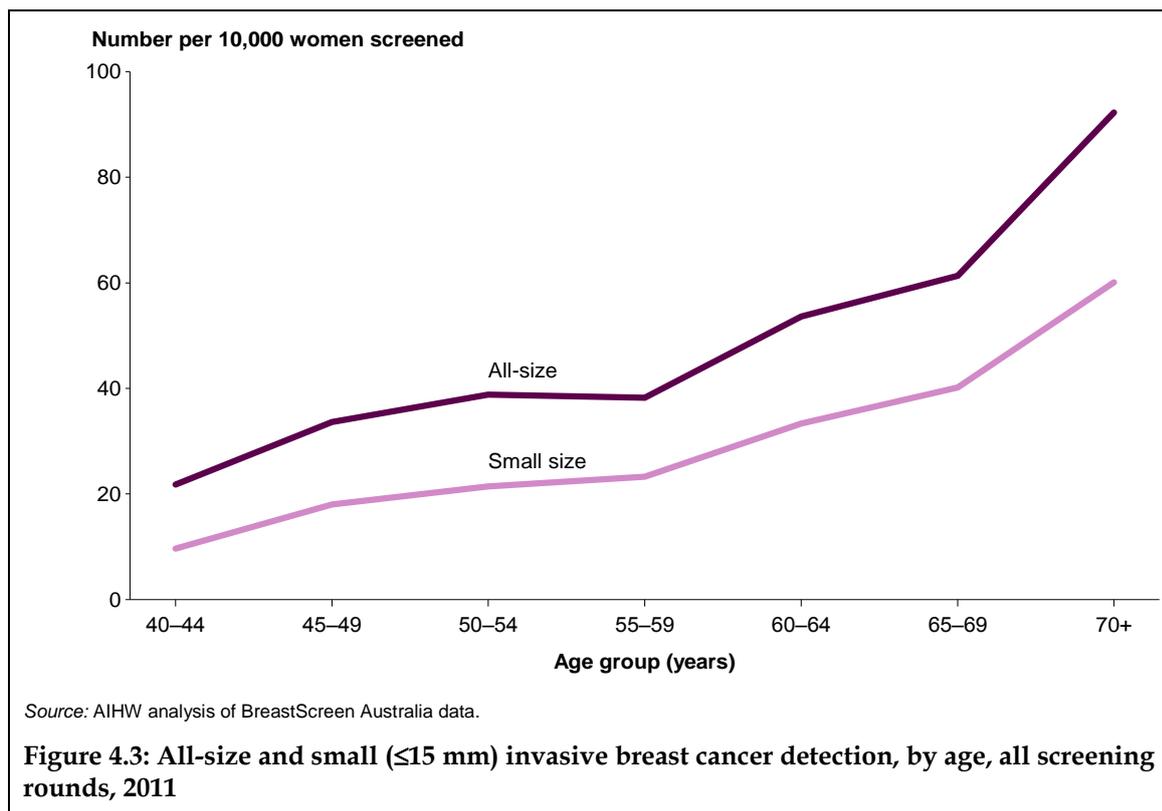
Note: Rates are the number of women with small invasive breast cancer detected as a proportion of the number of women with invasive breast cancer detected.

Source: AIHW analysis of BreastScreen Australia data.



### Invasive breast cancer detection by age

Detection of invasive breast cancer increased with age (Figure 4.3), reflecting the increase in incidence that occurs with age, as described in Indicator 7a. In 2010, invasive breast cancer detection increased from 24.1 per 10,000 women screened for women aged 40–44 to 91.5 for women aged 70 or over. In 2011, invasive breast cancer detection increased from 21.8 to 92.3 for women over the same age (Table 4.5).



Small invasive breast cancer detection increased with age in 2010 and 2011 – from 11.0 per 10,000 women aged 40–44 to 54.6 per 10,000 women aged 70 or more in 2010, and from 9.4 per 10,000 women aged 40–44 to 60.1 per 10,000 women aged 70 or more in 2011 (Table 4.5).

**Table 4.5: All-size and small ( $\leq 15$  mm) invasive breast cancer detection rates, by age, all screening rounds, 2010 and 2011**

|                 | Age group (years) |       |       |       |       |       |      |
|-----------------|-------------------|-------|-------|-------|-------|-------|------|
|                 | 40–44             | 45–49 | 50–54 | 55–59 | 60–64 | 65–69 | 70+  |
| <b>2010</b>     |                   |       |       |       |       |       |      |
| <b>All-size</b> |                   |       |       |       |       |       |      |
| Number          | 94                | 281   | 720   | 811   | 1,017 | 912   | 637  |
| Rate            | 24.1              | 38.7  | 37.7  | 42.3  | 54.4  | 66.0  | 91.5 |
| <b>Small</b>    |                   |       |       |       |       |       |      |
| Number          | 43                | 149   | 383   | 486   | 632   | 581   | 380  |
| Rate            | 11.0              | 20.5  | 20.0  | 25.4  | 33.8  | 42.1  | 54.6 |
| <b>2011</b>     |                   |       |       |       |       |       |      |
| <b>All-size</b> |                   |       |       |       |       |       |      |
| Number          | 88                | 248   | 742   | 737   | 1,026 | 894   | 656  |
| Rate            | 21.8              | 33.6  | 38.9  | 38.2  | 53.6  | 61.4  | 92.3 |
| <b>Small</b>    |                   |       |       |       |       |       |      |
| Number          | 38                | 133   | 408   | 449   | 636   | 584   | 427  |
| Rate            | 9.4               | 18.0  | 21.4  | 23.3  | 33.2  | 40.1  | 60.1 |

Note: Rates are age-specific rates.

Source: AIHW analysis of BreastScreen Australia data.

## Invasive breast cancer detection by state and territory

The number of women with invasive breast cancer diagnosed per 10,000 women screened showed considerable variation among states and territories. These data should be interpreted with caution because, due to small numbers, none of the observed differences were statistically significant (Figure 4.4; Table 4.6).

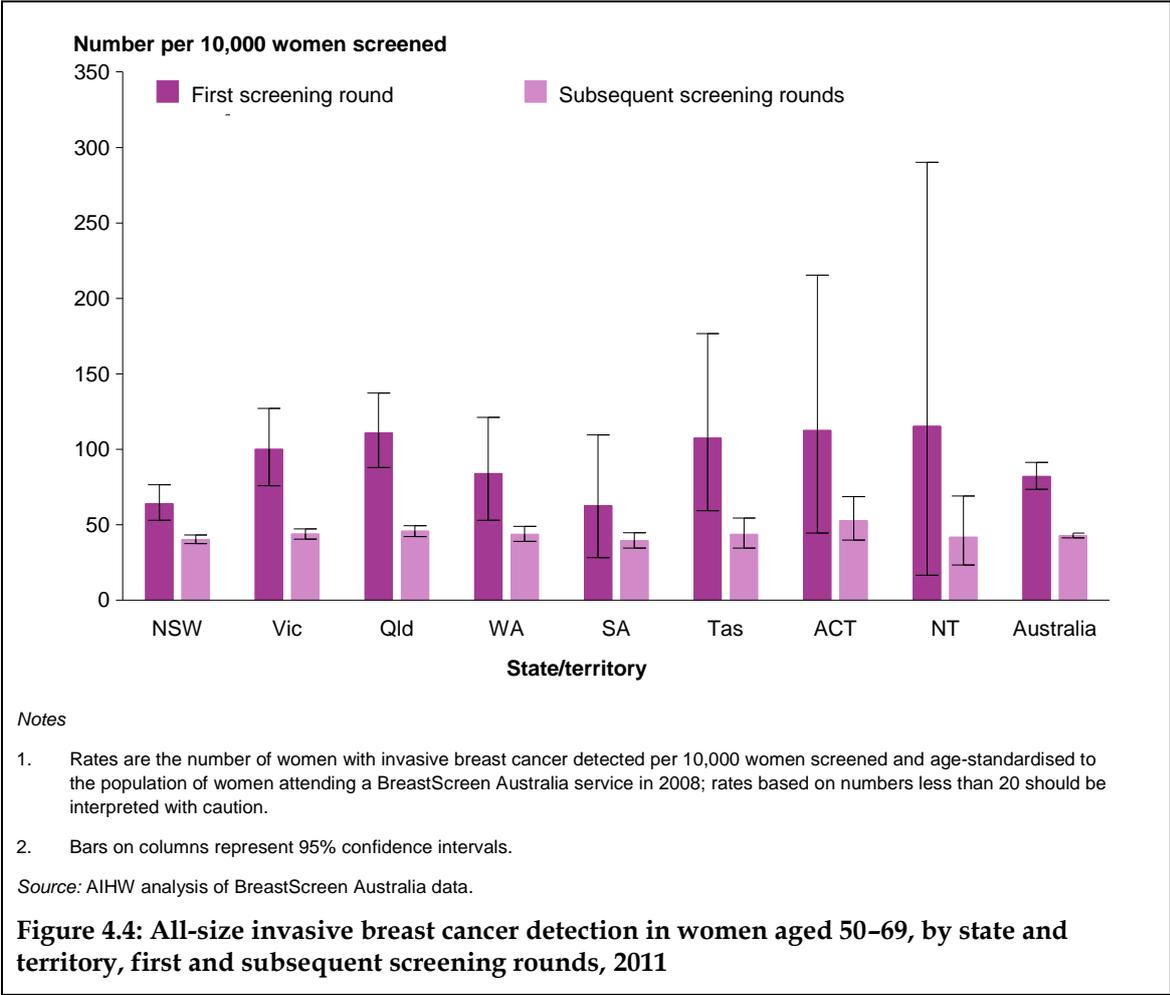
**Table 4.6: All-size and small ( $\leq 15$  mm) invasive breast cancer detection rates in women aged 50–69, by state and territory, 2010 and 2011**

|  | NSW       | Vic        | Qld        | WA         | SA         | Tas        | ACT        | NT         | Australia  |
|--|-----------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>2010</b>                                  |           |            |            |            |            |            |            |            |            |
| <b>All-size, first screening round</b>       |           |            |            |            |            |            |            |            |            |
| Number                                       | 198       | 150        | 100        | 68         | 28         | 22         | 8          | 7          | 581        |
| AS rate                                      | 84.3      | 103.4      | 91.4       | 91.5       | 96.3       | 149.6      | 151.9      | 83.8       | 91.6       |
| 95% CI                                       | 71.7–98.2 | 79.2–130.6 | 71.9–114.0 | 62.9–125.8 | 47.5–161.1 | 84.7–239.1 | 19.1–378.7 | 26.5–185.4 | 82.6–101.2 |
| <b>All size, subsequent screening rounds</b> |           |            |            |            |            |            |            |            |            |
| Number                                       | 842       | 678        | 654        | 309        | 249        | 81         | 46         | 20         | 2,879      |
| AS rate                                      | 41.8      | 44.2       | 47.7       | 43.6       | 46.3       | 43.9       | 49.0       | 58.2       | 44.4       |
| 95% CI                                       | 39.0–44.7 | 40.9–47.8  | 44.1–51.5  | 38.8–48.7  | 40.7–52.5  | 34.8–54.7  | 35.7–65.5  | 35.3–90.4  | 42.8–46.1  |
| <b>Small, all screening rounds</b>           |           |            |            |            |            |            |            |            |            |
| Number                                       | 615       | 481        | 477        | 211        | 187        | 59         | 37         | 15         | 2,082      |
| AS rate                                      | 27.3      | 28.1       | 32.3       | 27.2       | 32.3       | 29.4       | 36.6       | 36.7       | 29.2       |
| 95% CI                                       | 25.2–29.6 | 25.6–30.7  | 29.5–35.3  | 23.7–31.2  | 27.9–37.3  | 22.4–37.9  | 25.8–50.5  | 20.3–61.0  | 27.9–30.4  |
| <b>2011</b>                                  |           |            |            |            |            |            |            |            |            |
| <b>All-size, first screening round</b>       |           |            |            |            |            |            |            |            |            |
| Number                                       | 148       | 156        | 110        | 61         | 24         | 18         | 13         | 7          | 537        |
| AS rate                                      | 64.0      | 100.0      | 110.9      | 83.8       | 62.6       | 110.9      | 112.4      | 115.2      | 82.1       |
| 95% CI                                       | 53.0–76.4 | 76.0–127.0 | 88.0–137.2 | 53.0–121.1 | 28.1–109.5 | 62.2–180.3 | 44.5–215.5 | 16.5–290.2 | 73.5–91.3  |
| <b>All size, subsequent screening rounds</b> |           |            |            |            |            |            |            |            |            |
| Number                                       | 815       | 697        | 646        | 310        | 240        | 81         | 58         | 15         | 2,862      |
| AS rate                                      | 40.4      | 43.8       | 45.7       | 43.7       | 39.4       | 43.7       | 52.8       | 41.8       | 42.9       |
| 95% CI                                       | 37.6–43.3 | 40.5–47.2  | 42.3–49.4  | 39.0–48.9  | 34.5–44.7  | 34.6–54.4  | 39.8–68.6  | 23.3–69.2  | 41.3–44.5  |
| <b>Small, all screening rounds</b>           |           |            |            |            |            |            |            |            |            |
| Number                                       | 598       | 501        | 457        | 234        | 161        | 69         | 41         | 16         | 2,077      |
| AS rate                                      | 26.7      | 28.4       | 30.4       | 30.1       | 24.8       | 34.5       | 34.9       | 38.8       | 28.4       |
| 95% CI                                       | 24.6–28.9 | 25.9–31.0  | 27.6–33.3  | 26.4–34.2  | 21.1–28.9  | 26.8–43.6  | 25.0–47.4  | 21.9–63.3  | 27.2–29.7  |

### Notes

1. Rates are the number of women with invasive breast cancer detected per 10,000 women screened and age-standardised to the population of women attending a BreastScreen Australia service in 2008; rates based on numbers less than 20 should be interpreted with caution.
2. State and territory differences, along with the size of the 95% confidence intervals (particularly in the smaller states and territories), need to be taken into consideration when interpreting cancer detection results.
3. In some states and territories, age-standardised rates vary considerably from crude rates. Crude rates are available in the *BreastScreen Australia monitoring report 2010–2011: supplementary data tables*.

Source: AIHW analysis of BreastScreen Australia data.



## Indicator 5 Ductal carcinoma in situ detection

### What you need to know about DCIS detection

**Definition:** The number of women with ductal carcinoma in situ (DCIS) detected through BreastScreen Australia per 10,000 women screened.

**Rationale:** Women with DCIS are at an increased risk of later developing invasive breast cancer (AIHW 2010a; WHO & IARC 2002). Research has shown that invasive breast cancer may also occur after treated cases of DCIS, either in the opposite breast or independently of the original DCIS in the same breast (Kerlikowske et al. 2010).

It is not currently possible to predict which DCIS cases might progress to invasive breast cancer. However, given the increased risk of invasive breast cancer after a diagnosis of DCIS, and that the detection and subsequent treatment of high-grade DCIS is likely to prevent deaths from invasive breast cancer (Eusebi et al. 1994), BreastScreen Australia aims to maximise the detection of DCIS. This is reflected in the NAS for detection of DCIS that requires that, for women aged 50–69, at least 12 women per 10,000 women screened who attend their first screen are diagnosed with DCIS (NAS 2.3.1), and that at least 7 women per 10,000 women screened who attend for subsequent screens are diagnosed with DCIS (NAS 2.3.2) (BreastScreen Australia 2004).

**Guide to interpretation:** DCIS is disaggregated into first and subsequent screening rounds because a woman is more likely to have DCIS diagnosed at her first screen than subsequent screens, since her first visit detects prevalent cases, not just incident cases.

To produce stable, comparable rates from the relatively small number of DCIS cases, detection of DCIS is reported by 10-year age groups and, when disaggregated by state and territory, is presented for all screening rounds combined.

The most recent DCIS detection data are for women screened in 2010 and 2011.

### What the data tell us about DCIS detection

#### Trend

DCIS detection has remained relatively stable over the last 10 years.

#### 2010

For women aged 50–69, 17.9 per 10,000 women screened were diagnosed with DCIS in the first screening round, and 11.5 per 10,000 in subsequent rounds.

#### 2011

For women aged 50–69, 20.9 per 10,000 women screened were diagnosed with DCIS in the first screening round, and 11.2 per 10,000 in subsequent rounds.

## More information on DCIS

DCIS is a non-invasive tumour that arises from the lining of the ducts that carry milk from the milk-producing lobules to the nipple. The changes to the cells lining the milk ducts seen in DCIS are similar to those in invasive breast cancer. However, unlike breast cancer, DCIS does not invade the surrounding breast tissue and is, instead, contained entirely within the milk duct.

Most cases of DCIS are asymptomatic. They are usually detected as a change on a mammogram or as a chance finding on a breast biopsy for another condition (BreastScreen Australia 2004). DCIS was rarely discovered before the introduction of screening mammography. The introduction and progressive expansion of national organised screening mammography from 1991 (in the form of BreastScreen Australia) resulted in a substantial increase in its detection (Luke et al. 2006; NBBC et al. 2000).

Women with DCIS are at an increased risk of later developing invasive breast cancer (AIHW 2010a; WHO & IARC 2002). Research has shown that invasive breast cancer may also occur after treated cases of DCIS, either in the opposite breast or independently of the original DCIS in the same breast (Kerlikowske et al. 2010). BreastScreen Australia therefore aims to maximise the detection of DCIS in Australian women.

## Detailed analyses

### DCIS detection after a screen in 2010 and 2011

In 2010, 1,103 women were diagnosed with DCIS by BreastScreen Australia, of whom 876 (79.4%) were aged 50–69. Of these 876 women, 142 were attending their first screen (equivalent to 17.9 women diagnosed per 10,000 women screened) and 734 were attending a subsequent screen (equivalent to 11.5 per 10,000 women screened) (Table 5.1).

In 2011, the data show a similar trend with 1,120 women diagnosed with DCIS, of whom 881 (78.7%) were aged 50–69. Of these 881 women, 141 were attending their first screen (equivalent to 20.9 women diagnosed per 10,000 women screened) and 740 were attending a subsequent screen (equivalent to 11.2 per 10,000 women screened) (Table 5.1).

**Table 5.1: DCIS detection in women aged 50–69, first and subsequent screening rounds, 2010 and 2011**

|                             | Number | AS rate | 95% CI    |
|-----------------------------|--------|---------|-----------|
| <b>2010</b>                 |        |         |           |
| First screening round       | 142    | 17.9    | 14.1–22.1 |
| Subsequent screening rounds | 734    | 11.5    | 10.7–12.4 |
| <b>2011</b>                 |        |         |           |
| First screening round       | 141    | 20.9    | 16.7–25.7 |
| Subsequent screening rounds | 740    | 11.2    | 10.4–12.1 |

*Note:* Rates are the number of women with DCIS detected per 10,000 women screened and age-standardised to the population of women attending a BreastScreen Australia service in 2008.

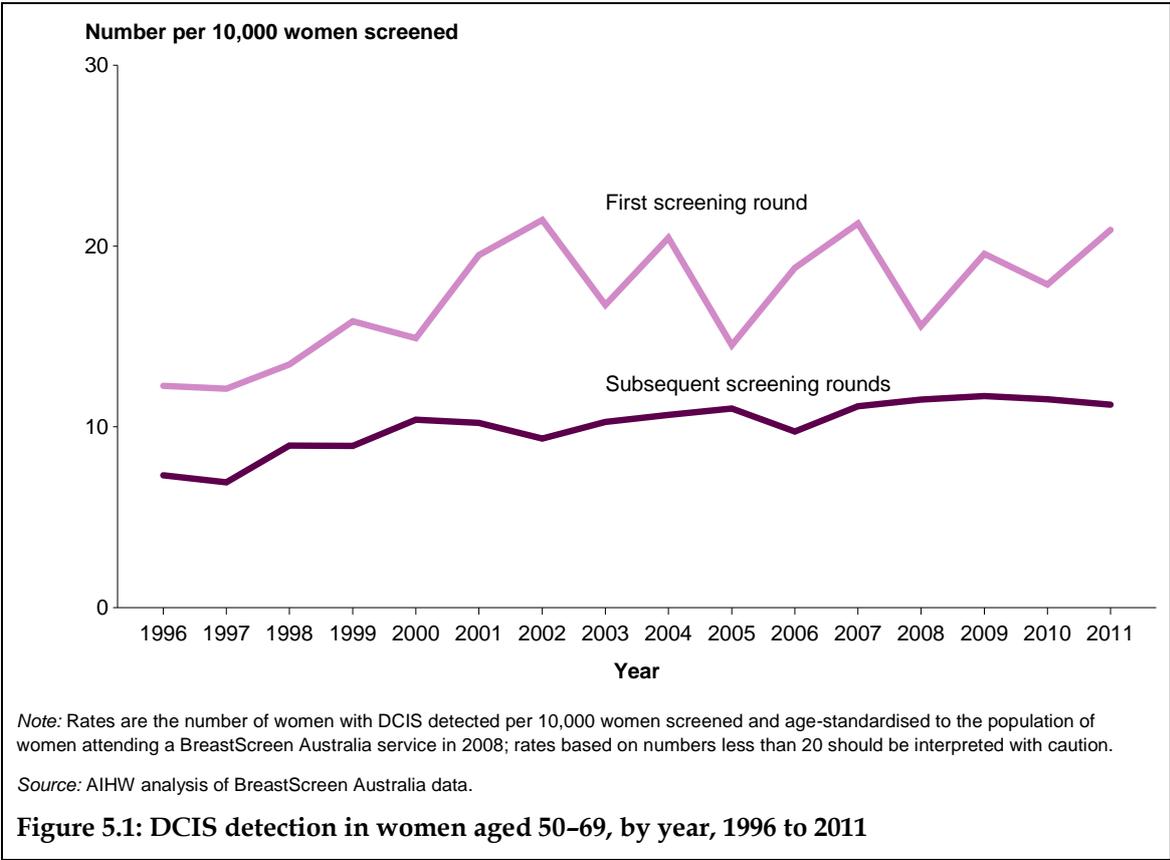
*Source:* AIHW analysis of BreastScreen Australia data.

These met the NAS for the detection of DCIS (NAS 2.3.1 being that *at least 12 women per 10,000 women screened aged 50–69 who attend their first screen are diagnosed with DCIS*, and NAS 2.3.2 being that *at least 7 women per 10,000 women screened aged 50–69 who attend for subsequent screens are diagnosed with DCIS*).

**DCIS detection trends**

Detection of DCIS in women aged 50–69 in the first screening round varied between 15 and 21 per 10,000 women screened over the years 2000 to 2011, with these rates having relatively broad confidence intervals (Figure 5.1; Table 5.2).

Detection of DCIS in women aged 50–69 in subsequent screening rounds increased from about 10.4 in 2000 to range between 11 and 12 per 10,000 women screened for all years from 2007 to 2011 (Figure 5.1; Table 5.2).



**Table 5.2: DCIS detection in women aged 50–69, first and subsequent screening rounds, 2000 to 2011**

|                                    | 2000          | 2001          | 2002          | 2003          | 2004          | 2005          | 2006          | 2007          | 2008          | 2009          | 2010          | 2011          |
|------------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| <b>First screening round</b>       |               |               |               |               |               |               |               |               |               |               |               |               |
| AS rate                            | 14.9          | 19.5          | 21.4          | 16.7          | 20.4          | 14.5          | 18.8          | 21.3          | 15.6          | 19.6          | 17.9          | 20.9          |
| 95% CI                             | 11.9–<br>18.4 | 16.1–<br>23.3 | 17.6–<br>25.8 | 13.0–<br>21.0 | 16.1–<br>25.4 | 11.2–<br>18.4 | 14.9–<br>23.3 | 17.3–<br>25.7 | 12.7–<br>18.8 | 16.0–<br>23.6 | 14.1–<br>22.1 | 16.7–<br>25.7 |
| <b>Subsequent screening rounds</b> |               |               |               |               |               |               |               |               |               |               |               |               |
| AS rate                            | 10.4          | 10.2          | 9.3           | 10.3          | 10.7          | 11.0          | 9.7           | 11.1          | 11.5          | 11.7          | 11.5          | 11.2          |
| 95% CI                             | 9.5–<br>11.4  | 9.3–<br>11.1  | 8.5–<br>10.2  | 9.4–<br>11.2  | 9.8–<br>11.6  | 10.2–<br>11.9 | 8.9–<br>10.6  | 10.3–<br>12.0 | 10.7–<br>12.4 | 10.9–<br>12.6 | 10.7–<br>12.4 | 10.4–<br>12.1 |

Note: Rates are the number of women with DCIS detected per 10,000 women screened and age-standardised to the population of women attending a BreastScreen Australia service in 2008.

Source: AIHW analysis of BreastScreen Australia data.

### Detection of DCIS by age

Similar to invasive breast cancer detection, DCIS detection increases with age.

In 2010, the rate of women diagnosed with DCIS per 10,000 women screened increased from 10.5 for women aged 40–49 to 11.6 for women aged 50–59, 13.3 for women aged 60–69 and 15.8 for women aged 70 and over (Table 5.3).

In 2011, the rate of women diagnosed with DCIS per 10,000 women decreased slightly from 11.1 for women aged 40–49 to 10.8 for women aged 50–59, then increased to 13.8 for women aged 60–69 and to 15.8 for women aged 70 and over (Table 5.3).

**Table 5.3: Age-specific detection rates for DCIS, all screening rounds, by age, 2010 and 2011**

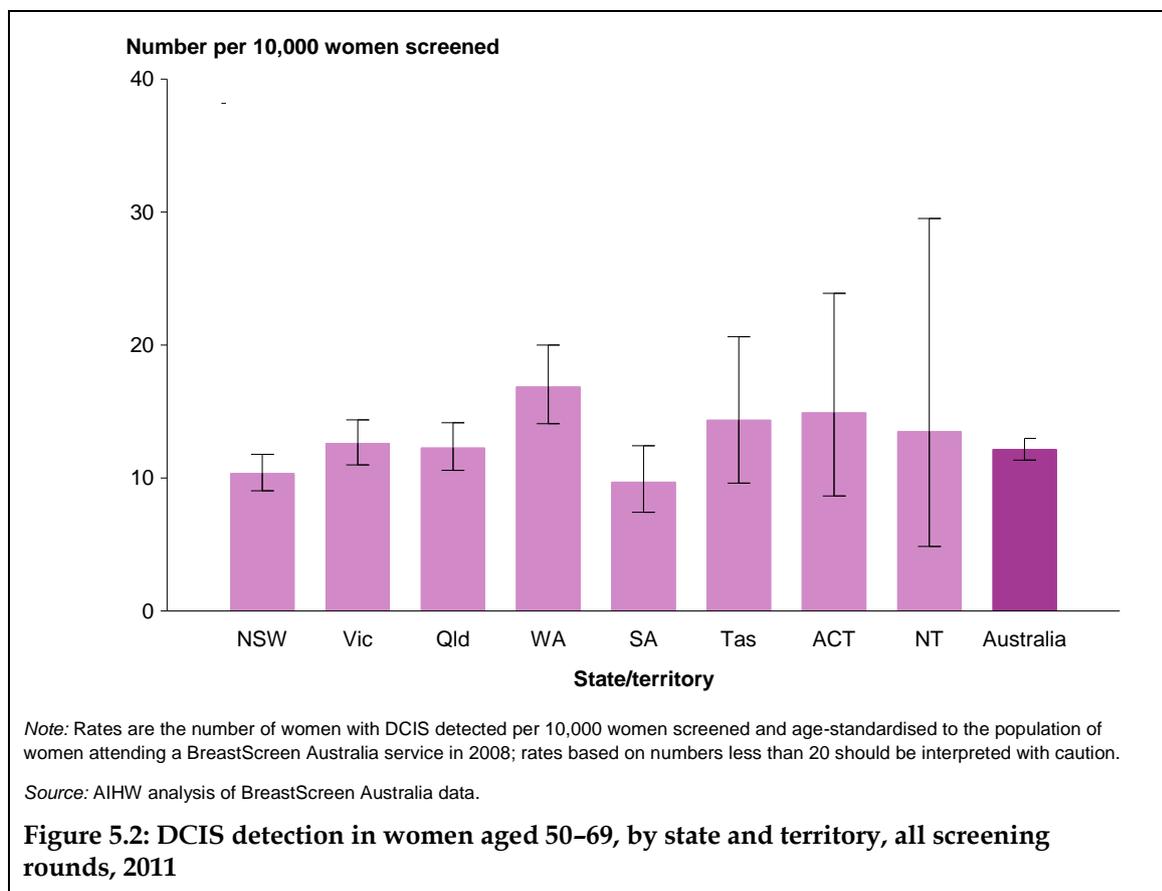
|                   | Age group (years) |       |       |      |
|-------------------|-------------------|-------|-------|------|
|                   | 40–49             | 50–59 | 60–69 | 70+  |
| <b>2010</b>       |                   |       |       |      |
| Number            | 117               | 442   | 434   | 110  |
| Age-specific rate | 10.5              | 11.6  | 13.3  | 15.8 |
| <b>2011</b>       |                   |       |       |      |
| Number            | 127               | 415   | 466   | 112  |
| Age-specific rate | 11.1              | 10.8  | 13.8  | 15.8 |

Note: Rates are the number of women with DCIS detected per 10,000 women screened.

Source: AIHW analysis of BreastScreen Australia data.

## Detection of DCIS by state and territory

DCIS detection across states and territories for all screening rounds combined in 2010 and 2011 is shown in Table 5.4. Figure 5.2 show data for 2011 only.



**Table 5.4: DCIS detection in women aged 50–69, by state and territory, all screening rounds, 2010 and 2011**

|             | NSW       | Vic       | Qld       | WA        | SA       | Tas       | ACT      | NT       | Australia |
|-------------|-----------|-----------|-----------|-----------|----------|-----------|----------|----------|-----------|
| <b>2010</b> |           |           |           |           |          |           |          |          |           |
| Number      | 255       | 197       | 228       | 96        | 57       | 23        | 13       | 7        | 876       |
| AS rate     | 11.5      | 11.5      | 15.4      | 12.4      | 10.0     | 11.1      | 13.1     | 18.9     | 12.3      |
| 95% CI      | 10.1–13.0 | 10.0–13.3 | 13.5–17.6 | 10.1–15.2 | 7.6–12.9 | 7.0–16.7  | 7.0–22.5 | 7.4–39.4 | 11.5–13.2 |
| <b>2011</b> |           |           |           |           |          |           |          |          |           |
| Number      | 230       | 220       | 185       | 131       | 62       | 30        | 17       | 6        | 881       |
| AS rate     | 10.3      | 12.6      | 12.3      | 16.9      | 9.7      | 14.8      | 14.9     | 13.5     | 12.1      |
| 95% CI      | 9.0–11.8  | 11.0–14.4 | 10.6–14.2 | 14.1–20.0 | 7.4–12.4 | 10.0–21.2 | 8.6–23.9 | 4.8–29.5 | 11.4–13.0 |

### Notes

1. Rates are the number of women with DCIS detected per 10,000 women screened and age-standardised to the population of women attending a BreastScreen Australia service in 2008; rates based on numbers less than 20 should be interpreted with caution.
2. State and territory differences, along with the size of the 95% confidence intervals (particularly in the smaller states and territories), need to be taken into consideration when interpreting DCIS detection results.
3. In some states and territories, the age-standardised rates vary considerably from the crude rates. Crude rates are available in the *BreastScreen Australia monitoring report 2010–2011: supplementary data tables*.

*Source:* AIHW analysis of BreastScreen Australia data.

## Indicator 6a Interval cancers

### What you need to know about interval cancers

**Definition:** The number of invasive breast cancers detected in women screened through BreastScreen Australia that arise during an interval between two screening rounds, per 10,000 women-years.

**Rationale:** The ability of screening mammography to successfully detect invasive breast cancer in women in the target age group can be assessed by considering the relative number of:

- invasive breast cancers detected at screening episode
- invasive breast cancers diagnosed 0–12 months after a screening episode detected no cancer
- invasive breast cancers diagnosed 13–24 months after a screening episode detected no cancer.

The goal of BreastScreen Australia is to have a high proportion of invasive breast cancers detected within screening episodes and a low proportion diagnosed after a screening episode detected no cancer (interval cancers).

This is reflected in NAS for interval breast cancers that require that less than 7.5 interval cancers per 10,000 women aged 50–69 are diagnosed in women who attend for screening less than 12 months after a negative screening episode (NAS 2.4.2(a)) (BreastScreen Australia 2004).

**Guide to interpretation:** Interval cancer rates are disaggregated into time since screening (0–12 months, 13–24 months and 0–24 months) and screening round (first and subsequent).

To produce comparable rates from the relatively small number of cases, interval cancer rates are reported by 10-year age groups, and aggregated over 3 years.

The most recent interval cancer data are for women screened in the index years 2005–2007 and 2006–2008. This small lag in data availability is because 2 years need to have passed since a woman's last screen to know whether she was diagnosed with an interval cancer.

### What the data tell us about interval cancers

#### Interval cancers for the index years 2006, 2007 and 2008

In the 0–12 months after a woman's first negative screening episode, there were 5.5 interval cancers per 10,000 women-years. In the 0–12 months after subsequent negative screening episodes, there were 6.6 interval cancers per 10,000 women-years.

In the 13–24 months after a woman's first negative screening episode, there were 12.6 interval cancers per 10,000 women-years. In the 13–24 months after subsequent negative screening episodes, there were 11.8 interval cancers per 10,000 women-years.

## More information on interval cancers

Invasive breast cancers that are diagnosed after a screening episode that detected no cancer and before the next scheduled screening episode are known as 'interval' cancers (Kavanagh et al. 1999). An interval cancer may be:

- an aggressive breast cancer that emerges and grows very rapidly in the period between scheduled screening episodes
- a breast cancer that, due to the characteristics of the cancer or the breast tissue, is not visible on screening mammography and therefore not able to be detected
- a breast cancer that can be retrospectively detected on the previous screening mammogram (BreastScreen SA 2010).

The first two types of interval cancer described above are true interval cancers, and therefore do not represent any failure in detection; the third represents a failure of the screening process. Through the BreastScreen accreditation process, state and territory BreastScreen programs are required to audit interval cancers. On investigation, more than 80% are found to be true interval cancers.

State and territory BreastScreen programs source information about breast cancers diagnosed outside the program from jurisdictional cancer registries to help to identify interval cancers (Kavanagh et al. 1999).

## Detailed analyses

### Interval cancers for the index years 2005–2007 and 2006–2008

For the index years 2005–2007 combined, in the 0–12 months after a woman's first negative screening episode, there were 5.4 interval cancers per 10,000 women-years; in the 0–12 months after subsequent negative screening episodes, there were 6.7 interval cancers per 10,000 women-years (Table 6.1).

The interval cancer rate was higher in the 13–24 months after a negative screening episode than in the 0–12 months after a negative screening episode.

In the 13–24 months after a woman's first negative screening episode, there were 14.0 interval cancers per 10,000 women-years; in the 13–24 months after subsequent negative screening episodes, there were 11.8 interval cancers per 10,000 women-years (Table 6.2).

For the index years 2006–2008 combined, in the 0–12 months after a woman's first negative screening episode, there were 5.5 interval cancers per 10,000 women-years; in the 0–12 months after subsequent negative screening episodes, there were 6.6 interval cancers per 10,000 women-years (Table 6.1).

Similar to the previous trend, the interval cancer rate in 2006–2008 was higher in the 13–24 months after a negative screening episode than in the 0–12 months after a negative screening episode.

In the 13–24 months after a woman's first negative screening episode, there were 12.6 interval cancers per 10,000 women-years; in the 13–24 months after subsequent negative screening episodes, there were 11.8 interval cancers per 10,000 women-years (Table 6.2).

For both 2005–2007 and 2006–2008, the observed rates were well within the NAS (NAS 2.4.2(a) being *that less than 7.5 interval cancers per 10,000 women aged 50–69 are diagnosed in women who attend for screening less than 12 months after a negative screening episode*).

**Table 6.1: Interval cancer rate for women aged 50–69, screened in index years 2005–2007 and 2006–2008, by state and territory, first and subsequent screening rounds, 0–12 months follow-up**

|                                    | NSW     | Vic     | Qld     | WA       | SA      | Tas      | ACT      | NT       | Australia |
|------------------------------------|---------|---------|---------|----------|---------|----------|----------|----------|-----------|
| <b>2005–2007</b>                   |         |         |         |          |         |          |          |          |           |
| <b>First screening round</b>       |         |         |         |          |         |          |          |          |           |
| AS rate                            | 5.8     | 5.9     | 5.5     | 1.8      | 3.5     | 5.8      | 3.0      | 3.5      | 5.4       |
| 95% CI                             | 4.1–8.0 | 3.4–8.9 | 3.3–8.4 | 0.7–3.9  | 1.4–7.1 | 0.1–22.8 | 0.4–10.8 | 0.1–19.3 | 4.3–6.7   |
| <b>Subsequent screening rounds</b> |         |         |         |          |         |          |          |          |           |
| AS rate                            | 7.0     | 6.8     | 6.8     | 5.9      | 6.3     | 8.2      | 5.6      | 2.6      | 6.7       |
| 95% CI                             | 6.3–7.7 | 6.0–7.7 | 5.9–7.7 | 4.8–7.2  | 5.1–7.7 | 5.7–11.3 | 3.1–9.2  | 0.3–9.6  | 6.3–7.1   |
| <b>2006–2008</b>                   |         |         |         |          |         |          |          |          |           |
| <b>First screening round</b>       |         |         |         |          |         |          |          |          |           |
| AS rate                            | 6.3     | 5.5     | 4.5     | 3.2      | 4.9     | 1.6      | 2.9      | 6.6      | 5.5       |
| 95% CI                             | 4.5–8.5 | 3.6–7.9 | 2.5–7.5 | 0.0–10.7 | 2.5–8.8 | 0.0–8.9  | 0.4–10.6 | 0.8–24.0 | 4.4–6.8   |
| <b>Subsequent screening rounds</b> |         |         |         |          |         |          |          |          |           |
| AS rate                            | 7.4     | 6.3     | 6.5     | 5.3      | 6.7     | 6.6      | 4.9      | 3.7      | 6.6       |
| 95% CI                             | 6.7–8.2 | 5.5–7.1 | 5.7–7.4 | 4.3–6.5  | 5.5–8.2 | 4.4–9.4  | 2.6–8.4  | 0.7–10.8 | 6.2–7.0   |

Note: Rates are the number of interval cancers detected per 10,000 women-years and age-standardised to the population of women attending a BreastScreen Australia service in 2008.

Source: AIHW analysis of BreastScreen Australia data.

**Table 6.2: Interval cancer rate for women aged 50–69, screened in index years 2005–2007 and 2006–2008 by state and territory, first and subsequent screening rounds, 13–24 months follow-up**

|                                    | NSW       | Vic       | Qld       | WA        | SA        | Tas      | ACT      | NT       | Australia |
|------------------------------------|-----------|-----------|-----------|-----------|-----------|----------|----------|----------|-----------|
| <b>2005–2007</b>                   |           |           |           |           |           |          |          |          |           |
| <b>First screening round</b>       |           |           |           |           |           |          |          |          |           |
| AS rate                            | 14.5      | 18.6      | 9.9       | 20.0      | 7.2       | 14.0     | 4.7      | 0.0      | 14.0      |
| 95% CI                             | 11.4–18.0 | 12.9–25.3 | 6.8–13.9  | 11.0–31.8 | 1.0–17.9  | 4.5–30.8 | 1.0–13.8 | ..       | 12.0–16.2 |
| <b>Subsequent screening rounds</b> |           |           |           |           |           |          |          |          |           |
| AS rate                            | 11.6      | 12.6      | 12.1      | 9.4       | 12.5      | 11.6     | 9.4      | 7.7      | 11.8      |
| 95% CI                             | 10.7–12.6 | 11.5–13.7 | 11.0–13.4 | 7.9–11.0  | 10.7–14.5 | 8.5–15.5 | 5.9–14.2 | 2.8–16.8 | 11.2–12.3 |
| <b>2006–2008</b>                   |           |           |           |           |           |          |          |          |           |
| <b>First screening round</b>       |           |           |           |           |           |          |          |          |           |
| AS rate                            | 14.8      | 12.9      | 9.9       | 11.6      | 10.1      | 20.1     | 3.1      | 0.0      | 12.6      |
| 95% CI                             | 11.1–19.1 | 8.8–17.8  | 6.6–14.2  | 5.7–19.6  | 3.2–20.1  | 6.9–42.5 | 0.4–11.3 | ..       | 10.6–14.8 |
| <b>Subsequent screening rounds</b> |           |           |           |           |           |          |          |          |           |
| AS rate                            | 11.3      | 12.8      | 12.4      | 8.6       | 13.4      | 11.1     | 9.8      | 11.5     | 11.8      |
| 95% CI                             | 10.2–12.5 | 11.7–14.0 | 11.2–13.6 | 7.2–10.1  | 11.5–15.4 | 8.1–14.9 | 6.1–14.8 | 5.2–21.9 | 11.3–12.4 |

*Notes*

1. New South Wales data are based on the index years 2005, 2006 and 2007 only.
2. Rates are the number of interval cancers detected per 10,000 women-years and age-standardised to the population of women attending a BreastScreen Australia service in 2008.

Source: AIHW analysis of BreastScreen Australia data.

As can be seen from tables 6.1 and 6.2, for the reporting periods 2005–2007 and 2006–2008, there were no appreciable differences in the interval cancer rate between first and subsequent screening rounds for either 0–12 months or 13–24 months after a negative screening episode. This indicates that, although women are more likely to have an invasive breast cancer detected in their first screening round compared with subsequent screening rounds, they are no more likely to have an interval cancer diagnosed after their first screen than after any other screen at a BreastScreen Australia service.

### Box 6.1: What is a screening episode?

A screening episode includes all attendances for screening and assessment within 6 months relating to a particular round of screening. It starts at the date of attendance for screening. It is completed when:

- a recommendation is made to return the woman to routine rescreening
- a recommendation is made for early review at 6 months or more from the screening date
- a diagnosis of cancer is made
- the woman fails to attend for technical recall or assessment within 6 months
- the woman dies.

### Interval cancer by age

When looking at the pattern of interval cancers by age, 10-year age groups and data for all screening rounds combined are used to produce meaningful rates from the relatively small number of cases. The interval cancer rate was lowest for women aged 50–59, followed by that for those aged 60–69, and was higher for women outside the target age group (Table 6.3).

**Table 6.3: Interval cancer rate for women screened in index years 2005–2007 and 2006–2008, all screening rounds, by age, 0–12 months and 13–24 months follow-up**

| Time since screen (months) |            | Age group (years) |       |       |      |
|----------------------------|------------|-------------------|-------|-------|------|
|                            |            | 40–49             | 50–59 | 60–69 | 70+  |
| <b>2005–2007</b>           |            |                   |       |       |      |
| <b>0–12 months</b>         | Number     | 271               | 715   | 540   | 181  |
|                            | Crude rate | 7.7               | 6.5   | 6.8   | 8.2  |
| <b>13–24 months</b>        | Number     | 411               | 1,175 | 973   | 276  |
|                            | Crude rate | 12.3              | 11.2  | 12.9  | 13.2 |
| <b>2006–2008</b>           |            |                   |       |       |      |
| <b>0–12 months</b>         | Number     | 280               | 714   | 541   | 181  |
|                            | Crude rate | 8.0               | 6.5   | 6.6   | 8.6  |
| <b>13–24 months</b>        | Number     | 395               | 1,026 | 935   | 266  |
|                            | Crude rate | 12.7              | 10.8  | 13.4  | 14.0 |

*Notes*

1. New South Wales data are based on the index years 2005, 2006 and 2007 only.
2. Rates are the number of interval cancers detected per 10,000 women-years.

Source: AIHW analysis of BreastScreen Australia data.

## Interval cancer by state and territory

Interval cancer rates are shown for states and territories in tables 6.1, 6.2 and 6.4.

It should be noted that differences in state and territory policies for managing women with symptoms may affect interval cancer rates. For example, in some jurisdictions, women are not recalled to assessment on the basis of symptom status; those women with a negative screen but who have symptoms are referred for diagnostic follow-up outside BreastScreen Australia. Those referred women who later have a cancer diagnosis will be counted as interval cancers, leading to a higher apparent interval cancer rate. Other states that do recall on the basis of symptoms may have lower apparent interval cancer rates. This affects the comparability of this indicator between jurisdictions.

**Table 6.4: Interval cancer rate for women aged 50–69, screened in index years 2005–2007 and 2006–2008, by state and territory, first and subsequent screening rounds, 0–24 months follow-up**

|                                    | NSW      | Vic      | Qld      | WA       | SA       | Tas      | ACT      | NT       | Australia |
|------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| <b>2005–2007</b>                   |          |          |          |          |          |          |          |          |           |
| <b>First screening round</b>       |          |          |          |          |          |          |          |          |           |
| AS rate                            | 10.0     | 12.2     | 7.7      | 11.7     | 5.3      | 9.8      | 3.8      | 1.7      | 9.7       |
| 95% CI                             | 8.2–12.0 | 9.1–15.8 | 5.7–10.1 | 6.5–18.2 | 1.9–10.3 | 3.7–20.0 | 1.2–8.9  | 0.0–9.7  | 8.5–10.9  |
| <b>Subsequent screening rounds</b> |          |          |          |          |          |          |          |          |           |
| AS rate                            | 9.2      | 9.7      | 9.4      | 7.5      | 9.3      | 9.8      | 7.3      | 5.1      | 9.2       |
| 95% CI                             | 8.6–9.8  | 9.0–10.4 | 8.7–10.2 | 6.6–8.6  | 8.2–10.5 | 7.8–12.2 | 5.2–10.1 | 2.2–10.2 | 8.9–9.5   |
| <b>2006–2008</b>                   |          |          |          |          |          |          |          |          |           |
| <b>First screening round</b>       |          |          |          |          |          |          |          |          |           |
| AS rate                            | 9.5      | 9.2      | 7.2      | 7.5      | 7.4      | 10.5     | 3.0      | 3.3      | 8.7       |
| 95% CI                             | 7.7–11.6 | 6.9–11.9 | 5.2–9.7  | 3.7–12.6 | 3.7–12.4 | 4.0–21.2 | 0.8–7.7  | 0.4–12.1 | 7.7–9.9   |
| <b>Subsequent screening rounds</b> |          |          |          |          |          |          |          |          |           |
| AS rate                            | 8.9      | 9.5      | 9.4      | 6.9      | 9.9      | 8.7      | 7.2      | 7.6      | 9.0       |
| 95% CI                             | 8.3–9.6  | 8.9–10.2 | 8.7–10.2 | 6.0–7.8  | 8.8–11.1 | 6.8–10.9 | 5.0–10.0 | 3.9–13.3 | 8.7–9.4   |

### Notes

1. New South Wales data are based on the index years 2005, 2006 and 2007 only.
2. Rates are the number of interval cancers detected per 10,000 women-years and age-standardised to the population of women attending a BreastScreen Australia service in 2008.

Source: AIHW analysis of BreastScreen Australia data.

## Indicator 6b Program sensitivity

### What you need to know about program sensitivity

**Definition:** Program sensitivity is directly related to interval cancers. It is the proportion of invasive breast cancers detected by BreastScreen Australia (screen-detected cancers) out of all invasive breast cancers (interval cancers plus screen-detected cancers) diagnosed in program-screened women in the screening interval.

**Rationale:** High program sensitivity indicates that few cancers in screened women are missed by BreastScreen Australia – that is, most breast cancers are detected by BreastScreen Australia as reported in Indicator 4 rather than as interval cancers.

While there are no NAS that directly relate to the program sensitivity indicator, high sensitivity is desirable.

**Guide to interpretation:** Program sensitivity is disaggregated into time since screening (0–12 months and 0–24 months) and screening round (first and subsequent).

To produce comparable rates from the relatively small number of cases, interval cancer rates are reported by 10-year age groups, and aggregated over 3 years.

The most recent program sensitivity data are for women screened in the index years 2005–2007 and 2006–2008. This small lag in data availability is because 2 years need to have passed since a woman's last screen to know whether she was diagnosed with an interval cancer.

### What the data tell us about program sensitivity

#### **Program sensitivity for the index years 2006, 2007 and 2008**

Program sensitivity for 0–12 months was 92.9% for the first screening round and 86.9% for subsequent screening rounds. For the same years, program sensitivity for 0–24 months was 81.4% for the first screening round and 72.1% for subsequent screening rounds.

For all screening rounds combined, program sensitivity for 0–12 months increased with age, from 78.2% in women aged 40–49 to 85.9% and 90.2% for women aged 50–59 and 60–69, respectively, and to 90.4% for women aged 70 or over.

## Detailed analyses

### Program sensitivity for the index years 2005–2007 and 2006–2008

For the index years 2005–2007 combined, program sensitivity for 0–12 months was 92.7% for the first screening round and 86.1% for subsequent screening rounds (Table 6.5).

Overall program sensitivity (0–24 months) was 79.8% for the first screening round and 71.0% for subsequent screening rounds (Table 6.6).

For the index years 2006–2008 combined, program sensitivity for 0–12 months was 92.9% for the first screening round and 86.9% for subsequent screening rounds (Table 6.5).

Overall program sensitivity (0–24 months) was 81.4% for the first screening round and 72.1% for subsequent screening rounds (Table 6.6).

**Table 6.5: Program sensitivity for women aged 50–69, screened in index years 2005–2007 and 2006–2008, by state and territory, first and subsequent screening rounds, 0–12 months follow-up**

|                                    | NSW            | Vic            | Qld            | WA             | SA             | Tas            | ACT            | NT             | Australia     |
|------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------|
| <b>2005–2007</b>                   |                |                |                |                |                |                |                |                |               |
| <b>First screening round</b>       |                |                |                |                |                |                |                |                |               |
| AS rate                            | 92.1           | 91.6           | 93.0           | 97.5           | 93.8           | 94.3           | 95.7           | 93.0           | 92.7          |
| 95% CI                             | 84.1–<br>100.0 | 79.8–<br>100.0 | 82.0–<br>100.0 | 78.4–<br>100.0 | 70.5–<br>100.0 | 64.9–<br>100.0 | 58.5–<br>100.0 | 50.8–<br>100.0 | 87.6–<br>98.1 |
| <b>Subsequent screening rounds</b> |                |                |                |                |                |                |                |                |               |
| AS rates                           | 85.3           | 85.6           | 87.0           | 86.7           | 88.0           | 81.3           | 88.8           | 94.6           | 86.1          |
| 95% CI                             | 81.8–<br>89.0  | 81.4–<br>89.9  | 82.6–<br>91.5  | 80.4–<br>93.3  | 81.3–<br>95.1  | 69.8–<br>94.3  | 73.2–<br>100.0 | 65.9–<br>100.0 | 84.1–<br>88.1 |
| <b>2006–2008</b>                   |                |                |                |                |                |                |                |                |               |
| <b>First screening round</b>       |                |                |                |                |                |                |                |                |               |
| AS rate                            | 92.4           | 91.4           | 94.8           | 97.3           | 90.4           | 97.2           | 95.7           | 89.9           | 92.9          |
| 95% CI                             | 84.8–<br>100.0 | 79.3–<br>100.0 | 83.6–<br>100.0 | 79.9–<br>100.0 | 70.0–<br>100.0 | 66.3–<br>100.0 | 55.8–<br>100.0 | 49.6–<br>100.0 | 88.0–<br>98.1 |
| <b>Subsequent screening rounds</b> |                |                |                |                |                |                |                |                |               |
| AS rates                           | 85.3           | 87.4           | 87.7           | 88.3           | 87.0           | 83.9           | 90.5           | 91.9           | 86.9          |
| 95% CI                             | 81.9–<br>88.9  | 83.3–<br>91.6  | 83.5–<br>92.0  | 82.0–<br>94.9  | 80.4–<br>94.0  | 71.9–<br>97.2  | 75.2–<br>100.0 | 63.7–<br>100.0 | 84.9–<br>88.8 |

*Note:* Rates are the number of screen-detected cancers as a percentage of all cancers (screen-detected and interval cancers) and age-standardised to the population of women attending a BreastScreen Australia in 2008.

*Source:* AIHW analysis of BreastScreen Australia data.

No significant difference was found in program sensitivity between the first screening round and subsequent screening rounds for 0–12 months. In contrast, program sensitivity was significantly lower for subsequent screening rounds than for the first screening round for overall program sensitivity (0–24 months) (Table 6.6).

**Table 6.6: Program sensitivity for women aged 50–69, screened in index years 2005–2007 and 2006–2008, by state and territory, first and subsequent screening rounds, 0–24 months follow-up**

|                                    | NSW           | Vic           | Qld           | WA             | SA             | Tas            | ACT            | NT             | Australia     |
|------------------------------------|---------------|---------------|---------------|----------------|----------------|----------------|----------------|----------------|---------------|
| <b>2005–2007</b>                   |               |               |               |                |                |                |                |                |               |
| <b>First screening round</b>       |               |               |               |                |                |                |                |                |               |
| AS rates                           | 78.5          | 75.0          | 83.3          | 81.6           | 86.4           | 79.5           | 93.8           | 93.0           | 79.8          |
| 95%CI                              | 71.7–<br>85.8 | 65.2–<br>85.6 | 73.2–<br>94.2 | 66.3–<br>98.9  | 64.7–<br>100.0 | 54.5–<br>100.0 | 56.9–<br>100.0 | 50.8–<br>100.0 | 75.4–<br>84.4 |
| <b>Subsequent screening rounds</b> |               |               |               |                |                |                |                |                |               |
| AS rates                           | 69.6          | 67.6          | 70.7          | 83.4           | 71.8           | 67.0           | 83.4           | 81.4           | 71.0          |
| 95%CI                              | 67.1–<br>72.9 | 64.3–<br>70.9 | 67.2–<br>74.3 | 77.3–<br>89.9  | 66.4–<br>77.6  | 57.5–<br>77.5  | 69.0–<br>100.0 | 56.7–<br>100.0 | 69.4–<br>72.7 |
| <b>2006–2008</b>                   |               |               |               |                |                |                |                |                |               |
| <b>First screening round</b>       |               |               |               |                |                |                |                |                |               |
| AS rates                           | 79.2          | 78.1          | 85.5          | 88.0           | 80.4           | 79.1           | 95.7           | 89.9           | 81.4          |
| 95%CI                              | 71.2–<br>87.9 | 67.5–<br>89.7 | 75.4–<br>96.5 | 72.0–<br>100.0 | 61.7–<br>100.0 | 53.8–<br>100.0 | 55.8–<br>100.0 | 49.6–<br>100.0 | 76.7–<br>86.4 |
| <b>Subsequent screening rounds</b> |               |               |               |                |                |                |                |                |               |
| AS rates                           | 70.1          | 69.7          | 71.7          | 84.8           | 70.4           | 69.3           | 84.3           | 73.9           | 72.1          |
| 95% CI                             | 66.6–<br>73.7 | 66.5–<br>73.0 | 68.3–<br>75.3 | 78.8–<br>91.2  | 65.1–<br>76.0  | 59.6–<br>80.2  | 70.3–<br>100.0 | 51.2–<br>100.0 | 70.4–<br>73.8 |

*Notes*

1. New South Wales data are based on the index years 2005, 2006 and 2007 only.
2. Rates are the number of screen-detected cancers as a percentage of all cancers (screen-detected and interval cancers) and age-standardised to the population of women attending a BreastScreen Australia service in 2008.

Source: AIHW analysis of BreastScreen Australia data.

### Program sensitivity by age

In both 2005–2007 and 2006–2008, program sensitivity was lowest in women aged 40–49, thereafter increasing with age (Table 6.7).

Lower sensitivity means that BreastScreen Australia is less able to detect invasive breast cancers in women aged 40–49 who attend for screening.

**Table 6.7: Program sensitivity for women screened in index years 2005–2007 and 2006–2008, all screening rounds, by age, 0–12 months and 0–24 months follow-up**

| Time since screen (months) | Age group (years) |       |       |      |
|----------------------------|-------------------|-------|-------|------|
|                            | 40–49             | 50–59 | 60–69 | 70+  |
| <b>2005–2007</b>           |                   |       |       |      |
| 0–12                       | 78.3              | 85.3  | 89.4  | 90.3 |
| 0–24                       | 59.9              | 69.7  | 75.7  | 79.0 |
| <b>2006–2008</b>           |                   |       |       |      |
| 0–12                       | 78.2              | 85.9  | 90.2  | 90.4 |
| 0–24                       | 60.3              | 70.8  | 76.5  | 78.6 |

*Notes*

1. New South Wales data are based on the index years 2005, 2006 and 2007 only.
2. Rates are the number of interval cancers detected per 10,000 women-years.

Source: AIHW analysis of BreastScreen Australia data.

### **Program sensitivity by state and territory**

Program sensitivity is shown for states and territories in tables 6.5 and 6.6.

As noted for the interval cancer indicator, both interval cancers and sensitivity rates in each state and territory are affected by the varying policies for managing symptomatic women. This affects the comparability of this indicator between jurisdictions.

## Indicator 7a Invasive breast cancer incidence

### What you need to know about invasive breast cancer incidence

**Definition:** The number of new cases of invasive breast cancer per 100,000 estimated resident female population in a 12-month period.

**Rationale:** Incidence data provide information about the underlying level of invasive breast cancer in Australia. Annual monitoring of these data with various stratifications (such as age or location) may reveal findings of concern or positive trends that can be used to inform BreastScreen Australia as well as broader policies for breast cancer in Australian women.

**Guide to interpretation:** These data include both screen-detected breast cancers (detected through BreastScreen Australia) and breast cancers detected outside BreastScreen Australia.

Incidence data are reported per 100,000 women in the population.

Incidence of invasive breast cancer by state and territory, remoteness area, socioeconomic status and Indigenous status is reported over a 5-year (instead of a 12-month) period. This is to improve the stability and comparability of rates due to the small number of new cases in less populated areas and in Aboriginal and Torres Strait Islander women. Invasive breast cancer incidence data are presented for women aged 50–69 and for all Australian women (unlike Indicators 1–6, this includes women aged under 40).

The Australian Cancer Database is the source of breast cancer incidence data.

The most recent invasive breast cancer incidence data are for new cases diagnosed in 2009.

### What the data tell us about invasive breast cancer incidence

#### Trend

The number of new breast cancer cases in women aged 50–69 more than doubled between 1982 (the first year for which cancer incidence data are available) and 2009 from 2,456 new cases to 7,022 new cases. Over this same time, the incidence rate increased from 175.4 to 288.2 new cases per 100,000 women. The rate has been roughly stable since 2003.

#### 2009

There were 7,022 new cases of breast cancer in women aged 50–69, the target population of BreastScreen Australia, or 288.2 new cases per 100,000 women. There were 13,668 new cases, or 113.5 new cases per 100,000 women, in women of all ages.

New cases diagnosed in women aged 50–69 comprised 51.4% of all invasive breast cancers.

#### 2004–2008

Invasive breast cancer incidence in Aboriginal and Torres Strait Islander women was significantly lower than that for non-Indigenous women, at 213.3 new cases per 100,000 women aged 50–69 compared with the non-Indigenous rate of 262.9 per 100,000.

## More information on incidence

Registration of cancer cases is required by law in each state and territory in Australia. Data are collected by state and territory cancer registries and compiled in the national Australian Cancer Database, held by the AIHW. The data include clinical and demographic information about people with newly diagnosed cancer.

Invasive breast cancer incidence measures the number of new cases of breast cancer diagnosed each year, sourced from the Australian Cancer Database. Only primary breast cancers are included – secondary breast cancers and breast cancers that are a reoccurrence of a primary breast cancer are not counted. Note that incidence data refer to the number of new cases diagnosed and not the number of women diagnosed (although it is rare for a woman to be diagnosed with more than one primary breast cancer in the same year).

The main data source for this chapter was the 2009 Australian Cancer Database. Note that, since 2009, incidence data include estimates for New South Wales and the Australian Capital Territory data which require disaggregation could only be presented to 2008.

## Detailed analyses

### Invasive breast cancer incidence in 2009

There were 13,668 new cases of breast cancer in Australian women in 2009. This is equivalent to 124.0 new cases for every 100,000 women in the population which, when age-standardised to allow analysis of trends and differentials, equates to an incidence rate of 113.5.

Of the 13,668 new cases, 7,022 (51.4%) were in women aged 50–69, equivalent to 291.4 new cases for every 100,000 women in the population. When age-standardised to allow analyses of trends and differentials, this equates to an incidence rate of 288.2 for women aged 50–69.

#### **Box 7.1: How many breast cancers were detected through BreastScreen Australia?**

It is estimated that 43% of invasive breast cancers diagnosed in women aged 50–69, and 32% of breast cancers in women aged 40 and over, were detected through BreastScreen Australia in 2009.

In the broader context of cancers diagnosed in Australian women, breast cancer was the most commonly diagnosed cancer (excluding basal cell and squamous cell carcinoma of the skin) in Australian women in 2009, comprising 27.4% of all cancers diagnosed in women that year, as well as being the most prevalent.

The mean age at first diagnosis was 60.6, and the risk of being diagnosed with breast cancer was 1 in 11 by age 75 and 1 in 8 by age 85.

### Invasive breast cancer incidence trends

The number of new breast cancer cases in women aged 50–69 has almost tripled during the 27 years, from 2,456 new cases in 1982 (the year in which national incidence data were first available) to 7,022 in 2009 (Figure 7.1; *BreastScreen Australia monitoring report 2010–2011: supplementary data tables*, Table S7.1).

For all age groups combined, the overall increase in the number of new cases of invasive breast cancer more than doubled from 5,317 in 1982 to 13,668 in 2009, an increase of 157% (*BreastScreen Australia monitoring report 2010–2011: supplementary data tables, Table S7.1*).

**Table 7.1: Incidence of invasive breast cancer, 1982 to 2009**

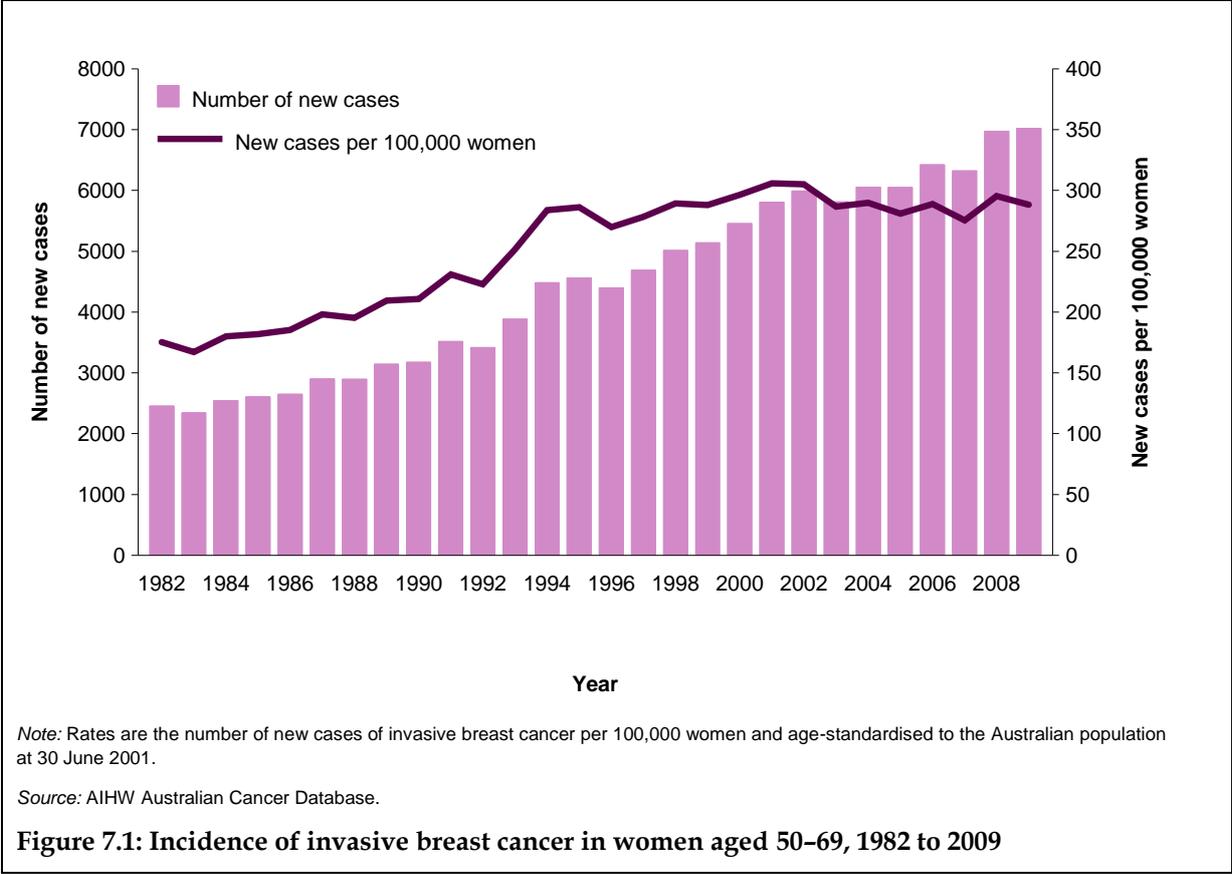
| Year of diagnosis | All ages | Age group (years) |       |       |
|-------------------|----------|-------------------|-------|-------|
|                   |          | <50               | 50–69 | 70+   |
| 1982              | 81.1     | 33.8              | 175.4 | 250.0 |
| 1983              | 80.8     | 34.5              | 167.2 | 258.1 |
| 1984              | 83.9     | 34.2              | 180.1 | 268.0 |
| 1985              | 84.8     | 34.9              | 181.9 | 267.6 |
| 1986              | 85.4     | 33.3              | 185.2 | 280.3 |
| 1987              | 91.6     | 38.3              | 198.1 | 281.0 |
| 1988              | 90.0     | 36.9              | 195.3 | 279.8 |
| 1989              | 94.0     | 37.5              | 209.5 | 288.8 |
| 1990              | 95.3     | 38.4              | 210.6 | 293.6 |
| 1991              | 100.7    | 38.8              | 231.0 | 305.8 |
| 1992              | 98.4     | 39.8              | 222.9 | 290.3 |
| 1993              | 105.5    | 40.3              | 251.4 | 302.8 |
| 1994              | 114.5    | 41.3              | 283.7 | 323.8 |
| 1995              | 115.9    | 41.6              | 286.2 | 332.8 |
| 1996              | 109.6    | 40.2              | 270.0 | 308.9 |
| 1997              | 111.9    | 39.6              | 278.3 | 320.7 |
| 1998              | 115.0    | 40.5              | 289.2 | 324.7 |
| 1999              | 111.6    | 39.1              | 288.0 | 300.2 |
| 2000              | 116.2    | 40.9              | 296.5 | 318.2 |
| 2001              | 117.8    | 40.7              | 305.8 | 318.1 |
| 2002              | 117.6    | 41.4              | 305.2 | 310.9 |
| 2003              | 112.7    | 41.3              | 286.6 | 299.0 |
| 2004              | 113.7    | 40.7              | 289.7 | 307.1 |
| 2005              | 111.8    | 42.7              | 280.9 | 289.8 |
| 2006              | 113.2    | 42.1              | 288.8 | 292.8 |
| 2007              | 109.9    | 41.2              | 275.4 | 292.9 |
| 2008              | 116.0    | 42.6              | 295.3 | 306.0 |
| 2009              | 113.5    | 40.8              | 288.2 | 307.5 |

*Note:* Rates are the number of new cases of invasive breast cancer per 100,000 women and age-standardised to the Australian population at 30 June 2001.

*Source:* AIHW Australian Cancer Database.

BreastScreen Australia began in 1991. While the age-standardised incidence rate for women aged 50–69 had been increasing steadily before this – from 175.4 new cases per 100,000 women in 1982 (the first year for which data are available) to 210.6 in 1990 – incidence increased more sharply from 231.0 in 1991 to a peak of 305.8 new cases per

100,000 women in 2001 (Table 7.1; Figure 7.1). Thereafter, the rate decreased between 2002 and 2009 from 305.2 to 288.2 new cases per 100,000, respectively (Figure 7.1).

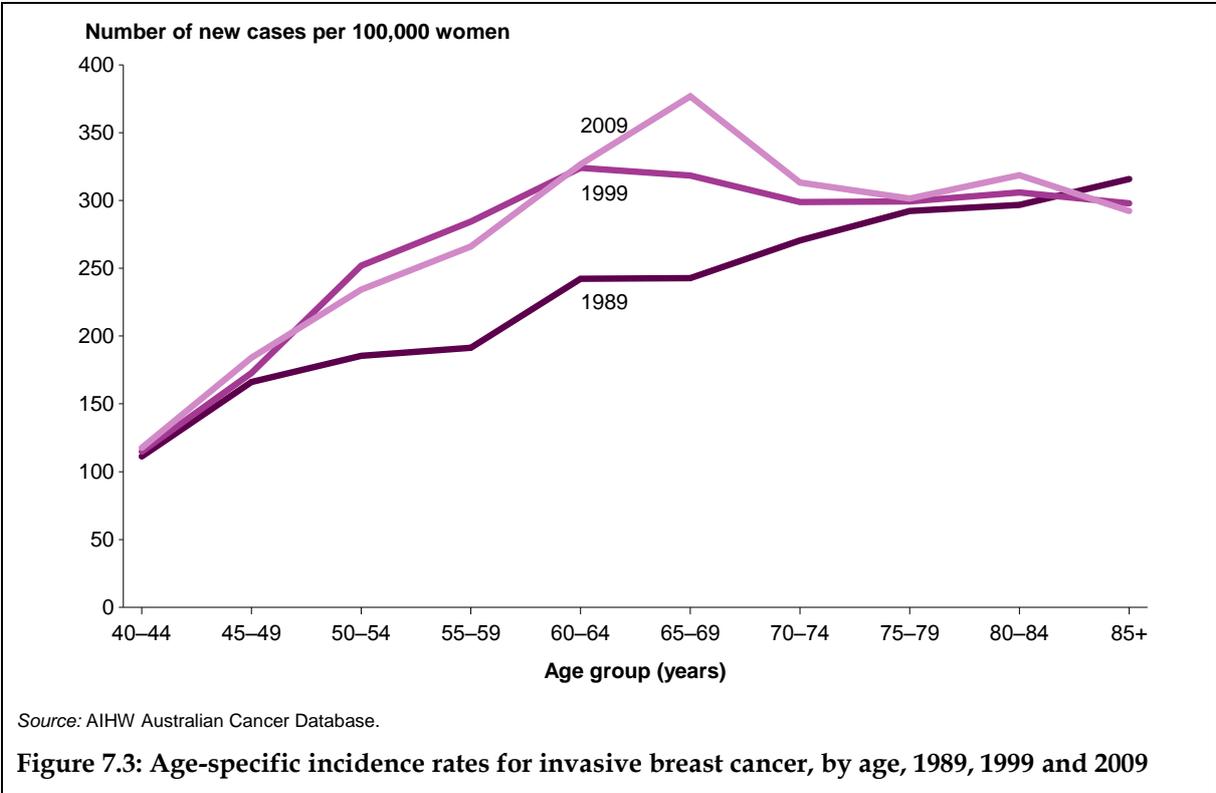
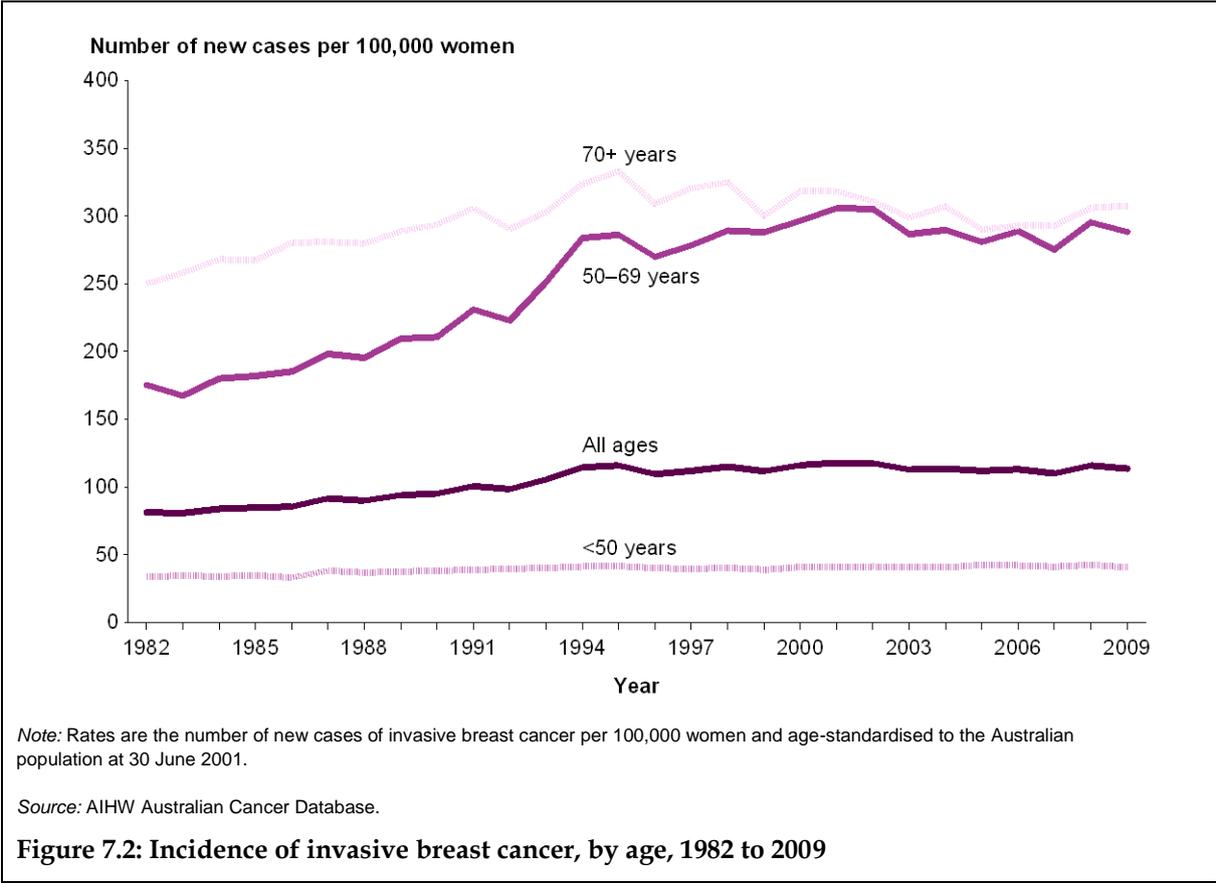


**Invasive breast cancer incidence trends by age**

When comparing trends in the incidence of invasive breast cancer across broad age groups, the pattern for women aged 50-69 appears to be mirrored in that for women aged 70 and over (Figure 7.2). While incidence was historically highest in women aged 70 and over, incidence has been indistinguishable from that in women aged 50-69 since 2005. Incidence for women aged under 50 remained steady at between about 39 and 43 new cases per 100,000 women between 1991 and 2009.

It is also interesting to note that, in 2009, new cases of invasive breast cancer diagnosed in women aged 50-69 comprised 51.4% of all invasive breast cancers. This is an increase from 48.1% in 1999, and 43.6% in 1989. BreastScreen Australia targets women aged 50-69.

For invasive breast cancer diagnosed in 2009, analysis of 5-year age groups reveals that incidence was highest for women aged 65-69, at 376.9 new cases per 100,000 women (Figure 7.3; Table 7.2).



**Table 7.2: Age-specific incidence of invasive breast cancer, by age, 2009**

|            | Age group (years) |       |       |       |       |       |       |       |       |       |
|------------|-------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|            | 40–44             | 45–49 | 50–54 | 55–59 | 60–64 | 65–69 | 70–74 | 75–79 | 80–84 | 85+   |
| New cases  | 904               | 1,462 | 1,703 | 1,754 | 1,912 | 1,653 | 1,112 | 893   | 792   | 724   |
| Crude rate | 117.5             | 184.1 | 234.3 | 266.2 | 326.7 | 376.9 | 313.2 | 301.4 | 318.6 | 292.2 |

Note: Rates are the number of new cases of invasive breast cancers per 100,000 women.

Source: AIHW Australian Cancer Database.

Figure 7.3 shows age-specific incidence rates for invasive breast cancer for 1989, 1999 and 2009. While women aged 65–69 had the highest incidence of invasive breast cancer in 2009 (at 376.9 cases per 100,000 women), the 1999 trend across 5-year age groups was notably flatter with the incidence rate between 298 and 324 new cases per 100,000 women for women aged 60–64 and older.

Going back another 10 years to 1989 – before BreastScreen Australia began – incidence was lower than in 1999 and 2009 for all age groups from 45–49 to 80–84. Only for women aged 85 and over was the incidence rate higher.

### Invasive breast cancer incidence by state and territory

In 2004–2008, the incidence of invasive breast cancer for women aged 50–69 was relatively stable across states and territories, with most around the national rate of 286.1 new cases per 100,000 women (Table 7.3; Figure 7.4).

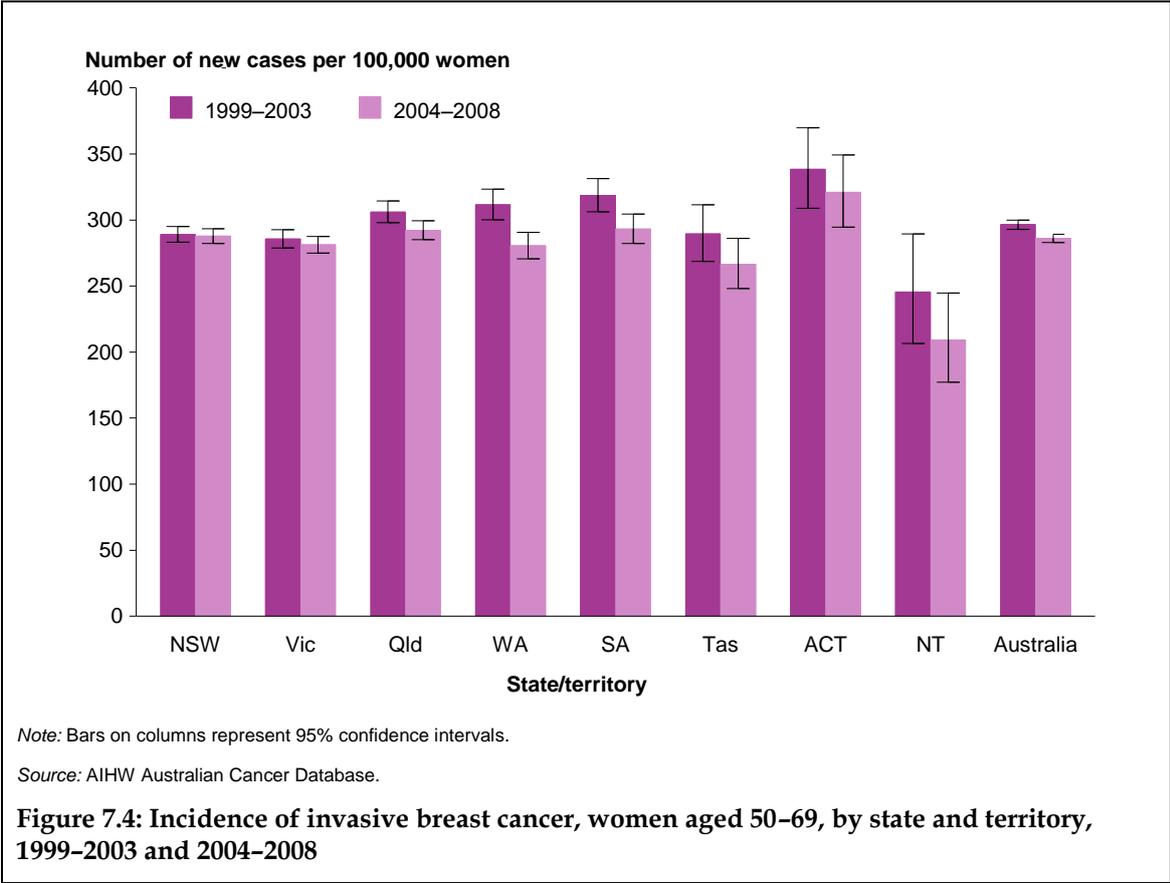
The exceptions were the least populated states and territories – the Australian Capital Territory, with a higher incidence of 321.1 new cases per 100,000 women, and the Northern Territory, with a lower incidence of 209.0. It should be noted, however, that the data for the two least-populated jurisdictions are subject to variation due to smaller numbers, even with 5 years of data combined.

**Table 7.3: Incidence of invasive breast cancer, women aged 50–69, by state and territory, 2004–2008**

|           | NSW             | Vic             | Qld             | WA              | SA              | Tas             | ACT             | NT              | Australia       |
|-----------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| New cases | 10,568          | 7,721           | 6,355           | 3,022           | 2,666           | 780             | 550             | 163             | 31,825          |
| AS rate   | 287.7           | 281.2           | 292.2           | 280.5           | 293.2           | 266.6           | 321.1           | 209.0           | 286.1           |
| 95% CI    | 282.2–<br>293.3 | 274.9–<br>287.5 | 285.1–<br>299.5 | 270.6–<br>290.7 | 282.2–<br>304.6 | 248.1–<br>286.0 | 294.7–<br>349.2 | 177.2–<br>244.8 | 283.0–<br>289.3 |

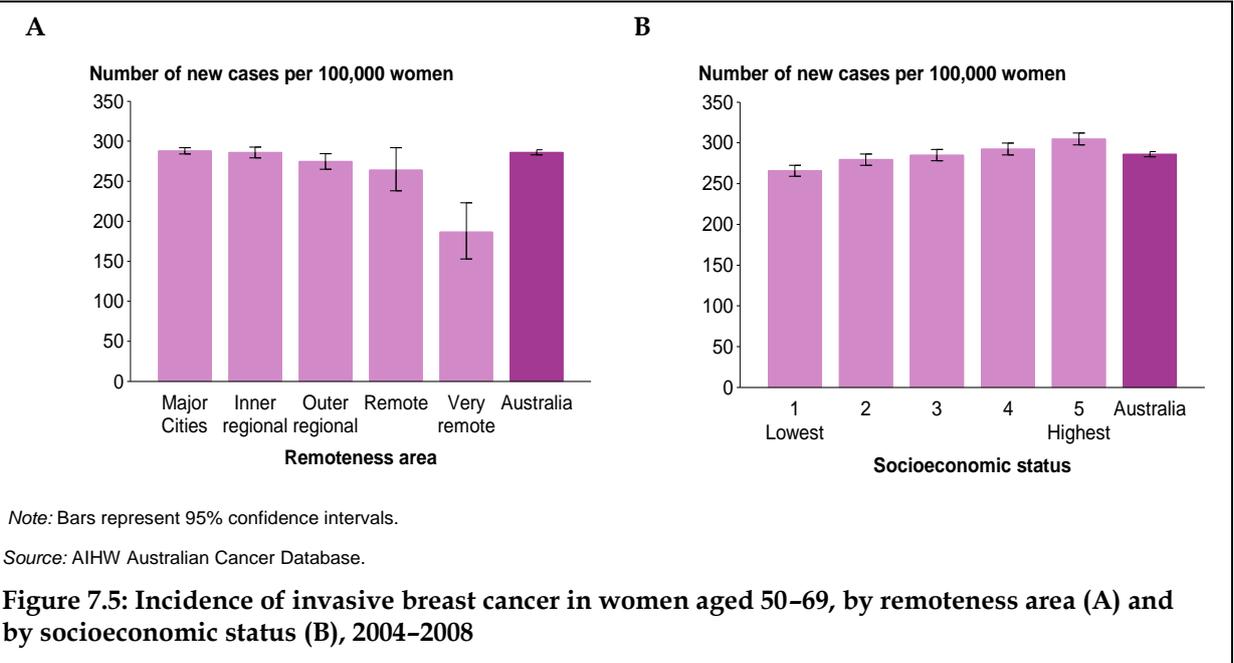
Note: Rates are the number of new cases of invasive breast cancer per 100,000 women and age-standardised to the Australian population at 30 June 2001.

Source: AIHW Australian Cancer Database.



**Invasive breast cancer incidence by remoteness area**

The incidence of invasive breast cancer in women aged 50–69 decreased with increasing level of remoteness. In 2004–2008, incidence decreased from 288.0 new cases per 100,000 women in *Major cities* to 186.4 in *Very remote* locations (Figure 7.5A; Table 7.4).



**Table 7.4: Incidence of invasive breast cancer, women aged 50–69, by remoteness area, 2004–2008**

|           | Major cities | Inner regional | Outer regional | Remote      | Very remote | Australia   |
|-----------|--------------|----------------|----------------|-------------|-------------|-------------|
| New cases | 21,264       | 6,968          | 3,014          | 384         | 115         | 31,825      |
| AS rate   | 288.0        | 285.9          | 274.6          | 264.0       | 186.4       | 286.1       |
| 95% CI    | 284.1–291.9  | 279.2–292.8    | 264.9–284.6    | 237.9–291.5 | 153.0–223.2 | 283.0–289.3 |

*Notes*

1. Rates are the number of new cases of invasive breast cancer per 100,000 women and age-standardised to the Australian population at 30 June 2001.
2. Remoteness areas were assigned using the woman's residential postcode according to the Australian Standard Geographical Classification for 2006. Not all postcodes can be assigned to a remoteness area therefore, categories do not add to Australia.

Source: AIHW Australian Cancer Database.

**Invasive breast cancer incidence by socioeconomic status**

In 2004–2008, the incidence of invasive breast cancer in women aged 50–69 increased progressively with increasing socioeconomic status. Consistent with this, women living in areas with the highest socioeconomic status had a significantly higher invasive breast cancer incidence rate (304.7 cases per 100,000 women) than women living in areas with the lowest socioeconomic status (265.7 cases per 100,000 women) (Table 7.5; Figure 7.5B).

**Table 7.5: Incidence of invasive breast cancer, women aged 50–69, by socioeconomic status, 2004–2008**

|           | 1(Lowest)   | 2           | 3           | 4           | 5 (Highest) | Australia   |
|-----------|-------------|-------------|-------------|-------------|-------------|-------------|
| New cases | 6,046       | 6,407       | 6,281       | 6,187       | 6,822       | 31,825      |
| AS rate   | 265.7       | 279.5       | 284.9       | 292.3       | 304.7       | 286.1       |
| 95% CI    | 259.0–272.5 | 272.7–286.5 | 277.9–292.1 | 285.0–299.7 | 297.5–312.1 | 283.0–289.3 |

*Notes*

1. Rates are the number of new cases of invasive breast cancer per 100,000 women and age-standardised to the Australian population at 30 June 2001.
2. Socioeconomic status was assigned using the woman's residential postcode according to the Socioeconomic Index for Areas (SEIFA) Index of Relative Socioeconomic Disadvantage for 2006; 1 (lowest socioeconomic group) corresponds to the most disadvantaged socioeconomic status and 5 (highest socioeconomic group) to the least disadvantaged socioeconomic status. Not all postcodes could be assigned to a socioeconomic category, therefore, categories do not add to Australia.

Source: AIHW Australian Cancer Database.

**Invasive breast cancer incidence by Indigenous status**

The collection of reliable information by the state and territory cancer registries on the Indigenous status of individuals diagnosed with cancer is problematic. This is because primary cancer diagnosis information is sourced from pathology forms which, in most states and territories, currently do not have the capacity to record this information. The registries collect information about Indigenous status from additional sources such as hospital records and death records, which affects the completeness and correctness of these data.

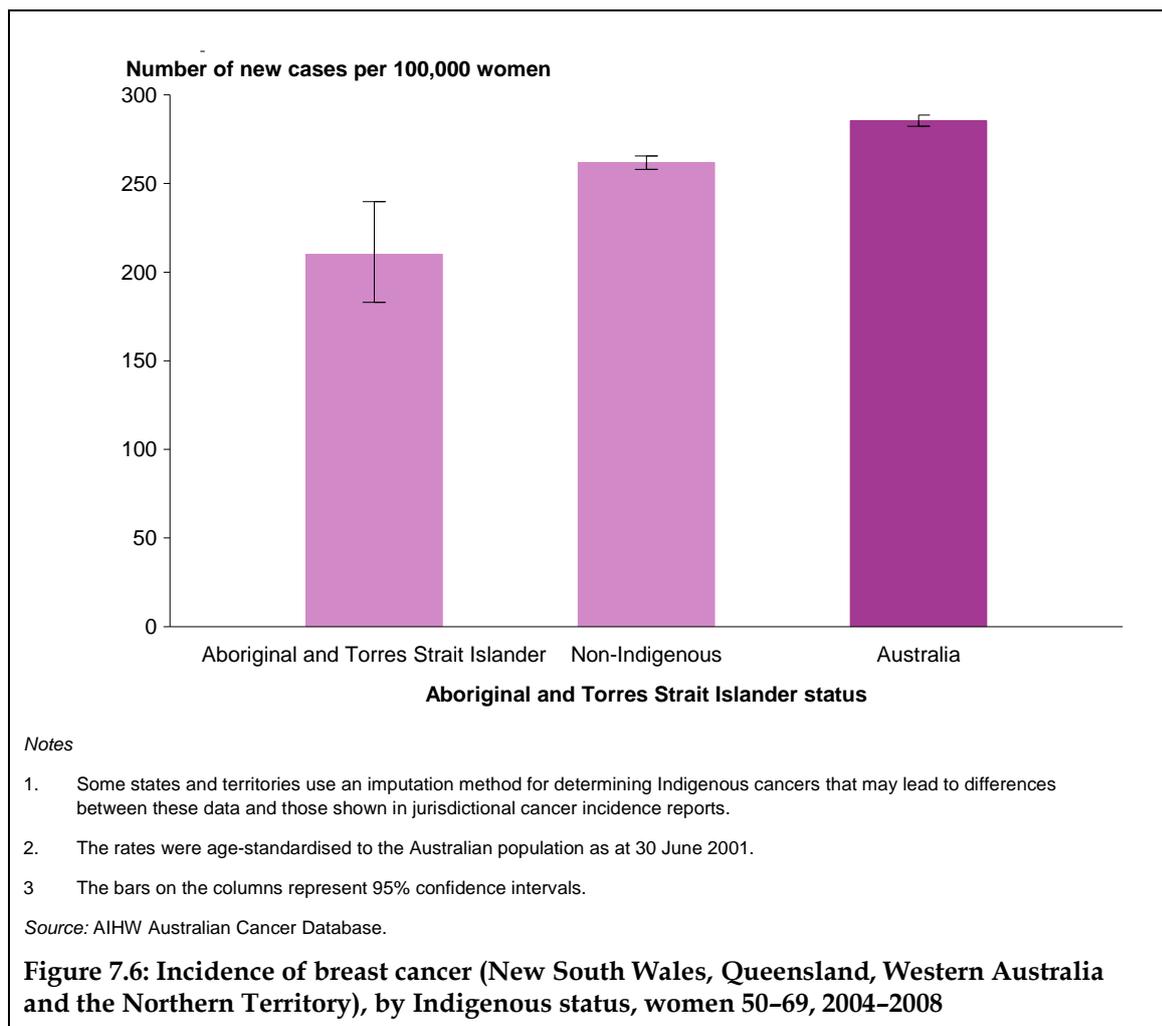
This means that reliable national data on the incidence of cancer for Aboriginal and Torres Strait Islander Australians are not available, because in some jurisdictions the level of identification of Indigenous status is not considered sufficient to enable analyses.

Over the 5-year period 2004–2008, data for New South Wales, Queensland, Western Australia and the Northern Territory were considered of sufficient quality and have been used to examine the incidence of invasive breast cancer by Indigenous status.

While the majority (84%) of Aboriginal and Torres Strait Islander people reside in these four jurisdictions (ABS 2009), the degree to which these data are representative of data for all Aboriginal and Torres Strait Islander people in Australia is unknown. Further, even for these jurisdictions, the level of missing data on Indigenous status for invasive breast cancers diagnosed in 2004–2008 was 8.9%. This means that for about for 1 in 9 women diagnosed with invasive breast cancer over the 5-year period 2004–2008, information on Indigenous status was not recorded. This level of missing data should be taken into account when interpreting these data. However, it is considered that the benefits of reporting these incidence data outweigh the risk of including imperfect and incomplete data.

In 2004–2008, for women in New South Wales, Queensland, Western Australia and the Northern Territory, Aboriginal and Torres Strait Islander women aged 50–69 had a significantly lower incidence of invasive breast cancer (213.3 new cases per 100,000 women) compared with non-Indigenous women from these states and territories (262.9 new cases per 100,000 women) (Figure 7.6; Table 7.6).

This was also true for Aboriginal and Torres Strait Islander women of all ages, with an age-standardised incidence rate of 82.1 new cases per 100,000 women compared with the non-Indigenous rate of 103.6 (see *BreastScreen Australia monitoring report 2010–2011: supplementary data tables*). Despite this lower rate, breast cancer is the most commonly diagnosed cancer for Aboriginal and Torres Strait Islander women in New South Wales, Queensland, Western Australia and the Northern Territory.



**Table 7.6: Incidence of breast cancer (New South Wales, Queensland, Western Australia and the Northern Territory) by Indigenous status, women aged 50–69, 2004–2008**

|            | Aboriginal and Torres Strait Islander <sup>(a)</sup> | Non-Indigenous <sup>(a)</sup> | Australia   |
|------------|--|-------------------------------|-------------|
| New cases  | 228  | 18,122                        | 31,825      |
| Crude rate | 205.7  | 264.5                         | 287.9       |
| AS rate    | 213.3  | 262.9                         | 286.1       |
| 95% CI     | 186.1–243.2  | 259.1–266.8                   | 283.0–289.3 |

(a) 'Aboriginal and Torres Strait Islander' and 'Non-Indigenous' are for New South Wales, Queensland, Western Australia and the Northern Territory only. Data from these jurisdictions were considered to have adequate levels of Indigenous identification in cancer registration data at the time this report was prepared.

*Notes*

1. Some states and territories use an imputation method for determining Indigenous cancers that may lead to differences between these data and those shown in jurisdictional cancer incidence reports.
2. Crude rates are the number of new cases of invasive breast cancer per 100,000 women.
3. Age-standardised rates are the number of new cases of invasive breast cancer per 100,000 women, age-standardised to the Australian population at 30 June 2001.

*Source:* AIHW Australian Cancer Database.

## Indicator 7b Ductal carcinoma in situ incidence

### What you need to know about DCIS incidence

**Definition:** The number of new cases of ductal carcinoma in situ (DCIS) per 100,000 estimated resident female population in a 12-month period.

**Rationale:** DCIS incidence data provide information about the underlying level of DCIS in Australia. DCIS was rarely detected before breast screening was introduced. Since the introduction of screening mammography, detection of DCIS has increased. Annual monitoring of these data with various stratifications (such as age or location) may reveal findings of concern or positive trends that can be used to inform BreastScreen Australia as well as broader policies for DCIS in Australian women.

**Guide to interpretation:** These data include both screen-detected DCIS cases (through BreastScreen Australia) and DCIS cases detected outside the screening program.

Incidence data are reported per 100,000 women in the population.

Incidence of DCIS by state and territory is reported over a 5-year instead of a 12-month period to improve the stability and comparability of rates due to the small number of new cases in less-populated areas. Further, to produce comparable rates from the relatively small number of DCIS cases, incidence of DCIS is reported by 10-year age groups. Unlike data for Indicators 1 to 6, DCIS incidence data are presented for women aged 50–69 years and for all Australian women (unlike Indicators 1–6, this includes women under 40).

State and territory cancer registries are the source of DCIS incidence data.

The most recent incidence of DCIS data are for new cases diagnosed in 2008.

### What the data tell us about DCIS incidence

#### Trend

Incidence of DCIS for women aged 50–69 increased over time from 29.9 new cases per 100,000 women in 1996 to a peak of 45.7 new cases in 2001, thereafter remaining steady at about 42 to 46 new cases per 100,000 women. In 2008, the incidence in women aged 50–69 was 45.6 new cases per 100,000 women.

#### 2008

For women aged 50–69, there were 1,075 new cases of DCIS, or 45.6 new cases per 100,000 women. In the same year, there were 1,673 new cases, or 14.3 new cases per 100,000, for women of all ages.

## More information about DCIS

DCIS is a non-invasive tumour arising from the lining of the ducts that carry milk from the milk-producing lobules to the nipple. Cell changes seen in DCIS are similar to those in invasive breast cancer. However, unlike invasive breast cancer, DCIS does not invade surrounding breast tissue, and is instead contained entirely within the milk duct.

Incidence of DCIS measures the number of new cases of DCIS diagnosed each year. DCIS is presently not included in the Australian Cancer Database; however, state and territory cancer registries have been routinely collecting data on DCIS for more than 10 years, and are the source of DCIS incidence data reported here. Similar to invasive breast cancer incidence data, DCIS data refer to the number of new cases diagnosed and not the number of women diagnosed. Further, if a woman is diagnosed with DCIS and invasive breast cancer, only the more serious diagnosis of invasive breast cancer is counted.

## Detailed analyses

### DCIS incidence 2008

There were 1,673 new cases of DCIS in Australian women in 2008. This is equivalent to 15.5 new cases per 100,000 women in the population, which, when age-standardised to allow analyses of trends and differentials, equates to an incidence rate of 14.3.

Of the 1,673 new cases, 1,075 were in women aged 50–69, the target population of BreastScreen Australia. These 1,075 new cases represent 64.3% of all DCIS cases in that year and 45.9 new cases for every 100,000 women in the population. When age-standardised, this equates to an incidence rate of 45.6.

#### Box 7.2: How many DCIS cases were detected through BreastScreen Australia?

In 2008, it was estimated that 76% of DCIS cases diagnosed in women aged 50–69, and 64% of DCIS cases in women aged 40 or over, were detected through BreastScreen Australia.

### DCIS incidence trends

Incidence of DCIS has increased over time (Table 7.7). For women aged 50–69, it has increased steadily from 29.9 new cases per 100,000 women in 1996 to a peak of 45.7 new cases in 2001, thereafter remaining steady at about 42 to 46 new cases per 100,000 women. In 2008, the incidence in women aged 50–69 was 45.6 new cases per 100,000.

Table 7.7: Incidence of DCIS, women aged 50–69, 1996 to 2008

|         | 1996      | 1997      | 1998      | 1999      | 2000      | 2001      | 2002      | 2003      | 2004      | 2005      | 2006      | 2007      | 2008      |
|---------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| AS rate | 29.9      | 33.3      | 37.0      | 37.9      | 41.0      | 45.7      | 42.6      | 41.9      | 44.3      | 43.4      | 43.1      | 43.4      | 45.6      |
| 95% CI  | 27.3–32.7 | 30.6–36.2 | 34.2–40.0 | 35.1–40.8 | 38.1–44.0 | 42.7–48.9 | 39.7–45.6 | 39.1–44.8 | 41.5–47.2 | 40.6–46.3 | 40.4–45.9 | 40.7–46.2 | 42.9–48.4 |

Note: Rates are the number of new cases of DCIS per 100,000 women and age-standardised to the Australian population at 30 June 2001.

Source: AIHW analysis of state and territory cancer registry data.

## DCIS incidence by age

In 2008, the highest incidence of DCIS was for women aged 60–69, with 52.5 new cases per 100,000 women; this was followed by women aged 50–59, with 41.1 (Table 7.8).

**Table 7.8: Age-specific incidence rates for DCIS, by age, 2008**

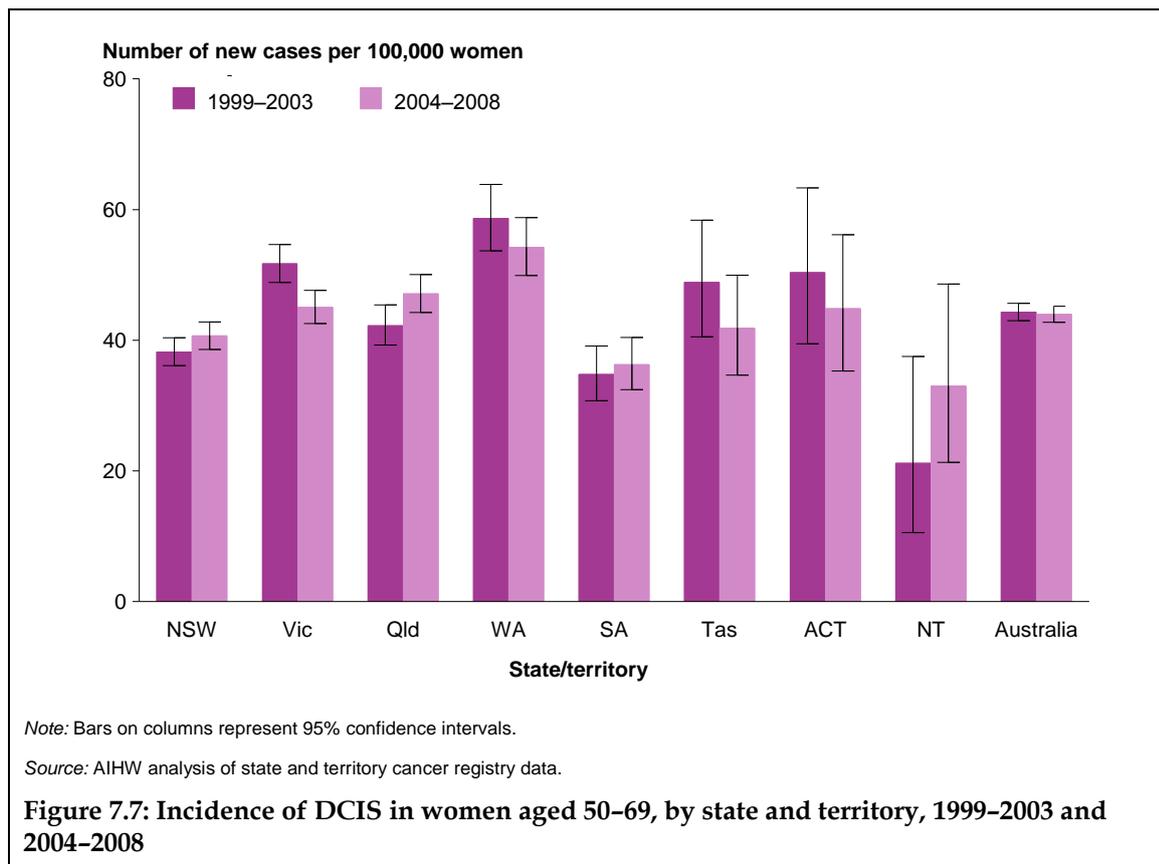
|            | Age group (years) |       |       |      |
|------------|-------------------|-------|-------|------|
|            | 40–49             | 50–59 | 60–69 | 70+  |
| New cases  | 299               | 559   | 516   | 246  |
| Crude rate | 19.3              | 41.1  | 52.5  | 21.9 |

*Note:* Rates are the number of new cases of DCIS per 100,000 women.

*Source:* AIHW analysis of state and territory cancer registry data.

## DCIS incidence by state and territory

In 2004–2008, the incidence of DCIS across the states and territories for women aged 50–69 varied between 33.0 and 54.2 new cases per 100,000 women (Table 7.9), although caution should be used when interpreting rates from small numbers such as these. There was little change in the DCIS incidence rates between 1999–2003 and 2004–2008 (Figure 7.7).



**Table 7.9: Incidence of DCIS, women aged 50–69, by state and territory, 2004–2008**

|           | <b>NSW</b> | <b>Vic</b> | <b>Qld</b> | <b>WA</b> | <b>SA</b> | <b>Tas</b> | <b>ACT</b> | <b>NT</b> | <b>Australia</b> |
|-----------|------------|------------|------------|-----------|-----------|------------|------------|-----------|------------------|
| New cases | 1,485      | 1,232      | 1,021      | 584       | 328       | 121        | 76         | 26        | 4,873            |
| AS rate   | 40.7       | 45.0       | 47.1       | 54.2      | 36.3      | 41.8       | 44.8       | 33.0      | 44.0             |
| 95% CI    | 38.6–42.8  | 42.5–47.6  | 44.2–50.1  | 49.9–58.8 | 32.5–40.4 | 34.7–50.0  | 35.3–56.1  | 21.3–48.6 | 42.7–45.2        |

*Note:* Rates are the number of new cases of DCIS per 100,000 women and age-standardised to the Australian population at 30 June 2001.

*Source:* AIHW analysis of state and territory cancer registry data.

# Indicator 8 Mortality

## What you need to know about mortality

**Definition:** The number of deaths from breast cancer per 100,000 estimated resident female population in a 12-month period.

**Rationale:** BreastScreen Australia aims to reduce mortality from breast cancer.

**Guide to interpretation:** These data include mortality from all breast cancers, whether or not they were detected through BreastScreen Australia. Mortality from breast cancer refers to mortality from invasive breast cancer, although the term 'invasive' has been dropped from this chapter as it is not required to distinguish it from DCIS.

Mortality data are reported per 100,000 women in the population.

Mortality from breast cancer by state and territory, remoteness area, socioeconomic status and Indigenous status is reported over a 5-year period to improve the stability and comparability of rates due to the small number of deaths in less populated areas and in Aboriginal and Torres Strait Islander women.

The National Mortality Database is the source of breast cancer mortality data.

The most recent data for mortality from breast cancer (when preparing this report) are deaths in 2010.

## What the data tell us about mortality

### Trend

Mortality decreased from 68.2 deaths per 100,000 women in 1991, when BreastScreen Australia commenced, to 43.3 per 100,000 women in 2010.

### 2010

In 2010, there were 1,098 deaths from breast cancer in women aged 50–69 (the target population of BreastScreen Australia), or 43.3 deaths per 100,000 women. There were 2,840 deaths, or 21.6 deaths per 100,000 women, for women of all ages.

### 2006–2010

Death rates did not differ between Aboriginal and Torres Strait Islander women and non-Indigenous women (54.5 and 45.4 per 100,000 women, respectively, for the 2006–2010 period).

## More information about mortality

Mortality data are some of the most comprehensively collected national data in Australia. Registration of death is a legal requirement in Australia and, as a result, the data set is virtually complete. Registration of deaths is the responsibility of the Registrar of Births, Deaths and Marriages in each state and territory. The mortality data used in this report were provided by these registries and the National Coroners Information System, and coded by the ABS. These data are maintained at the AIHW in the National Mortality Database.

Mortality from breast cancer measures the number of deaths each year for which breast cancer was the underlying cause of death. Analyses are based on the year of death, except for 2010 (the latest year for which mortality data were available at the time of printing), which is based on year of registration of death. Cause of death data for 2009 are revised and data for 2010 are preliminary, and both are subject to revision. About 5% of deaths are not registered until the year following the death (ABS 2007).

Note that no adjustments were made to 2010 data regarding late registrations in Queensland.

## Detailed analyses

### Mortality in 2010

In 2010, there were 2,840 deaths from breast cancer in Australian women. This is equivalent to 25.4 deaths for every 100,000 women in the population, which, when age-standardised to allow analysis of trends and differentials, equates to a mortality rate of 21.6.

Of the 2,840 deaths, 1,098 were in women aged 50–69, the target population of BreastScreen Australia. These 1,098 deaths represent 38.7% of all breast cancer deaths in that year, and 44.3 deaths for every 100,000 women aged 50–69 in the population. When age-standardised to allow analysis of trends and differentials, this equates to a mortality rate of 43.3 deaths per 100,000 women for women aged 50–69.

In the broader context of cancer deaths in Australian women, breast cancer was the second most common cancer causing death in Australian women in 2010 (behind lung cancer), comprising 15.3% of all cancer deaths in women that year. In 2010, the mean age of death for women was 69.0 years, and the risk of dying from breast cancer was 1 in 67 by age 75 and 1 in 39 by age 85.

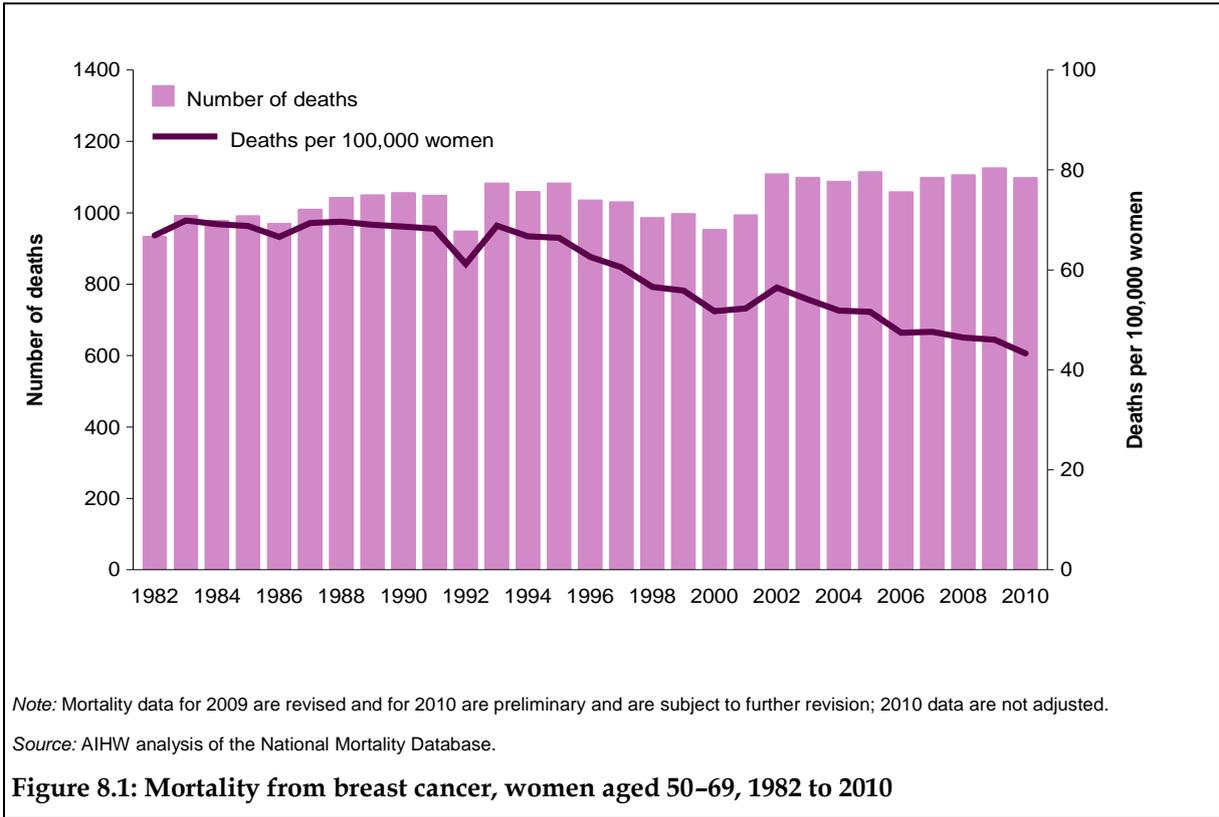
### Mortality trends

Mortality from breast cancer has decreased over time in Australia.

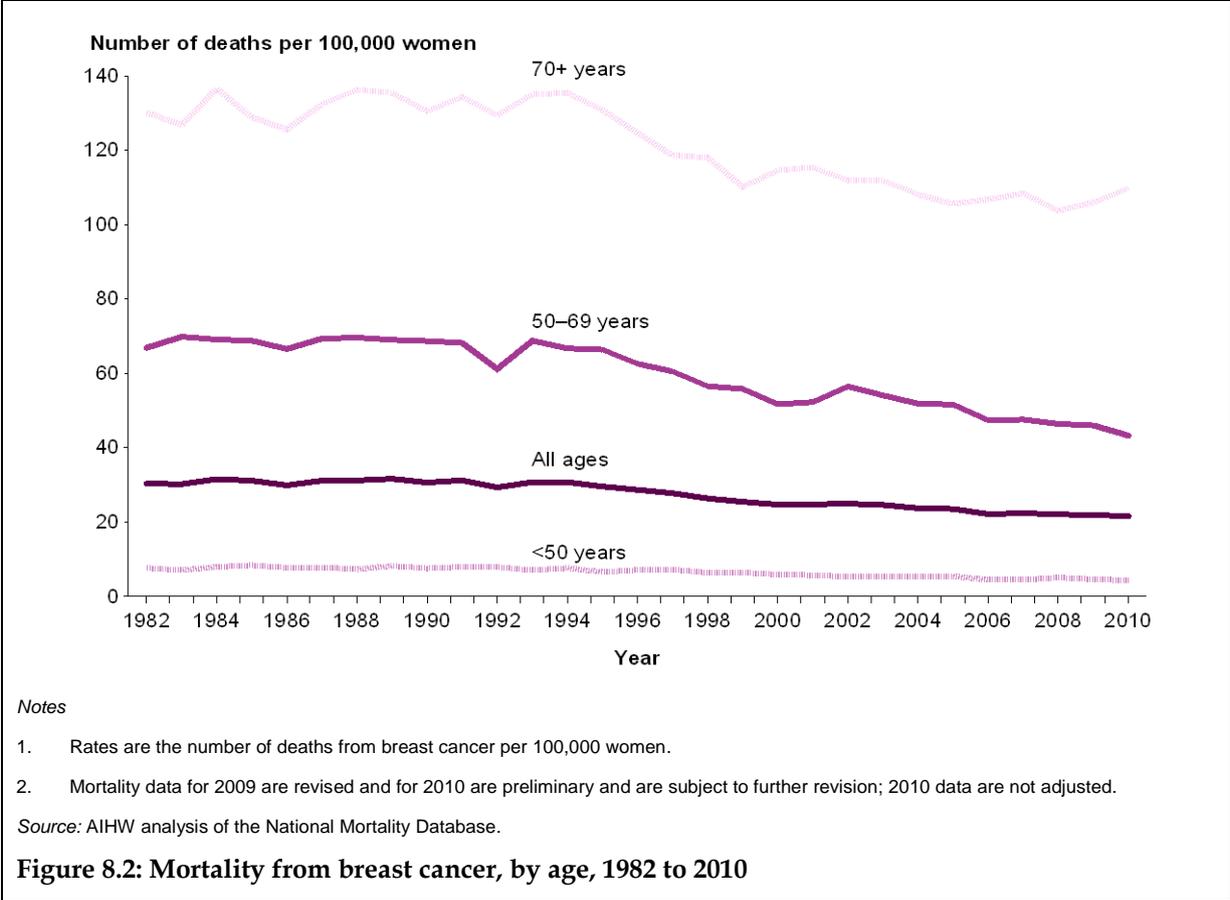
For women aged 50–69, mortality remained relatively steady between 1982 and 1990 (the year before BreastScreen Australia began).

However, it decreased from 68.2 deaths per 100,000 women in 1991, when BreastScreen Australia started, to 43.3 per 100,000 in 2010 (the latest year for which data are available) (Table 8.1; Figure 8.1). This represents a decrease of 36.5% from the 1991 mortality rate to that observed in 2010 for women aged 50–69.

The decrease in mortality in women aged 50–69 has been attributed, in part, to the early detection of breast cancer through BreastScreen Australia, along with advances in the management and treatment of breast cancer (BreastScreen Australia EAC 2009a).



**Breast cancer mortality by age**



When comparing trends across broad age groups, it is evident that breast cancer mortality affects more older women than younger women (Figure 8.2). Further, mortality in women aged 50–69 appears to mirror that for women aged 70 and over. Further (although difficult to see in Figure 8.2), the general trend described for women aged 50–69 was also true for women aged under 50. For these younger women, after a period of relative stability, the mortality rate fell from 8.0 deaths per 100,000 women in 1991 to 4.4 in 2010 (Table 8.1).

**Table 8.1: Mortality rates from breast cancer, 1982 to 2010**

| Year | Age group (years) |     |       |       |
|------|-------------------|-----|-------|-------|
|      | All ages          | <50 | 50–69 | 70+   |
| 1982 | 30.4              | 7.6 | 66.9  | 130.2 |
| 1983 | 30.2              | 7.1 | 69.9  | 126.8 |
| 1984 | 31.6              | 8.0 | 69.2  | 136.6 |
| 1985 | 31.2              | 8.4 | 68.8  | 128.9 |
| 1986 | 29.9              | 7.7 | 66.6  | 125.6 |
| 1987 | 31.1              | 7.8 | 69.4  | 132.4 |
| 1988 | 31.2              | 7.3 | 69.6  | 136.3 |
| 1989 | 31.6              | 8.2 | 69.0  | 135.5 |
| 1990 | 30.6              | 7.5 | 68.7  | 130.5 |
| 1991 | 31.3              | 8.0 | 68.2  | 134.4 |
| 1992 | 29.3              | 7.9 | 61.2  | 129.4 |
| 1993 | 30.8              | 7.1 | 68.8  | 135.1 |
| 1994 | 30.8              | 7.6 | 66.7  | 135.5 |
| 1995 | 29.6              | 6.6 | 66.4  | 130.8 |
| 1996 | 28.7              | 7.2 | 62.6  | 124.8 |
| 1997 | 27.8              | 7.2 | 60.6  | 118.6 |
| 1998 | 26.4              | 6.4 | 56.6  | 118.1 |
| 1999 | 25.5              | 6.4 | 55.8  | 110.1 |
| 2000 | 24.7              | 5.9 | 51.7  | 114.7 |
| 2001 | 24.8              | 5.8 | 52.3  | 115.4 |
| 2002 | 25.0              | 5.3 | 56.5  | 111.9 |
| 2003 | 24.7              | 5.5 | 54.1  | 111.9 |
| 2004 | 23.7              | 5.3 | 51.8  | 108.1 |
| 2005 | 23.6              | 5.5 | 51.6  | 105.6 |
| 2006 | 22.2              | 4.5 | 47.4  | 106.8 |
| 2007 | 22.4              | 4.5 | 47.6  | 108.4 |
| 2008 | 22.1              | 5.1 | 46.5  | 103.8 |
| 2009 | 21.9              | 4.7 | 46.0  | 106.0 |
| 2010 | 21.6              | 4.4 | 43.3  | 109.9 |

*Notes*

1. Rates are the number of deaths from breast cancer per 100,000 women and age-standardised to the Australian population at 30 June 2001.
2. Mortality data for 2009 are revised and for 2010 are preliminary and are subject to further revision; 2010 data are not adjusted.

Source: AIHW National Mortality Database.

For all age groups combined, mortality from breast cancer fell from 31.3 deaths per 100,000 women in 1991, when BreastScreen Australia was introduced, to 21.6 deaths per 100,000 women in 2010 (Table 8.1).

In 2010, deaths from breast cancer in women aged 50–69 comprised 38.7% of all breast cancer deaths. This has changed little from the 39.6% of breast cancer deaths in 1997, but represents a fall from the 44.0% of all breast cancer deaths in 1987.

Analysis of 5-year age groups reveals that, in 2010, mortality increased with age, from 12.3 deaths per 100,000 women aged 40–44 to 207.1 for women aged 85 and over (Table 8.2).

**Table 8.2: Age-specific mortality rates for breast cancer, 2010**

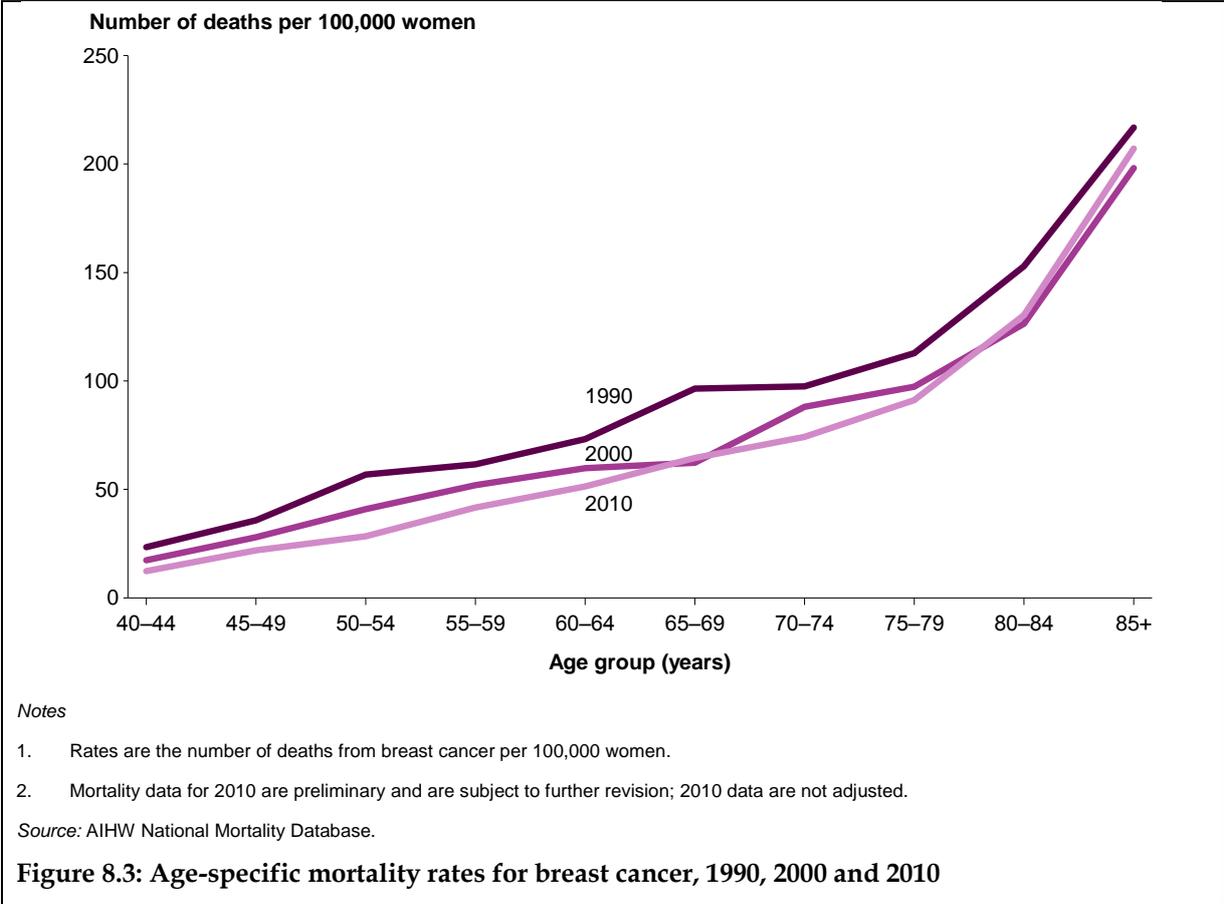
|            | Age group (years) |       |       |       |       |       |       |       |       |       |
|------------|-------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|            | 40–44             | 45–49 | 50–54 | 55–59 | 60–64 | 65–69 | 70–74 | 75–79 | 80–84 | 85+   |
| Deaths     | 96                | 174   | 211   | 279   | 312   | 296   | 272   | 270   | 327   | 535   |
| Crude rate | 12.3              | 21.9  | 28.4  | 41.7  | 51.3  | 64.5  | 74.2  | 91.2  | 130.3 | 207.1 |

*Notes*

1. Rates are the number of deaths from breast cancer per 100,000 women.
2. Mortality data for 2010 are preliminary and are subject to further revision; 2010 data are not adjusted.

Source: AIHW National Mortality Database.

The trend described in 2010 was similar to that for both 10 and 20 years earlier – in 2000 and 1990, respectively (Figure 8.3).



## Mortality from breast cancer by state and territory

In 2006–2010, mortality from breast cancer for women aged 50–69 was relatively similar across states and territories to the national rate of 46.1 deaths per 100,000 women (Table 8.3; Figure 8.4).

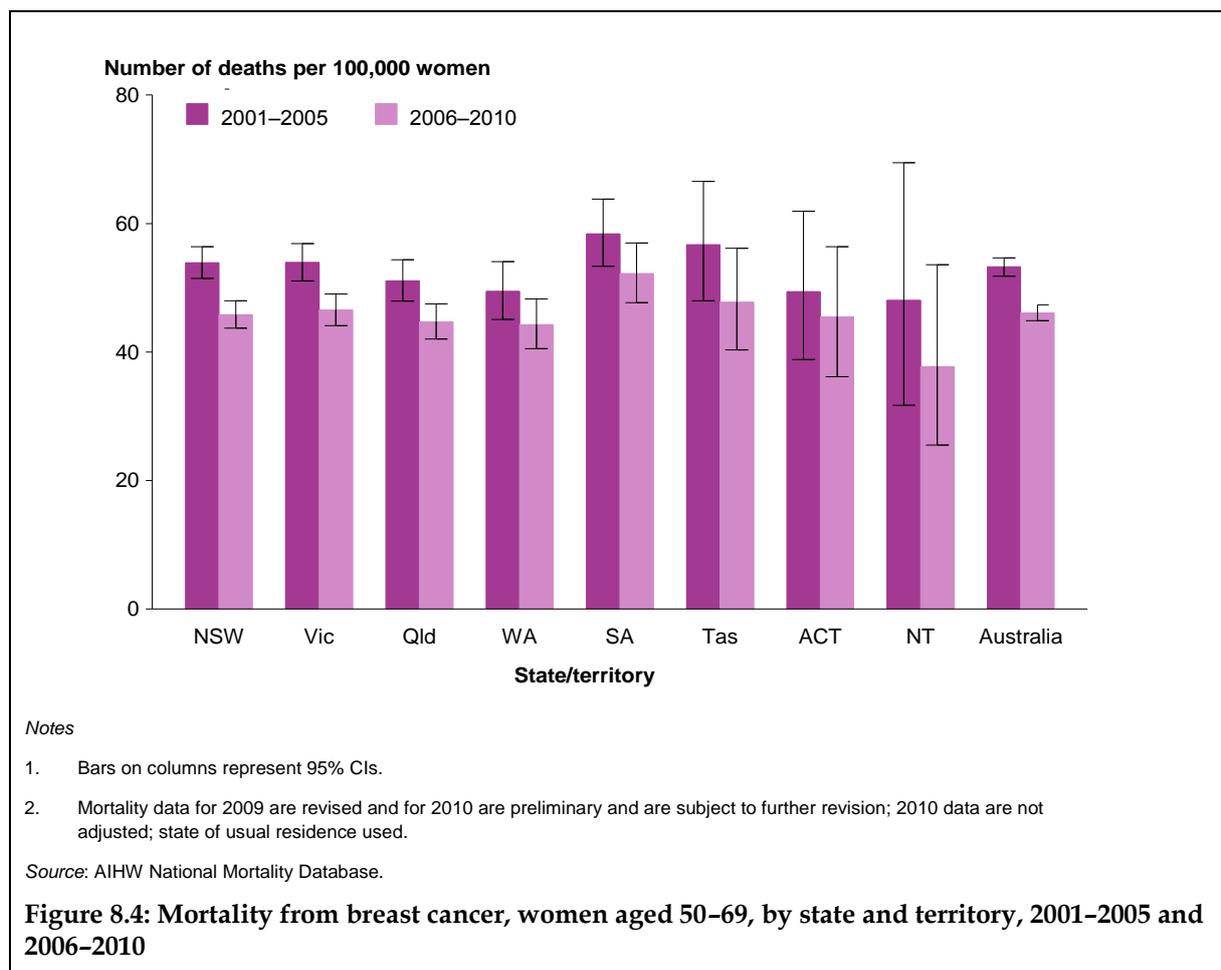
**Table 8.3: Mortality from breast cancer, women aged 50–69 and women of all ages, by state and territory, 2006–2010**

|                    | NSW       | Vic       | Qld       | WA        | SA        | Tas       | ACT       | NT        | Australia |
|--------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>50–69 years</b> |           |           |           |           |           |           |           |           |           |
| Deaths             | 1,788     | 1,366     | 1,053     | 515       | 501       | 148       | 83        | 32        | 5,486     |
| AS rate            | 45.8      | 46.5      | 44.7      | 44.2      | 52.2      | 47.8      | 45.5      | 37.7      | 46.1      |
| 95% CI             | 43.7–48.0 | 44.1–49.1 | 42.0–47.5 | 40.5–48.2 | 47.7–57.0 | 40.3–56.1 | 36.2–56.4 | 25.5–53.6 | 44.9–47.3 |
| <b>All ages</b>    |           |           |           |           |           |           |           |           |           |
| Deaths             | 4,679     | 3,524     | 2,431     | 1,219     | 1,242     | 363       | 201       | 57        | 13,716    |
| AS rate            | 22.4      | 22.4      | 20.7      | 21.0      | 23.4      | 22.4      | 23.7      | 17.3      | 22.0      |
| 95% CI             | 21.7–23.0 | 21.6–23.1 | 19.9–21.6 | 19.8–22.2 | 22.1–24.8 | 20.1–24.9 | 20.5–27.2 | 12.5–23.1 | 21.7–22.4 |

### Notes

1. Rates are the number of deaths from breast cancer per 100,000 women and age-standardised to the Australian population at 30 June 2001.
2. Mortality data for 2009 are revised and for 2010 are preliminary and are subject to further revision; 2010 data are not adjusted; state of usual residence used.

Source: AIHW National Mortality Database.



## Mortality from breast cancer by remoteness area

In 2006–2010, mortality from breast cancer for women aged 50–69 was relatively similar across remoteness areas (Table 8.4; Figure 8.5).

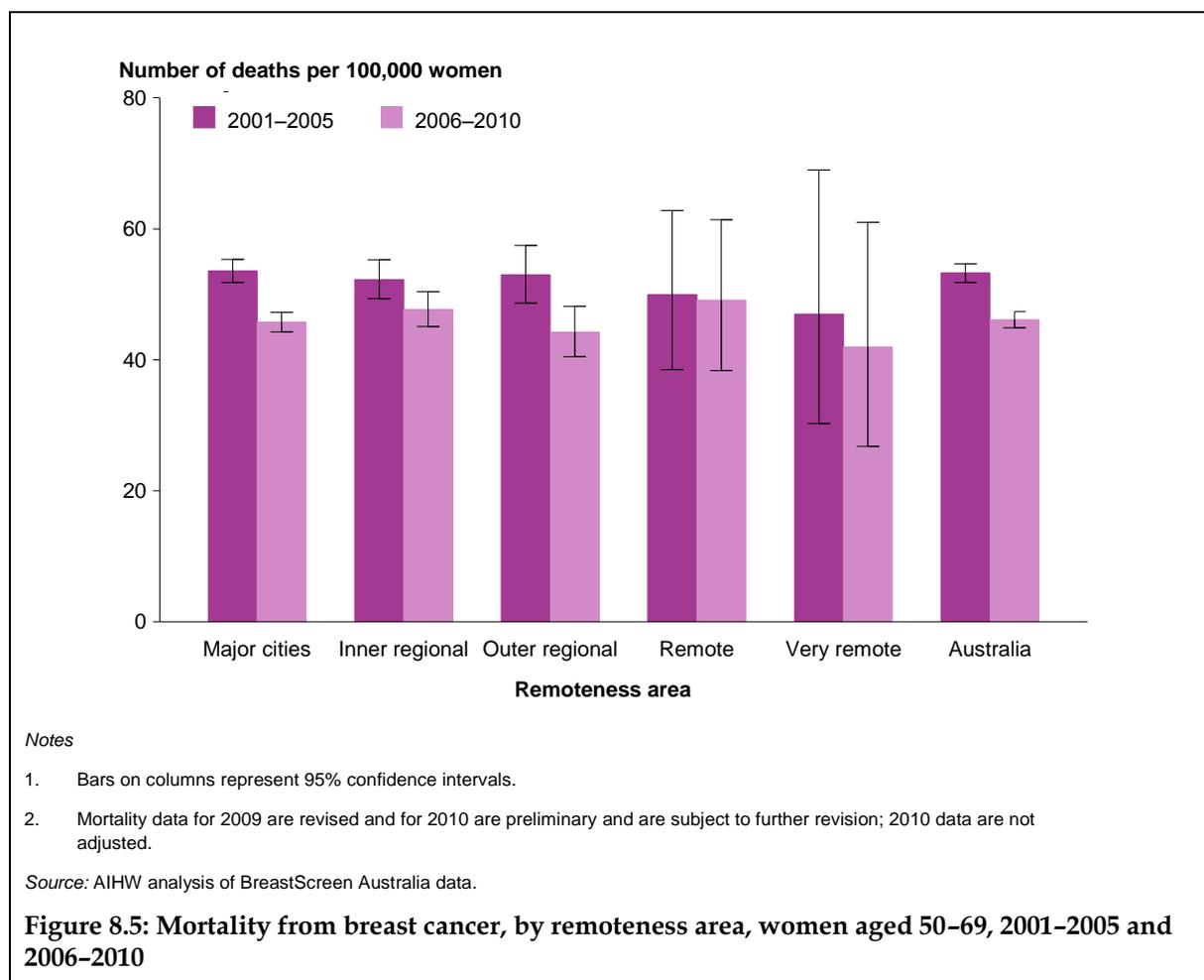
**Table 8.4: Mortality from breast cancer, by remoteness area, women aged 50–69 and women of all ages, 2006–2010**

|                    | Major cities | Inner regional | Outer regional | Remote    | Very remote | Australia |
|--------------------|--------------|----------------|----------------|-----------|-------------|-----------|
| <b>50–69 years</b> |              |                |                |           |             |           |
| Deaths             | 3,596        | 1,260          | 523            | 74        | 26          | 5,486     |
| AS rate            | 45.7         | 47.7           | 44.2           | 49.1      | 41.9        | 46.1      |
| 95% CI             | 44.3–47.3    | 45.1–50.4      | 40.5–48.2      | 38.4–61.4 | 26.8–61.0   | 44.9–47.3 |
| <b>All ages</b>    |              |                |                |           |             |           |
| Deaths             | 9,154        | 3,066          | 1,277          | 145       | 52          | 13,716    |
| AS rate            | 21.9         | 22.6           | 21.9           | 20.9      | 19.2        | 22.0      |
| 95% CI             | 21.4–22.3    | 21.8–23.4      | 20.7–23.2      | 17.5–24.5 | 14.1–25.4   | 21.7–22.4 |

### Notes

1. Rates are the number of deaths from breast cancer per 100,000 women and age-standardised to the Australian population at 30 June 2001.
2. Mortality data for 2009 are revised and for 2010 are preliminary and are subject to further revision; 2010 data are not adjusted.
3. Remoteness areas were assigned using the woman's residential postcode according to the Australian Standard Geographical Classification for 2006. Not all postcodes can be assigned to a remoteness area therefore, categories do not add to Australia.

Source: AIHW National Mortality Database.



## Mortality from breast cancer by Indigenous status

Information on Indigenous status on the National Mortality Database is considered of sufficient quality to analyse the years 2006 to 2010 for five jurisdictions – New South Wales, Queensland, Western Australia, South Australia and the Northern Territory. The majority (89%) of Aboriginal and Torres Strait Islander people reside in these five jurisdictions (ABS 2009).

Note that, as the jurisdictions for which mortality by Indigenous status can be estimated is different from those for which incidence by Indigenous status can be estimated, no direct comparisons between incidence and mortality are made.

Mortality from breast cancer by Indigenous status for New South Wales, Queensland, Western Australia, South Australia and the Northern Territory is presented for the most recent 5-year period, 2006–2010.

These data show that in 2006–2010, mortality from breast cancer did not differ between Indigenous women and non-Indigenous women.

In 2006–2010, mortality from breast cancer in Aboriginal and Torres Strait Islander women aged 50–69 in the five jurisdictions combined was 54.5 per 100,000 women, compared with the non-Indigenous rate of 45.4 in these jurisdictions (Figure 8.6, Table 8.5).

Mortality for women of all ages was 27.4 deaths per 100,000 women for Aboriginal and Torres Strait Islander women compared with the non-Indigenous rate of 21.6 (Table 8.5).

**Table 8.5: Mortality from breast cancer (New South Wales, Queensland, Western Australia, South Australia and the Northern Territory) by Indigenous status, women aged 50–69 and women of all ages, 2006–2010**

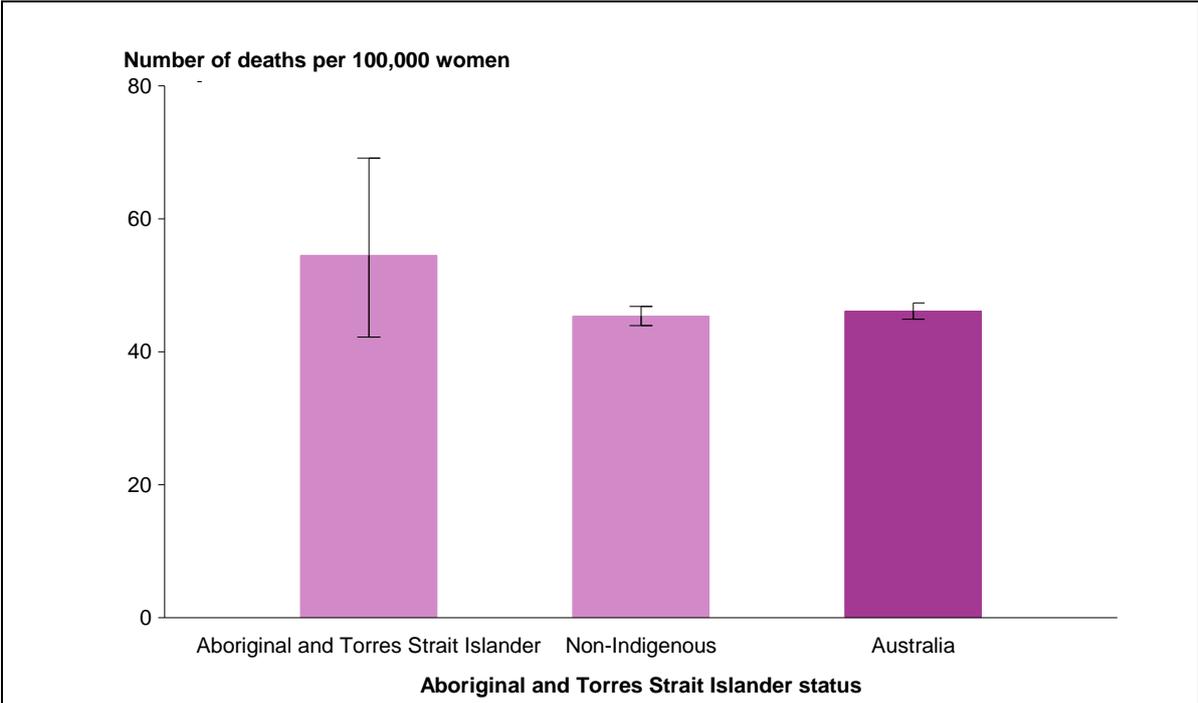
|                    | Aboriginal and Torres Strait Islander <sup>(a)</sup> | Non-Indigenous <sup>(a)</sup> | Australia |
|--------------------|--|-------------------------------|-----------|
| <b>50–69 years</b> |  |                               |           |
| Deaths             | 69   | 3,784                         | 5,486     |
| Crude rate         | 52.8   | 46.1                          | 46.8      |
| AS rate            | 54.5   | 45.4                          | 46.1      |
| 95% CI             | 42.2–69.1  | 43.9–46.8                     | 44.9–47.3 |
| <b>All ages</b>    |  |                               |           |
| Deaths             | 137  | 9,407                         | 13,716    |
| Crude rate         | 11.4   | 25.3                          | 25.4      |
| AS rate            | 27.4   | 21.6                          | 22.0      |
| 95% CI             | 22.3–33.1  | 21.2–22.0                     | 21.7–22.4 |

(a) 'Aboriginal and Torres Strait Islander' and 'Non-Indigenous' are for New South Wales, Queensland, Western Australia, South Australia and the Northern Territory only. Data from these jurisdictions were considered to have adequate levels of Indigenous identification in cancer mortality data at the time this report was prepared.

### Notes

1. Crude rates are the number of deaths from breast cancer per 100,000 women.
2. Age-standardised rates are the number of deaths from breast cancer per 100,000 women, age-standardised to the Australian population at 30 June 2001.
3. Mortality data for 2009 are revised and for 2010 are preliminary and are subject to further revision; 2010 data are not adjusted.

Source: AIHW National Mortality Database.



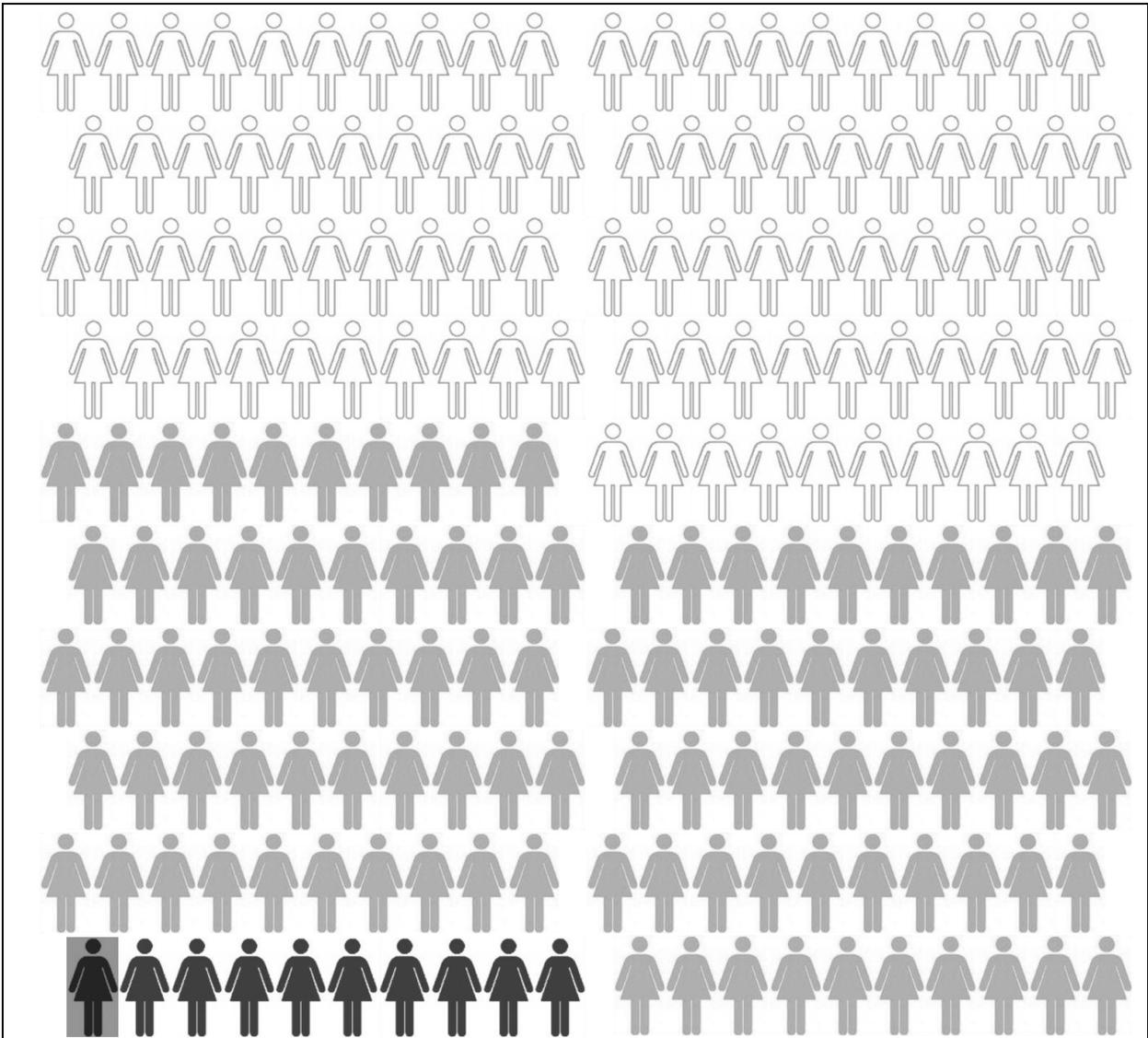
*Notes*

1. Bars on columns represent 95% confidence intervals.
2. 'Aboriginal and Torres Strait Islander' and 'non-Indigenous' are for New South Wales, Queensland, Western Australia, South Australia and the Northern Territory only. 'Australia' includes all states and territories.
3. Age-standardised rates are the number of deaths from breast cancer per 100,000 women, age-standardised to the Australian population at 30 June 2001.
4. Mortality data for 2009 are revised and for 2010 are preliminary and are subject to further revision; 2010 data are not adjusted.

Source: AIHW National Mortality Database.

**Figure 8.6: Mortality from breast cancer (New South Wales, Queensland, Western Australia, South Australia and the Northern Territory), by Indigenous status, women aged 50–69, 2006–2010**

# Appendix A Additional data



**Notes**

1. The symbols represent the average 2010 and 2011 ABS estimated resident population for women aged 50–69.
2. The lighter shaded symbols represent the proportion of women screened in 2010–2011.
3. The darker shaded symbols represent the proportion of women recalled to assessment in 2010.
4. The single darkest symbol (set within a screened box) represents the proportion of women who have an invasive breast cancer detected through BreastScreen Australia.

Source: AIHW analysis of BreastScreen Australia data.

**Figure A1: Women in BreastScreen Australia aged 50–69, 2010–2011**

# Appendix B BreastScreen Australia information

**Table B1: Contacts and links for the state, territory and Australian government components of BreastScreen Australia**

---

|  |  |
|--|--|
| <b>BreastScreen New South Wales</b>                          |  |
| Tel: (02) 8374 5777  | <www.bsnsw.org.au/>.   |
| Fax: (02) 8374 5699  |  |
| E-mail: information@cancerinstitute.org.au                   |  |
| <b>BreastScreen Victoria</b>                                 |  |
| Tel: (03) 9660 6888  | <www.BreastScreen.org.au>.   |
| Fax: (03) 9662 3881  |  |
| E-mail: info@BreastScreen.org.au                             |  |
| <b>BreastScreen Queensland</b>                               |  |
| Tel: (07) 3328 9467  | <www.BreastScreen.qld.gov.au>.   |
| Fax: (07) 3328 9487  |  |
| Email: cssb@health.gov.au                                    |  |
| <b>BreastScreen Western Australia</b>                        |  |
| Tel: (08) 9323 6700  | <www.BreastScreen.health.wa.gov.au>.   |
| Fax: (08) 9323 6799  |  |
| E-mail: BreastScreenwa@health.wa.gov.au                      |  |
| <b>BreastScreen South Australia</b>                          |  |
| Tel: (08) 8274 7100  | <www.breastcreensa.sa.gov.au>.   |
| Fax: (08) 8373 4395  |  |
| E-mail: BSSAenquiries@health.sa.gov.au                       |  |
| <b>BreastScreen Tasmania</b>                                 |  |
| Tel: (03) 6216 4300  | <www.dhhs.tas.gov.au/cancerscreening/information_about_breast_screening>.                  |
| Fax: (03) 6216 4326  |  |
| E-mail: canscreen@dhhs.tas.gov.au                            |  |
| <b>BreastScreen ACT</b>                                      |  |
| Tel: (02) 6205 4444  | <http://health.act.gov.au/c/health?a=sp&pid=1059452616>.                                   |
| Fax: (02) 6205 1394  |  |
| E-mail: BreastScreen@act.gov.au                              |  |
| <b>BreastScreen NT</b>                                       |  |
| Tel: (08) 8922 6449  | <www.health.nt.gov.au/Womens_Health/Breast_Screen_NT/index.aspx>.                          |
| Fax: (08) 8922 6440  |  |
| E-mail: wcpp.ths@nt.gov.au                                   |  |
| <b>Australian Government Department of Health and Ageing</b> |  |
| cancerscreening@health.gov.au                                | <www.cancerscreening.gov.au/internet/screening/publishing.nsf/Content/BreastScreen-about>. |
| <b>AIHW</b>  |  |
| screening@aihw.gov.au  | <www.aihw.gov.au/breast-cancer-screening/>.  |

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# BreastScreen Australia definitions

## Target age group

Women aged 50–69. BreastScreen Australia selects women on the basis of age alone. BreastScreen Australia actively targets women aged 50–69 through recruitment strategies and reminder letters.

## Indigenous status

Participation can be reported by Indigenous status because this is recorded on state and territory BreastScreen registers. Women who attend for a screening mammogram at a BreastScreen Australia service are asked to complete a form that includes personal and demographic details, as well as personal and family history of breast cancer. The form also includes a question on Indigenous status where the respondent can identify as 'Aboriginal', 'Torres Strait Islander', 'both Aboriginal and Torres Strait Islander', or 'neither Aboriginal or Torres Strait Islander'. There is an additional 'not stated' category for women who choose not to answer this question.

This aligns with the *BreastScreen Australia data dictionary* (AIHW & DoHA 2005) which specifies that 'Indigenous status' (currently 'Indigenous status' in the dictionary) should be coded as:

- Aboriginal
- Torres Strait Islander
- both Aboriginal and Torres Strait Islander
- not Indigenous, or
- not stated.

For the purposes of this report, these categories were amalgamated and the data stratified into three categories:

- Aboriginal and Torres Strait Islander
- not Indigenous, or
- not stated.

While self-reported data are generally a robust source of data on Indigenous status (AIHW 2010b), it should be noted that some Aboriginal and Torres Strait Islander women may choose not to identify as such when presenting to a BreastScreen Australia service. Thus, some Aboriginal and Torres Strait Islander women may be incorrectly assigned non-Indigenous status. This means that the analysis based upon Indigenous status should be interpreted with caution.

Aboriginal and Torres Strait Islander women comprise a small proportion of women, both in the population and within BreastScreen Australia. Aboriginal and Torres Strait Islanders make up about 2.5% of the Australian population, with 1.3% of the 2010 female population aged 50–69 estimated to be Aboriginal or Torres Strait Islander, based on estimates in Aboriginal and Torres Strait Islander population projections (ABS cat. no. 3238.0) (ABS 2009)

## **Main language spoken at home**

Main language spoken at home is also a self-reported category that is supplied at the time of screening. Women who are reported as 'non-English-speaking' have reported that they speak a language other than English at home, which can be interpreted as indicating 'active ethnicity'. Since a different cultural and linguistic background may present a barrier to screening, this self-reported category is used to identify women who may have difficulties accessing services due to their cultural or language background.

The *BreastScreen Australia data dictionary* (AIHW & DoHA 2005) specifies that 'main language spoken at home' be coded according to the 4-digit ABS Australian Standard Classification of Languages, 1997 (ABS cat. no. 1267.0). This report has collapsed the classification into the simple dichotomy of 'English' and 'other language'.

Although this stratification is reported as 'main language spoken at home', practice varies between the jurisdictions as to how this information is collected. Thus, in some jurisdictions, there may be some lack of comparability with the *BreastScreen Australia data dictionary* definition of 'main language'.

Some jurisdictions do not allow for the 'not stated' category, which means some women who speak a language other than English at home will be incorrectly assigned to the 'English only' category.

## **Tumour size**

Tumour size is the size in millimetres of the malignant lesion, and applies to invasive cancers only. For more details, see the definition given in the *BreastScreen Australia data dictionary* (AIHW & DoHA 2005).

## **Screening round**

The *BreastScreen Australia data dictionary* (AIHW & DoHA 2005) distinguishes between a woman's screening round in the national program and her round in the state or territory program. The screening round in the jurisdictional program is used for this stratification in this report.

# Appendix C Data sources and classifications

## Data sources

Data used in this report are derived from multiple sources and are summarised below (Table C1). All data are based on calendar years.

**Table C1: Data sources for performance indicators in the BreastScreen Australia monitoring report series**

| Indicator  | Data source                                | Epoch and latest data available  |
|--|--|--|
| 1 Participation                                  | State and territory BreastScreen registers | 2 years (to align with recommended screening interval); latest data are for women screened in 2010 or 2011   |
| 2 Rescreening                                    | State and territory BreastScreen registers | 1 year; latest data are for women screened in 2008 and 2009 (27 months needs to have passed since last screen to calculate this indicator)   |
| 3 Recall to assessment                           | State and territory BreastScreen registers | 1 year; latest data are for women screened in 2010 and 2011  |
| 4 Invasive breast cancer detection               | State and territory BreastScreen registers | 1 year; latest data are for women screened in 2010 and 2011  |
| 5 DCIS detection                                 | State and territory BreastScreen registers | 1 year; latest data are for women screened in 2010 and 2011  |
| 6 Sensitivity                                    | State and territory BreastScreen registers | 3 years are combined due to small numbers (2005, 2006, and 2007) and (2006, 2007 and 2008); latest data are for women screened in 2008 and 2009 (2 years needs to have passed since last screen to calculate this indicator)   |
| 7a Invasive breast cancer incidence (ICD-10 C50) | Australian Cancer Database, AIHW           | 1 year; latest data are for new cases diagnosed in 2009. The 5 years of incidence data from 2004 to 2008 were used for showing breast cancer incidence by population subgroup because 2008 is the latest year for which actual data were available for all states and territories (see the section <i>Incidence data</i> below). |
| 7b DCIS incidence                                | State and territory cancer registries      | 1 year; latest data are for new cases diagnosed in 2008  |
| 8 Mortality (ICD-9 174, ICD-10 C50)              | National Mortality Database, AIHW          | 1 year; latest data are for deaths registered in 2010  |

## BreastScreen Australia data

BreastScreen Australia has both national and state and territory components. BreastScreen Australia policy is coordinated at the national level, but implementing the program is the responsibility of the individual state or territory. Data for participation, rescreening, recall to assessment, cancer and DCIS detection, and sensitivity are provided by each state and territory BreastScreen program, and then compiled into national figures to allow national monitoring of BreastScreen Australia.

Last year, New South Wales data for participation by main language spoken at home (a disaggregation of participation), rescreening, recall to assessment, invasive breast cancer detection, DCIS detection, and sensitivity were not available because of issues relating to the

implementation of a new business information system in New South Wales. These data have since been provided.

This report presents these data as well as the latest data, except that New South Wales data were not available for interval cancers and program sensitivity for 2008 only, 13–24 months follow-up.

Trend data are not provided.

## **Incidence data**

Incidence data in this report come from the Australian Cancer Database (formerly the National Cancer Statistics Clearing House), a national collection of cancer statistics held and operated by the AIHW. The Australian Cancer Database receives data from individual state and territory cancer registries on cancers diagnosed in residents of Australia and is the data source for reports on national incidence.

Data have been analysed using the year of cancer diagnosis. This is a more accurate reflection of incidence during a particular year than year of registration data.

Some states and territories use an imputation method for determining Indigenous cancers that may lead to differences between these data and those shown in jurisdictional cancer incidence reports.

## **Constructing the 2009 Australian Cancer Database**

The 1982–2009 data files for New South Wales and the Australian Capital Territory were not available for inclusion in the 2009 version of the Australian Cancer Database. An extended delay of the receipt of mortality data has meant that New South Wales and the Australian Capital Territory have not been able to close off their 2009 data sets. As a consequence, 2009 cancer data for these jurisdictions are not available for reporting purposes. The 2009 incidence data for New South Wales and the Australian Capital Territory were estimated by the AIHW in consultation with New South Wales and the Australian Capital Territory cancer registries. The estimates were combined with the actual data supplied by other state and territory cancer registries to form a 1982–2009 national cancer data set. These steps are explained in more detail below.

To construct the 2009 Australian Cancer Database, the 2009 estimates for New South Wales and the Australian Capital Territory were combined with the actual data supplied by other state and territory cancer registries to form a 1982–2009 national cancer data set.

## **Mortality data**

The mortality data used in this report were provided by the Registries of Births, Deaths and Marriages, the ABS and the National Coroners Information System. These data are maintained at the AIHW in the National Mortality Database.

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. Information on the cause of death is supplied by the medical practitioner certifying the death, or by a coroner. State refers to state of residence. Since 1906, the Commonwealth Statistician has compiled the information collected by the Registrars and published national death information.

The information on cause of death is coded by the ABS to an international standard, the International Classification of Disease and Related Health Problems, currently the tenth version (ICD-10). Deaths are coded to reflect the underlying cause of death.

Over time, changes have been made to the coding and processing of mortality data that affect comparability of the data. For instance, data holdings on cause of death for 1987 to 1996 were manually coded using the ninth revision of the ICD, while the data for 1997 onwards were coded to the ICD-10 standard. The change to the coding and processing of mortality data introduced a break, in 1997, in the time series.

In the National Mortality Database, both the year death occurred, and the year it was registered, are indicated. For the purposes of this report, mortality data are shown based on the year of death, except for the most recent year (namely, 2010) where the number of people whose death was registered is used. Previous investigation has shown that the year of death and its registration coincide for the most part. However, in some instances, deaths at the end of each calendar year may not be registered until the following year. Thus, year of death information for the latest available year is generally an underestimate of the actual number of deaths that occurred in that year.

Queensland mortality data by Indigenous status have been adjusted for late registrations in 2010. More information is available in *ABS causes of death for 2010* (ABS cat. no. 3303.0) from <[www.abs.gov.au](http://www.abs.gov.au)>.

## Population data

The ABS estimated resident female population was used to calculate participation, incidence and mortality rates in this report.

Participation rates were calculated using the average of the estimated resident female population for 2-year reporting periods. Denominators for participation rates have been calculated using the average of the ABS estimated resident population for 2008 and 2009 and other periods. Because the ABS does not calculate the estimated resident population by socioeconomic status or language spoken at home, alternative methods were used to calculate the denominators for these rates. In the case of language spoken at home, the denominator was calculated by applying the age-specific distribution from the language question in the 2006 national population Census to the relevant age-specific estimated resident population counts. The denominator for rates based on socioeconomic status was calculated by applying an ABS concordance between postal area and socioeconomic status to the relevant estimated resident population by postal area.

The average of the ABS projected populations (ABS cat. no. 3238.0) (ABS 2009) for 2009 and 2010 was used as the denominator for the participation of Aboriginal and Torres Strait Islander women.

The age-standardised rates in this publication were calculated using the total estimated resident Australian population at June 2001.

There may be some variation in published participation rates because of different sources of estimated resident population data between national reports and state and territory reports.

# Classifications

## Age

The data in this report are either stratified by the age of the woman at the time of screening (for the screening data), at the time of diagnosis (for the cancer incidence data) or at the time of death (for the cancer mortality data).

## State or territory

The state or territory reported is the one where screening took place (for the screening data), where the diagnosis was made (for the cancer incidence data) or the place of usual residence (for the cancer mortality data).

This means that it is possible for a woman to be double-counted in the screening data. If she was screened in one jurisdiction and then screened again less than 2 years later in another, both screens may be included in participation. This is expected to have a negligible effect on the reported participation.

## Remoteness area

Remoteness areas are classified according to the ABS's Australian Standard Geographic Classification (ASGC) Remoteness Structure (ABS 2006), which groups geographic areas into six categories. These categories, called remoteness areas, are based on Census Collection Districts (CDs) and defined using the Accessibility/Remoteness Index for Australia (ARIA). This index is a measure of the remoteness of a location from the services provided by large towns or cities. Accessibility is judged purely on distance to one of the metropolitan centres. A higher ARIA score denotes a more remote location. The six remoteness areas of the ASGC Remoteness Structure are listed in the table below (Table C2); the sixth area – 'migratory' – is not used in this report.

**Table C2: Remoteness areas for the ASGC**

| Remoteness area of Australia | Collection districts within region   |
|------------------------------|--|
| Major cities                 | CDs with an average ARIA index value of 0 to 0.2                                       |
| Inner regional               | CDs with an average ARIA index value greater than 0.2 and less than or equal to 2.4    |
| Outer regional               | CDs with an average ARIA index value greater than 2.4 and less than or equal to 5.92   |
| Remote                       | CDs with an average ARIA index value greater than 5.92 and less than or equal to 10.53 |
| Very remote                  | CDs with an average ARIA index value greater than 10.53                                |
| Migratory                    | Areas composed of off-shore, shipping and migratory CDs                                |

Women were allocated to a remoteness area using their residential postcode supplied at the time of screening. Caution is required when examining differences across remoteness areas. First, postcodes used to allocate women may not represent their location of residence. Second, because remoteness area classifications are based on the 2006 Census, their accuracy diminishes due to subsequent changes in demographics. Third, many postcodes (and hence women) are unable to be allocated to a remoteness area.

## **Socioeconomic status**

Socioeconomic status classifications are based on the ABS Index of Relative Socioeconomic Disadvantage (ABS 2008). Geographic areas are assigned a score based on attributes such as low income, low educational attainment, high unemployment and jobs in relatively unskilled occupations. The score does not refer to the socioeconomic situation of a particular individual but instead refers to the geographic area in which a person lives. A low score means an area has many low-income families, people with little training and high unemployment, and may be considered disadvantaged relative to other areas. Areas with high index scores may be considered less disadvantaged relative to other areas.

Socioeconomic status groups based on the level of the index are used for analysis where 1 (lowest) represents the most disadvantaged and 5 (highest) the least disadvantaged.

Women were allocated to a socioeconomic status using their residential postcode supplied at the time of screening. Caution is required when examining differences across socioeconomic status for several reasons. First, postcodes used to allocate women may not represent their location of residence. Second, because socioeconomic status classifications are based on the 2006 Census, their accuracy may diminish due to subsequent changes in demographics. Third, many postcodes (and hence women) are unable to be allocated to a socioeconomic status group.

## **BreastScreen Australia classifications**

See Appendix B, 'BreastScreen Australia definitions' for classifications specific to BreastScreen Australia.

# Appendix D BreastScreen Australia 2010–2011 Data Quality Statement

## Summary of key data quality issues

- All states and territories maintain a population-based BreastScreen register which records the data collected during a woman's contact with a BreastScreen service.
- The AIHW compiles BreastScreen Australia data supplied from state and territory BreastScreen registers in order to monitor BreastScreen Australia annually at a national level.
- State and territory BreastScreen registers change every day, adding new records and improving the quality of existing records as new information becomes available. BreastScreen Australia data may therefore change.
- Some New South Wales data were not available for inclusion in the BreastScreen Australia monitoring report 2009–2010. (See the BreastScreen Australia 2009–2010 Data Quality Statement for more information). These data have since been provided.
- Data for all jurisdictions were available for 2010–2011.

## Description

BreastScreen Australia is Australia's national, population-based breast cancer screening program and is a joint program of the Australian and state and territory governments.

BreastScreen registers in each state and territory record data collected during a woman's contact with a BreastScreen service.

Each BreastScreen program supplies BreastScreen data annually to the AIHW. These data are compiled into the BreastScreen Australia database, held at the AIHW to enable national monitoring of BreastScreen Australia.

Some BreastScreen data are supplied as aggregate data, which are not included in the BreastScreen Australia database.

## Institutional environment

The AIHW is a major national agency set up by the Australian Government under the *Australian Institute of Health and Welfare Act 1987* (Cwlth) to provide reliable, regular and relevant information and statistics on Australia's health and welfare. It is an independent statutory authority established in 1987, governed by a management Board, and accountable to the Australian Parliament through the Health and Ageing portfolio.

The AIHW aims to improve the health and wellbeing of Australians through better health and welfare information and statistics. It collects and reports information on a wide range of topics and issues, ranging from health and welfare expenditure, hospitals, disease and injury, and mental health, to ageing, homelessness, disability and child protection.

The Institute also plays a role in developing and maintaining national metadata standards. This work contributes to improving the quality and consistency of national health and welfare statistics. The Institute works closely with governments and non-government

organisations to achieve greater adherence to these standards in administrative data collections to promote national consistency and comparability of data and reporting.

One of the main functions of the AIHW is to work with the states and territories to improve the quality of administrative data and, where possible, to compile national data sets based on data from each jurisdiction, to analyse these data sets and disseminate information and statistics.

The *Australian Institute of Health and Welfare Act 1987*, in conjunction with compliance to the *Privacy Act 1988* (Cwlth), ensures that the data collections managed by the AIHW are kept securely and under the strictest conditions with respect to privacy and confidentiality.

For further information see the AIHW website <[www.aihw.gov.au](http://www.aihw.gov.au)>.

The AIHW has been receiving BreastScreen data since 1996.

## **Timeliness**

BreastScreen data are available within about 6–12 months of activity (it can take up to 12 months for final pathology results on all breast tissue samples to be received by BreastScreen registers.) The BreastScreen Australia database cannot be fully compiled until the final jurisdiction supplies its data.

Participation data for the previous calendar year are supplied in July each year; rescreening and invasive breast cancer and DCIS detection data for the previous calendar year are supplied July–December each year. (Rescreening and sensitivity data lag behind, as the specifications for these require a specified period of time to pass before they can be accurately calculated.)

The current BreastScreen Australia database contains data on women who participated in BreastScreen Australia between 1996 and 2011.

## **Accessibility**

BreastScreen Australia data are published annually in the *BreastScreen Australia monitoring report* available on the AIHW website <<http://www.aihw.gov.au/breast-cancer-screening/>> where they can be downloaded without charge. Supplementary data tables presenting more detailed data accompany each report and these, too, are available on the AIHW website where they can be downloaded without charge.

General enquiries about AIHW publications can be made to the Communications, Media and Marketing Unit on (02) 6244 1032 or via email to <[info@aihw.gov.au](mailto:info@aihw.gov.au)>.

## **Interpretability**

While many concepts in the *BreastScreen Australia monitoring report* are easy to interpret, other concepts and statistical calculations are more complex. All concepts are explained within the body of the report presenting these data, along with footnotes to provide further details and caveats. The appendixes provide additional detail on the data sources and classifications, and on the statistical methods used.

## **Relevance**

Breast cancer screening data are highly relevant for monitoring trends in breast screening participation and the detection of invasive breast cancer and DCIS, as well as other measures of program performance such as recall rates and sensitivity measures. The data are used for

many purposes by policy makers and researchers, but are supplied and analysed specifically to monitor and inform BreastScreen Australia.

## **Accuracy**

All data provided by state and territory BreastScreen programs, once analysed, are supplied back to the jurisdictional BreastScreen programs for verification.

Women attending a BreastScreen service are able to self-report Indigenous status; this database field is therefore considered to be of high quality. However, use of the 'not stated' category has changed substantially over time, which makes trend data difficult to interpret.

State and territory BreastScreen databases change every day, and not just because new records are added; existing records are changed if new, more precise information becomes available or if typographical errors are discovered by routine data checking procedures. As a result, the number of women participating, as well as DCIS and invasive breast cancer cases reported by the AIHW for any particular year, may change slightly over time. Further, data published by a jurisdictional BreastScreen program at a certain point in time may differ slightly from what is published by the AIHW at a different time.

## **Coherence**

BreastScreen data are reported and published annually by the AIHW.

Some New South Wales data were not available for inclusion in the BreastScreen Australia monitoring report 2009–2010. (See the BreastScreen Australia 2009–2010 Data Quality Statement for more information.) These data have since been provided. Data for all jurisdictions were available for 2010–2011.

# Appendix E Statistical methods

## Comparisons and tests of statistical significance

This report includes statistical tests of the significance of comparisons of rates between population groups. Any statistical comparison applied to one variable must take account of any other potentially relevant variables. For example, any comparison of participation by state must also take account of differences in the distribution of age between the states. These other variables are known as 'confounding' variables.

### Crude rates

A crude rate is defined as the number of events over a specified period of time (for example, a year) divided by the total population. For example, a crude cancer incidence rate is defined as the number of new cases of cancer in a specified period of time divided by the population at risk.

Crude mortality rates and cancer incidence rates are expressed in this report as number of deaths or new cases per 100,000 population. Crude participation rate is expressed as a percentage.

### Age-specific rates

Age-specific rates are calculated by dividing the number of cases occurring in each specified age group by the corresponding population in the same age group, expressed as a percentage or a number per 1,000 or 100,000 population. This rate may be calculated for particular age and sex groupings.

For example:

Age-specific cervical cancer incidence rate in females aged 50–54:

= (New cases aged 50–54 over Female population aged 50–54) times 100,000

= (75 over 698,700) times 100,000

= 10.7 per 100,000

### Age-standardised rates

Rates are adjusted for age to facilitate comparisons between populations that have different age structures; for example, between youthful and ageing communities. There are two different methods commonly used to adjust for age.

This publication uses direct standardisation, in which the age-specific rates are multiplied by a constant population (the 2001 Australian Standard Population, unless otherwise specified). This effectively removes the influence of the age structure on the summary rate.

It is important to note that, for some data presented in this report, indirect age standardisation would be more appropriate due to small numbers (most commonly for the Australian Capital Territory and the Northern Territory); however, direct age standardisation has been used for consistency. This can result in relatively large differences between crude and

age-standardised rates. In these cases, crude rates should also be considered when interpreting data.

The method used for this calculation is as follows:

- First, the age-specific rate is calculated (as shown above) for each age group.
- Second, the expected number of cases in each 5-year age group is calculated by multiplying the age-specific rates by the corresponding standard population and dividing by the appropriate factor (that is, 100,000 for mortality and incidence rates, and 100 for participation).
- Third, to give the age-standardised rate, the expected number of cases in each group are summed, divide by the total of the standard population and multiplied by the appropriate factor (for example, 100,000 for mortality and incidence rates, and 100 for participation).

## Confidence intervals

Population numbers for incidence and mortality and screening have a natural level of variability for a single year above and below what might be expected in the mean over many years. The percentage variability is small for large population numbers but high for small numbers such as mortality in a young age group. One measure of the likely difference is the standard error, which indicates the extent to which a population number might have varied by chance in only 1 year of data. In the 95% confidence interval, there are about 19 chances in 20 that the difference will be less than two standard errors.

There are several methods for calculating confidence intervals. The 95% confidence intervals in this report were calculated using a method developed by Dobson et al. (1991). This method calculates approximate confidence intervals for a weighted sum of Poisson parameters.

## Interpretation of confidence intervals

Where indicators include a comparison (such as between states and territories), a 95% confidence interval is presented along with the rates. This is because the observed value of a rate may vary due to chance, even where there is no variation in the underlying value of the rate. The 95% confidence interval represents a range (interval) over which variation in the observed rate is consistent with this chance variation. In other words, there is a 95% confidence that the true value of the rate is somewhere within this range.

These confidence intervals can be used as a guide to whether differences in a particular rate are consistent with chance variation. Where the confidence intervals do not overlap, the difference between rates is greater than that which could be explained by chance and is regarded as being statistically significant at the 95% level.

It is important to note that overlapping confidence intervals does not imply that the difference between two rates is definitely due to chance. Instead, an overlapping confidence interval represents a difference in rates that is too small to allow differentiation between a real difference and one that is due to chance variation. It can, therefore, be stated only that no statistically significant differences were found, and not that no differences exist.

The approximate comparisons presented might understate the statistical significance of some differences, but they are sufficiently accurate for the purposes of this report.

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

## **Small counts**

Numbers of 1 and 2 as well as the rates on which these are based have been suppressed. (Some small numbers remain in some indicators, where these were considered important to show.) Additional suppression has been applied to some data on the request of the data custodians.

# Glossary

**Aboriginal or Torres Strait Islander:** a person of Aboriginal and/or Torres Strait Islander descent who identifies as an Aboriginal and/or Torres Strait Islander.

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

**Age-standardised rate:** 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, which allows comparison of disease rates.

**Assessment:** further investigation of a mammographic abnormality or symptom reported at screening.

**Benign:** not *malignant*.

**Biopsy:** small sample of tissue that is taken to obtain a definitive diagnosis of an abnormality.

**Cancer (malignant neoplasm):** a term used to describe one of several diseases that result when the process of cell division, by which tissues normally grow and renew themselves, becomes uncontrolled and leads to the development of malignant cells. These cancer cells multiply in an uncoordinated way, independently of normal growth control mechanisms, to form a tumour. The tumour can expand locally by invasion or systemically by metastasis through the lymphatic or vascular systems. If left untreated, most malignant tumours eventually result in death.

**Cancer death:** a death where the underlying cause is indicated as cancer. People with cancer who died of other causes are not counted in the death statistics in this publication.

**Confidence interval:** a range determined by variability in data, within which there is a specified (usually 95%) chance that the true value of a calculated parameter lies.

**Data:** the building blocks of health information, including observations from administrative databases and health survey data sets.

**Ductal carcinoma in situ:** a non-invasive tumour of the mammary gland (breast) arising from cells lining the ducts.

**False negative:** a test that has incorrectly observed that the disease is not present.

**False positive:** a test that has incorrectly observed that the disease is present.

**First screening round:** see *Screening round*.

**ICD-10:** International Classification of Diseases – a coding system used to identify the primary site of the malignancy. This classification is in its 10<sup>th</sup> revision.

***in situ*:** a Latin term meaning in place or position; undisturbed.

**Incidence:** see *New cancer case*.

**Incident cancer:** a new cancer that is detected in a subsequent screening round.

**Index screening year:** the year for which the interval cancer rate and the program sensitivity rate are determined.

**Index screens:** all screening examinations performed within the index screening year.

**Indicators:** observations about data that have been analysed to provide a means of comparing measures of health within and between population groups.

**International Classification of Diseases:** the World Health Organization's internationally accepted classification of diseases. The 10th revision (ICD-10) is currently in use.

**Interval cancer – invasive** (as defined for national reporting purposes by Kavanagh et al. 1999, with minor changes endorsed by the National Advisory Committee):

- an invasive breast cancer diagnosed after completion of a negative screening episode and before the next screening examination (within 24 months from the date of the previous screen)
- a case of invasive breast cancer that is diagnosed at early review or in the interval between assessment and early review, where the recommendation for early review is 6 months or more from the screening date
- breast cancer diagnosed in a woman by BreastScreen Australia within 24 months of a negative screen (early rescreen) if the woman presents with a breast lump and/or clear or blood-stained nipple discharge in the breast in which the breast cancer was diagnosed
- an invasive breast cancer diagnosed between 6 and 24 months after a recommendation for assessment is made and a woman fails to attend assessment.

**Invasive cancer:** a *tumour* whose cells have the potential to spread to nearby healthy or normal tissue or to more distant parts of the body.

**Malignant:** abnormalities in cells or tissues consistent with *cancer*.

**Mammogram:** a radiographic depiction of the breast.

**Metastasis:** the process by which cancerous cells are transferred from one part of the body to another, for example, via the lymphatic system or the bloodstream.

**Morbidity:** illness.

**Mortality:** see *Cancer death*.

**New cancer case:** a person who has a new cancer diagnosed for the first time. One person can have more than one cancer and therefore may be counted twice in incidence statistics if it is decided that the two cancers are not of the same origin. This decision is based on a series of principles set out in more detail in a publication by Jensen et al. (1991).

**Population estimates:** official population numbers compiled by the ABS at both state and territory and statistical local area levels, by age and sex, as at 30 June each year. These estimates allow geographic areas of differing population sizes and age structures to be compared.

**Prevalent cancer:** an existing cancer that is detected at a woman's first screen.

**Rescreening:** the next screening examination after the screening episode in the index screening year.

**Risk factor:** an attribute or exposure that is associated with an increased probability of a specified outcome, such as the occurrence of a disease. Risk factors are not necessarily the causes of disease.

**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. Because a screening test is not intended to be diagnostic, a person with a positive or suspicious result must be referred for diagnosis and treatment if necessary.

**Screening episode:** all attendances for screening and assessment within 6 months relating to a particular round of screening. It starts at the date of attendance for screening. It is completed when:

- a recommendation is made to return the woman to routine rescreening
- a recommendation is made for early review at 6 months or more from the screening date
- a diagnosis of cancer is made
- the woman fails to attend for technical recall or assessment within 6 months
- the woman dies.

**Screening round:** the first screening round is a woman's first visit to a mammography screening service; a subsequent screening round means that she has been screened before. If she attends for the fourth screening round, she has been screened three times before.

**Screening round (first):** a woman's first visit to a BreastScreen Australia mammography screening service.

**Screening round (subsequent):** a woman's visit to a BreastScreen Australia mammography screening service when she has attended such a service before.

**Sensitivity:** the proportion of people with a disease that has a positive test result for the disease.

**Significant difference:** a difference between rates deemed to be statistically significantly different. This occurs when their confidence intervals do not overlap, because their difference is greater than what could be explained by chance. See 'confidence intervals' in Appendix D for more information.

**Symptom:** any evidence of disease apparent to the patient. For the purposes of this report, symptoms refer to a self-reported breast lump and/or blood-stained or watery nipple discharge.

**Target population:** women aged 50–69.

**Tumour:** an abnormal growth of tissue. Can be *benign* (not a cancer) or *malignant* (cancer).

**The Institute:** the Australian Institute of Health and Welfare.

**Ultrasound:** diagnostic method based on the reflection of ultrasonic sound waves generated through scanning of, in this case, the breast. The reflections are viewed on a computer screen or photograph and checked for variations in images.

**Underlying cause of death:** the condition, disease or injury initiating the sequence of events leading directly to death; that is, the primary, chief or principal cause.

**Women-years 'at risk' of interval or screen-detected breast cancer are:**

- all women screened aged 50–69 who are resident in the service catchment area in which they are screened at the time of screening who have not reported a personal history of invasive cancer or DCIS
- women who are recommended for annual rescreening are only at risk of interval cancer until 12 months after the screening examination
- women who are recommended for routine rescreening are only at risk of an interval cancer until 24 months after the screening examination.

*Note:* terms in italics are defined elsewhere in the glossary.

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## Related publications

This report, *BreastScreen Australia monitoring report 2010–2011*, is part of an annual series. Earlier editions and any published subsequently can be downloaded for free from the AIHW website <<http://www.aihw.gov.au/publications>>. The website also includes information on ordering printed copies.

For those requiring further detail, complete data tables are available in *BreastScreen Australia monitoring report: supplementary data tables*, which can also be downloaded for free from the AIHW website <<http://www.aihw.gov.au/publications>>.

BreastScreen Australia aims to reduce illness and death resulting from breast cancer through organised screening of women. This report is the latest in an annual series that presents national statistics monitoring the program against performance indicators.

More than 1.3 million women in the target age group of 50–69 were screened in 2010–2011, a participation rate of 55%. Breast cancer mortality is at a historic low, at 43 deaths per 100,000 women.