Australian Government
Australian Institute of
Health and Welfare

BreastScreen Australia monitoring report 2013–2014

BreastScreen
AUSTRALIA
A joint Commonwealth/State and Territory Program

CANCER SERIES NO. 100

Australian Government
Australian Institute of
Health and Welfare

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

CANCER SERIES
Number 100

BreastScreen Australia monitoring report

2013–2014

Australian Institute of Health and Welfare
Canberra
Cat. no. CAN 99

The Australian Institute of Health and Welfare is a major national agency that provides reliable, regular and relevant information and statistics on Australia's health and welfare. The Institute's purpose is to provide authoritative information and statistics to promote better health and wellbeing among Australians.

© Australian Institute of Health and Welfare 2016

This product, excluding the AIHW logo, Commonwealth Coat of Arms and any material owned by a third party or protected by a trademark, has been released under a Creative Commons BY 3.0 (CC-BY 3.0) licence. Excluded material owned by third parties may include, for example, design and layout, images obtained under licence from third parties and signatures. We have made all reasonable efforts to identify and label material owned by third parties.

You may distribute, remix and build upon this work. However, you must attribute the AIHW as the copyright holder of the work in compliance with our attribution policy available at <www.aihw.gov.au/copyright/>. The full terms and conditions of this licence are available at <http://creativecommons.org/licenses/by/3.0/au/>.

The rights to the following material are owned by third parties and are excluded from the CC-BY 3.0 licence: Figure 1.1: Anatomy: The breast and adjacent lymph nodes (National Cancer Institute).

This publication is part of the Australian Institute of Health and Welfare's Cancer series. A complete list of the Institute's publications is available from the Institute's website <www.aihw.gov.au>.

ISSN 2205-4855 (PDF)
ISSN 1039-3307 (Print)
ISBN 978-1-74249-813-3 (PDF)
ISBN 978-1-74249-814-0 (Print)

Suggested citation
Australian Institute of Health and Welfare 2016. BreastScreen Australia monitoring report 2013–2014. Cancer series no. 100. Cat. no. CAN 99. Canberra: AIHW.

Australian Institute of Health and Welfare

Board Chair	Director
Dr Mukesh C Haikerwal AO	Mr Barry Sandison

Any enquiries about copyright or comments on this publication should be directed to:
Digital and Media Communications Unit
Australian Institute of Health and Welfare
GPO Box 570
Canberra ACT 2601
Tel: (02) 6244 1000
Email: info@aihw.gov.au

Published by the Australian Institute of Health and Welfare

This publication is printed in accordance with ISO 14001 (Environmental Management Systems) and ISO 9001 (Quality Management Systems). The paper is sourced from sustainably managed certified forests.

MIX
From responsible sources
FSC® C017269
www.fsc.org

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> for any amendments.

Contents

Acknowledgments

The report was produced by Alison Budd, Biljana Tanevska, Chris Rompotis, Chun Oberst and Justin Harvey under the direction of Louise York.

This report was produced in collaboration with BreastScreen Australia. Thanks are extended to the state and territory program and data managers listed below for providing the data, expertise and assistance in producing this document.

Thanks are also extended to all state and territory cancer registries—the source of data on breast cancer incidence and ductal carcinoma in situ incidence (through the Australian Cancer Database), and to all state and territory Registrars of Births, Deaths and Marriages—the source of data on breast cancer mortality (through the National Mortality Database).

Financial support and professional assistance provided by the Screening Section of the Australian Government Department of Health are also gratefully acknowledged.

BreastScreen Australia

New South Wales

Sarah McGill
Naomi Combe
Matthew Warner-Smith
Soumya Pulukuri
Anna Cohen

Victoria

Vicki Pridmore
Rachael Anderson
Karlene Willcocks
Georgina Marr
Suzen Maljevac

Queensland

Paul Vardon
Michelle Tornabene
Hansen Sun
David Sinclair

Western Australia

Liz Wylie
Ruth Bostock

South Australia

Jane Burden
Andrew Holmes
Ada Childs

Tasmania

Gail Ward
Dylan Sutton
Carol Ramsay

Australian Capital Territory

Yvonne Epping
Mark Debeljakovic

Northern Territory

Kim Coulter
Guillermo Enciso

Australian Government Department of Health

Kim Dobbie
Gabrielle Bryant
Jason Scoullar
Natalie Bortolotto

Abbreviations

ABS	Australian Bureau of Statistics
ACD	Australian Cancer Database
ACT	Australian Capital Territory
AIHW	Australian Institute of Health and Welfare
CI	confidence interval
DCIS	ductal carcinoma in situ
NAS	National Accreditation Standards
NMD	National Mortality Database
NSW	New South Wales
NOS	not otherwise specified
NT	Northern Territory
Qld	Queensland
RA	remoteness area
SA	South Australia
SEIFA	Socio-Economic Indexes for Areas
Tas	Tasmania
Vic	Victoria
WA	Western Australia

Symbols

. .	not applicable
n.p.	not publishable because of small numbers, confidentiality or other concerns about the quality of the data

Summary

BreastScreen Australia is the national breast cancer screening program. It aims to reduce illness and death from breast cancer through an organised approach to the early detection of breast cancer, using screening mammography to detect unsuspected breast cancer in women. Detection at an early stage provides an opportunity for early treatment, which can reduce illness and death. Women aged 40 and over are eligible for free mammograms every 2 years.

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 of BreastScreen Australia. This report presents preliminary participation data for 2014–2015 and final data for 2013–2014, as well as the latest available data on incidence and mortality.

As part of the 2013–14 Federal Budget, the Australian Government committed $55.7 million over 4 years to expand BreastScreen Australia's target age range from 50–69 to 50–74 from 1 July 2013. However, 2013–2014 data have been reported for the target age range of 50–69, as there will be at most 18 months in which women aged 70–74 were also actively targeted.

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

Breast cancer is the most common cancer diagnosed in Australian women

In 2016, it is estimated that there will be 8,369 new cases of invasive breast cancer diagnosed in Australian women aged 50–69. This is equivalent to just under 300 new cases per 100,000 women, and makes breast cancer the most common cancer affecting Australian women.

Incidence has remained steady at about 300 new cases per 100,000 women for over a decade.

In 2016, it is estimated that 1,187 women aged 50–69 will die from breast cancer, which is equivalent to 40 deaths per 100,000 women. This makes breast cancer the second-most common cause of cancer-related death for Australian women, behind lung cancer.

Breast cancer mortality has decreased from 68 deaths per 100,000 women, which was the age-standardised rate in 1991 when BreastScreen Australia began.

Incidence of breast cancer is lower for Indigenous women than for non-Indigenous women at 214 compared with 278 new cases per 100,000 women aged 50–69; despite this, mortality from breast cancer is similar at 45 and 43 deaths per 100,000 women, respectively.

More than half of targeted women participate in BreastScreen Australia

In both 2013–2014 and 2014–2015, almost 1.5 million women aged 50–69 had a screening mammogram through BreastScreen Australia, which is around 54% participation.

Participation of Aboriginal and Torres Strait Islander women was lower at 37% in 2013–2014.

Participation has been 54% or 55% for all years between 2010–2011 and 2014–2015.

Some women are recalled for further investigation

In 2014, 12% of women screening for the first time and 4% of women attending subsequent screens were recalled for further investigation. These rates are similar to those in 2013.

More than half the cancers detected by BreastScreen Australia are small

Small breast cancers (≤15 mm in diameter) tend to be associated with more treatment options and improved survival. In 2014, a high proportion of invasive breast cancers detected were small: 50% of invasive breast cancers detected in those attending their first screen, and 59% in those attending subsequent screens. These figures have changed only slightly from 2013.

Report card

	What indicates a good finding?	Previous	Latest data	Recent trend
Participation				
For women aged 50–69	Higher indicates better participation	53.7%	54.0%	Steady at 54%
For women aged 50–74	Higher indicates better participation	. .	53.2%	. .
Rescreening				
After first screening round	Higher indicates better retention	59.6%	56.4%	Falling from 60% to 56%
After second screening round	Higher indicates better retention	67.8%	65.5%	Falling from 70% to 66%
After subsequent screening rounds	Higher indicates better retention	81.6%	81.5%	Steady at 82%
Recall to assessment				
First screening round	<10% is considered better	11.6%	12.2%	Rising from 11% to 12%
Subsequent screening rounds	<5% is considered better	3.9%	4.0%	Steady at around 4%
Invasive breast cancer detection				
First screening round	≥50 is considered better	107.9	108.2	Rising from 82 to 108
Subsequent screening rounds	≥35 is considered better	47.6	48.3	Rising from 43 to 48
Small breast cancer detection	≥25 is considered better	30.4	30.5	Rising from 28 to 30
Ductal carcinoma in situ detection				
First screening round	≥12 is considered better	29.2	23.7	Ranging from 21 to 29
Subsequent screening rounds	≥7 is considered better	12.8	14.6	Rising from 11 to 15
Interval cancers				
In the first year after a negative screen	Lower indicates fewer cancers are missed	6.1	6.1	Steady at around 6
In the second year after a negative screen	Lower indicates fewer cancers are missed	11.9	12.0	Steady at around 12
Program sensitivity				
In the 2 years after a negative screen	Higher indicates more cancers are detected	76.2%	76.2%	Steady at around 75%
Invasive breast cancer incidence	A function of prevalence and detection	289.4	295.3	Steady at around 300
Ductal carcinoma in situ incidence	A function of prevalence and detection	48.0	48.2	Rising from 44 to 48
Mortality	Lower is better	42.2	41.7	Falling from 44 to 42

Notes

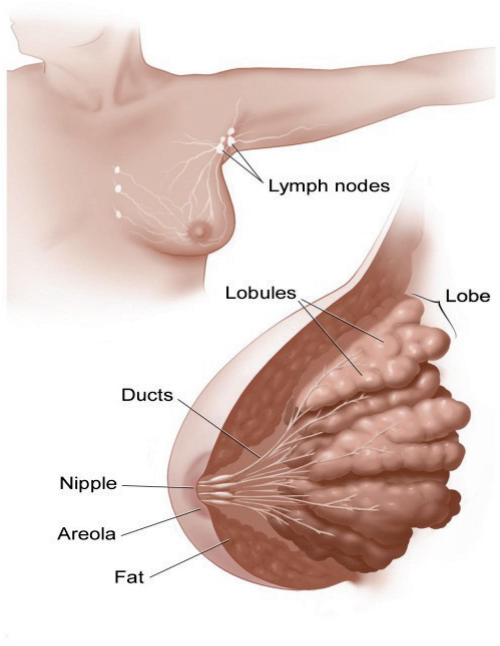
1. ‘Invasive breast cancer detection’, ‘Ductal carcinoma in situ detection’ and ‘Interval cancers’ are per 10,000 women screened.
2. ‘Invasive breast cancer incidence’, ‘Ductal carcinoma in situ incidence’ and ‘Mortality’ are per 100,000 women in the population.
3. Report card uses age-standardised rates where available to aid in comparison of trends; incidence and mortality are ‘true’ rates, not projected rates that appear elsewhere; ‘Recent trend’ refers to the past 3–5 years. All data shown are for women aged 50–69 except for participation data ‘For women aged 50–74’.

1 Introduction

1.1 Breast cancer

Cancer is a group of several hundred diseases in which abnormal cells are not destroyed naturally by the body but instead multiply and spread out of control. Cancers are distinguished from each other by the specific type of cell involved and the place in the body in which the disease began.

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). More rarely, breast cancer can originate in the connective tissue of the breast. The arrangement of breast tissue is illustrated in Figure 1.1.



Source: National Cancer Institute 2007 <http://visualsonline.cancer.gov>.

Figure 1.1: Anatomy: The breast and adjacent lymph nodes

Worldwide, breast cancer is the most common cancer affecting women, representing 1 in 4 of all cancers in women. The incidence of breast cancer differs worldwide, with this disease being far more common in more developed countries compared with developing countries (although as less developed countries become more developed, a shift towards the lifestyles of developed countries brings an increase in cancers that have reproductive, dietary and hormonal risk factors, of which breast cancer is one) (UICC 2014).

Breast cancer is the most commonly diagnosed cancer in Australian women, comprising 27% of all female cancers, and with an incidence rate of around 115 new cases per 100,000 women, and is second only to lung cancer in cancer deaths (AIHW 2014). (Note that cancer—and therefore cancer rankings—excludes basal and squamous cell carcinoma of the skin, as these cancers cannot currently be reported.)

1.2 Age is the greatest risk factor for breast cancer

It is not known what causes breast cancer; however, several risk factors have been identified that may increase the chance of a woman developing breast cancer. Having a risk factor does not mean that a woman will get breast cancer—many women who have risk factors never develop the disease.

The greatest risk factor for breast cancer is **age**, with most breast cancers occurring in women over the age of 50—in Australia this is more than three-quarters of breast cancers.

Certain reproductive or hormonal factors may also increase a woman's risk of developing breast cancer, including not having carried or given birth to any children (or to fewer children), older age at birth of first child, younger age at menarche and older age at 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).

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—8 out of 9 women who develop breast cancer do not have a mother, sister or daughter with breast cancer (Breast Cancer Network Australia 2013).

Family history can be split into 3 categories (Cancer Australia 2015a):

- 'At or slightly above average risk', which covers more than 95% of the female population, and includes women with no family history as well as women with a weak family history (such as one first degree relative diagnosed with breast cancer at age 50 or older). Nine out of 10 women in this group will not develop breast cancer.
- 'Moderately increased risk', which covers less than 4% of the female population, and includes women with a strong family history (for instance, one first degree relative diagnosed with breast cancer under the age of 50).
- 'Potentially high risk', which covers less than 1% of the female population, and includes women with a very strong family history (for instance, two first or second degree relatives on one side of the family diagnosed with breast or ovarian cancer plus one of a range of additional factors on the same side of the family, such as an additional breast cancer diagnosed before the age of 40, or breast cancer in a male relative).

See *Advice about familial aspects of breast cancer and epithelial ovarian cancer: a guide for health professionals* (Cancer Australia 2015a) for more information about assessing individual risk.

Women with a **BRCA1 or BRCA2 mutation** have a higher risk of developing breast cancer compared with the general population in all age groups. Women who carry a fault in BRCA1 or BRCA2 have a high lifetime risk of breast cancer, estimated to be in the range of 30–60%, and a lifetime ovarian cancer risk of about 20% (Cancer Australia 2015b).

Other risk factors associated with breast cancer include a higher body mass index, exposure to X-rays and gamma radiation, and consumption of alcoholic beverages (Cancer Research UK 2014).

The only factor protective against breast cancer is breastfeeding (WCRF/AICR 2007).

Although most breast cancers occur in women over the age of 50, younger women, and men of any age can, and do, get breast cancer. Women aged 40 and over are the focus of this report as this is the age group of most relevance to BreastScreen Australia, but other reports are available on breast cancer in younger women—for instance *Breast cancer in young women: key facts about breast cancer in women in their 20s and 30s* (AIHW 2015a) (see Box 1.1).

Box 1.1: People of all ages can develop breast cancer

As women aged 40 and over are eligible for breast cancer screening through BreastScreen Australia, these women are the focus of this report. However, even though screening mammography is not recommended for women under the age of 40, young women can, and do, develop breast cancer. More rarely, men of any age can also develop breast cancer.

Therefore **it is important for people of all ages to be aware of how their breasts normally look and feel and promptly report any new or unusual changes** to their general practitioner. More information about breast cancer diagnosed in women aged under the age of 40 can be found in *Breast cancer in young women: key facts about breast cancer in women in their 20s and 30s* (AIHW 2015a); more information about breast cancer in men can be found at <http://breastcancerinmen.canceraustralia.gov.au>.

1.3 Screening can detect breast cancer early

In Australia, population-based breast cancer screening is available through BreastScreen Australia, which targets women aged 50–74 for 2-yearly screening mammograms (women aged 40–49 and 75 years and over are also eligible to attend, but are not actively targeted).

As with all population-based breast cancer screening programs, BreastScreen Australia aims to reduce morbidity and mortality from breast cancer by using screening mammograms to detect unsuspected breast cancers in women who have no symptoms and therefore would not otherwise know they had the disease. Detection of breast cancers at an early stage allows access to diagnostic and treatment services early, so that women can benefit the most from available treatments.

Mammography is the only means of population-based screening shown to reduce breast cancer mortality, and is recommended as a population-based screening tool by Cancer Australia (Cancer Australia 2009). In screening mammography, two views are taken of each breast, and images reviewed by radiologists to look for suspicious characteristics that require further investigation. Screening mammography, like screening tests used in other screening programs, is not intended to be diagnostic; rather, it aims to identify people who are more likely to have cancer, and therefore require further investigation from diagnostic tests.

Screening mammograms work well in older women because breasts become less dense as women get older, particularly after menopause, which is why mammograms become more effective as women get closer to age 50. Incidence of breast cancer is also much higher, with more than 75% of breast cancers occurring in women aged 50 and over.

Mammographic screening is not recommended for women younger than 40. This is because breast tissue in premenopausal women tends to be dense, which can make it difficult to correctly identify the presence of breast cancer with mammography. The reduced accuracy of mammography in younger women produces a high risk of false positive and false negative results, which would result in a high number of unnecessary investigations and missed breast cancers (Irwig et al. 1997).

Box 1.2: ‘Overdiagnosis’ of breast cancer by BreastScreen Australia

It is likely that some breast cancers detected through BreastScreen Australia may never have progressed to a stage where they would have been diagnosed during a woman’s lifetime.

Detection of these cancers is sometimes referred to as ‘overdiagnosis’.

It is estimated that ‘for every 1,000 women in Australia who are screened every 2 years from age 50–74, around 8 (between 2 and 21) breast cancers may be found and treated that would not have been found in a woman’s lifetime’ (Cancer Australia 2014). However, **it is currently not possible to predict precisely which breast cancers would have progressed and which would not have progressed during a woman’s lifetime**.

Given these facts, the possibility of ‘overdiagnosis’ should not dissuade women from participating in breast cancer screening through BreastScreen Australia.

For further information, please refer to the position statement endorsed by the Australian Health Ministers’ Advisory Council Standing Committee on Screening, Cancer Council Australia and the Royal Australian and New Zealand College of Radiologists, and supported by the Cancer Australia Advisory Council, which can be found at <http://canceraustralia.gov.au/publications-and-resources/position-statements/overdiagnosis-mammographic-screening> (Cancer Australia 2014).

1.4 Screening mammography decreases mortality from breast cancer

Lower morbidity from breast cancer is achieved by detecting cancers when they are small, because small breast cancers tend to be associated with increased treatment options (NBOCC 2009). Consistent with this, it has been shown that 58% of breast cancers detected by BreastScreen Australia are small, compared with just 28% of breast cancers detected outside BreastScreen Australia. Further, 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.

Mortality benefits from breast cancer screening are also due to the detection of breast cancers when they are small, as it has been shown that finding breast cancers when they are small leads to improved survival (AIHW & NBCC 2007). In 2009, in a comprehensive evaluation of BreastScreen Australia, it was estimated that breast cancer mortality had been reduced by 21–28% as a result of breast cancer screening (BreastScreen Australia EAC 2009), and in 2010, it was estimated that 8.8 and 5.7 breast cancer deaths per 1,000 women screened were prevented using data from the Swedish Two-Country Trial and England’s breast cancer screening program, respectively (Duffy et al. 2010).

In 2015, the International Agency for Research on Cancer (IARC) conducted a full review of available high-quality observational studies, to ensure that the evidence that showed a sufficient reduction in mortality from screening mammography compiled in 2002 (IARC 2002) was still relevant today. The study determined that women aged 50–69 who attended breast cancer screening using screening mammography had about a 40% reduction in the risk of death from breast cancer, with a substantial reduction in the risk of death also observed in women aged 70–74 (IARC 2015). These mortality benefits align with the women targeted by BreastScreen Australia (that is, those aged 50–74).

2 Recent change to the target age range of BreastScreen Australia

2.1 Women aged 50–74 now targeted

As part of the 2013–14 Federal Budget, the Australian Government committed $55.7 million over 4 years to expand BreastScreen Australia's target age range from 50–69 to 50–74, resulting in a change to the age group actively targeted for 2-yearly screening mammograms.

This means that, from 1 July 2013, women aged 70–74 began being actively targeted by BreastScreen Australia, along with women aged 50–69.

Both the funding and the targeting activities associated with increasing the target age range by 5 years are being phased in over several years, with full implementation expected by 2016–17. This means that participation of women aged 70–74 is likely to increase until 2016–17, and thereafter be relatively stable (as illustrated in Figure 2.1).

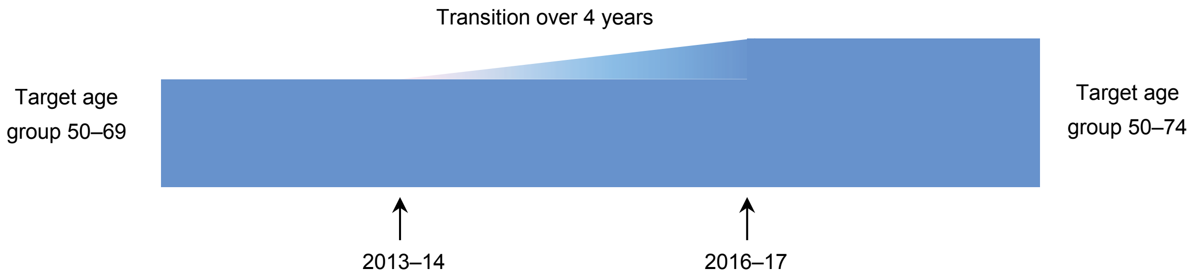


Figure 2.1: Transition of the target age range of BreastScreen Australia from women aged 50–69 to women aged 50–74 between the financial years 2013–14 and 2016–17

2.2 Changes to reporting

In order to report participation in a way that incorporates the new target age range, yet is also comparable with previous years (and is thus a useful measure of performance), participation will be reported for both target age groups, women aged 50–69 and women aged 50–74, for several years, until the change has been fully implemented.

The timing of commencement of this co-reporting has been considered carefully, because there is a discord between the implementation of the change in target age range (based on financial years to align with funding) and the reporting of participation data, which are measured over 2 calendar years (from 1 January of the first year to 31 December of the second year).

The plan for reporting the new target age group of BreastScreen Australia is detailed in Box 2.1.

Box 2.1: Reporting BreastScreen Australia's new target age group

The following is a brief summary of the plan for reporting from 2013–2014 onwards:

- Participation for 2012–2013 (1 January 2012 to 31 December 2013) was reported for women aged 50–69 only, because there was at most 6 months (from 1 July 2013 to 31 December 2013) in which women aged 70–74 were also actively targeted.
- Participation for 2013–2014 (1 January 2013 to 31 December 2014) has been reported for women aged 50–69 only, because there will be at most 18 months (from 1 July 2013 to 31 December 2014) in which women aged 70–74 were also actively targeted.
- Participation for 2014–2015 (1 January 2014 to 31 December 2015) onwards will be reported for both women aged 50–69 and women aged 50–74, because these reporting periods overlap completely with the implementation of the new target age range.

This report, which covers the 2 calendar years 2013–2014, has used the target age group of 50–69 only, because there will be at most 18 months (from 1 July 2013 to 31 December 2014) in which women aged 70–74 were also actively targeted.

An exception to this is preliminary participation data for 2014–2015, which are also included in this report. These data are reported for both women aged 50–69 and women aged 50–74.

3 Monitoring BreastScreen Australia using program data

3.1 Screening behaviour

Screening behaviour in this report refers to participation in BreastScreen Australia (screening) and whether or not women return at 2-yearly intervals (rescreening).

Note that these data to not include any screening mammography performed outside BreastScreen Australia (screening mammography is available through Medicare for women at higher risk of breast cancer, and mammograms are also undertaken in private clinics).

Screening

Participation is a major indicator of the performance of BreastScreen Australia, because high attendance for screening by women in the target age group maximises the reductions in mortality from breast cancer. Participation is measured as the percentage of women in the population in the target age group screened by BreastScreen Australia over 2 calendar years (Box 3.1).

Box 3.1: Participation is measured over 2 calendar years

Participation is measured over 2 years to align with the 2-year recommended screening interval, because most women will only screen once within a 2-year period. A consequence of measuring participation over 2 years on an annual basis is that there are 'rolling' participation rates, in which there is an overlap of 1 calendar year between any 2 consecutive rates. Because of this, the participation rate for a 2-year reporting period is often compared with the previous non-overlapping rate.

Preliminary participation data are released in July each year, with final comprehensive participation data published in this report. The latest preliminary participation data are for the 2-year period 2014–2015, and the latest final participation data are for 2013–2014.

Preliminary participation data for 2014–2015 show that 1,701,920 women aged 50–74 (the new target age group of BreastScreen Australia) participated in BreastScreen Australia, which is 53.7% of the target population.

There are no trend data with which to compare this participation rate, because it is the first time that participation has been reported for women aged 50–74. However, it is of note that, even though women aged 70–74 have only been targeted since 1 July 2013 at the earliest, they had a relatively high participation rate of 48.7% in 2014–2015. The crude participation for the new target age group of women aged 50–74 (53.7%) was therefore very similar to the participation for women aged 50–69 (54.5%) in 2014–2015.

Preliminary participation data for 2013–2014 were published in the *BreastScreen Australia monitoring report 2012–2013* (AIHW 2015b). Final participation data show that, in 2013–2014, 1,456,822 women aged 50–69 participated in BreastScreen Australia, which is 54.2% of the target population.

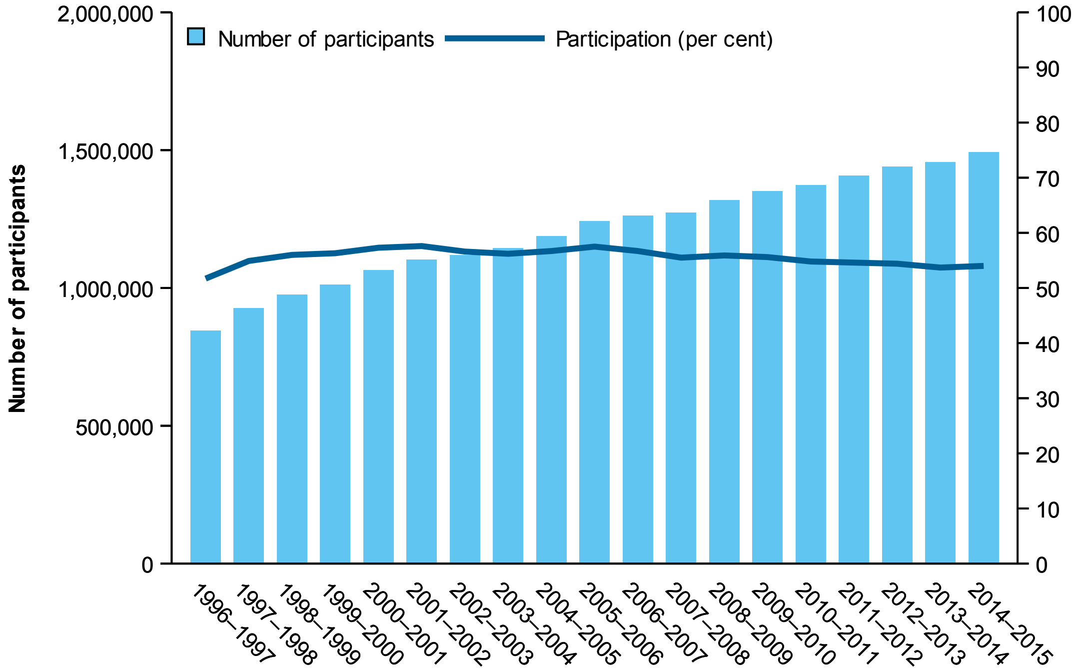
Participation rates for 2013–2014 and 2014–2015 have been age-standardised to allow comparisons over time or across population subgroups, such as states and territories, remoteness areas and socioeconomic status groups (see Box 3.2). These are 53.2% for women aged 50–74 in 2014–2015, 54.0% for women aged 50–69 in 2014–2015, and 53.7% for women aged 50–69 in 2013–2014.

Box 3.2: Crude versus age-standardised rates

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 2013–2014 was 54.2%). However, comparisons over time or across states/territories or population subgroups require that crude rates are age-standardised to remove underlying differences in age-structure over time or between groups. These allow analysis of trends and differentials, and are therefore preferentially reported in these situations (for example, the age-standardised participation rate in 2013–2014 was 53.7%).

Using the age-standardised rates for women aged 50–69 allows us to see that participation in these latest years is similar to the participation in previous 2-year periods, as indicated by the dark blue line in Figure 3.1. This figure also shows that the number of women screened in each 2-year period (indicated by the light blue columns) increased steadily from year to year.

There are as yet no trend data available for women aged 50–74.



Note: Data for 2014–2015 are preliminary; data for all other reporting periods are final.

Source: AIHW analysis of BreastScreen Australia data. Data for this figure are available in Table A1.1.

Figure 3.1: Participation of women aged 50–69 in BreastScreen Australia, 1996–1997 to 2014–2015

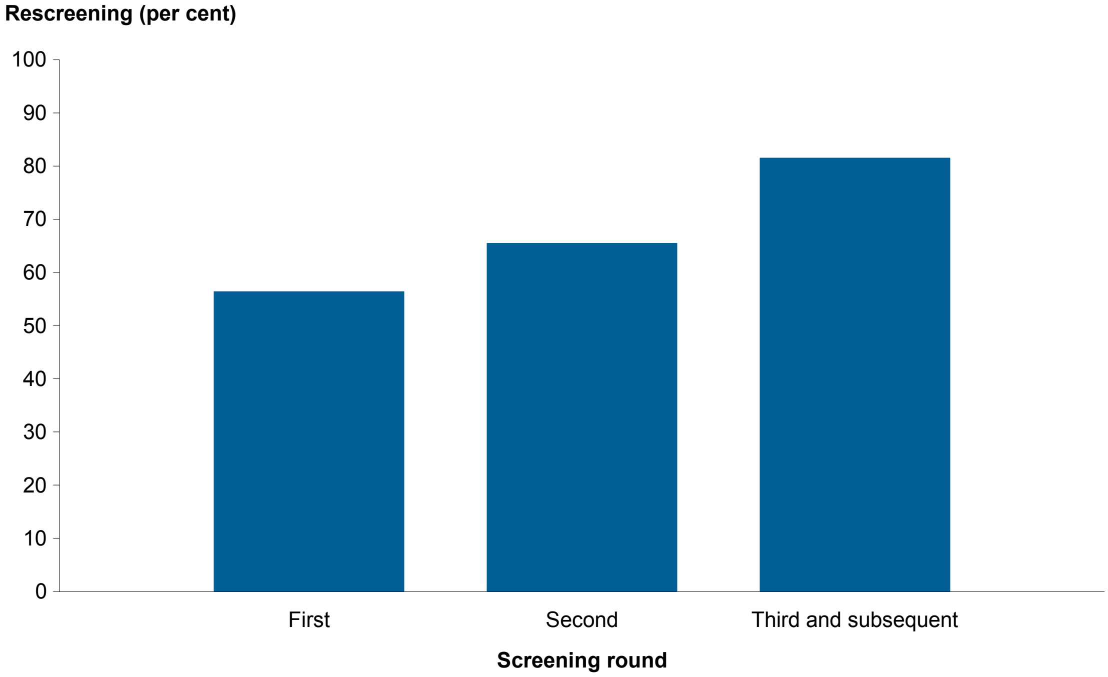
Rescreening

As well as the proportion of women who screen in each 2-year period, the proportion of women who return for a rescreen is also monitored. It is important that women rescreen according to BreastScreen Australia's recommended screening interval of 2 years, because 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.

Although the recommended screening interval is 2 years (24 months), 27 months is used to allow a reasonable time frame for women to respond to invitations. The target age group used for rescreening is 50–67 rather 50–69, because women aged 68–69 at the age of their screen will be outside the target age group of 50–69 when they are due for their rescreen, and therefore will no longer be actively targeted by BreastScreen Australia.

The latest rescreening data are for women screened in 2012. These show that for women screened for the first time in 2012, 56.4% of women aged 50–67 rescreened within 27 months. This increased to 65.5% of women who screened for the second time in 2012, and to 81.5% of women who screened for the third or subsequent time in 2012 (Figure 3.2). This indicates that the proportion of women aged 50–67 who return for a rescreen within 27 months increases with the number of screens previously attended.

It has been shown that women with false positive screening mammograms (that is, those recalled to assessment for further investigation and found not to have breast cancer) are less likely to participate in subsequent screening rounds (Sim et al. 2012). Since women are more likely to be recalled to assessment at their first screening visit (see Section 3.3), this may deter some women from rescreening within the desired 27 months, which may contribute to the lower rescreening rates for women after their first screening visit.



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 service in 2008.

Source: AIHW analysis of BreastScreen Australia data. Data for this figure are available in Table A2.1.

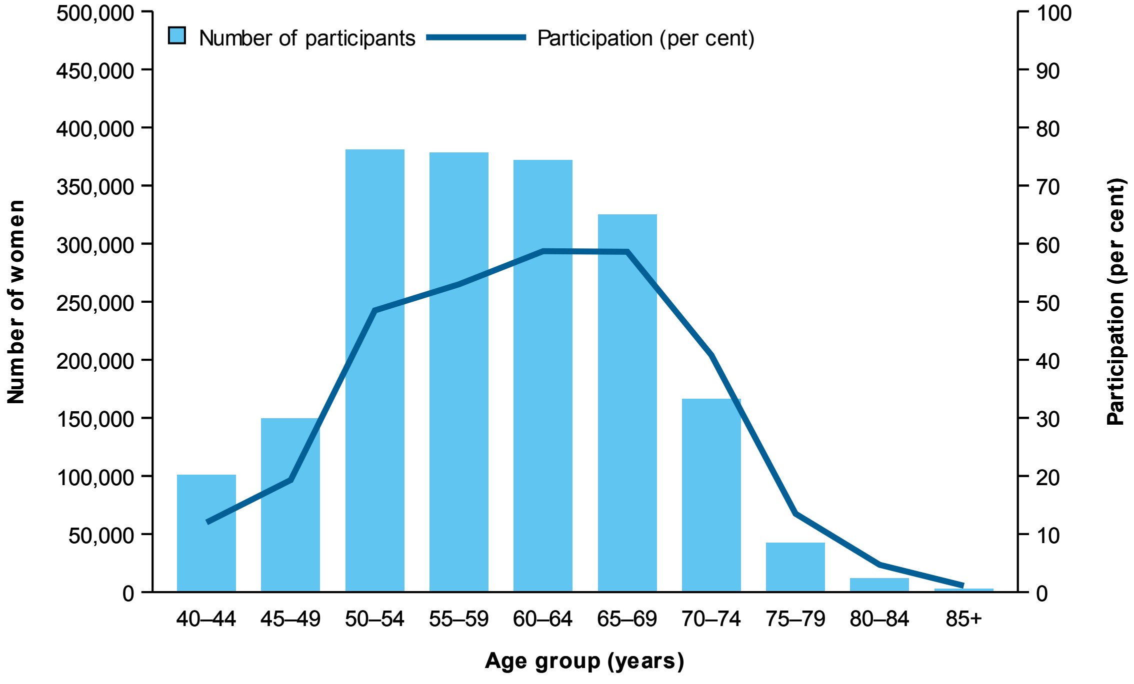
Figure 3.2: Rescreening by screening round, women aged 50–67 screened during 2012

Screening and rescreening behaviour across ages

In both 2013–2014 and 2014–2015, the proportion of women screened was highest for those aged 50–69, in line with BreastScreen Australia's aim to maximise the proportion of women in the target age group screened every 2 years. Further, the proportion of women participating was around 49% or above for all 5-year age groups within the target age range, with participation highest for women aged 60–64, this being 58.7% in 2013–2014 (Figure 3.3) and highest for women aged 65–69 at 59.5% in 2014–2015.

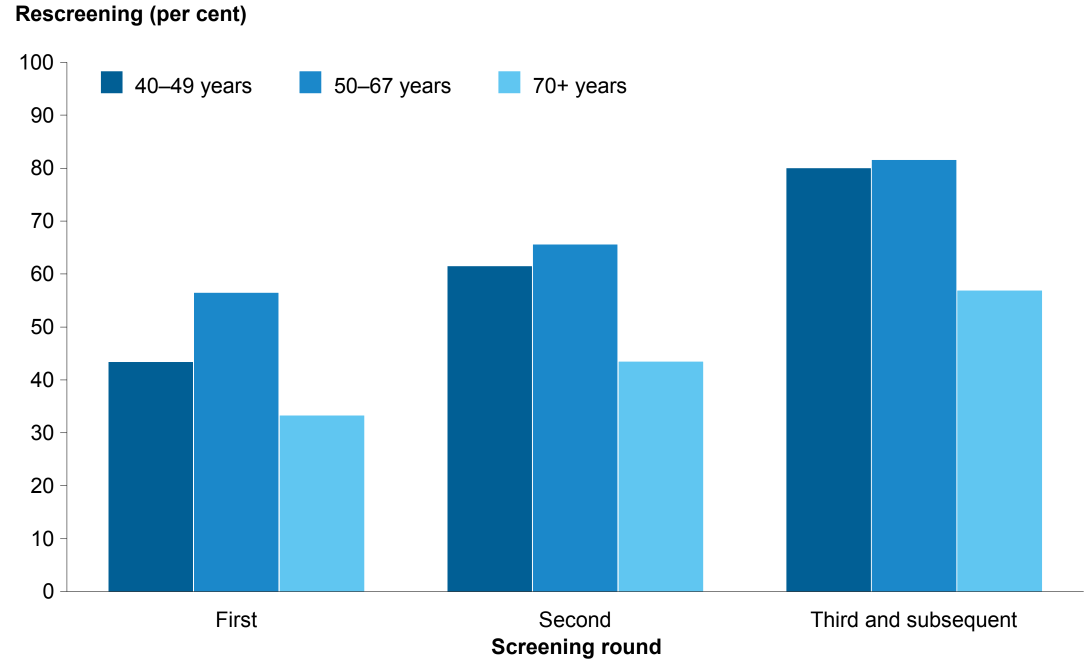
The proportion of women screened who were outside the target age group was lower, with around 16% of women aged 40–49 and around 18% of women aged 70 and over screened in 2013–2014. In 2014–2015, the proportion of women screened aged 70 and over was higher at 21%, which is likely due to women aged 70–74 being actively targeted by BreastScreen Australia from mid-2013. A similar trend was noted for women rescreening, with the highest rescreen rates for women aged 50–67, followed by women aged 40–49 in all 3 screening rounds. Women aged 70 and over had far lower rescreening rates regardless of the screening round (Figure 3.4).

Women aged 50–67 comprise a greater proportion of women rescreening with increasing number of previous screens attended—63.4% of those rescreening after their first screen were aged 50–67, whereas 73.4% of those rescreening after their second screen and 80.5% of all women rescreening after their third or subsequent screen were aged 50–67.



Source: AIHW analysis of BreastScreen Australia data. Data for this figure are available in Table A1.2.

Figure 3.3: Participation in BreastScreen Australia by age, 2013–2014



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

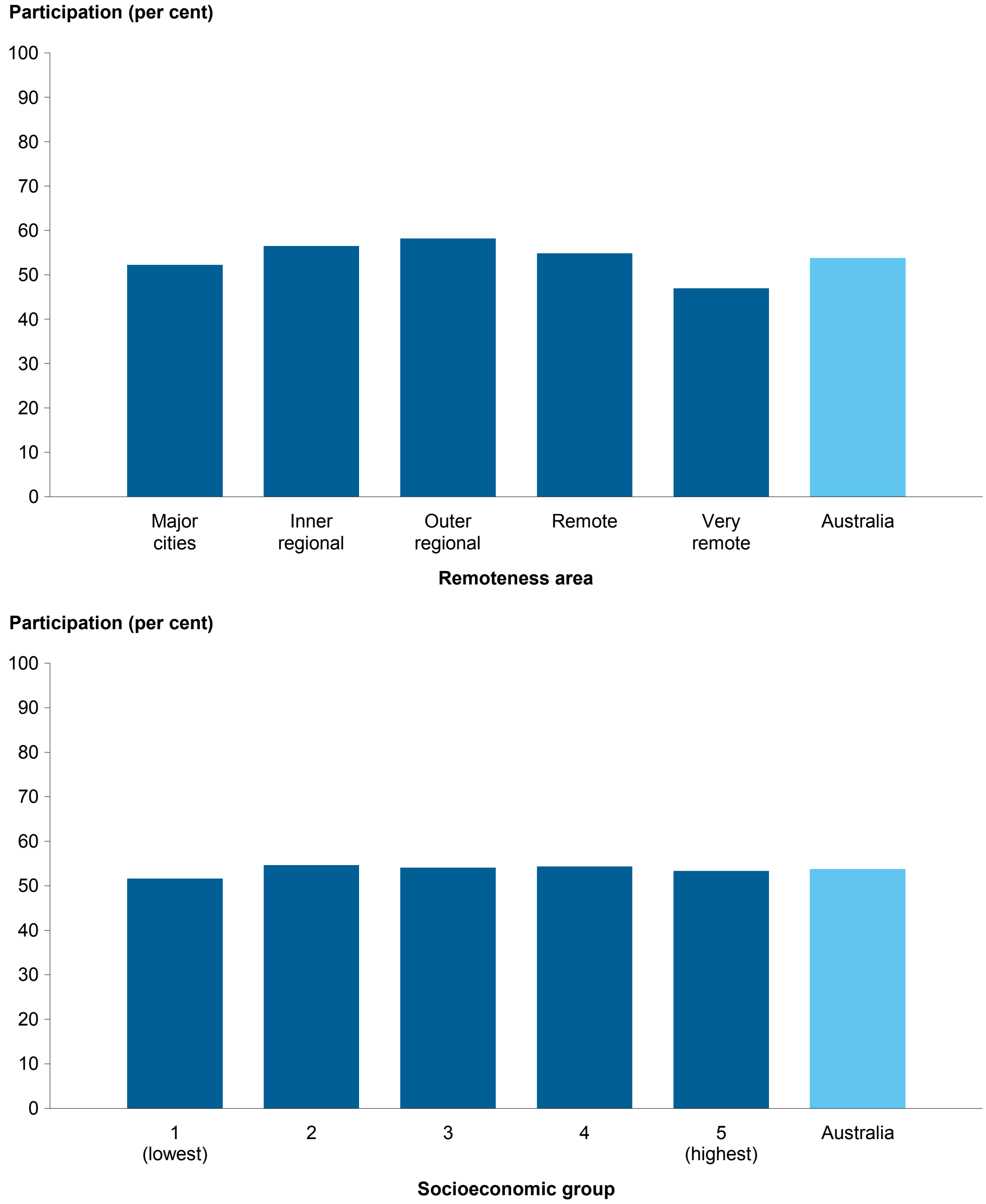
Source: AIHW analysis of BreastScreen Australia data. Data for this figure are available in Table A2.2.

Figure 3.4: Rescreening by age and screening round, women screened during 2012

Screening behaviour across groups

Participation was highest in *Outer regional* areas at 58.1%, compared with 52.2% in *Major cities* and 46.9% in *Very remote* areas (Figure 3.5).

There was little variation in participation across socioeconomic groups, with all groups having participation rates between 51.6% and 54.6% (Figure 3.5).



Source: AIHW analysis of BreastScreen Australia data. Data for this figure are available in tables A1.4 and A1.5.

Figure 3.5: Participation of women aged 50–69 in BreastScreen Australia, by remoteness area, and by socioeconomic group, 2013–2014

Participation in BreastScreen Australia is also reported for Aboriginal and Torres Strait Islander women, and for women who speak a language other than English at home, both of which are able to be self-reported by women at the time of their screen.

Aboriginal and Torres Strait Islander women participate in BreastScreen Australia at a lower rate than non-Indigenous women, with a difference of around 17 percentage points. This is also true to a lesser extent for women from culturally and linguistically diverse backgrounds, with participation for women who report that they speak a language other than English at home around 5 percentage points lower than for women who report that they only speak English at home.

In 2013–2014, participation of Aboriginal and Torres Strait Islander women in BreastScreen Australia was 36.5% compared with the non-Indigenous rate of 53.8% (age-standardised), whereas participation of women who report that they speak a language other than English at home was 49.3% compared with the English-speaking rate of 53.9%.

Participation trends for Aboriginal and Torres Strait Islander women and non-Indigenous women are shown in Figure 3.6. Historical Indigenous participation rates have been recalculated using new Indigenous population estimates so that meaningful comparisons between reporting periods can be made (see Box 3.3).

Box 3.3: Indigenous populations

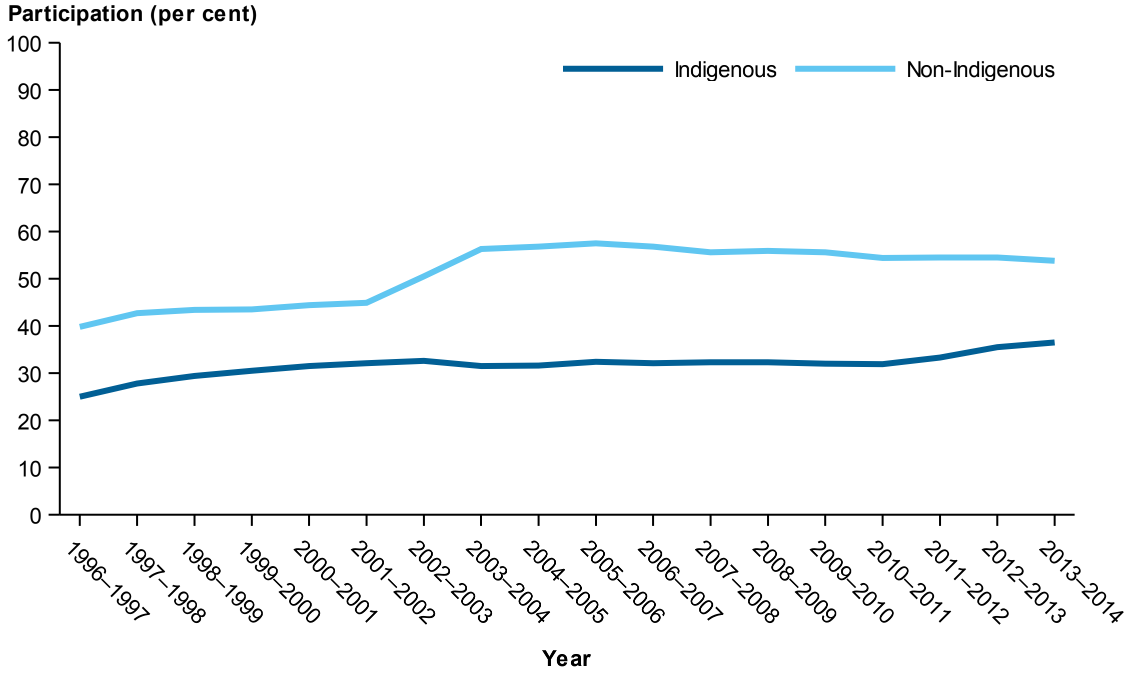
New Indigenous population estimates were released by the Australian Bureau of Statistics (ABS) in 2014 based on the 2011 Census. These estimates included backcasts of the Indigenous population, as well as population projections to 2026. The new backcast estimates of the Indigenous population were considerably larger than those previously published based on the 2006 Census. This is in part due to improvements in Census coverage and enumeration of Indigenous Australians in the 2011 Census, and an increased likelihood that individuals identified themselves and their children as Indigenous. Historical Indigenous participation rates have been recalculated using these new Indigenous population estimates so that meaningful comparisons between reporting periods can be made over time. Rates presented in this report should not be compared with previously published rates that used population estimates based on the 2006 Census.

Trend data show that Indigenous women have always had lower participation rates than non-Indigenous women—at around 32–33% for all reporting periods between 2001–2002 and 2011–2012, although participation rates have increased to 36% in 2012–2013 and 37% in 2013–2014 (Figure 3.6). Lower participation of Indigenous women may reflect a decreased opportunity to screen compared with non-Indigenous women and/or different screening behaviour of Indigenous women (that is, being less likely to screen even with the same opportunity to do so). There may also be a level of under-reporting of Indigenous status in BreastScreen data, which would also have the effect of lowering the participation rate (Indigenous status is self-reported by women at the time of their screen).

Results of a recent project, ‘Closing the Gap in Breast Cancer Screening’ (in Queensland), suggest that different screening behaviour of Indigenous women may play a significant role in their lower participation rates. This project aimed to address barriers to screening for Indigenous women through culturally appropriate messages, art shows and partnerships with local Indigenous groups, in order to build trust, educate and support Indigenous women to attend BreastScreen Australia. The project reported an increase in Indigenous participation from 49% to 56% in 2 years.

Initiatives such as these are common to state and territory BreastScreen programs, many of which have adopted strategies and initiatives to encourage greater participation in breast cancer screening by Aboriginal and Torres Strait Islander women. These strategies and initiatives are designed to be culturally sensitive and appropriate to the knowledge, attitudes and beliefs of Aboriginal and Torres Strait Islander women. They include dedicated and appropriate communication resources, group bookings for Indigenous women who would prefer to attend as a group, and the use of Indigenous artwork. BreastScreen workers liaise closely with Aboriginal Health Workers and Aboriginal and Torres Strait Islander community groups to increase acceptance of screening.

In the last quarter of 2014–15, the Australian Government ran the National BreastScreen Australia Campaign to support the expansion of the program for women aged 50–74. The campaign included communication activities for Aboriginal and Torres Strait Islander consumers, with materials developed in consultation with Aboriginal and Torres Strait Islander women.



Note: The non-Indigenous participation rate excludes women with Indigenous status 'not stated' and is therefore lower than the total Australian participation rate.

Source: AIHW analysis of BreastScreen Australia data. Data for this figure are available in Table A1.7.

Figure 3.6: Participation of women aged 50–69 in BreastScreen Australia, by Indigenous status, 1996–1997 to 2013–2014

Access to BreastScreen services, especially for women from Indigenous, culturally and linguistically diverse, rural/remote, and lower socioeconomic backgrounds is a national policy feature of BreastScreen Australia, which has developed National Accreditation Standard (NAS) Measures to ensure that this policy feature is met by services accredited through BreastScreen Australia (see Box 3.4 for more information on NAS Measures and accreditation).

These NAS Measures, along with other NAS Measures related to access and participation in BreastScreen Australia, underpin BreastScreen Australia's aim to maximise the proportion of women in the target population who are screened every 2 years.

Table 3.1 shows the NAS Measures related to participation and rescreening.

Table 3.1: NAS Measures for participation and rescreening calculated using BreastScreen Australia data supplied for the *BreastScreen Australia monitoring report 2013–2014*

NAS Measure		Calculated value
NAS Measure 1.1.1 (b)	≥70% of women aged 50–69 participate in screening in the most recent 24-month period.	53.7%
NAS Measure 1.1.2 (b)	≥75% of women aged 50–67 who attend for their first screening episode within the Program are rescreened within 27 months.	56.4%
NAS Measure 1.1.3 (b)	≥90% of women aged 50–67 who attend for their second and subsequent screens within the Program are rescreened within 27 months of their previous screening episode.	65.5% second 81.5% subsequent
NAS Measure 1.2.1 (b)	The Service and/or SCU monitors and reports participation of women aged 50–69 from special groups and where rates are below that of the overall population, implements specific strategies to encourage their participation in screening. Consideration of equitable participation rates of at least the following groups is made: women from Indigenous, culturally and linguistically diverse, rural/remote and lower socio-economic backgrounds.	
	Indigenous	36.5%
	Non-English-speaking	49.3%
	Remote/Very remote	54.8%/46.9%
	SES group (lowest)	51.6%
NAS Measure 1.2.2	The Service and/or SCU monitors the proportion of all women in the Service who are screened and recalled for assessment, aged 40–49 and 75 years and over.	
	(a) women who are screened	
	40–49	15.5%
	75+	17.7%
	(b) women who are recalled for assessment	
	40–49	11.0%/5.3%
	75+	12.6%/4.3%

Source: AIHW analysis of BreastScreen Australia data.

Box 3.4: BreastScreen Australia and National Accreditation Standards

Provision of a high-quality service to women is of great importance to BreastScreen Australia. For this reason, services accredited under BreastScreen Australia are expected to operate according to the National Accreditation Standards (NAS) of BreastScreen Australia, along with national policy features and protocols. The accreditation system, of which the NAS are an integral part, intends to drive continuous quality improvement in the delivery of breast screening services to ensure women receive safe, effective and high-quality care.

The BreastScreen Australia NAS Measures have been developed to ensure that all women receive breast screening services that are of a consistently high quality, regardless of where they attend for screening or assessment.

A number of NAS Measures are consistent with the performance indicators in this report. For this reason, where appropriate, the data in this report are benchmarked against these Measures. These benchmarks are useful in helping to interpret the data presented, although in considering how these national data compare with the NAS Measures, it should be noted that the NAS Measures were not designed to be used as standards for the BreastScreen Australia performance indicators.

3.2 Sensitivity of the screening test

Mammography (X-ray of the breast) is the test used in breast cancer screening. 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.

Sensitivity of a screening test is the ability of that test to accurately identify the disease in people who have that disease. This is referred to as a 'true positive' screening result. A 'false negative' screening result occurs when women have screening mammography that incorrectly indicates that they do not have breast cancer.

The estimation of false negative results requires that we know if a woman had breast cancer present at the time of her screen. Because this cannot be truly known at the time of the test, we use interval cancers—breast cancers that arise between routine screening mammograms—as a way of assessing breast cancers that may have been present at the time of screen but missed by the screening process (although many interval cancers are not able to be detected because they were either not yet present or not visible—this is described in more detail in Box 3.5 and in the paragraphs that follow).

Box 3.5: Interval cancers

An interval cancer is defined as an invasive breast cancer that is diagnosed after a screening episode that detected no cancer and before the next scheduled screening episode (Kavanagh et al. 1999). This means that a woman attends BreastScreen for a screening mammogram, is advised that her mammogram is not suspicious for breast cancer, and is given a recommendation to rescreen in 2 years (or in 1 year if she screens annually), and then within those 2 years (or 1 year in the case of the latter), she experiences signs or symptoms suggestive of breast cancer (such as a lump or clear or bloody nipple discharge), and either returns to BreastScreen or—more commonly—visits her general practitioner for further investigation, at which time it is discovered that she has invasive breast cancer.

There are 2 categories of interval cancers, but the category can only be determined when previous screening mammograms are reviewed after the discovery of an interval cancer (for interval cancers diagnosed outside BreastScreen Australia, this discovery is made through linkage with the cancer registry in the relevant state or territory). All interval cancers in all state and territory BreastScreen programs undergo clinical review.

The first category comprises 'true' interval cancers. These are invasive breast cancers diagnosed between routine screening mammograms that, upon review, could not be detected in the previous routine screening mammogram. This may be due to either the interval cancer being an aggressive breast cancer that emerged and grew very rapidly in the period between routine screening mammograms, or due to the breast cancer not being visible due to the characteristics of the cancer or the breast tissue (for example, dense breast tissue can make breast cancers very difficult to see). True interval cancers do not represent any failure in detection.

The second category comprises breast cancers that, upon review, were visible in the previous routine screening mammogram. These are false negative screening results and are considered a failure of the screening process.

However, even though only missed cancers, and not 'true' interval cancers, are false negative screening results, all interval cancers are included in this measure of sensitivity.

‘Program sensitivity’ is measured as 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, and is therefore a measure of the sensitivity of screening mammography.

How time since screen affects sensitivity

The latest data for interval cancers and program sensitivity are for women screened in 2009, 2010 and 2011 (referred to as index years 2009–2011). These are the latest data available because, by its very definition, at least 2 years need to have passed since a woman’s last routine screening mammogram to know whether she was diagnosed with an interval cancer in that time—often longer due to time required for cancer registries to be notified of the cancer, and for linkage between the BreastScreen registers and cancer registers.

There are fewer interval cancers, and thus higher program sensitivity, in the first year following a woman’s negative screen than in the second year. For the index years 2009–2011, in the first year after a negative screening episode, there were 7 interval cancers per 10,000 women-years after a woman’s first visit, and 6 per 10,000 women-years after subsequent visits. In comparison, in the second year after a negative screening episode, there were 10 and 12 interval cancers per 10,000 women-years after a woman’s first visit and subsequent visits, respectively (Table 3.2).

In these data, there were no appreciable differences in the interval cancer rate between first and subsequent screening rounds for either the first or second year after a negative screening episode (apparent differences are considered not statistically significant due to overlapping confidence intervals). This indicates that women are no more likely to have an interval cancer diagnosed after their first screen than after any other screen at BreastScreen Australia. This is different to invasive cancer detection through BreastScreen Australia, which is more likely at a woman’s first screen compared with subsequent screens (see Section 3.3).

Program sensitivity differs by time since screen, being higher in the first year after a negative screening episode than when the entire 2 years are considered together (92.8% and 88.0% after a woman’s first visit and subsequent visits, respectively, compared with 85.7% and 74.5% after a woman’s first visit and subsequent visits, respectively) (Table 3.2).

Unlike the interval cancer measures, program sensitivity measures differ by screening round, being higher after a woman’s first visit compared with her subsequent visits. This may be because women at their first screening visit are more likely to be recalled to assessment for further investigation, and thus more likely to have a breast cancer that is present detected.

Table 3.2: Interval cancer rate and program sensitivity, by time since screen, women aged 50–69 screened in 2009–2011

Time since screen	First year after screen	Second year after screen	First and second years
Interval cancers			
First screening round			
Number	143	216	359
Crude rate	6.7	10.4	8.5
AS rate	6.6	10.1	8.3
95% CI	5.3–8.0	8.5–12.0	7.3–9.5
Subsequent screening rounds			
Number	1,125	2,135	3,260
Crude rate	6.1	12.2	9.1
AS rate	6.1	12.1	9.0
95% CI	5.7–6.4	11.6–12.7	8.7–9.3
Program sensitivity			
First screening round			
Crude rate	92.0	. .	84.0
AS rate	92.8	. .	85.7
Subsequent screening rounds			
Crude rate	88.7	. .	75.5
AS rate	88.0	. .	74.5

. . not applicable: program sensitivity is not calculated for the second year after a negative screening episode.

Note: Crude rate is the number of interval cancers detected per 10,000 women-years; age-standardised (AS) rate is the number of interval cancers detected per 10,000 women-years, age-standardised to the population of women attending a BreastScreen Australia service in 2008; 95% CI are 95% confidence intervals.

Source: AIHW analysis of BreastScreen Australia data.

How age affects sensitivity

In 2009–2011, for the first year after a negative screening round, the interval cancer rate was lowest for women aged 50–59 and 60–69, and was highest for women outside these age groups. The trend was not as clear in the second year after a negative screening round, with the interval cancer rate lowest for women aged 40–49 and 50–59, and thereafter increasing with age (Table 3.3).

Program sensitivity was lowest for women aged 40–49, increasing with each 10-year age group to be highest for women aged 70 and over (Table 3.3).

These results, when combined, point to lower sensitivity of screening mammography for women aged 40–49, meaning that BreastScreen Australia is less able to detect invasive breast cancers in women aged 40–49 who attend for screening. This is likely due to features of young breasts, such as high density, which can make breast cancers difficult to visualise with mammography.

Table 3.3: Interval cancer rate and program sensitivity, by age, women screened in 2009–2011

		Age group (years)			
Time since screen		**40–49**	**50–59**	**60–69**	**70+**
Interval cancers					
First year	Number	282	667	601	160
	Crude rate	8.2	5.9	6.4	8.2
Second year	Number	379	1,184	1,167	290
	Crude rate	11.7	11.1	13.2	15.8
Program sensitivity					
First year	Crude rate	79.5	87.3	90.8	92.4
First and second years	Crude rate	67.6	74.0	78.9	83.3

Note: Crude rates are the number of interval cancers detected per 10,000 women-years.

Source: AIHW analysis of BreastScreen Australia data.

Specificity

While sensitivity is the ability of a screening test to accurately identify the disease in people who have that disease, specificity refers to the ability of a screening test to accurately identify people who do not have the disease. This is referred to as a 'true negative' screening result. The vast majority of women who are given a negative screening result after their screening mammography through BreastScreen Australia do not have breast cancer, and thus receive a true negative screening result.

Women who are not given a negative screening result are recalled to assessment for further investigation. A 'true positive' screening result is when they are found to have breast cancer at assessment. A 'false positive' screening result is when women are recalled to assessment for further investigation when they do not have breast cancer. Most women who are recalled to assessment through BreastScreen Australia do not have breast cancer.

The proportion of women who are recalled to assessment is examined in Section 3.3. BreastScreen Australia aims to achieve a balance in breast cancer screening that minimises the number of cancers that are missed (false negatives) while also minimising the number of women who are recalled when they do not have breast cancer (false positives). This underpins many of the objectives and NAS Measures of BreastScreen Australia. The NAS Measures related to interval cancers are shown in Table 3.4.

Table 3.4: NAS Measures for interval cancers calculated using BreastScreen Australia data supplied for the *BreastScreen Australia monitoring report 2013–2014*

NAS Measure		**Calculated value**
NAS Measure 2.3.1 (b)	<7.5 per 10,000 women aged 50–69 years who attend for screening are diagnosed with an interval invasive breast cancer in the first calendar year following a negative screening episode.	6.6/6.1
NAS Measure 2.3.2 (b)	≤15 per 10,000 women aged 50–69 years who attend for screening are diagnosed with an interval invasive breast cancer in the second calendar year following a negative screening episode.	10.1/12.1

Source: AIHW analysis of BreastScreen Australia data.

3.3 Detection of invasive breast cancer and ductal carcinoma in situ

At the completion of the screening episode, each woman screened through BreastScreen Australia receives what is called a ‘recommendation of screening’. For some women, this recommendation will be that she is recalled to an assessment centre to undergo further investigation because her mammogram was suspicious.

The majority of women who participate in BreastScreen Australia experience only the screening test, while a subset—those who the screening test identify as being more likely to have breast cancer and therefore require further investigation from diagnostic tests—is recalled for more rigorous and sometimes invasive testing. Testing at assessment can include palpation, diagnostic mammography, ultrasound and, if required, a percutaneous biopsy (fine needle aspiration or core biopsy of breast tissue upon which cytology or histology can be performed).

In 2014, of the 74,526 women screened for the first time, 9,149 (12.2%) were recalled for further assessment, while, of the 687,634 women attending subsequent screens, 26,974 (4.0%) were recalled. Of the women recalled to assessment, most did not have an invasive breast cancer or ductal carcinoma in situ (DCIS) detected—801 women attending their first visit, and 4,517 attending a subsequent screen had an invasive breast cancer or DCIS detected (Table 3.5).

Table 3.5: Number of women aged 50–69 who had invasive breast cancer or DCIS detected, 2014

Number of women aged 50–69	First screening round	Subsequent screening rounds
Screened	74,526	687,634
Recalled to assessment	9,149	26,974
Invasive breast cancer or DCIS detected	801	4,517

Source: AIHW analysis of BreastScreen Australia data.

This means that, for women attending their first screen, 1.1% of women screened and 8.8% of women recalled to assessment will have an invasive breast cancer or DCIS detected, and for women attending subsequent screens, 0.7% of women screened and 16.7% of women recalled to assessment have an invasive breast cancer or DCIS detected.

From this, it can be seen that screening mammography is less accurate for women attending for the first time, in so far as more women are recalled to assessment when there is no breast cancer or DCIS present (that is, have more false positives). This is likely due, in part, to not having any previous images with which to compare a woman’s first screening mammography images. Without any previous images for comparison, it is more difficult to distinguish between what is normal and what might be suspicious (BreastScreen WA 2008), with additional testing less likely when prior mammograms are available for comparison.

Detection is usually expressed as the number of cancers diagnosed per 10,000 women screened. In 2014, for women aged 50–69, for every 10,000 women screened for the first time, 85 had an invasive breast cancer detected, while for every 10,000 women attending subsequent screens, 51 had a cancer detected (Table 3.6). Detection of DCIS was rarer, at 23 per 10,000 women attending their first screen, and 15 per 10,000 women attending subsequent screens in 2014 (Table 3.6).

A higher proportion of women attending their first screen have an invasive breast cancer or DCIS detected 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, which tend to be the breast cancers detected at subsequent screening visits (Kavanagh et al. 1999).

Table 3.6: Invasive breast cancer and DCIS detection in women aged 50–69, first and subsequent screening rounds, 2014

	Number	Crude rate	AS rate
Invasive breast cancer			
First screening round	633	84.9	108.2
Subsequent screening rounds	3,490	50.8	48.3
DCIS			
First screening round	168	22.5	23.7
Subsequent screening rounds	1,027	14.9	14.6

Note: Crude rate is the number of women with invasive breast cancer detected per 10,000 women screened; age-standardised (AS) rate is the number of women with invasive breast cancer detected per 10,000 women screened, age-standardised to the population of women attending a BreastScreen Australia service in 2008. AS rates are shown to aid in comparisons over time.

Source: AIHW analysis of BreastScreen Australia data.

Detection of small breast cancers

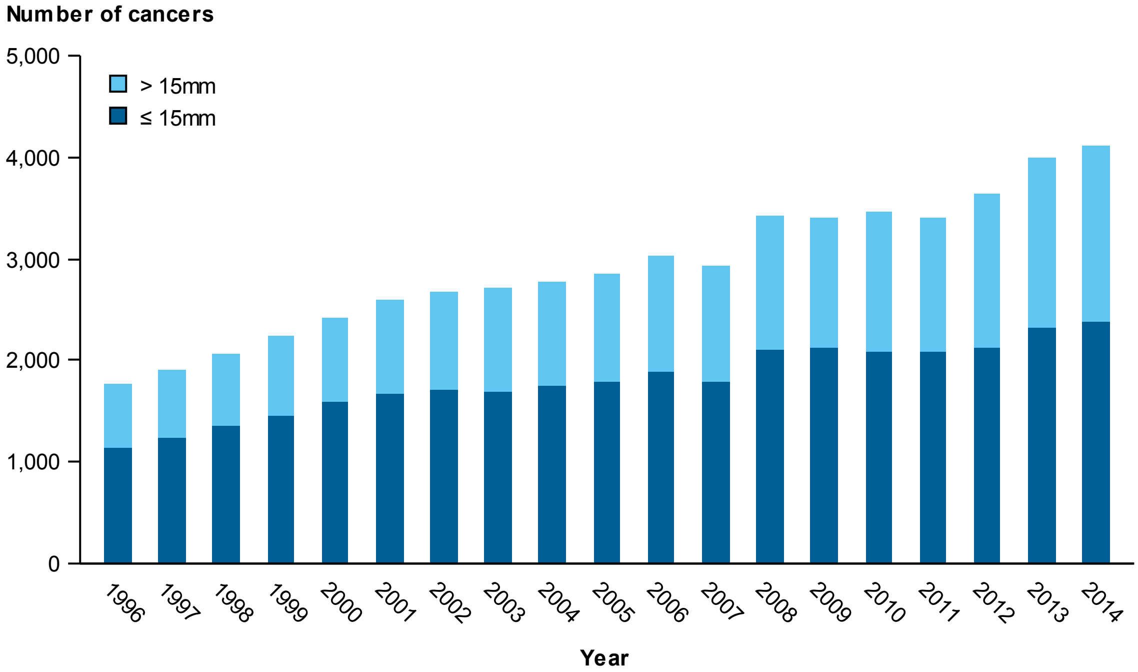
BreastScreen Australia strives to maximise the detection of invasive breast cancers, particularly small cancers, to achieve the desired reductions in morbidity and mortality.

In 2014, for every 10,000 women screened through BreastScreen Australia aged 50–69, 31 had a small (≤15 mm) invasive breast cancer detected. As a proportion of all invasive breast cancers detected, this was 50.2% for first screens, and 59.1% for subsequent screens. For all screening rounds combined, it was 57.7%.

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.

Although the proportion of breast cancers detected that are small has fallen over time, from around 65% of all invasive breast cancers between 1996 and 2001 to 58% in 2014 (Figure 3.7), it is still of note that more than half of all invasive breast cancers detected through BreastScreen Australia are small, at ≤15 mm. The high proportion of small breast cancers is a positive outcome, because small breast cancers tend to be associated with increased treatment options (NBOCC 2009) and improved survival (AIHW & NBCC 2007). Invasive breast cancers detected outside BreastScreen Australia are less likely to be small, with only 28% measuring ≤15 mm (NBOCC 2009).

The proportion of cancers that are small is lower in younger age groups—47.9% for women aged 40–49 compared with 57.7% for women aged 50–69 and 60.0% for women aged 70 and over. 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 detect using screening mammography (Irwig et al. 1997).



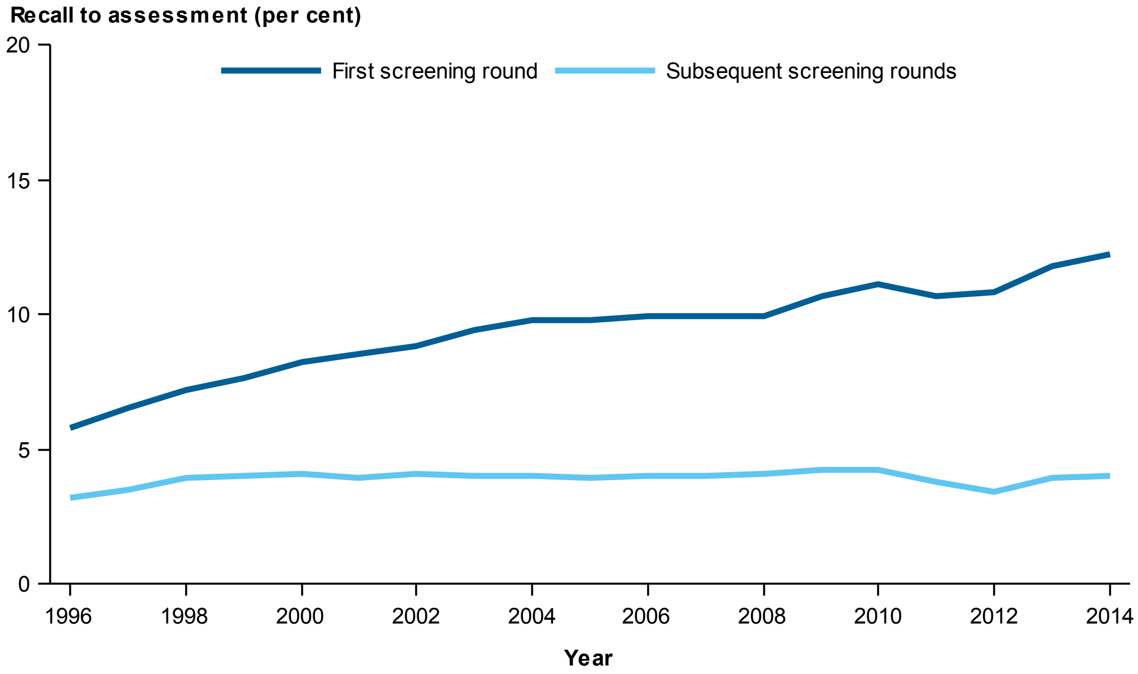
Source: AIHW analysis of BreastScreen Australia data. Data for this figure are available in Table A.4.3.

Figure 3.7: Number of invasive breast cancers, showing the proportion of small (≤15 mm) to other sizes (>15 mm), detected in women aged 50–69, all screening rounds, 1996 to 2014

Detection over time

Over time, while the recall to assessment rate for subsequent screening rounds has remained steady at 4%, the proportion of women attending BreastScreen Australia for the first time who were recalled to assessment has increased. After remaining steady at 10% from 2004 to 2008, it increased to 11% from 2009 to 2013, before reaching a high of 12.2% in 2014 (Figure 3.8).

Changes to recall to assessment rates should be considered alongside corresponding invasive cancer detection rates, because a higher recall to assessment rate may be considered acceptable (within reasonable limits) if it leads to higher breast cancer detection rates.



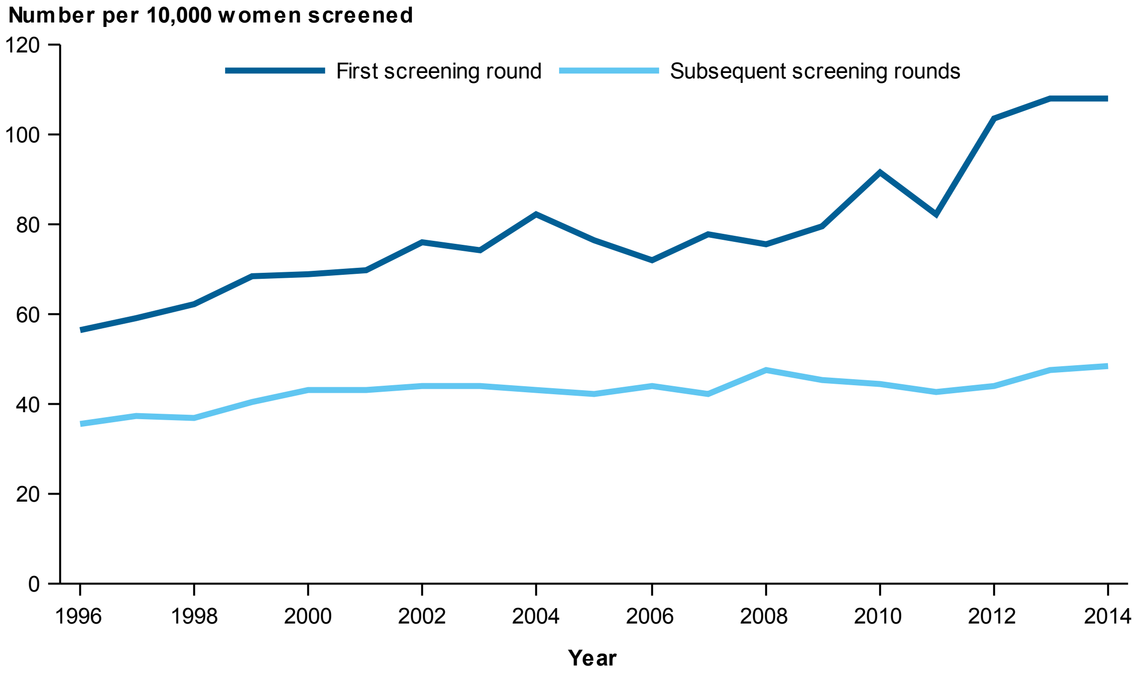
Source: AIHW analysis of BreastScreen Australia data. Data for this figure are available in Table A.3.1.

Figure 3.8: Recall to assessment, women aged 50–69, first and subsequent screening rounds, 1996 to 2014

Invasive breast cancer detection trends are shown in Figure 3.9. For the past decade, the rate of invasive breast cancer detection for subsequent screening rounds has remained steady, ranging between 42 and 48 per 10,000 women screened. In contrast, after ranging between 72 and 82 early in the past decade, invasive breast cancer detection for the first screening round increased to 92 in 2010, before falling back to 82 in 2011, and then increasing to 108 women diagnosed with invasive breast cancer per 10,000 women screened in 2013 and 2014 (Figure 3.9).

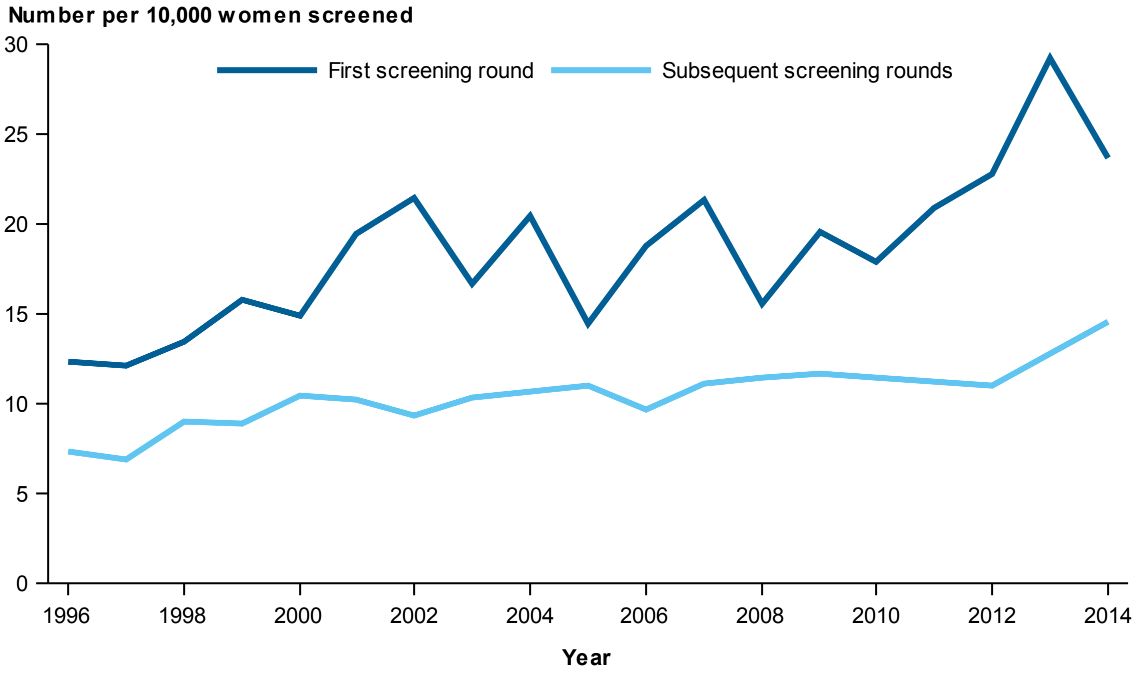
Detection of DCIS in women screening for the first time was also high in 2013 and 2014, reaching a high of 29 in 2013 and falling to 24 women diagnosed with DCIS per 10,000 women screened in 2014 (Figure 3.10).

Considering recall to assessment and invasive breast cancer detection rates together, it appears that the increase in the proportion of women who were recalled for further investigation in the last few years has led to an increase in the detection of breast cancer and DCIS for women screening for the first time. In this respect, the increase in the recall to assessment rate to around 12% for the first screening round may be considered acceptable.



Source: AIHW analysis of BreastScreen Australia data. Data for this figure are available in Table A.4.1

Figure 3.9: Invasive breast cancer detection (all sizes), women aged 50–69, first and subsequent screening rounds, 1996 to 2014



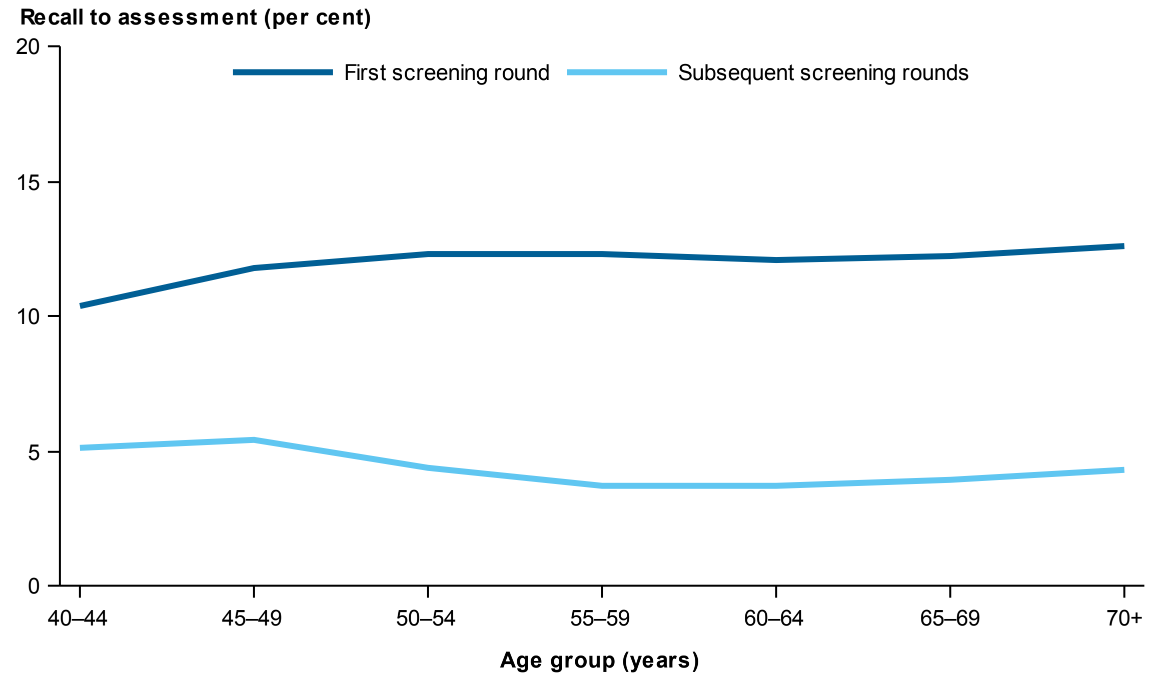
Source: AIHW analysis of BreastScreen Australia data. Data for this figure are available in Table A.5.1.

Figure 3.10: DCIS detection, women aged 50–69, first and subsequent screening rounds, 1996 to 2014

Detection across ages

In 2014, the proportion of women attending their first screen that were recalled to assessment for further investigation was between 12% and 13% for all age groups aged 45 and over, with women aged 40–44 having a lower recall rate of 10% (Figure 3.11).

This differed for women attending subsequent screens, for whom the proportion recalled to assessment was highest for women aged 40–44 and 45–49, at 5.1% and 5.4%, respectively. Women aged 50–54 were a little lower at 4.4%. Women aged 55–69 were least likely to be recalled after a subsequent screen, having recall rates ranging between 3.7% and 3.9% of women screened in 2014 (Figure 3.11).



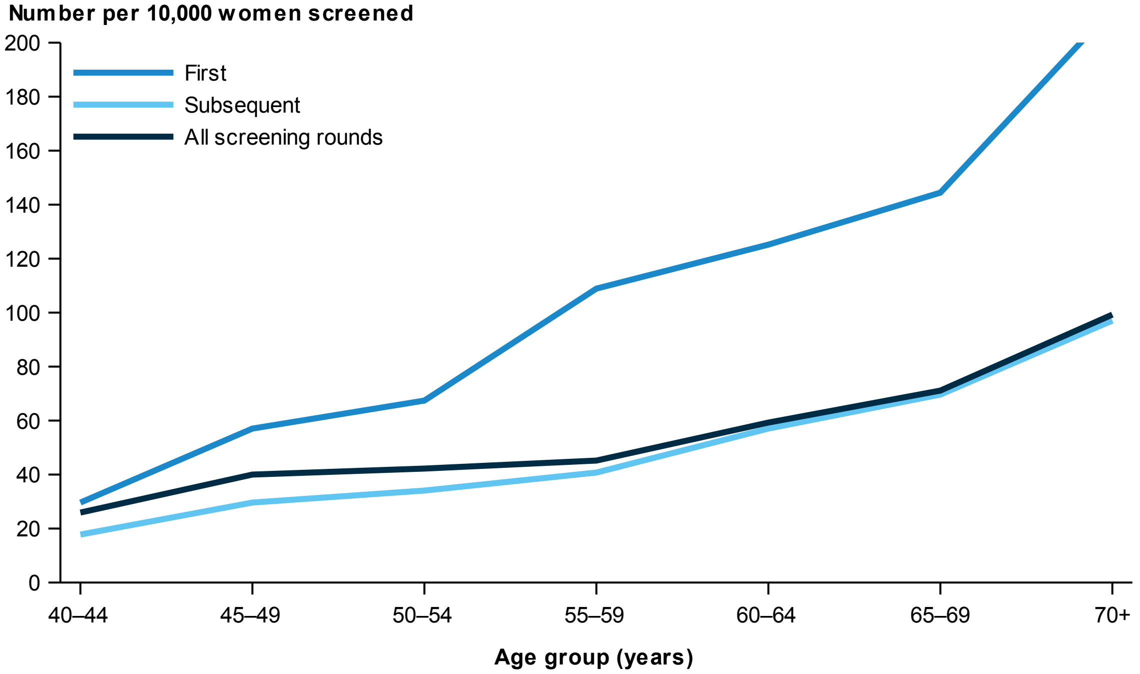
Source: AIHW analysis of BreastScreen Australia data. Data for this figure are available in Table A.3.2.

Figure 3.11: Recall to assessment by age, first and subsequent screening rounds, 2014

Breast cancer detection increased with age in 2014, from 26 and 40 per 100,000 women screened for those aged 40–44 and 45–49, respectively, to 43 and 45 for those aged 50–54 and 55–59, respectively, increasing to 60 and 71 for women aged 60–64 and 65–69, respectively. Breast cancer detection was highest for women aged 70 and over, with 100 women diagnosed with invasive breast cancer for every 10,000 women screened (Figure 3.12).

This trend of increasing invasive breast cancer detection with increasing age was true for both women attending their first screen and women attending subsequent screens (Figure 3.12).

DCIS detection also increased with age. In 2014, DCIS detection was 15 per 10,000 women screened for those aged 40–49 and 50–59, 17 for those aged 60–69, and 18 women diagnosed with DCIS per 10,000 women screened for ages 70 and over.



Source: AIHW analysis of BreastScreen Australia data. Data for this figure are available in Table A4.4.

Figure 3.12: Invasive breast cancer detection by age, first, subsequent and all screening rounds, 2014

BreastScreen Australia aims to maximise the number of invasive breast cancers and DCIS detected, while also minimising the number of women who are recalled when they do not have breast cancer (false positives). The NAS Measures related to invasive breast cancer detection, DCIS detection and recall to assessment are shown in Table 3.7.

Table 3.7: NAS Measures for the detection of invasive breast cancers, the detection of DCIS and recall to assessment calculated using BreastScreen Australia data supplied for the *BreastScreen Australia monitoring report 2013–2014*

NAS Measure		Calculated value
NAS Measure 2.1.1 (b)	≥50 per 10,000 women aged 50–69 who attend for their first screening episode are diagnosed with invasive breast cancer.	108.2
NAS Measure 2.1.2 (b)	≥35 per 10,000 women aged 50–69 who attend for their second or subsequent screening episode are diagnosed with invasive breast cancer.	48.3
NAS Measure 2.1.3 (c)	≥25 per 10,000 women aged 50–69 who attend for screening are diagnosed with small (≤15mm) invasive breast cancer.	30.5
NAS Measure 2.2.1 (b)	≥12 per 10,000 women aged 50–69 who attend for their first screening episode are diagnosed with DCIS.	23.7
NAS Measure 2.2.2 (b)	≥7 per 10,000 women aged 50–69 who attend for their second or subsequent screening episode are diagnosed with DCIS.	14.6
NAS Measure 2.6.3 (b)	<10% of women aged 50–69 who attend for their first screening episode are recalled for assessment.	12.2%
NAS Measure 2.6.4 (b)	<5% of women aged 50–69 who attend for their second or subsequent screening episode are recalled for assessment.	4.0%

Source: AIHW analysis of BreastScreen Australia data.

4 Monitoring BreastScreen Australia using AIHW data

4.1 Incidence of breast cancer

Australia has high-quality and virtually complete cancer incidence data. Collected by state and territory cancer registries, clinical and demographic data for all cancer cases are provided to the AIHW and compiled into the Australian Cancer Database (ACD). The latest national data available are for new cases in 2012, with estimates to 2016.

In 2016, it is projected that there will be 15,934 new cases of breast cancer in Australian women, which is equivalent to 130 new cases for every 100,000 women in the population. Of the 15,934 new cases, it is projected that 8,369 women aged 50–69 (the target population of BreastScreen Australia) will be diagnosed with breast cancer, which is equivalent to 298 new cases for every 100,000 women in the population.

These rates have also been age-standardised for use in analyses of trends and differentials to 115 for women of all ages, and 290 new cases per 100,000 women for those aged 50–69.

Box 4.1: Invasive breast cancer cases detected through BreastScreen Australia

Of all invasive breast cancer cases diagnosed in 2012 in women aged 50–69, approximately 47% were detected through BreastScreen Australia (33% for women aged 40 and over).

Breast cancer types

Invasive breast cancers by type are shown in Table 4.1 (2010 data are used instead of 2012, as 2011 and 2012 data are estimates for New South Wales and the Australian Capital Territory).

The most common breast cancer type for women aged 50–69 was invasive ductal carcinoma at 79.7% of all breast cancers; invasive lobular cancer was the second-most common at 11.9%.

Table 4.1: Incidence of breast cancer in women aged 50–69, by type, 2010

Type of breast cancer	New cases	Crude rate	Percentage of breast cancers
Invasive ductal carcinoma	5,945	242.6	79.7
Invasive lobular carcinoma	886	36.1	11.9
Medullar carcinoma and atypical medullary carcinoma	20	0.8	0.3
Tubular carcinoma and invasive cribriform carcinoma	151	6.2	2.0
Mucinous carcinoma	90	3.7	1.2
Invasive papillary carcinoma	105	4.3	1.4
Inflammatory carcinoma	13	0.5	0.2
Mesenchymal	7	0.3	0.1
Other—specified	114	4.7	1.5
Unspecified	126	5.1	1.7
Total	**7,457**	**304.2**	**100.0**

Note: Crude rate is the number of new cases per 100,000 women. Histology codes that comprise each breast cancer group appear in Table D1.

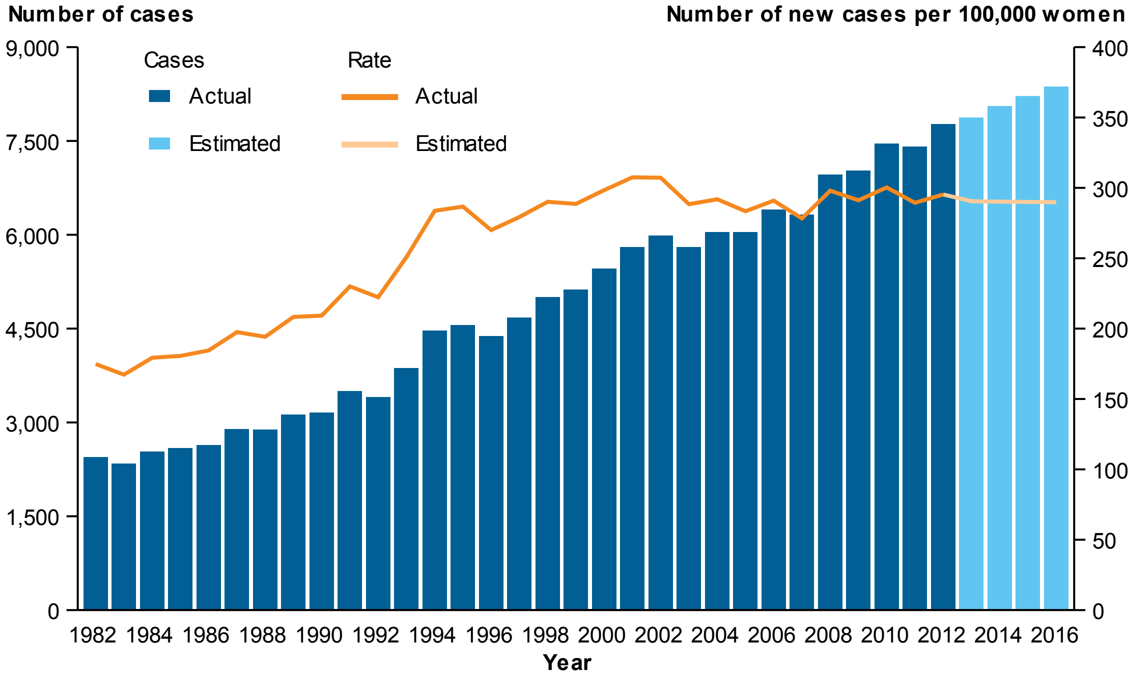
Source: AIHW Australian Cancer Database 2012.

Other breast cancer types were rarer—ranging between less than 1 to 6 new cases per 100,000 women aged 50–69 in the population. These accounted for 0.1% and 2.0% of all invasive breast cancers, respectively; unspecified breast cancers accounted for 1.7% of cases (Table 4.1).

Breast cancer over time

The age-standardised incidence rate for women aged 50–69 increased following the introduction of BreastScreen Australia in 1991, and has since remained relatively steady at around 300 new cases per 100,000 women (Figure 4.1).

This is despite an increase in the number of new cases from 2,448 in 1982 to 7,767 in 2012 and a projected 8,369 in 2016 (from 5,311 to 15,050 and projected to 15,934 for women of all ages).



Notes

1. Rates are age-standardised to the Australian population as at 30 June 2001.
2. Estimated incidence data for 2013–2016 are based on 2002–2011 incidence data. Actual incidence data for 2013–2016 may differ from estimated data for 2013–2016 due to current and ongoing program or practice changes.

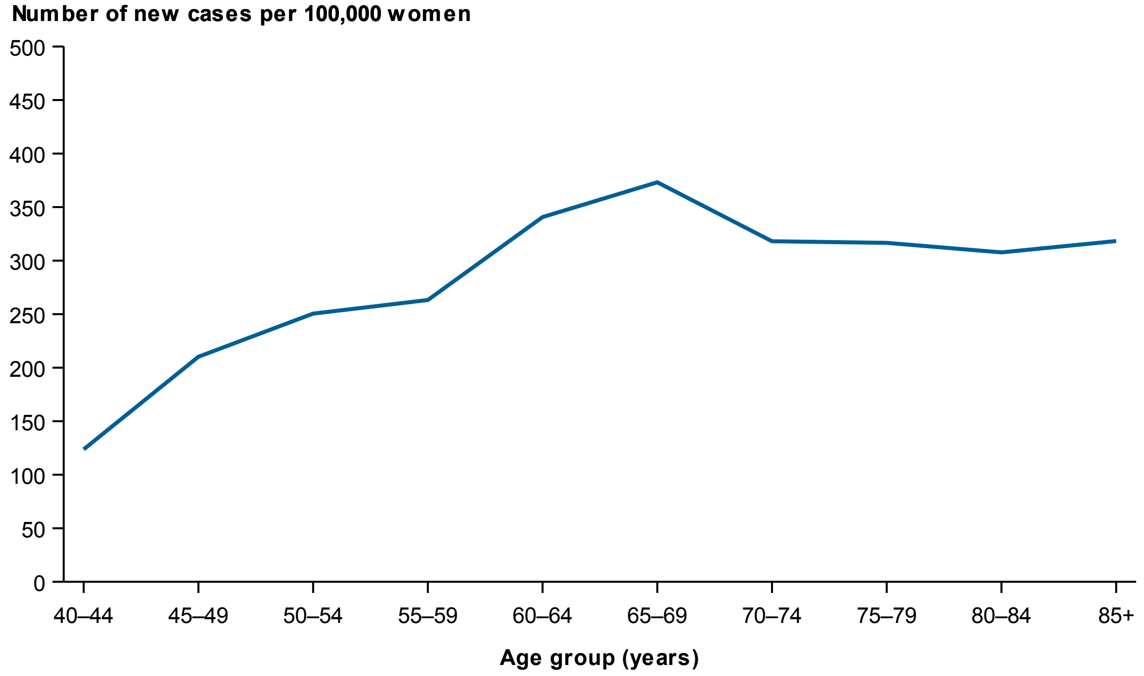
Source: AIHW Australian Cancer Database 2012. Data for this figure are available in Table A7.1.

Figure 4.1: Incidence of breast cancer in women aged 50–69, 1982 to 2016

Breast cancer across ages

Incidence of breast cancer usually increases with age, but the impact of BreastScreen Australia on the age at which breast cancers are diagnosed results in peak incidence occurring for women aged 60–64 and 65–69 at 341 and 373 new cases per 100,000 women in 2012, respectively—both of which are higher than the incidence rates of the older age groups (Figure 4.2).

In 2012, breast cancers in women aged 50–69 comprised just over half (51.6%) of all breast cancers diagnosed in that year.



Source: AIHW Australian Cancer Database 2012. Data for this figure are available in Table A7.2.

Figure 4.2: Incidence of breast cancer, by age, 2012

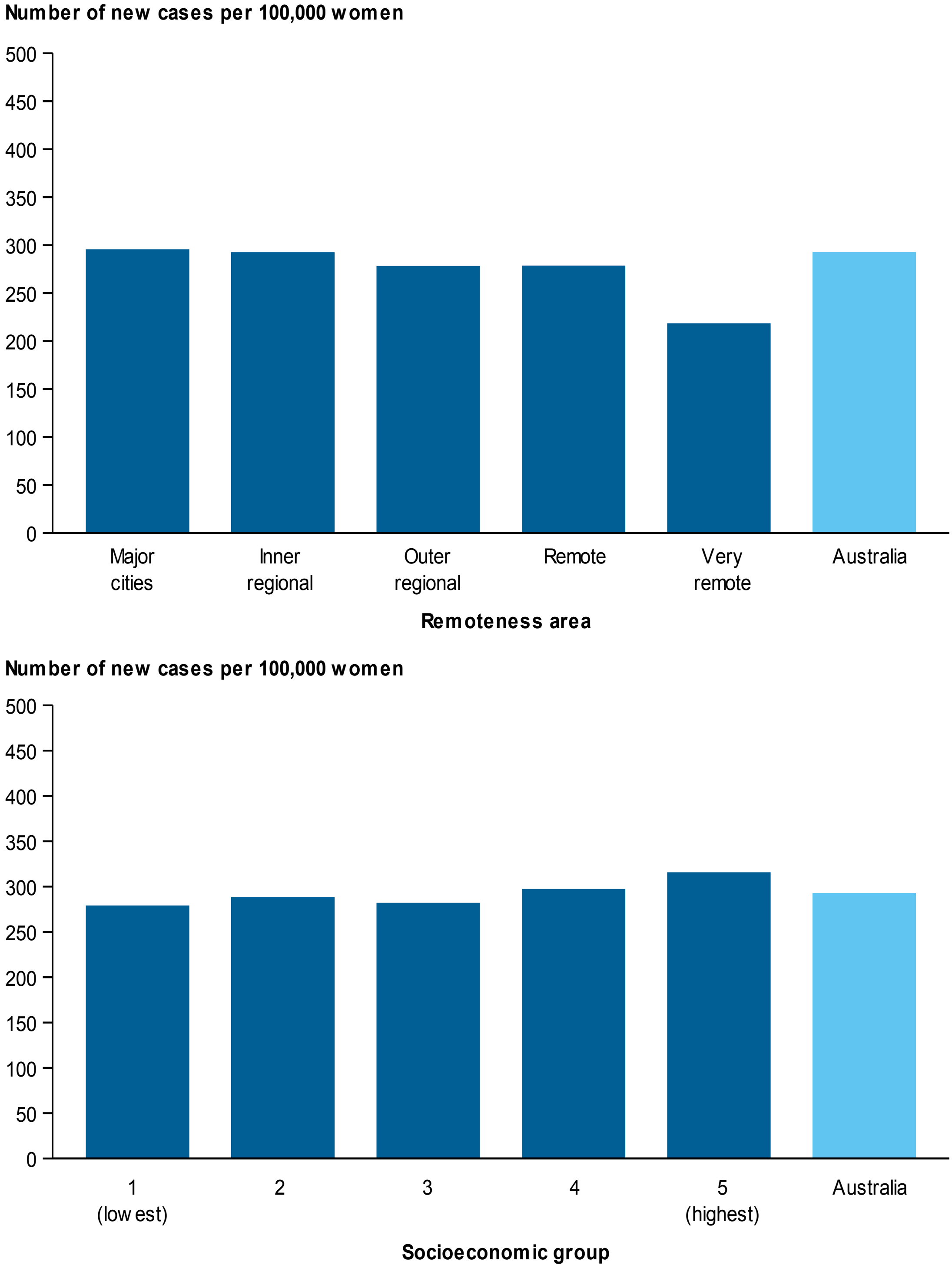
Breast cancer across groups

Incidence for population groups is presented for 2006–2010 rather than for 2008–2012, because the actual data for 2011 and 2012 were not provided for New South Wales and the Australian Capital Territory to compile the 2012 ACD (see Appendix C).

Although highest in *Major cities* at 295 new cases per 100,000 women, incidence of breast cancer in 2006–2010 was relatively similar across all remoteness areas except for *Very remote* areas, which had a far lower incidence of 218 new cases per 100,000 women (Figure 4.3).

Lower incidence in *Very remote* areas may be related to the proportionately high number of Aboriginal and Torres Strait Islander women living in these areas, since the incidence rate of breast cancer is lower for Indigenous women (see Figure 4.4).

In 2006–2010, while incidence was relatively similar across socioeconomic groups, there was a small trend of increasing incidence with increasing socioeconomic group (Figure 4.3).



Note: Rates age-standardised to the Australian population as at 30 June 2001.

Source: AIHW Australian Cancer Database 2012. Data for this figure are available in tables A7.5 and A7.6.

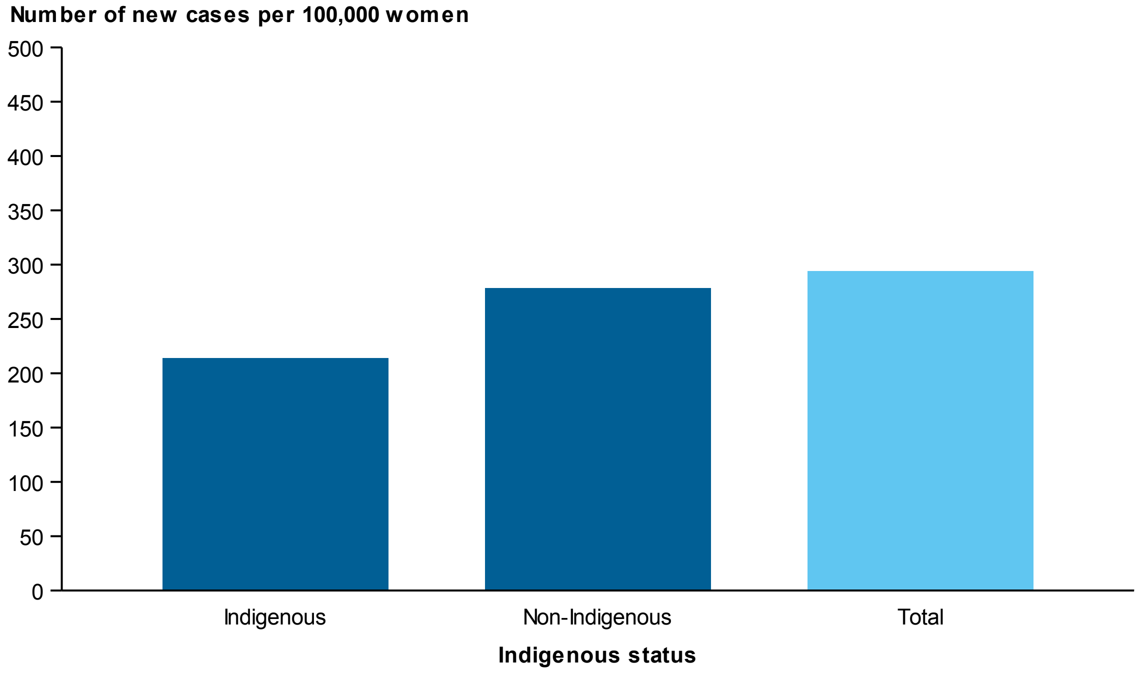
Figure 4.3: Incidence of breast cancer in women aged 50–69, by remoteness area and by socioeconomic group, 2006–2010

Box 4.2: Indigenous identification on the Australia Cancer Database

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 currently do not record information on Indigenous status in most states and territories. The registries collect information on the Indigenous status of individuals from additional sources such as hospital records and death records, which affects the completeness (and quality) of 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 analysis. In this report, data for 4 states and territories—New South Wales, Queensland, Western Australia and the Northern Territory—are considered of sufficient quality, and were used to examine the incidence of breast cancer by Indigenous status. While the majority (around 85%) of Australian Aboriginal and Torres Strait Islander people reside in these 4 jurisdictions, both the level of completeness of Indigenous status recorded in these jurisdictions, and the degree to which data for these jurisdictions are representative of all Aboriginal and Torres Strait Islander people, is unknown.

It was found that, over the 5-year period 2006–2010, breast cancer incidence in Aboriginal and Torres Strait Islander women aged 50–69 in New South Wales, Queensland, Western Australia and the Northern Territory was lower than that of non-Indigenous women. This was 214 new cases per 100,000 Indigenous women compared with 278 new cases per 100,000 non-Indigenous women (Figure 4.4).



Note: Rates age-standardised to the Australian population as at 30 June 2001; 'Total' rate includes women with a 'not stated' Indigenous status and is therefore greater than the 'Non-Indigenous' rate.

Source: AIHW Australian Cancer Database 2012. Data for this figure are available in Table A7.7.

Figure 4.4: Incidence of breast cancer in women aged 50–69 (New South Wales, Queensland, Western Australia and the Northern Territory), by Indigenous status, 2006–2010

4.2 Incidence of ductal carcinoma in situ

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.

State and territory cancer registries have been collecting data on DCIS since 1996. Recently, these data have been included in data provided to the AIHW for the formation of the ACD; this means that for the first time, DCIS data have been sourced and analysed nationally through the ACD (see Appendix D for classification of DCIS). Because actual data were not provided, data for New South Wales and the Australian Capital Territory were projected for 2011 and 2012 in the 2012 ACD. Because DCIS was not included in the projections, there are no DCIS cases for New South Wales or the Australian Capital Territory for 2011 or 2012. Therefore the latest national data for DCIS incidence are for 2010.

In 2010, there were 1,862 new cases of DCIS in Australian women. This is equivalent to 17 new cases for every 100,000 women in the population. Of the 1,862 new cases, 1,192 were in women aged 50–69: the target population of BreastScreen Australia. These 1,192 new cases are equivalent to 49 new cases for every 100,000 women in the population.

These rates have also been age-standardised for use in analyses of trends and differentials to 15 new cases per 100,000 women for women of all ages, and 48 new cases per 100,000 women for those aged 50–69.

Box 4.3: DCIS cases detected through BreastScreen Australia

Of all DCIS cases diagnosed in 2010 in women aged 50–69, approximately 74% were detected through BreastScreen Australia (62% for women aged 40 and over).

DCIS over time

Both the incidence rate and the number of new cases of DCIS in women aged 50–69 have increased over time: the former from 31 new cases per 100,000 women in 1996 to 48 in 2010, and the latter from 501 new cases in 1996 to 1,192 new cases in 2010.

DCIS across ages

Similar to invasive breast cancer, the incidence of DCIS increases with age. Also similar to invasive breast cancer, there is a clear impact of BreastScreen Australia in determining the peak incidence of DCIS in women age 60–69. While DCIS incidence in 2010 increased from 20 new cases per 100,000 women aged 40–49 to 43 in women aged 50–59 and finally to 56 for women aged 60–69, incidence of DCIS thereafter drops off to be 24 new cases per 100,000 women for women aged 70 and over.

In 2010, DCIS in women aged 50–69 comprised 64% of all cases diagnosed in that year.

It is clear from these data, and the data shown in Box 4.3, that DCIS is deserving of its name as a ‘disease of screening’. Indeed, DCIS was rarely detected before breast screening was introduced, and its incidence has increased since the introduction of screening mammography, including that performed through BreastScreen Australia.

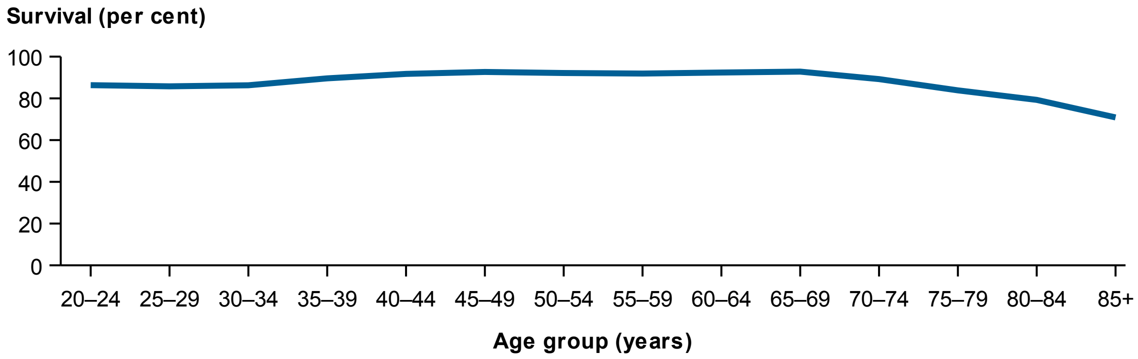
4.3 Survival after a diagnosis of breast cancer

Survival in this report refers to 'relative survival', which means that the survival figures presented are the probability of being alive for a given amount of time after diagnosis compared with the general population, and reflects the impact of a cancer diagnosis.

The source of survival data is the 2012 ACD, which includes data from the National Death Index on deaths (from any cause) that occurred up to 31 December 2012, which were used to determine which people with cancer had died and when this occurred.

In 2008–2012, women diagnosed with breast cancer in Australia had an 89.8% chance of surviving for 5 years compared with their counterparts in the general population. For the target age group (50–69), 5-year relative survival was 92.3%.

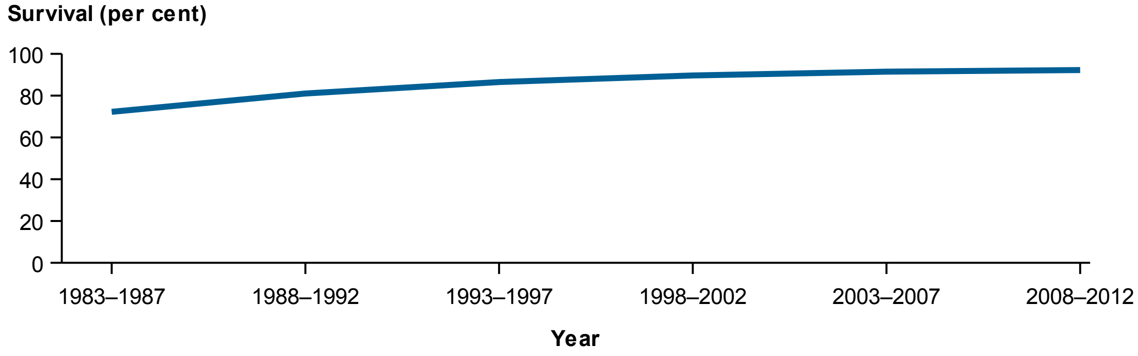
In 2008–2012, the 5-year survival rate from breast cancer was highest for women aged 40–69, followed by women aged 20–39. Women aged 75+ had a lower chance of surviving for 5 years with the lowest 5-year survival rate for women aged 85+ at 70.9% (Figure 4.5).



Source: AIHW Australian Cancer Database 2012. Data for this figure are available in Table A7.10.

Figure 4.5: Five-year relative survival from breast cancer, by age group, 2008–2012

Survival from breast cancer has improved over time: between 1983–1987 and 2008–2012, the 5-year relative survival rate increased from 72.2% to 92.2%, respectively (Figure 4.6).



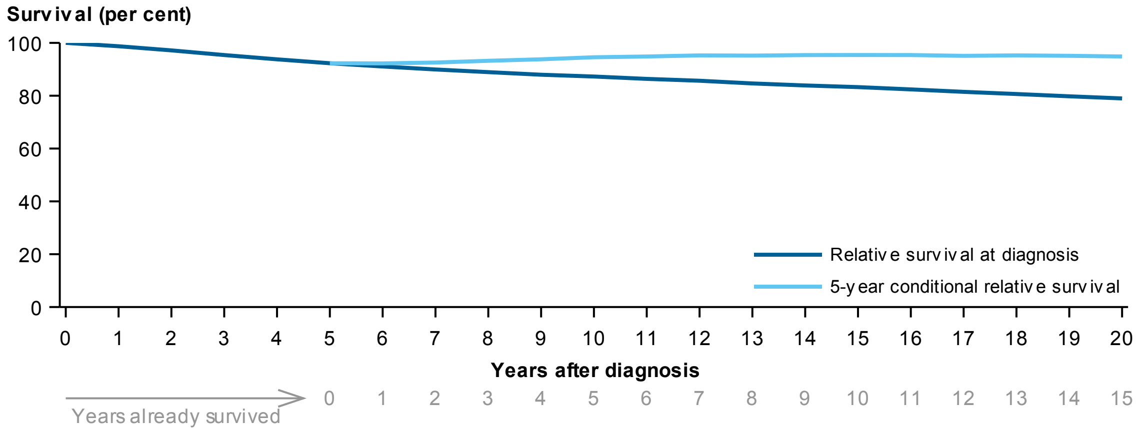
Source: AIHW Australian Cancer Database 2012. Data for this figure are available in Table A7.11.

Figure 4.6: Trends in 5-year relative survival from breast cancer in women aged 50–69, 1983–1987 to 2008–2012

Conditional survival is the probability of surviving a given number of years provided that an individual has already survived a specified amount of time after diagnosis.

Conditional survival for breast cancer for women aged 50–69 is illustrated in Figure 4.7. In this graph, the darker blue line shows relative survival for each year after diagnosis (as shown by the numbers in black on the x-axis), whereas the lighter blue line shows relative survival for each year once an individual has already survived a certain number of years (as shown by the numbers in grey on the x-axis).

For breast cancer, the prospect of surviving for at least 5 more years after having already survived for 5, 10 or 15 years was much higher than relative survival, at around 94 or 95% (Figure 4.7), indicating that if an individual survives for at least 5 years after diagnosis, their survival is almost the same as an individual not diagnosed with breast cancer.



Source: AIHW Australian Cancer Database 2012. Data for this figure are available in Table A7.12.

Figure 4.7: Relative survival at diagnosis and 5-year conditional survival from breast cancer in women aged 50–69, 2008–2012

4.4 Prevalence of breast cancer

Prevalence is the number of people alive after a diagnosis of cancer. It is related to incidence and survival: if incidence and survival are both high, prevalence will be high, whereas if incidence and survival are both low, prevalence will be low.

The source of prevalence data is the 2012 ACD, which includes data from the National Death Index on deaths (from any cause) that occurred up to 31 December 2012, which were used to determine which people with cancer had died and when this occurred. Individuals who have been diagnosed with cancer and are still alive contribute to prevalence data.

At the end of 2010, there were 32,865 women aged 50–69 alive who had been diagnosed with breast cancer in the previous 5 years and 57,596 who had been diagnosed in the previous 10 years (Table 4.2).

Table 4.2: Prevalence of breast cancer, by age group, Australia, end of 2010

Age group	5-year prevalence	10-year prevalence
<20	2	3
20–24	15	16
25–29	153	165
30–34	542	639
35–39	1,563	2,000
40–44	3,285	4,527
45–49	6,042	8,875
50–54	7,944	12,955
55–59	7,710	14,065
60–64	9,095	16,124
65–69	8,116	14,452
70–74	5,907	11,617
75–79	4,186	8,377
80–84	3,273	6,432
85+	3,260	6,292
All ages	**61,093**	**106,539**
Ages 50–69	**32,865**	**57,596**

Note: Prevalence refers to the number of living people previously diagnosed with cancer, not the number of cancer cases.

Source: AIHW Australian Cancer Database 2012.

4.5 Mortality from breast cancer

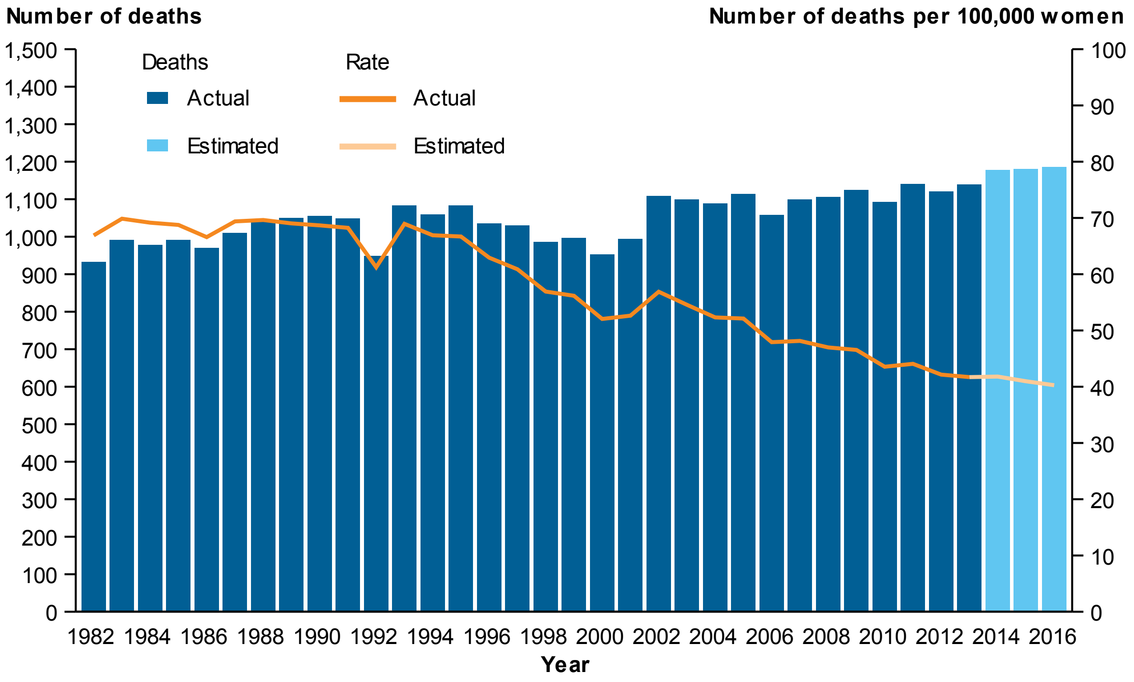
Similar to incidence data, Australia has high-quality and virtually complete mortality data. These data are maintained at the AIHW in the National Mortality Database. The latest national data available are for deaths in 2013, with estimates to 2016.

In 2016, it is projected that there will be 3,046 deaths from breast cancer in Australian women. This is equivalent to 25 deaths for every 100,000 women in the population.

Of the 3,046 deaths, it is projected that 1,187 will be in women aged 50–69, the target population of BreastScreen Australia, which is equivalent to 43 deaths for every 100,000 women in the population.

These rates have also been age-standardised for use in analyses of trends and differentials to 20 deaths per 100,000 women for women of all ages, and 40 deaths per 100,000 women for those aged 50–69.

Breast cancer deaths over time



Notes

1. Deaths from 1982 to 2012 were derived by year of death; deaths in 2013 were derived by year of registration of death. Deaths registered in 2011 and earlier are based on the final version of cause-of-death data; deaths registered in 2012 and 2013 are based on revised and preliminary versions, respectively, and are subject to further revision by the ABS.
2. Rates age-standardised to the Australian population as at 30 June 2001.
3. Estimated mortality data for 2014–2016 are based on 2004–2013 mortality data. Actual mortality data for 2014–2016 may differ from estimated data for 2014–2016 due to current and ongoing program or practice changes.

Source: AIHW National Mortality Database. Data for this figure are available in Table A8.1.

Figure 4.8: Mortality from breast cancer in women aged 50–69, 1982 to 2016

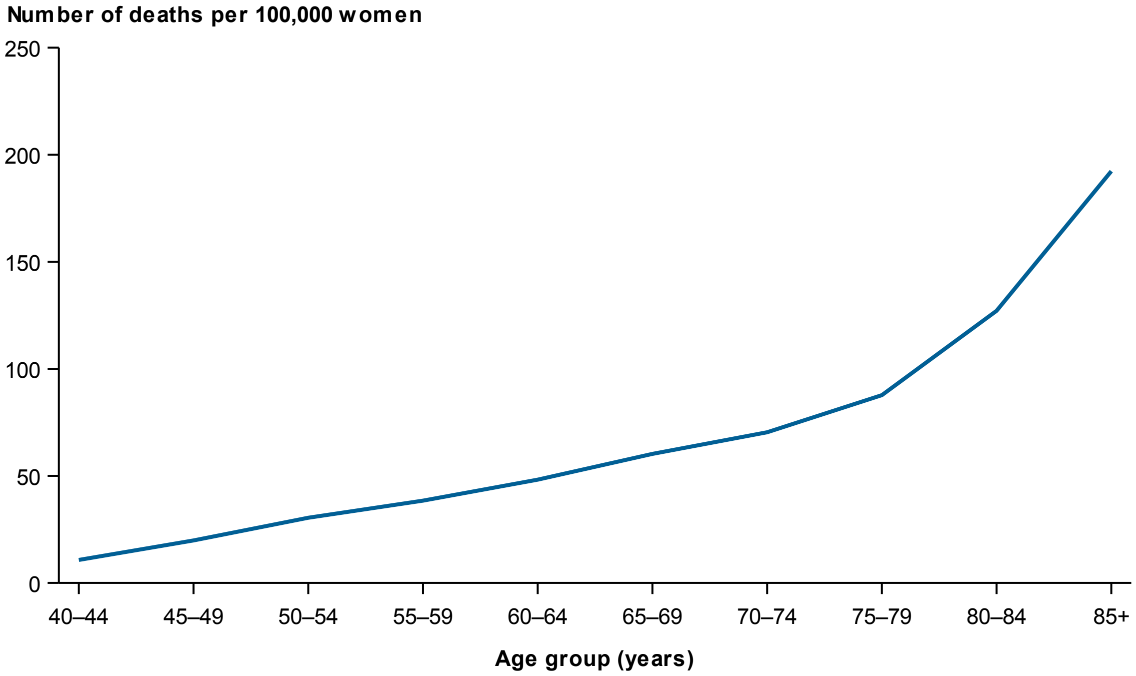
Breast cancer mortality rates have decreased over time, with this decrease evident after the introduction of BreastScreen Australia in 1991, from 68 deaths per 100,000 women in that year to 42 deaths per 100,000 women in 2013 for women aged 50–69 (Figure 4.8).

The fall in breast cancer 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 2009).

Breast cancer deaths across ages

Mortality from breast cancer increases with age; in 2013, this was from 11 deaths per 100,000 women for women aged 40–44, to 193 deaths per 100,000 women for women aged 85 and over (Figure 4.9).

In 2013, deaths due to breast cancer in women aged 50–69 comprised 39.8% of all breast cancer deaths in that year.



Notes

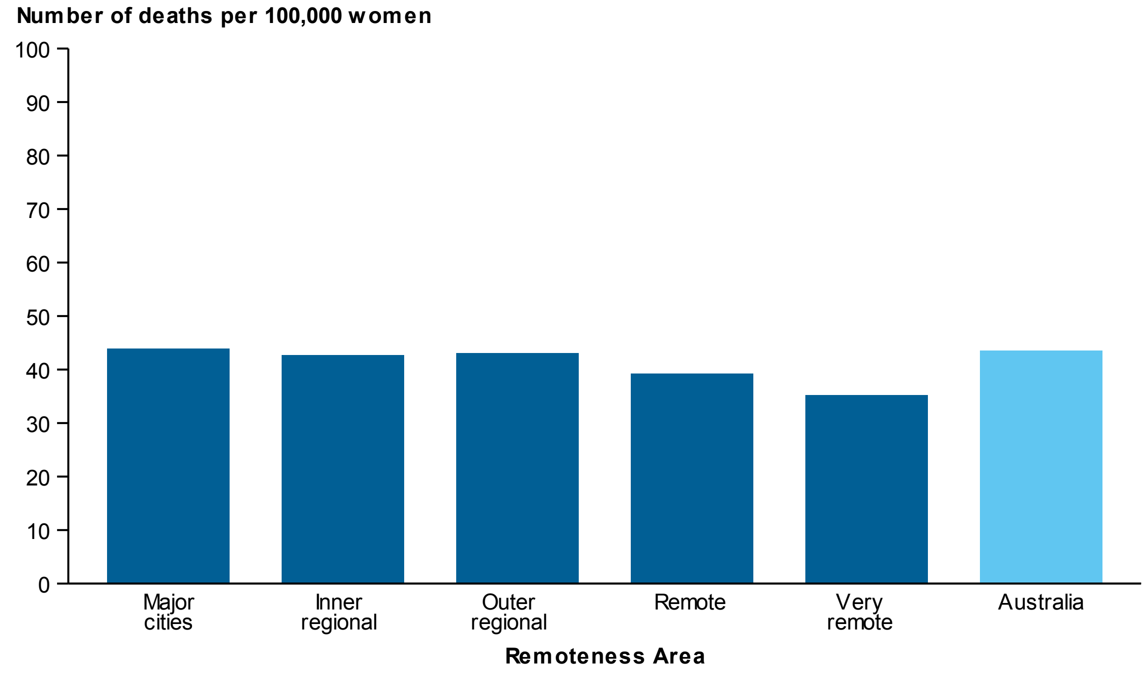
1. Deaths in 2013 were derived by year of registration of death; these are based on the preliminary version of cause-of-death data and are subject to further revision by the ABS.
2. Rates are the number of deaths from breast cancer per 100,000 women.

Source: AIHW National Mortality Database. Data for this figure are available in Table A8.2.

Figure 4.9: Mortality from breast cancer, by age, 2013

Breast cancer deaths across population groups

Mortality rates in 2009–2013 for women aged 50–69 were relatively similar across *Major cities, Inner regional* and *Outer regional* areas, at around 43–44 deaths per 100,000 women. However, mortality rates were lower in *Remote* and *Very remote* areas at 39 and 35 deaths per 100,000 women, respectively (Figure 4.10).



Notes

1. Deaths from 2009 to 2012 were derived by year of death; deaths in 2013 were derived by year of registration of death. Deaths registered in 2011 and earlier are based on the final version of cause-of-death data; deaths registered in 2012 and 2013 are based on revised and preliminary versions, respectively, and are subject to further revision by the ABS.
2. Rates age-standardised to the Australian population as at 30 June 2001.

Source: AIHW National Mortality Database. Data for this figure are available in Table A8.4.

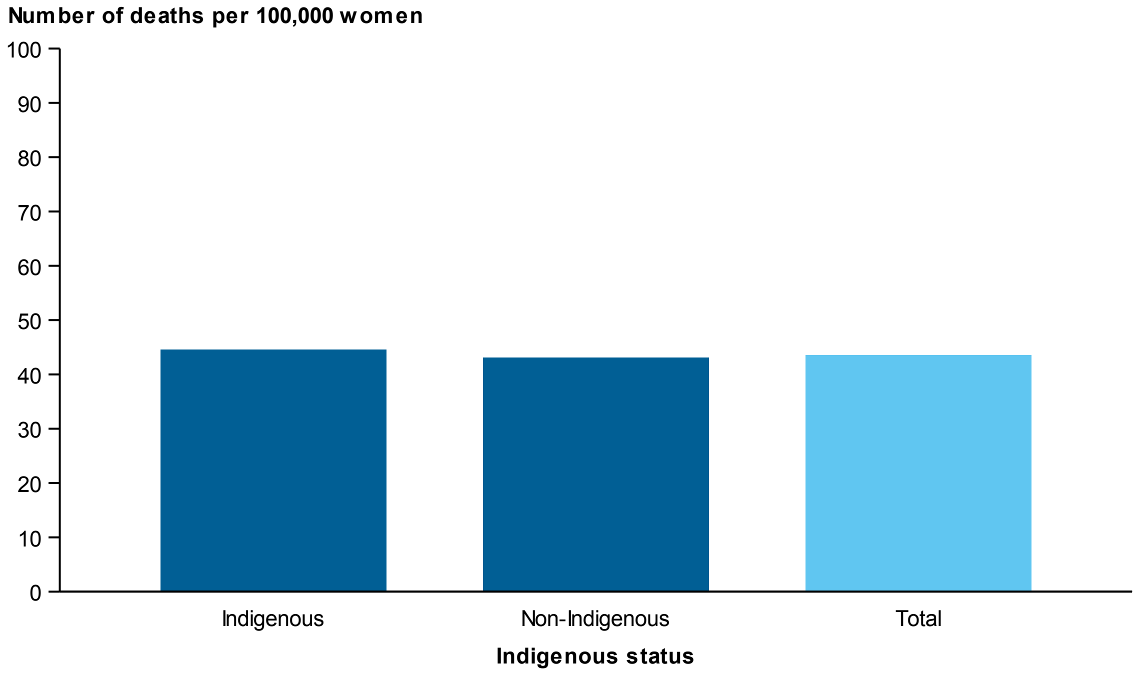
Figure 4.10: Mortality from breast cancer in women aged 50–69, by remoteness area, 2009–2013

Information on Indigenous status in the AIHW National Mortality Database is considered to be adequate for reporting for 5 jurisdictions—New South Wales, Queensland, Western Australia, South Australia and the Northern Territory. The majority (around 90%) of Aboriginal and Torres Strait Islander people reside in these 5 jurisdictions.

In 2009–2013, mortality from breast cancer in Aboriginal and Torres Strait Islander women aged 50–69 in New South Wales, Queensland, Western Australia, South Australia and the Northern Territory was similar to that of non-Indigenous women. The mortality rate was 45 deaths per 100,000 Indigenous women compared with 43 deaths per 100,000 non-Indigenous women (Figure 4.11).

This slightly higher mortality from breast cancer in Indigenous women is despite them having a lower incidence of breast cancer compared with non-Indigenous women.

Higher mortality from breast cancer is associated with a larger size of breast cancer at diagnosis and spread of the cancer to lymph nodes (AIHW & NBCC 2007), and it has previously been shown that Aboriginal and Torres Strait Islander women have, on average, larger breast cancers, and a higher proportion of breast cancers that are node positive (Roder et al. 2012). This then translates to lower survival from breast cancer for Aboriginal and Torres Strait Islander women (Roder et al. 2012).



Notes

1. Deaths from 2009 to 2012 were derived by year of death; deaths in 2013 were derived by year of registration of death. Deaths registered in 2011 and earlier are based on the final version of cause-of-death data; deaths registered in 2012 and 2013 are based on revised and preliminary versions, respectively, and are subject to further revision by the ABS.
2. Rates age-standardised to the Australian population as at 30 June 2001.
3. 'Total' includes women for whom Indigenous status was 'not stated'.

Source: AIHW National Mortality Database. Data for this figure are available in Table A8.5.

Figure 4.11: Mortality from breast cancer in women aged 50–69 (New South Wales, Queensland, Western Australia, South Australia and Northern Territory), by Indigenous status, 2009–2013

5 Monitoring other aspects of BreastScreen Australia

5.1 Expenditure on BreastScreen Australia

In Australia, there are 3 cancers for which screening is recommended—breast, cervical and bowel. Each cancer has a national screening program, with both Australian Government and state and territory government components.

The Australian Government provides funding to the states and territories for public health services through National Health Reform Payments (known as National Specific Purpose Payments before 1 July 2012) and National Partnership Payments. State and territory governments have full discretion over the application of National Health Reform Payments for public health funding, including the amount expended on BreastScreen Australia and the National Cervical Screening Program. The funding for the National Bowel Cancer Screening Program is through a specific National Partnership Payment.

Table 5.1 shows expenditure for the 3 national cancer screening programs (expenditure by Australian and state and territory governments combined), as well as total expenditure on cancer screening for the 2013–14 financial year.

In 2013–14, an estimated $235.2 million was spent on BreastScreen Australia.

Table 5.1: Government funding for cancer screening programs, 2013–14, $ million

Screening program	Expenditure 2013–14
BreastScreen Australia(a)	235.2
National Cervical Screening Program(b)	82.6
National Bowel Cancer Screening Program(c)	45.7
Total	**363.5**

(a) Excludes mammography for breast cancer screening that occurs outside BreastScreen Australia.

(b) Excludes the proportion of the costs associated with general practitioner, specialist and nurse attendances that would have been for Pap smears.

(c) Excludes Medicare Benefits Schedule flow-on costs as well as bowel screening that occurs outside the National Bowel Cancer Screening Program.

Note: These expenditure data only include recurrent expenditure; health infrastructure payments for cancer have been excluded, as well as any health workforce expenditure.

Sources: AIHW Health expenditure database; Medicare Australia Statistics.

Appendix A: Supporting data tables

A1 Participation

Table A1.1: Participation of women aged 50–69 in BreastScreen Australia, 1996–1997 to 2014–2015

Reporting period	Participants[(a)]	Population[(b)]	Crude rate[(c)]	AS rate[(d)]
1996–1997	845,143	1,637,010	51.6	51.7
1997–1998	927,735	1,691,811	54.8	54.9
1998–1999	976,182	1,744,201	56.0	56.0
1999–2000	1,012,184	1,798,652	56.3	56.3
2000–2001	1,064,246	1,856,598	57.3	57.3
2001–2002	1,102,642	1,915,145	57.6	57.6
2002–2003	1,118,823	1,974,192	56.7	56.6
2003–2004	1,145,008	2,033,831	56.3	56.2
2004–2005	1,188,955	2,094,183	56.8	56.7
2005–2006	1,242,210	2,155,430	57.6	57.5
2006–2007	1,262,334	2,217,714	56.9	56.7
2007–2008	1,273,317	2,282,672	55.8	55.5
2008–2009	1,319,771	2,349,050	56.2	55.9
2009–2010	1,352,112	2,416,676	55.9	55.6
2010–2011	1,373,731	2,487,062	55.2	54.8
2011–2012	1,407,065	2,557,284	55.0	54.6
2012–2013	1,439,748	2,624,718	54.9	54.4
2013–2014	1,456,822	2,687,296	54.2	53.7
2014–2015	1,493,222	2,738,328	54.5	54.0

(a) Participants are the number of women aged 50–69 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) Crude 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.

(d) 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 age-standardised to the Australian population at 30 June 2001.

Note: Data for 2014–2015 are preliminary; data for all other reporting periods are final.

Source: AIHW analysis of BreastScreen Australia data.

Table A1.2: BreastScreen Australia participation by age, 2013–2014 and 2014–2015

	40–44	45–49	50–54	55–59	60–64	65–69	70+
2013–2014							
Number	100,891	149,508	380,937	378,666	372,138	325,081	224,375
Crude rate	12.0	19.3	48.5	53.0	58.7	58.6	17.7
2014–2015							
Number	94,051	144,734	385,377	387,426	378,941	341,478	269,358
Crude rate	11.2	18.5	48.9	53.1	58.6	59.5	20.7

Notes

1. Crude rate is the number of women screened in each 2-year reporting period as a percentage of the ABS estimated resident population.
2. Data for 2014–2015 are preliminary.

Source: AIHW analysis of BreastScreen Australia data.

Table A1.3: BreastScreen Australia participation by state and territory, women aged 50–69 in 2013–2014 and 2014–2015, women aged 50–74 in 2014–2015

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
2013–2014	**50–69**								
Number	448,233	362,624	307,932	150,464	116,899	39,410	22,702	8,558	1,456,822
Crude rate	51.3	54.8	57.6	54.5	55.7	57.2	55.0	39.8	54.2
AS rate	50.7	54.5	57.2	54.1	54.9	56.4	54.4	39.8	53.7
2014–2015	**50–69**								
Number	461,438	365,883	312,062	155,339	126,061	40,709	23,489	8,241	1,493,222
Crude rate	51.9	54.1	57.3	55.0	59.3	58.3	56.0	37.6	54.5
AS rate	51.2	53.8	56.8	54.6	58.5	57.4	55.4	37.7	54.0
2014–2015	**50–74**								
Number	527,998	411,372	358,413	178,246	144,168	46,672	26,317	8,734	1,701,920
Crude rate	51.2	52.6	57.0	55.2	58.3	57.5	55.1	36.6	53.7
AS rate	50.6	52.2	56.6	54.8	57.6	56.7	54.4	35.8	53.2

Notes

1. Crude rate is the number of women screened in each 2-year reporting period as a percentage of the ABS estimated resident population; age-standardised (AS) rate is the number of women screened in each 2-year reporting period as a percentage of the ABS estimated resident population age-standardised to the Australian population at 30 June 2001.
2. 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, geographical size and structure, policies and other factors.
3. Data for 2014–2015 are preliminary.

Source: AIHW analysis of BreastScreen Australia data.

Table A1.4: BreastScreen Australia participation by remoteness area, women aged 50–69, 2013–2014

	Major cities	Inner regional	Outer regional	Remote	Very remote	Australia
Number	959,434	318,595	151,928	18,093	8,016	1,456,822
Crude rate	52.6	57.2	58.7	54.9	46.9	54.2
AS rate	52.2	56.4	58.1	54.8	46.9	53.7

Notes

1. Crude rate is the number of women screened in 2013–2014 as a percentage of the ABS estimated resident population; age-standardised (AS) rate is the number of women screened in 2013–2014 as a percentage of the ABS estimated resident population 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 Statistical Geography Standard (ASGS) for 2011. Not all postcodes can be assigned to a remoteness area, therefore categories do not add exactly to the total for Australia.

Source: AIHW analysis of BreastScreen Australia data.

Table A1.5: BreastScreen Australia participation by socioeconomic group, women aged 50–69, 2013–2014

	1 (lowest)	2	3	4	5 (highest)	Australia
Number	284,263	300,597	290,490	287,576	290,576	1,456,822
Crude rate	52.4	55.3	54.4	54.7	53.6	54.2
AS rate	51.6	54.6	54.0	54.3	53.3	53.7

Notes

1. Crude rate is the number of women screened in 2013–2014 as a percentage of the ABS estimated resident population; age-standardised (AS) rate is the number of women screened in 2013–2014 as a percentage of the ABS estimated resident population age-standardised to the Australian population at 30 June 2001.
2. Women were allocated to a socioeconomic group using their residential postcode according to the Socio-Economic Indexes for Areas (SEIFA) Index of Relative Socio-Economic Disadvantage for 2011. Caution is required when examining differences across socioeconomic groups (see Appendix D).

Source: AIHW analysis of BreastScreen Australia data.

Table A1.6: BreastScreen Australia participation by Indigenous status, women aged 50–69, 2013–2014

	Indigenous	Non-Indigenous	Australia[(a)]
Number	15,969	1,434,926	1,456,822
Crude rate	36.0	54.3	54.2
AS rate	36.5	53.8	53.7

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

Notes

1. Indigenous status is self-reported; therefore accuracy of Indigenous participation rates will be affected if women choose not to identify as Indigenous at the time of screening.
2. Crude rate is the number of women screened in 2013–2014 as a percentage of the ABS estimated resident population; age-standardised (AS) rate is the number of women screened in 2013–2014 as a percentage of the ABS estimated resident population age-standardised to the Australian population at 30 June 2001.

Source: AIHW analysis of BreastScreen Australia data.

Table A1.7: Number and age-standardised rate of women aged 50–69 participating in BreastScreen Australia, by Indigenous status, 1996–1997 to 2013–2014

Reporting period	Indigenous participants	Indigenous crude rate	Indigenous AS rate	Non-Indigenous participants	Non-Indigenous crude rate	Non-Indigenous AS rate
1996–1997	4,660	25.0	25.0	643,182	39.7	39.8
1997–1998	5,398	27.8	27.8	713,175	42.6	42.7
1998–1999	5,965	29.3	29.4	748,367	43.4	43.4
1999–2000	6,479	30.4	30.5	773,574	43.5	43.5
2000–2001	7,011	31.4	31.5	813,461	44.3	44.4
2001–2002	7,504	31.9	32.1	849,334	44.9	44.9
2002–2003	7,985	32.3	32.6	985,439	50.5	50.5
2003–2004	8,132	31.2	31.5	1,131,173	56.3	56.3
2004–2005	8,595	31.2	31.6	1,175,197	56.9	56.8
2005–2006	9,284	32.0	32.4	1,226,306	57.7	57.5
2006–2007	9,720	31.7	32.1	1,246,513	57.0	56.8
2007–2008	10,294	31.9	32.3	1,256,472	55.8	55.6
2008–2009	10,902	31.9	32.3	1,302,050	56.2	55.9
2009–2010	11,374	31.5	32.0	1,332,597	56.0	55.6
2010–2011	11,971	31.5	31.9	1,341,869	54.8	54.4
2011–2012	13,164	32.9	33.3	1,384,064	55.0	54.5
2012–2013	14,786	35.1	35.5	1,418,450	54.9	54.5
2013–2014	15,969	36.0	36.5	1,434,926	54.3	53.8

Notes

1. Indigenous status is self-reported; therefore accuracy of Indigenous participation rates will be affected if women choose not to identify as Indigenous at the time of screening.
2. Crude rate is the number of women screened as a percentage of the ABS estimated resident population; age-standardised (AS) rate is the number of women screened as a percentage of the ABS estimated resident population age-standardised to the Australian population at 30 June 2001.

Source: AIHW analysis of BreastScreen Australia data.

Table A1.8: BreastScreen Australia participation by main language spoken at home, women aged 50–69, 2013–2014

	English-speaking	Non-English-speaking	Australia[(a)]
Number	1,214,148	225,964	1,456,822
Crude rate	54.4	49.6	54.2
AS rate	53.9	49.3	53.7

(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.

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.
2. Crude rate is the number of women screened in 2013–2014 as a percentage of the ABS estimated resident population; age-standardised (AS) rate is the number of women screened in 2013–2014 as a percentage of the ABS estimated resident population age-standardised to the Australian population at 30 June 2001.

Source: AIHW analysis of BreastScreen Australia data.

A2 Rescreening

Table A2.1: Rescreening by screening round, women aged 50–67, 2002 to 2012

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
First screening round											
AS rate	61.5	60.4	62.7	59.3	49.9	55.9	59.9	59.4	58.3	59.6	56.4
Second screening round											
AS rate	70.2	69.3	70.5	66.8	58.5	62.6	71.2	69.8	67.8	67.8	65.5
Third and subsequent screening rounds											
AS rate	80.8	80.2	81.0	78.4	73.5	76.1	81.6	82.3	82.8	81.6	81.5

Note: Age-standardised (AS) rate is the number of women rescreened within 27 months as a percentage of women screened age-standardised to the population of women attending a BreastScreen Australia service in 2008.

Source: AIHW analysis of BreastScreen Australia data.

Table A2.2: Rescreening by age and screening round, women screened during 2012

	Age group (years)		
	40–49	50–67	70+
First screening round			
Crude rate	42.6	57.5	31.0
Second screening round			
Crude rate	61.4	67.0	42.6
Third and subsequent screening rounds			
Crude rate	79.0	81.7	56.6

Note: Crude rate is the number of women rescreened within 27 months as a percentage of women screened.

Source: AIHW analysis of BreastScreen Australia data.

Table A2.3: Rescreening by state and territory and screening round, women aged 50–67 screened during 2012

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
First screening round									
Crude rate	61.5	56.5	62.8	46.9	51.4	66.0	55.4	43.9	57.5
AS rate	59.4	54.0	63.0	45.6	48.9	66.5	53.4	41.0	56.4
Second screening round									
Crude rate	68.8	67.1	72.1	56.9	63.5	71.3	67.0	53.3	67.0
AS rate	67.6	62.9	72.0	54.9	60.5	71.3	63.8	51.3	65.5
Third and subsequent screening rounds									
Crude rate	83.2	79.7	86.0	74.2	79.4	84.1	81.1	66.6	81.7
AS rate	83.0	79.6	85.8	74.0	79.1	83.9	81.4	66.2	81.5

Note: Crude rate is the number of women rescreened within 27 months as a percentage of women screened; age-standardised (AS) rate is the number of women rescreened within 27 months as a percentage of women screened age-standardised to the population of women attending a BreastScreen Australia service in 2008.

Source: AIHW analysis of BreastScreen Australia data.

A3 Recall to assessment

Table A3.1: Recall to assessment, women aged 50–69, first and subsequent screening rounds, 2004 to 2014

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
First screening round											
Number	7,061	7,503	7,743	7,948	9,213	9,454	9,110	8,420	8,395	10,214	9,149
Crude rate	10.0	10.2	10.2	10.3	10.3	11.2	11.4	11.1	10.8	11.9	12.3
AS rate	9.8	9.8	9.9	9.9	9.9	10.7	11.1	10.7	10.8	11.6	12.2
Subsequent screening rounds											
Number	21,292	21,851	23,078	22,472	23,604	25,164	25,880	24,022	22,406	25,681	26,974
Crude rate	4.0	3.9	4.0	4.0	4.1	4.1	4.1	3.7	3.4	3.9	3.9
AS rate	4.0	3.9	4.0	4.0	4.1	4.2	4.2	3.8	3.4	3.9	4.0

Note: Crude rate is the number of women recalled for assessment as a percentage of women screened; age-standardised (AS) rate is the number of women recalled for assessment as a percentage of women screened age-standardised to the population of women attending a BreastScreen Australia service in 2008.

Source: AIHW analysis of BreastScreen Australia data.

Table A3.2: Recall to assessment by age, first and subsequent screening rounds, 2014

	Age group (years)						
	40–44	45–49	50–54	55–59	60–64	65–69	70+
First screening round							
Number	3,641	3,297	6,142	1,625	859	523	315
Crude rate	10.4	11.8	12.3	12.3	12.1	12.2	12.6
Subsequent screening rounds							
Number	742	2,500	6,430	6,875	7,029	6,640	5,524
Crude rate	5.1	5.4	4.4	3.7	3.7	3.9	4.3

Note: Crude rate is the number of women recalled for assessment as a percentage of women screened.

Source: AIHW analysis of BreastScreen Australia data.

Table A3.3: Recall to assessment by state and territory, women aged 50–69, first and subsequent screening rounds, 2014

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
First screening round									
Number	3,437	2,665	1,536	676	448	158	109	120	9,149
Crude rate	13.7	12.5	12.8	8.5	10.5	10.8	7.4	13.0	12.3
AS rate	13.6	12.4	12.9	7.7	10.4	11.4	5.9	12.5	12.2
Subsequent screening rounds									
Number	8,800	6,375	6,203	1,817	2,709	597	306	167	26,974
Crude rate	4.1	4.0	4.2	2.6	4.2	3.1	2.9	5.1	3.9
AS rate	4.2	4.1	4.2	2.6	4.3	3.1	2.9	5.2	4.0

Note: Crude rate is the number of women recalled for assessment as a percentage of women screened; age-standardised (AS) rate is the number of women recalled for assessment as a percentage of women screened age-standardised to the population of women attending a BreastScreen Australia service in 2008.

Source: AIHW analysis of BreastScreen Australia data.

A4 Invasive breast cancer detection

Table A4.1: All-size invasive breast cancer detection in women aged 50–69, first and subsequent screening rounds, 2004 to 2014

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
First screening round											
Number	465	475	442	489	585	549	581	537	631	715	633
Crude rate	66.1	64.5	58.4	63.6	67.2	65.2	72.7	70.7	80.8	83.1	84.9
AS rate	82.2	76.6	71.8	77.6	75.5	79.5	91.6	82.1	103.6	107.9	108.2
Subsequent screening rounds											
Number	2,313	2,371	2,589	2,437	2,834	2,859	2,879	2,862	3,011	3,279	3,490
Crude rate	43.5	42.5	44.4	43.0	48.7	46.8	45.9	44.4	45.4	49.4	50.8
AS rate	43.3	42.1	44.0	42.3	47.8	45.4	44.4	42.9	43.9	47.6	48.3

Note: Crude rate is the number of women with invasive breast cancer detected per 10,000 women screened; age-standardised (AS) rate is the number of women with invasive breast cancer detected per 10,000 women screened, age-standardised to the population of women attending a BreastScreen Australia service in 2008.

Source: AIHW analysis of BreastScreen Australia data.

Table A4.2: Small (≤15 mm) invasive breast cancer detection in women aged 50–69, all screening rounds, 2004 to 2014

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Number	1,763	1,797	1,898	1,798	2,103	2,132	2,082	2,077	2,122	2,317	2,379
Crude rate	29.3	28.4	28.8	27.9	31.4	30.7	29.4	28.8	28.6	30.9	31.2
AS rate	29.6	28.7	29.2	28.0	31.4	30.5	29.2	28.4	28.2	30.4	30.5

Note: Crude rate is the number of women with invasive breast cancer detected per 10,000 women screened; age-standardised (AS) rate is the number of women with invasive breast cancer detected per 10,000 women screened, age-standardised to the population of women attending a BreastScreen Australia service in 2008.

Source: AIHW analysis of BreastScreen Australia data.

Table A4.3: Proportion of small (≤15 mm) invasive breast cancers detected in women aged 50–69, all screening rounds, 2004 to 2014

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Proportion (%)	63.5	63.1	62.6	61.4	61.5	62.6	60.2	61.1	58.3	58.0	57.7

Note: Figures 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.

Table A4.4: All-size and small (≤15 mm) invasive breast cancer detection by age, all screening rounds, 2014

	Age group (years)						
	40–44	**45–49**	**50–54**	**55–59**	**60–64**	**65–69**	**70+**
All-size							
Number	130	298	826	897	1,159	1,241	1,317
Crude rate	26.2	40.1	42.5	45.1	59.5	71.3	99.5
Small							
Number	64	141	445	507	698	729	790
Crude rate	12.9	19.0	22.9	25.5	35.8	41.9	59.7

Note: Crude rate is the number of women with small invasive breast cancer detected per 10,000 women screened.

Source: AIHW analysis of BreastScreen Australia data.

Table A4.5: All-size and small (≤15 mm) invasive breast cancer detection by state and territory, women aged 50–69, first and subsequent screening rounds, 2014

	NSW	**Vic**	**Qld**	**WA**	**SA**	**Tas**	**ACT**	**NT**	**Australia**
All-size, first screening round									
Number	213	162	128	63	35	18	7	7	633
Crude rate	84.9	75.8	106.7	79.0	82.4	122.5	47.7	76.1	84.9
AS rate	106.6	108.1	125.0	92.1	91.4	154.2	39.2	64.7	108.2
All-size, subsequent screening rounds									
Number	1,046	815	794	346	332	87	51	19	3,490
Crude rate	49.0	51.7	53.3	49.0	51.8	45.5	48.2	57.9	50.8
AS rate	46.4	49.1	51.5	46.9	48.8	42.4	47.0	54.6	48.3
Small, all screening rounds									
Number	730	541	525	229	246	59	34	15	2,379
Crude rate	30.6	30.2	32.6	29.2	36.0	28.6	28.2	35.7	31.2
AS rate	29.8	29.7	32.0	28.7	34.5	27.5	27.9	36.5	30.5

Notes

1. Crude rate is the number of women with invasive breast cancer detected per 10,000 women screened; age-standardised (AS) rate is the number of women with invasive breast cancer detected per 10,000 women screened, age-standardised to the population of women attending a BreastScreen Australia service in 2008.
2. State and territory differences need to be taken into consideration when interpreting cancer detection results.
3. A small number of women may be screened in one jurisdiction but have their cancer detected in another.

Source: AIHW analysis of BreastScreen Australia data.

A5 Ductal carcinoma in situ detection

Table A5.1: DCIS detection by year, women aged 50–69, first and subsequent screening rounds, 2004 to 2014

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
First screening round											
Number	123	104	130	144	142	152	142	141	153	207	168
Crude rate	17.5	14.1	17.2	18.7	15.9	18.0	17.8	18.6	19.6	24.1	22.5
AS rate	20.4	14.5	18.8	21.3	15.6	19.6	17.9	20.9	22.8	29.2	23.7
Subsequent screening rounds											
Number	565	618	571	633	678	723	734	740	750	876	1,027
Crude rate	10.6	11.1	9.8	11.2	11.7	11.8	11.7	11.5	11.3	13.2	14.9
AS rate	10.7	11.0	9.7	11.1	11.5	11.7	11.5	11.2	11.0	12.8	14.6

Note: Crude rate is the number of women with DCIS detected per 10,000 women screened; age-standardised (AS) rate is the number of women with DCIS detected per 10,000 women screened, age-standardised to the population of women attending a BreastScreen Australia service in 2008.

Source: AIHW analysis of BreastScreen Australia data.

Table A5.2: DCIS detection by age, all screening rounds, 2014

	Age group (years)			
	40–49	50–59	60–69	70+
Number	183	574	621	243
Crude rate	14.8	14.6	16.8	18.4

Note: Crude rate is the number of women with DCIS detected per 10,000 women screened.

Source: AIHW analysis of BreastScreen Australia data.

Table A5.3: DCIS detection by state and territory, women aged 50–69, all screening rounds, 2014

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
Number	350	293	285	117	116	17	13	4	1,195
Crude rate	14.7	16.4	17.7	14.9	17.0	8.3	10.8	9.5	15.7
AS rate	14.5	16.4	17.6	14.8	16.7	7.9	10.6	9.9	15.6

Notes

1. Crude rate is the number of women with DCIS detected per 10,000 women screened; age-standardised (AS) rate is 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 need to be taken into consideration when interpreting DCIS detection results.
3. A small number of women may be screened in one jurisdiction but have their DCIS detected in another.

Source: AIHW analysis of BreastScreen Australia data.

A6a Interval cancers

Box A1: Different policies across state and territory BreastScreen programs affects interval cancer detection rates

Please note that differences in state and territory policies for managing women with symptoms may affect interval cancer rates.

For example, in some jurisdictions, women with a negative screening mammogram but who have symptoms are referred for diagnostic follow-up outside BreastScreen Australia, rather than being recalled for assessment within BreastScreen Australia. Any cancers found in these women will be counted as interval cancers, leading to a higher apparent interval cancer rate. Conversely, states and territories that do recall women to assessment if they have symptoms (even in the face of a negative screening mammogram) may have lower apparent interval cancer rates. This affects the comparability of this indicator between jurisdictions.

Table A6.1: Interval cancer rate for women aged 50–69, screened in index years 2009, 2010 and 2011, by state and territory, first and subsequent screening rounds, 0–12 months follow-up

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
First screening round									
AS rate	6.9	4.6	6.1	9.7	10.4	10.7	1.6	0.0	6.6
95% CI	4.8–9.6	2.5–7.3	3.6–9.4	4.4–17.3	2.9–21.6	4.3–21.9	0.0–8.8	0.0–0.0	5.3–8.0
Subsequent screening rounds									
AS rate	6.6	4.9	6.1	6.8	6.1	6.3	6.2	6.2	6.1
95% CI	6.0–7.3	4.2–5.6	5.3–6.9	5.7–8.1	5.0–7.4	4.3–8.8	3.6–9.8	2.3–13.6	5.7–6.4

Note: Age-standardised (AS) rate is the number of interval cancers detected per 10,000 women-years, age-standardised to the population of women attending a BreastScreen Australia service in 2008; 95% CI are 95% confidence intervals.

Source: AIHW analysis of BreastScreen Australia data.

Table A6.2: Interval cancer rate for women aged 50–69, screened in index years 2009, 2010 and 2011, by state and territory, first and subsequent screening rounds, 13–24 months follow-up

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
First screening round									
AS rate	9.5	8.6	11.7	8.9	4.2	15.9	43.7	5.5	10.1
95% CI	7.0–12.7	5.9–11.9	7.7–16.8	4.4–15.0	2.1–7.6	5.8–33.3	9.6–104.3	0.7–19.9	8.5–12.0
Subsequent screening rounds									
AS rate	10.8	13.6	11.7	11.4	13.7	14.3	13.7	12.6	12.1
95% CI	9.9–11.7	12.5–14.8	10.7–12.8	9.8–13.0	11.8–15.7	11.1–18.2	9.4–19.3	6.5–22.1	11.6–12.7

Note: Age-standardised (AS) rate is the number of interval cancers detected per 10,000 women-years, age-standardised to the population of women attending a BreastScreen Australia service in 2008; 95% CI are 95% confidence intervals.

Source: AIHW analysis of BreastScreen Australia data.

Table A6.3: Interval cancers for women screened in index years 2009, 2010 and 2011, by age, all screening rounds, 0–12 months and 13–24 months follow-up

		Age group (years)			
Time since screen (months)		**40–49**	**50–59**	**60–69**	**70+**
0–12	Number	282	667	601	160
	Crude rate	8.2	5.9	6.4	8.2
13–24	Number	379	1,184	1,167	290
	Crude rate	11.7	11.1	13.2	15.8

Note: Crude rate is the number of interval cancers detected per 10,000 women-years.

Source: AIHW analysis of BreastScreen Australia data.

Table A6.4: Interval cancer rate for women aged 50–69, screened in index years 2009, 2010 and 2011, by state and territory, first and subsequent screening rounds, 0–24 months follow-up

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
First screening round									
AS rate	8.2	6.6	8.8	9.3	7.5	13.1	21.3	2.7	8.3
95% CI	6.5–10.2	4.9–8.6	6.5–11.7	5.7–13.9	3.3–13.1	6.9–22.3	5.1–49.0	0.3–9.9	7.3–9.5
Subsequent screening rounds									
AS rate	8.6	9.2	8.9	9.0	9.7	10.0	9.7	9.4	9.0
95% CI	8.1–9.2	8.6–9.9	8.2–9.6	8.0–10.0	8.6–10.9	8.1–12.2	7.2–12.8	5.6–14.9	8.7–9.3

Note: Age-standardised (AS) rate is the number of interval cancers detected per 10,000 women-years, age-standardised to the population of women attending a BreastScreen Australia service in 2008; 95% CI are 95% confidence intervals.

Source: AIHW analysis of BreastScreen Australia data.

Box A2: Confidence intervals

Confidence intervals are only presented in this report for interval cancer rates and survival estimates. This is because, for both of these measures, it has been deemed important to show the degree of error due to rare events in small populations, to avoid potential misinterpretation of data and/or to present data consistent with other publications.

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 2 rates is definitely due to chance, it can only be stated 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.

A6b Program sensitivity

Table A6.5: Program sensitivity for women aged 50–69, screened in index years 2009, 2010 and 2011, by state and territory, first and subsequent screening rounds, 0–12 months follow-up

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
First screening round									
AS rate	92.8	93.9	93.5	89.7	86.3	90.9	98.5	100.0	92.8
Subsequent screening rounds									
AS rates	86.8	89.8	88.7	85.9	87.3	88.0	92.5	89.3	88.0

Note: Age-standardised (AS) rate is the number of screen-detected cancers as a percentage of all cancers (screen-detected and interval cancers), age-standardised to the population of women attending a BreastScreen Australia service in 2008.

Source: AIHW analysis of BreastScreen Australia data.

Table A6.6: Program sensitivity for women aged 50–69, screened in index years 2009, 2010 and 2011, by state and territory, first and subsequent screening rounds, 0–24 months follow-up

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
First screening round									
AS rates	84.7	84.6	89.5	90.6	80.6	85.6	84.3	94.4	85.7
Subsequent screening rounds									
AS rates	72.7	69.9	80.7	80.8	69.6	74.0	79.1	73.7	74.5

Note: Age-standardised (AS) rate is the number of screen-detected cancers as a percentage of all cancers (screen-detected and interval cancers), age-standardised to the population of women attending a BreastScreen Australia service in 2008.

Source: AIHW analysis of BreastScreen Australia data.

Table A6.7: Program sensitivity for women screened in index years 2009, 2010 and 2011, all screening rounds, by age, 0–12 months and 0–24 months follow-up

		Age group (years)			
Time since screen (months)		**40–49**	**50–59**	**60–69**	**70+**
0–12	Crude rate	79.5	87.3	90.8	92.4
0–24	Crude rate	67.6	74.0	78.9	83.3

Note: Crude rate is the number of interval cancers detected per 10,000 women-years.

Source: AIHW analysis of BreastScreen Australia data.

A7a Invasive breast cancer incidence

Table A7.1: Incidence of invasive breast cancer, 1982 to 2016

	New cases		AS rate	
Year of diagnosis	**50–69**	**All ages**	**50–69**	**All ages**
1982	2,448	5,311	174.8	81.1
1983	2,342	5,371	167.3	80.7
1984	2,530	5,708	179.3	83.5
1985	2,588	5,917	180.6	84.4
1986	2,640	6,085	184.5	85.1
1987	2,891	6,694	197.5	91.2
1988	2,880	6,726	194.2	89.5
1989	3,124	7,177	208.3	93.6
1990	3,153	7,419	209.2	94.9
1991	3,500	8,032	230.0	100.3
1992	3,401	8,014	222.3	98.1
1993	3,869	8,773	250.8	105.3
1994	4,470	9,749	283.7	114.5
1995	4,551	10,067	286.7	116.2
1996	4,378	9,744	270.0	109.7
1997	4,678	10,207	279.3	112.2
1998	5,003	10,737	290.1	115.3
1999	5,122	10,663	288.6	111.9
2000	5,457	11,395	298.4	116.8
2001	5,802	11,831	307.5	118.4
2002	5,984	12,090	307.2	118.3
2003	5,802	11,870	288.4	113.5
2004	6,044	12,204	291.9	114.5
2005	6,044	12,258	283.4	112.7
2006	6,401	12,679	290.9	114.1
2007	6,318	12,631	278.3	110.9
2008	6,958	13,619	298.0	117.0
2009	7,026	13,764	291.2	115.4
2010	7,457	14,366	300.3	117.8
2011	7,409	14,386	289.4	115.4
2012	7,767	15,050	295.3	118.3
2013	7,874	14,936	290.5	114.5
2014	8,053	15,266	290.2	114.5
2015	8,215	15,595	290.0	114.5
2016	8,369	15,934	289.8	114.5

Notes

1. 'Age-standardised (AS) rate' is the number of new cases of cervical cancer per 100,000 women, age-standardised to the Australian population at 30 June 2001.
2. Estimated incidence data for 2013–2016 are based on 2002–2011 incidence data. Actual incidence data for 2013–2016 may differ from estimated data for 2013–2016 due to current and ongoing program or practice changes.

Source: AIHW Australian Cancer Database 2011 and 2012.

Table A7.2: Incidence of invasive breast cancer, by age, 2012

	Age group (years)									
	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85+
New cases	1,021	1,625	1,928	1,817	2,098	1,924	1,223	968	779	870
Crude rate	123.7	210.2	250.5	263.2	340.7	373.2	318.1	316.6	307.7	318.3

Note: Crude rate is the number of new cases of breast cancer per 100,000 women.

Source: AIHW Australian Cancer Database 2012.

Table A7.3: Incidence of invasive breast cancer, by age and histology group, 2010

Type of breast cancer	40–49	50–59	60–69	70+
Invasive ductal carcinoma	2,080	2,977	2,968	2,529
Invasive lobular carcinoma	249	367	519	484
Medullar carcinoma and atypical medullary carcinoma	11	12	8	5
Tubular carcinoma and invasive cribriform carcinoma	25	74	77	30
Mucinous carcinoma	27	42	48	161
Invasive papillary carcinoma	18	32	73	65
Inflammatory carcinoma	4	4	9	10
Mesenchymal	1	3	4	3
Other - specified	34	52	62	108
Unspecified	36	68	58	266

Source: AIHW Australian Cancer Database 2012.

Table A7.4: Incidence of invasive breast cancer by state and territory, women aged 50–69, 2006–2010

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
New cases	11,317	8,215	6,918	3,254	2,819	830	602	205	34,160
AS rate	294.2	285.5	302.0	281.0	297.0	268.8	330.8	232.7	291.9

Note: Age-standardised (AS) rate is the number of new cases of breast cancers per 100,000 women age-standardised to the Australian population at 30 June 2001.

Source: AIHW Australian Cancer Database 2012.

Table A7.5: Incidence of invasive breast cancer by remoteness area, women aged 50–69, 2006–2010

	Major cities	Inner regional	Outer regional	Remote	Very remote	Australia
New cases	22,906	7,460	3,203	417	138	34,160
AS rate	294.7	291.6	277.3	277.7	217.5	291.9

Notes

1. Age-standardised (AS) rate is the number of new cases of breast cancers per 100,000 women age-standardised to the Australian population at 30 June 2001.
2. Women were allocated to a remoteness areas using residential statistical local area (SLA) according to the 2006 Australian Standard Geographical Classifications. Not all women can be assigned to a remoteness area, therefore categories do not add exactly to the total for Australia.

Source: AIHW Australian Cancer Database 2012.

Table A7.6: Incidence of invasive breast cancer by socioeconomic group, women aged 50–69, 2006–2010

	1(lowest)	2	3	4	5 (highest)	Australia
New cases	6,596	7,071	6,332	6,556	7,565	34,160
AS rate	278.1	287.3	281.1	296.4	314.8	291.9

Notes

1. Age-standardised (AS) rate is the number of new cases of breast cancers per 100,000 women age-standardised to the Australian population at 30 June 2001.
2. Women were allocated to a socioeconomic group using residential SLA according to Australian Bureau of Statistic Socio-Economic Indexes for Areas (SEIFA) Index of Relative Socio-Economic Disadvantage for 2006. Not all women can be assigned to a socioeconomic group, therefore categories do not add exactly to the total for Australia.

Source: AIHW Australian Cancer Database 2012.

Table A7.7: Incidence of breast cancer (New South Wales, Queensland, Western Australia and the Northern Territory) by Indigenous status, women aged 50–69, 2006–2010

	Indigenous[(a)]	Non-Indigenous[(a)]	Total[(a)]
New cases	286	20,173	21,694
Crude rate	207.3	281.3	296.7
AS rate	213.8	278.3	293.9

(a) ‘Indigenous’, ‘Non-Indigenous’ and ‘Total’ 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. Total includes women in the ‘not stated’ category.

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 rate is the number of new cases of breast cancer per 100,000 women; age-standardised (AS) rates are the number of breast cancers detected per 100,000 women directly age-standardised to the Australian population at 30 June 2001.

Source: AIHW Australian Cancer Database 2012.

A7b Ductal carcinoma in situ incidence

Table A7.8: Incidence of DCIS, 1996 to 2010

	Number of new cases of DCIS		AS rate	
Year of diagnosis	**50–69**	**All ages**	**50–69**	**All ages**
1996	501	911	31.1	10.5
1997	588	1,044	35.2	11.7
1998	661	1,167	38.3	12.7
1999	701	1,182	39.6	12.6
2000	784	1,322	42.9	13.8
2001	894	1,442	47.4	14.6
2002	838	1,383	43.1	13.7
2003	872	1,442	43.5	13.9
2004	930	1,536	45.1	14.5
2005	971	1,567	45.6	14.5
2006	962	1,515	43.9	13.7
2007	1,000	1,619	44.3	14.3
2008	1,110	1,731	47.6	14.9
2009	1,152	1,806	48.0	15.2
2010	1,192	1,862	48.2	15.3

Note: Age-standardised (AS) rate is the number of new cases of DCIS per 100,000 women age-standardised to the Australian population at 30 June 2001.

Source: AIHW Australian Cancer Database 2012.

Table A7.9: Incidence of DCIS, by age, 2010

	Age group (years)			
	40–49	**50–59**	**60–69**	**70+**
New cases of DCIS	311	605	587	282
Crude rate	20.0	43.3	55.7	24.3

Note: Crude rate is the number of new cases of DCIS per 100,000 women.

Source: AIHW Australian Cancer Database 2012.

Survival after a diagnosis of breast cancer

Table A7.10: Five-year relative survival from breast cancer, by age group, 2008–2012

Age group	5-year relative survival (%)	95% confidence interval
<20	n.p.	n.p.
20–24	86.3	73.3–93.3
25–29	85.8	81.1–89.4
30–34	86.3	83.9–88.4
35–39	89.6	88.3–90.8
40–44	91.7	90.9–92.5
45–49	92.7	92.0–93.3
50–54	92.2	91.5–92.8
55–59	91.9	91.2–92.5
60–64	92.4	91.7–93.0
65–69	92.8	92.0–93.6
70–74	89.2	88.0–90.4
75–79	83.8	82.2–85.4
80–84	79.3	77.0–81.5
85+	70.9	67.4–74.4
All ages	89.8	89.5–90.1
Ages 50–69 years	92.3	91.9–92.6

n.p. not published

Note: Relative survival was calculated with the period method, using the period 2008–2012 (Brenner & Gefeller 1996). Note that this period does not contain incidence data for 2011–2012 for NSW and ACT.

Source: AIHW Australian Cancer Database 2012.

Table A7.11: Trend in 5-year relative survival from breast cancer in women aged 50–69, 1983–1987 to 2008–2012

Year	5-year relative survival (%)	95% confidence interval
1983–1987	72.2	70.3–74.1
1988–1992	81.0	79.4–82.5
1993–1997	86.5	85.3–87.7
1998–2002	89.6	88.7–90.6
2003–2007	91.5	90.6–92.3
2008–2012	92.2	91.5–93.0

Note: Relative survival was calculated with the period method, using the period 2008–2012 (Brenner & Gefeller 1996). Note that this period does not contain incidence data for 2011–2012 for NSW and ACT.

Source: AIHW Australian Cancer Database 2012.

Table A7.12: Relative survival at diagnosis and 5-year conditional survival from breast cancer in women aged 50–69, 2008–2012

	Relative survival		Conditional survival		
Years after diagnosis	Relative survival (%)	95% confidence interval	Years already survived	5-year conditional relative survival (%)	95% confidence interval
1	98.7	98.6–98.9	. .	. .	. .
2	97.2	96.9–97.4	. .	. .	. .
3	95.4	95.1–95.6	. .	. .	. .
4	93.8	93.5–94.1	. .	. .	. .
5	92.3	91.9–92.6	0	92.3	91.9–92.6
6	91.1	90.7–91.4	1	92.2	91.9–92.6
7	89.9	89.5–90.3	2	92.6	92.2–92.9
8	88.9	88.5–89.3	3	93.2	92.9–93.6
9	87.9	87.5–88.4	4	93.8	93.4–94.1
10	87.3	86.8–87.7	5	94.6	94.2–94.9
11	86.4	85.9–86.9	6	94.8	94.5–95.2
12	85.7	85.1–86.2	7	95.3	94.8–95.7
13	84.6	84.1–85.2	8	95.2	94.7–95.6
14	83.9	83.3–84.5	9	95.4	94.9–95.8
15	83.3	82.6–83.9	10	95.4	94.9–95.9
16	82.4	81.7–83.1	11	95.4	94.8–95.9
17	81.5	80.7–82.2	12	95.1	94.5–95.7
18	80.6	79.9–81.4	13	95.3	94.6–95.9
19	79.8	78.9–80.6	14	95.1	94.4–95.8
20	79.0	78.1–79.9	15	94.9	94.0–95.7

Note: Relative survival was calculated with the period method, using the period 2008–2012 (Brenner & Gefeller 1996). Note that this period does not contain incidence data for 2011–2012 for NSW and ACT.

Source: AIHW Australian Cancer Database 2012.

A8 Mortality

Table A8.1: Mortality from breast cancer, 1982 to 2016

	Number of deaths		AS rate	
Year of death	**50–69**	**All ages**	**50–69**	**All ages**
1982	933	1,987	66.9	30.4
1983	992	2,040	69.9	30.2
1984	978	2,166	69.2	31.6
1985	991	2,196	68.8	31.2
1986	970	2,165	66.6	29.9
1987	1,010	2,293	69.4	31.1
1988	1,043	2,361	69.6	31.2
1989	1,050	2,449	69.0	31.6
1990	1,056	2,422	68.7	30.6
1991	1,049	2,526	68.2	31.3
1992	949	2,429	61.2	29.4
1993	1,083	2,611	69.0	30.8
1994	1,059	2,669	66.9	30.9
1995	1,083	2,635	66.7	29.7
1996	1,035	2,620	62.9	28.8
1997	1,030	2,604	60.9	27.9
1998	986	2,541	56.9	26.5
1999	997	2,512	56.2	25.6
2000	953	2,521	52.0	24.9
2001	994	2,594	52.6	25.0
2002	1,108	2,681	56.9	25.2
2003	1,099	2,710	54.6	24.9
2004	1,088	2,665	52.3	24.0
2005	1,114	2,710	52.1	23.8
2006	1,058	2,624	47.9	22.4
2007	1,099	2,722	48.1	22.6
2008	1,106	2,746	47.0	22.3
2009	1,125	2,785	46.5	22.2
2010	1,093	2,837	43.6	21.7
2011	1,140	2,901	44.1	21.8
2012	1,121	2,823	42.2	20.8
2013	1,139	2,862	41.7	20.4
2014	1,178	2,966	41.8	20.7
2015	1,181	3,001	41.0	20.4
2016	1,187	3,046	40.3	20.2

Notes

1. Deaths from 1982 to 2012 were derived by year of death; deaths in 2013 were derived by year of registration of death. Deaths registered in 2011 and earlier are based on the final version of cause-of-death data; deaths registered in 2012 and 2013 are based on revised and preliminary versions, respectively, and are subject to further revision by the ABS.
2. Age-standardised (AS) rate is number of deaths from breast cancer per 100,000 women age-standardised to the Australian population at 30 June 2001.
3. Estimated mortality data for 2014–2016 are based on 2004–2013 mortality data. Actual mortality data for 2014–2016 may differ from estimated data for 2014–2016 due to current and ongoing program or practice changes.

Source: AIHW National Mortality Database.

Table A8.2: Mortality from breast cancer, by age, 2013

	Age group (years)									
	40–44	**45–49**	**50–54**	**55–59**	**60–64**	**65–69**	**70–74**	**75–79**	**80–84**	**85+**
Deaths	90	153	238	271	302	328	280	274	321	544
Crude rate	10.7	19.8	30.4	38.4	48.2	60.2	70.2	87.6	127.0	192.8

Notes

1. Deaths in 2013 were derived by year of registration of death; these are based on the preliminary version of cause-of-death data and are subject to further revision by the ABS.
2. Crude rate is the number of deaths from breast cancer per 100,000 women.

Source: AIHW National Mortality Database.

Table A8.3: Mortality from breast cancer by state and territory, 2009–2013

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
50–69 years									
Deaths	1,824	1,379	1,113	539	484	160	82	37	5,618
AS rate	43.2	43.5	43.5	41.6	47.2	47.2	41.6	39.7	43.5
All ages									
Deaths	4,785	3,651	2,582	1,308	1,208	379	220	75	14,208
AS rate	21.6	21.7	20.5	20.5	21.9	22.3	24.3	22.2	21.4

Notes

1. Deaths from 2009 to 2012 were derived by year of death; deaths in 2013 were derived by year of registration of death. Deaths registered in 2011 and earlier are based on the final version of cause-of-death data; deaths registered in 2012 and 2013 are based on revised and preliminary versions, respectively, and are subject to further revision by the ABS.
2. Age-standardised (AS) rate is the number of deaths from breast cancer per 100,000 women, age-standardised to the Australian population at 30 June 2001.

Source: AIHW National Mortality Database.

Table A8.4: Mortality from breast cancer, by remoteness area, 2009–2013

	Major cities	Inner regional	Outer regional	Remote	Very remote	Australia
50–69 years						
Deaths	3,789	1,176	546	63	26	5,618
AS rate	43.9	42.7	43.1	39.3	35.2	43.5
All ages						
Deaths	9,662	3,014	1,310	128	54	14,208
AS rate	21.4	21.4	21.2	18.2	17.8	21.4

Notes

1. For 2009–2010, women were allocated to a remoteness area using residential statistical local area (SLA) according to the Australian Standard Geography Classification (ASGC). For 2011–2013, women were allocated to a remoteness area using residential Statistical Area level 2 (SA2) according to the Australian Statistical Geography Standard (ASGS). Not all women can be assigned to a remoteness area, therefore categories do not add exactly to the total for Australia.
2. Deaths from 2009 to 2012 were derived by year of death; deaths in 2013 were derived by year of registration of death. Deaths registered in 2011 and earlier are based on the final version of cause-of-death data; deaths registered in 2012 and 2013 are based on revised and preliminary versions, respectively, and are subject to further revision by the ABS.
3. Age-standardised (AS) rate is the number of deaths from breast cancer per 100,000 women age-standardised to the Australian population at 30 June 2001.

Source: AIHW National Mortality Database.

Table A8.5: 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, 2009–2013

	Indigenous[(a)]	Non-Indigenous[(a)]	Total[(a)]
50–69 years			
Deaths	73	3,888	3,997
Crude rate	42.2	44.1	44.5
AS rate	44.5	43.1	43.5
All ages			
Deaths	143	9,725	9,958
Crude rate	9.6	25.3	24.9
AS rate	21.9	21.0	21.2

(a) 'Indigenous', 'Non-Indigenous' and 'Total' 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. Total includes women in the 'not stated' category.

Notes

1. Crude rate is the number of deaths from breast cancer per 100,000 women; age-standardised (AS) rate is the number of deaths from breast cancer per 100,000 women directly age-standardised to the Australian population at 30 June 2001.
2. Deaths from 2009 to 2012 were derived by year of death; deaths in 2013 were derived by year of registration of death. Deaths registered in 2011 and earlier are based on the final version of cause-of-death data; deaths registered in 2012 and 2013 are based on revised and preliminary versions, respectively, and are subject to further revision by the ABS.

Source: AIHW National Mortality Database.

Appendix B: BreastScreen Australia information

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.

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.

Box B1: Objectives of BreastScreen Australia

The objectives of the BreastScreen Australia program are to:

1. Reduce the mortality and morbidity attributable to breast cancer.
2. Maximise early detection of breast cancer in the target population.
3. Maximise the proportion of women in the target population who are screened every two years.
4. Provide high quality services that are equitable, acceptable and appropriate to the needs of the population and equally accessible to all women in the target age group.
5. Provide screening and assessment services in accredited Screening and Assessment Services as part of the BreastScreen Australia program.
6. Provide high standards of program management, service delivery, monitoring, evaluation and accountability.

Source: BreastScreen Australia 2014.

Box B2: All BreastScreen services now use digital mammography

Digital mammography is a technique for recording breast X-ray images in computer code instead of on X-ray film, as with conventional film mammography. Digital mammography is as accurate as film mammography in screening asymptomatic women for breast cancer.

Advantages of digital mammography include increased efficiencies, improved working environment for radiographers, less physical storage requirements, and reduced need for radiologists to be on site to read mammograms.

In 2009, it was announced that $120 million would be provided over 4 years to ensure BreastScreen Australia would be fully digital by June 2013.

All BreastScreen services now use digital mammography.

Box B3: National policy features of BreastScreen Australia

Services accredited under BreastScreen Australia are expected to operate according to the national accreditation standards of BreastScreen Australia along with the national policy features and protocols detailed in this box.

1: Access and participation

Appropriate levels of access and participation in the target and eligible populations:

a. women are selected for screening on the basis of age alone. That is, women 40 years of age and above are eligible to participate and recruitment strategies are targeted at women aged 50–74 years
b. the screening interval is every two years
c. screening is provided at minimal or no cost to the women, and free of charge to eligible women who would not attend if there were a charge
d. patterns of participation are representative of the socioeconomic, ethnic and cultural profiles of the target population.

2: Cancer detection

Breast cancer detection is maximised in the target population and harm is minimised:

a. screening employs mammography as the primary screening method
b. all women are screened with two view mammography. Reasons for any variation from this policy are documented
c. all mammograms are taken by a mammographic technologist or radiographer appropriately trained in screening mammography
d. all mammographic images are read and reported independently, in a blind relationship, by two or more readers, at least one of whom shall be a radiologist
e. all mammography results are combined into a single recommendation, which indicates whether or not further assessment for the presence of breast cancer is required.

3: Assessment

Assessment and diagnosis of breast cancer is appropriate, safe and effective:

a. a comprehensive approach is employed in the assessment of breast abnormalities
b. a multidisciplinary team is involved in the assessment of women recalled from screening
c. the pre-operative diagnosis of breast cancer is maximised, and recommendations for surgery for benign lesions are minimised
d. the outcomes for all women recommended for surgery are collected, reviewed and utilised in continuing professional education for members of the multidisciplinary team
e. women's general practitioners are kept informed of the results of screening and assessment, unless a woman directs otherwise.

4: Timeliness

Screening and assessment services are provided to women in a timely and efficient manner:

a. women have timely access to screening
b. the time from screening to assessment is minimised
c. the results of screening and assessment are provided promptly and directly to the woman concerned in ways which are sensitive to her possible anxiety.

(continued)

Box B3 (continued): National policy features of BreastScreen Australia

5: Data management and information systems

Effective data and information management systems:

a. data are collected, stored and managed using secure, quality, contemporary data management and communication systems that comply with relevant state and national standards, and that enable valid, reliable system and service performance analysis and evaluation
b. data are used for strategic purposes, quality improvement of services and for clinical and service management
c. data are collected in line with the requirements of the BreastScreen Australia Data Dictionary
d. data are to be submitted annually to the Australian Institute of Health and Welfare, for use in a national program monitoring report, and annual performance data reports for review by the National Quality Management Committee.

6: Client focus

Services are of high quality and client focused:

a. high quality information is provided to inform women, and women feel appropriately engaged and supported
b. screening services are provided in a manner which is acceptable to women in accessible, non-threatening and comfortable environments
c. women and health care providers are given comprehensive and easily understood information about the Program, from screening up to and including diagnosis of breast cancer
d. counselling and information are an integral part of the Program
e. women are advised of the benefits and risks of mammography
f. women are provided with written information and actively involved in decisions about their management, particularly in relation to further assessment and treatment.

7: Governance and management

Effective structures and processes are in place to ensure high quality governance and management:

a. screening and assessment are carried out at BreastScreen Australia accredited services
b. key stakeholders and stakeholder groups participate in the monitoring and management of the Program.

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 Table B1.

Table B1: Performance indicators for 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

Note: Further details and definitions of performance indicators are available in previous *BreastScreen Australia monitoring reports* and in the *BreastScreen Australia data dictionary: version 1.1* (AIHW 2015c).

Source: BreastScreen Australia data dictionary: version 1.1 (AIHW 2015c).

National Accreditation Standards (NAS) Measures

Provision of a high-quality service to women is of great importance to BreastScreen Australia. For this reason, services accredited under BreastScreen Australia are expected to operate according to the National Accreditation Standards (NAS) of BreastScreen Australia, along with national policy features and protocols. The accreditation system, of which the NAS are an integral part, intends to drive continuous quality improvement in the delivery of breast screening services to ensure women receive safe, effective and high-quality care.

The BreastScreen Australia NAS have been developed to ensure that all women receive breast screening services that are of a consistently high quality, regardless of where they attend for screening or assessment.

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, although in considering how these national data compare with the NAS, it should be noted that the NAS were not designed to be used as standards for the BreastScreen Australia performance indicators.

NAS Measures that relate to these data, along with data analysed by the AIHW, appear in tables 3.1, 3.4 and 3.7 in this report.

Contact details and online resources for BreastScreen Australia components are provided in Table B2.

Table B2: Contacts and links for the state, territory and Australian government components of BreastScreen Australia

BreastScreen New South Wales	
Tel: (02) 8374 5777 Fax: (02) 8374 5699 Email: information@cancerinstitute.org.au	<www.bsnsw.org.au>
BreastScreen Victoria	
Tel: (03) 9660 6888 Fax: (03) 9662 3881 Email: info@BreastScreen.org.au	<www.BreastScreen.org.au>
BreastScreen Queensland	
Tel: (07) 3328 9467 Fax: (07) 3328 9487 Email: cssb@health.gov.au	<www.health.qld.gov.au/breastscreen>
BreastScreen Western Australia	
Tel: (08) 9323 6700 Fax: (08) 9323 6799 Email: BreastScreenwa@health.wa.gov.au	<www.BreastScreen.health.wa.gov.au>
BreastScreen South Australia	
Tel: (08) 8274 7100 Fax: (08) 8373 4395 Email: HealthBSSAEnquiries@sa.gov.au	<www.breastscreensa.sa.gov.au>
BreastScreen Tasmania	
Tel: (03) 6216 4300 Fax: (03) 6216 4326 Email: canscreen@dhhs.tas.gov.au	<www.dhhs.tas.gov.au/cancerscreening/information_about_breast_screening>
BreastScreen ACT	
Tel: (02) 6205 4444 Fax: (02) 6205 1394 Email: BreastScreen@act.gov.au	<www.health.act.gov.au/our-services/women-youth-and-children/breastscreen>
BreastScreen NT	
Tel: (08) 8922 6449 Fax: (08) 8922 6440 Email: wcpp.ths@nt.gov.au	<www.health.nt.gov.au/Womens_Health/Breast_Screen_NT/index.aspx>
Australian Government Department of Health	
Email: cancerscreening@health.gov.au	<http://www.cancerscreening.gov.au/internet/screening/publishing.nsf/Content/breast-screening-1>
AIHW	
Email: screening@aihw.gov.au	<http://www.aihw.gov.au/cancer/screening/breast>

Appendix C: Data sources

Data used in this report are derived from multiple sources and are summarised in Table C1.

Table C1: Data sources for BreastScreen Australia monitoring report 2013–2014

Data used to monitor BreastScreen Australia	Data source
Monitoring BreastScreen Australia using BreastScreen data	
Performance Indicator 1 Participation	State and territory BreastScreen registers, ABS population data
Performance Indicator 2 Rescreening	State and territory BreastScreen registers
Performance Indicator 3 Recall to assessment	State and territory BreastScreen registers
Performance Indicator 4 Invasive breast cancer detection	State and territory BreastScreen registers
Performance Indicator 5 DCIS detection	State and territory BreastScreen registers
Performance Indicator 6 Sensitivity	State and territory BreastScreen registers
Monitoring BreastScreen Australia using AIHW data	
Performance Indicator 7 Incidence	AIHW Australian Cancer Database; ABS population data
Performance Indicator 8 Mortality	AIHW National Mortality Database; ABS population data
Monitoring other aspects of BreastScreen Australia	
Expenditure on BreastScreen Australia	AIHW Health Expenditure Database

State and territory BreastScreen registers

Data for the performance indicators participation, rescreening, recall to assessment, invasive breast cancer detection, DCIS detection, and sensitivity are sourced from the BreastScreen register in each state and territory according to definitions and data specifications in the *BreastScreen Australia data dictionary version 1.1* (AIHW 2015c). These data are compiled into national figures by the AIHW to allow national monitoring of BreastScreen Australia.

The Data Quality Statement for BreastScreen Australia data can be found on the AIHW website at <http://meteor.aihw.gov.au/content/index.phtml/itemId/610753>.

AIHW Australian Cancer Database

All forms of cancer, except basal and squamous cell carcinomas of the skin, are notifiable diseases in each Australian state and territory. This means there is legislation in each jurisdiction that requires hospitals, pathology laboratories and various other institutions to report all cases of cancer to their central cancer registry. An agreed subset of the data collected by these cancer registries is supplied annually to the AIHW, where they are compiled into the Australian Cancer Database (ACD). The ACD currently contains data on all cases of cancer diagnosed from 1982 to 2010 for all states and territories, and for 2011 and 2012 for all except New South Wales and the Australian Capital Territory. Incidence projections were calculated for 2013 to 2016—see *Cancer in Australia: an overview 2014* (AIHW 2014) for more details.

The 2011 and 2012 incidence data for New South Wales and the Australian Capital Territory were not available for inclusion in the 2012 version of the ACD. The development of the new NSW Cancer Registry system has resulted in a delay in processing incidence data for 2011 onwards and therefore the most recent New South Wales data available for inclusion in the ACD are for 2010. As the coding of Australian Capital Territory cancer notifications is contracted to the NSW Cancer Registry, the most recent data available for the Australian Capital Territory are also for 2010.

The 2011 and 2012 incidence data for New South Wales and the Australian Capital Territory were estimated by the AIHW. These estimates were combined with the actual data supplied by the other 6 state and territory cancer registries to form the 2012 ACD. More information can be found in the Data Quality Statement for the 2012 ACD. The detailed methodology by which data are estimated is available in Appendix F of *Cancer in Australia: an overview 2014* (AIHW 2014).

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

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

The Data Quality Statement for the 2012 ACD can be found on the AIHW website at <http://meteor.aihw.gov.au/content/index.phtml/itemId/624388>.

AIHW National Mortality Database

The AIHW National Mortality Database (NMD) contains information provided by the Registries of Births, Deaths and Marriages and the National Coronial Information System (managed by the Victorian Department of Justice), and coded by the ABS, for deaths from 1964 to 2013. Registration of deaths is the responsibility of the State and Territory Registrars of Births, Deaths and Marriages. These data are then collated and coded by the ABS and are maintained at the AIHW in the NMD.

In the NMD, the year of occurrence of the death, and the year in which the death was registered, are both provided. For the purposes of this report, actual mortality data are shown based on the year of occurrence of the death, except for the most recent year 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. The number of deaths registered in the latest available year of data is a reasonable proxy for the number of deaths that occurred in that year.

In this report, deaths registered in 2011 and earlier are based on the final version of cause-of-death data; deaths registered in 2012 and 2013 are based on revised and preliminary versions, respectively, and are subject to further revision by the ABS.

The data quality statements underpinning the AIHW National Mortality Database can be found in the following ABS publications:

- Quality Declaration summary for *Deaths, Australia* (ABS cat. no. 3302.0) <http://www.abs.gov.au/ausstats/abs%40.nsf/mf/3302.0>
- Quality Declaration summary for *Causes of death, Australia* (ABS cat. no. 3303.0) <http://www.abs.gov.au/ausstats/abs%40.nsf/mf/3303.0>.

For more information on the AIHW National Mortality Database, see *Deaths data at AIHW* <http://www.aihw.gov.au/deaths/aihw-deaths-data>.

ABS population data

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

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

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

Estimated resident populations are then updated each year from the Census data, using indicators of population change, such as births, deaths and net migration. More information is available from the ABS website at <www.abs.gov.au>.

For the Indigenous comparisons in this report, the most recently released Indigenous experimental estimated resident populations as released by the ABS were used. Those estimates were based on the 2011 Census of Population and Housing.

ABS population data for participation calculations

Participation rates were calculated using the average of the estimated resident female population for the 2-year reporting period.

Note that there is the potential for variation in published participation rates between the AIHW and state and territory reports because of different sources of estimated resident population data.

ABS population data for incidence and mortality calculations

Incidence and mortality rates were calculated using the estimated resident population for single-year calculations, and the aggregate of the estimated resident populations for the 5 relevant years for 5-year calculations (or 4 years in the case of incidence for different groups of socioeconomic status).

AIHW Disease Expenditure Database

The AIHW Disease Expenditure Database contains estimates of expenditure by disease category, age group and sex for each of the following areas of expenditure: admitted patient hospital services; out-of-hospital medical services; prescription pharmaceuticals; optometrical and dental services; community mental health services; and public health cancer screening.

For more information on the AIHW Disease Expenditure Database, see *Health system expenditure on cancer and other neoplasms in Australia: 2008–09* (AIHW 2013).

The Data Quality Statement for the Disease Expenditure Database can be found on the AIHW website at <http://meteor.aihw.gov.au/content/index.phtml/itemId/512599>.

Appendix D: Classifications

Age

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

Remoteness area

The remoteness areas (RAs) divide Australia into broad geographical regions that share common characteristics of remoteness for statistical purposes. The remoteness structure divides each state and territory into several regions on the basis of their relative access to services. There are 6 classes of RA in the remoteness structure: *Major cities*, *Inner regional*, *Outer regional*, *Remote Australia*, *Very remote* and *Migratory*. The category *Major cities* includes Australia's capital cities, except for Hobart and Darwin, which are classified as *Inner regional*. RAs are based on the Accessibility and Remoteness Index of Australia produced by the Australian Population and Migration Research Centre at the University of Adelaide.

Remoteness area for participation calculations

For participation calculations, 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 these are based on the 2011 Census, the accuracy of remoteness area classifications diminishes due to subsequent changes in demographics. Third, some postcodes (and hence some individual women) are unable to be allocated to a remoteness area.

Remoteness area for incidence and mortality calculations

Each unit record in the ACD contains the 2006 SLA and 2011 Statistical Area Level 2 (SA2) but not the remoteness area. In order to calculate the cancer incidence rates by remoteness area, a correspondence was used to map the 2006 SLA to the 2006 RA. Similarly, the cancer mortality rates by remoteness area were calculated by applying a correspondence from the 2011 SA2 to the 2011 RA.

Socioeconomic group

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

In this report, the first socioeconomic group (quintile 1) corresponds to geographical areas containing the 20% of the population with the greatest socioeconomic disadvantage according to the IRSD (that is, the lowest socioeconomic group), and the fifth group (quintile 5) corresponds to the 20% of the population with the least socioeconomic disadvantage (that is, the highest socioeconomic group).

Socioeconomic group for participation calculations

For participation, women were allocated to a socioeconomic group using their residential postcode supplied at the time of screening. Caution is required when examining differences across socioeconomic groups for several reasons. First, postcodes used to allocate women may not represent their location of residence. Second, because these are based on the 2011 Census, the accuracy of socioeconomic group classifications diminishes due to subsequent changes in demographics. Third, many postcodes (and hence women) are unable to be allocated to a socioeconomic group.

Socioeconomics group for incidence and mortality calculations

Socioeconomic quintiles were assigned to cancer cases according to the IRSD of the SLA of residence at the time of diagnosis, and to deaths according to the Statistical Area Level 2 (SA2) of residence at the time of death.

Classification of invasive breast cancer and ductal carcinoma in situ

Histology

Invasive breast cancer

Histology codes to classify invasive breast cancer into the groups that appear in Table 4.1 in this report were developed with the assistance of the state and territory cancer registries. Groupings for invasive breast cancers are listed in Table D1.

Table D1: Breast cancer by histology group

Breast cancer group	Type of breast cancer (ICD-O-3 codes)
Invasive ductal carcinoma	Pleomorphic carcinoma (8022)
	Carcinoma with osteoclast-like giant cells (8035)
	Basaloid carcinoma (8123)
	Scirrhous adenocarcinoma (8141)
	Carcinoma simplex (8231)
	Infiltrating duct carcinoma, not otherwise specified (8500)

(continued)

Table D1 (continued): Breast cancer by histology group

Breast cancer group	Type of breast cancer (ICD-O-3 codes)
	Duct carcinoma, desmoplastic type (8514)
	Infiltrating ductular carcinoma (8521)
	Infiltrating duct and lobular carcinoma (8522)
	Infiltrating duct mixed with other types of carcinoma (8523)
	Paget disease and infiltrating duct carcinoma of breast (8541)
	Paget disease and intraductal carcinoma of breast (8543)
Invasive lobular carcinoma	Pleomorphic lobular carcinoma, NOS (8519)
	Lobular carcinoma, not otherwise specified (8520)
	Infiltrating lobular mixed with other types of carcinoma (8524)
Medullary carcinoma and atypical medullary carcinoma	Medullary carcinoma, not otherwise specified (8510)
	Atypical medullary carcinoma (8513)
	Medullary carcinoma with lymphoid stroma (8512)
Tubular carcinoma and invasive cribriform carcinoma	Tubular adenocarcinoma (8211)
	Cribriform carcinoma, not otherwise specified (8201)
Mucinous carcinoma	Mucinous adenocarcinoma (8480)
	Mucin-producing adenocarcinoma (8481)
	Signet ring cell carcinoma (8490)
Invasive papillary carcinoma	Intraductal papillary adenocarcinoma with invasion (8503)
	Papillary adenocarcinoma, not otherwise specified (8260)
	Intracystic (papillary) adenocarcinoma (8504)
	Papillary carcinoma, not otherwise specified (8050)
	Solid papillary carcinoma (8509)
	Invasive micropapillary carcinoma (8507)
Inflammatory carcinoma	Inflammatory carcinoma (8530)
Mesenchymal	Sarcoma, NOS (8800)
	Spindle cell sarcoma (8801)
	Giant cell sarcoma (8802)
	Epithelioid sarcoma (8804)
	Undifferentiated sarcoma (8805)
	Fibrosarcoma (8810)
	Fibromyxosarcoma (8811)
	Low grade myofibroblastic sarcoma (8825)
	Malignant fibrous histiocytoma (8830)
	Liposarcoma, NOS (8850)
	Well differentiated liposarcoma, NOS (excluding superficial soft tissue) (8851)
	Myxoid liposarcoma (8852)
	Pleomorphic liposarcoma (8854)
	Leiomyosarcoma (8890)
	Angiomyosarcoma (8894)

(continued)

Table D1 (continued): Breast cancer by histology group

Breast cancer group	Type of breast cancer (ICD-O-3 codes)
	Myosarcoma (8895)
	Rhabdomyosarcoma (8900)
	Alveolar rhabdomyosarcoma (8920)
	Stromal sarcoma, NOS (8935)
	Haemangiosarcoma (9120)
	Haemangioendothelioma, malignant (9130)
	Haemangiopericytoma, malignant (9150)
	Lymphangiosarcoma (9170)
	Osteosarcoma, NOS (9180
	Chondrosarcoma, NOS (9220
Other—specified	Metaplastic carcinoma, NOS (8575)
	Adenocarcinoma with squamous differentiation (8570)
	Adenocarcinoma with spindle cell metaplasia (8572)
	Squamous cell carcinoma, NOS (8070)
	Squamous cell carcinoma, keratinising, NOS (8071)
	Squamous cell carcinoma, large cell nonkeratinising, NOS (8072)
	Squamous cell carcinoma, spindle cell (8074)
	Spindle cell carcinoma, NOS (8032)
	Carcinosarcoma, NOS (8980)
	Adenocarcinoma with cartilaginous and osseous metaplasia (8571)
	Pseudosarcomatous carcinoma (8033)
	Malignant myoepithelioma (8982)
	Adenocarcinoma, NOS (8140)
	Phyllodes tumour, malignant (9020)
Other—specified (continued)	Paget disease, mammary (8540)
	Adenocarcinoma with apocrine metaplasia (8573)
	Apocrine adenocarcinoma (8401)
	Neuroendocrine carcinoma, NOS (8246)
	Small cell carcinoma, NOS (8041)
	Carcinoma with neuroendocrine differentiation (8574)
	Large cell neuroendocrine carcinoma (8013)
	Carcinoid , NOS (8240)
	Atypical carcinoid tumour (8249)
	Adenocarcinoma with mixed subtypes (8255)
	Mixed cell adenocarcinoma (8323)
	Secretory carcinoma of breast (8502)
	Acinar cell carcinoma (8550)
	Mucoepidermoid carcinoma (8430)
	Lipid-rich carcinoma (8314)

(continued)

Table D1 (continued): Breast cancer by histology group

Breast cancer group	Type of breast cancer (ICD-O-3 codes)
	Glycogen-rich carcinoma (8315)
	Clear cell adenocarcinoma, NOS (8310)
	Sebaceous carcinoma (8410)
	Mixed tumour, malignant (8940)
	Lymphoepithelial carcinoma (8082)
	Basal cell adenocarcinoma (8147)
	Trabecular carcinoma (8190)
	Solid carcinoma, NOS (8230)
	Adenomyoepithelioma, malignant (8983)
	Adenoid cystic carcinoma (8200)
	Epithelial-myoepithelial carcinoma (8562)
	Peripheral neuroectodermal tumour, NOS (9364)
	Granular cell tumour, malignant (9580)
	Adenosquamous carcinoma (8560)
	Comedocarcinoma, NOS (8501)
Unspecified	Neoplasm, malignant (8000)
	Tumour cells, malignant (8001)
	Malignant tumour, spindle cell type (8004)
	Carcinoma, NOS (8010)
	Large cell carcinoma, NOS (8012)
	Carcinoma, undifferentiated (8020)
	Carcinoma, anaplastic (8021)
	Giant cell and spindle cell carcinoma (8030)
	Giant cell carcinoma (8031)

Non-invasive breast tumours

Histology codes to classify non-invasive breast tumours were also developed with the assistance of the state and territory cancer registries. Groupings for non-invasive breast tumours are listed in Table D2. Only the histology codes for DCIS are relevant to this report, because other non-invasive breast tumours have not been reported here.

In interpreting incidence of non-invasive breast tumours, it should be noted that non-invasive tumours that are diagnosed within 4 months of an invasive breast cancer are excluded. This is referred to as the '4-month rule' and is based on the consensus view that in such a situation the invasive breast cancer was almost certainly present at the time of the DCIS diagnosis, but was not detected.

The effect of applying this rule was the removal any non-invasive records in which an invasive breast cancer was diagnosed in less than or equal to 121 days of a non-invasive tumour.

Table D2: Non-invasive breast tumours by histology group

Breast cancer group	Type of breast cancer (ICD-O-3 codes)
Ductal carcinoma in situ (DCIS)	Papillary carcinoma in situ, NOS (8050)
	Cribriform carcinoma in situ (8201)
	Ductal carcinoma in situ, solid type (8230)
	Papillary adenocarcinoma, NOS, in situ (8260)
	Apocrine adenocarcinoma in situ (8401)
	Intraductal carcinoma, noninfiltrating, NOS (8500)
	Comedocarcinoma, non-infiltrating (8501)
	Secretory carcinoma of breast in situ (8502)
	Noninfiltrating intraductal papillary adenocarcinoma (8503)
	Noninfiltrating intracystic carcinoma (8504)
	Intraductal micropapillary carcinoma (8507)
	Cystic hypersecretory carcinoma in situ (8508)
	Solid papillary carcinoma in situ (8509)
	Noninfiltrating ductular carcinoma (8521)
	Intraductal carcinoma and lobular carcinoma in situ (8522)
	Ductal carcinoma in situ mixed with other types of carcinoma in situ (8523)
	Paget disease, in situ, and intraductal carcinoma of breast (8543)
Lobular carcinoma in situ (LCIS)	Pleomorphic lobular carcinoma in situ (8519)
	Lobular carcinoma in situ, NOS (8520)
Other specified carcinoma in situ	Squamous cell carcinoma in situ, NOS (8070)
	Adenocarcinoma in situ (8140)
	Mucinous adenocarcinoma in situ, NOS (8480)
	Paget disease, in situ, mammary (8540)
	Adenocarcinoma in situ with squamous metaplasia (8570)
Unspecified	Carcinoma in situ, NOS (8010)

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

Age-standardised rates

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

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

There are 2 methods commonly used to adjust for age: direct and indirect standardisation. In this report, the direct standardisation approach presented by Jensen and others (1991) is used. To age-standardise using the direct method, the first step is to obtain population numbers and numbers of cases (or deaths) in age ranges: typically 5-year age ranges. The next step is to multiply the age-specific population numbers for the standard population (in this case, the Australian population as at 30 June 2001) by the age-specific incidence rates (or death rates) for the population of interest (such as those in a certain socioeconomic status group or those who lived in *Major cities*). The next step is to sum across the age groups and divide this sum by the total of the standard population to give an age-standardised rate for the population of interest. Finally, this is expressed per 1,000 or 100,000, as appropriate.

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 that of 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 2 standard errors.

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

Interpretation of confidence intervals

Some indicators have a 95% confidence interval 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 statistically significant.

It is important to note that the overlapping of confidence intervals does not imply that the difference between 2 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 only be stated that no statistically significant differences were found, and not that no differences exist.

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

As with all statistical comparisons, care should be exercised in interpreting the results of the comparison. If 2 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.

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. See also **Indigenous**.

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 increase) 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.

Australian Statistical Geography Standard (ASGS): Common framework defined by the Australian Bureau of Statistics for collection and dissemination of geographically classified statistics. The ASGS replaced the Australian Standard Geographical Classification (ASGC) in July 2011.

benign: Not **malignant**.

biopsy: Small sample of tissue that is taken to obtain a definitive diagnosis of an abnormality.

cancer (malignant neoplasm): A large range of diseases in which some of the body's cells become defective, and begin to multiply out of control. These cells can invade and damage the area around them, and can also spread to other parts of the body to cause further damage.

cancer death: A death where the **underlying cause of death** is indicated as cancer. People with cancer who die of other causes are not counted in the **mortality** 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.

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**.

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

incidence: The number of new cases (for example, of an illness or event) occurring during a given period, usually 1 year.

index screening year: The year for which an **interval cancer** rate and program sensitivity rate are determined.

index screens: All screening examinations performed within the index screening year.

Indigenous: A person of Aboriginal and/or Torres Strait Islander descent who identifies as an Aboriginal and/or Torres Strait Islander. See also **Aboriginal or Torres Strait Islander**.

interval cancer (invasive) (as defined for national reporting purposes by Kavanagh and others 1999, with minor changes endorsed by the then-named 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 bloodstained 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.

morbidity: Illness.

mortality: The number of deaths occurring during a given period.

new case (of cancer): A person who has a new cancer diagnosed for the first time. One person may have more than once cancer and therefore may be counted twice in **incidence** statistics if it is decided that the 2 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 and others (1991).

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.

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. For example, if she attends for a fourth screening round, she has been screened 3 times before.

significant difference: Where rates are referred to as significantly different, or one rate is deemed significantly higher or lower than another, these differences are statistically significant. Rates are deemed statistically significantly different when their **confidence intervals** do not overlap, since their difference is greater than what could be explained by chance. See 'confidence intervals' in Appendix F 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 bloodstained or watery nipple discharge.

target population: Women in thepopulation who are actively targeted by BreastScreen Australia; this is done on the basis of age, and was women aged 50–69 up until July 2013, afterwhich time this changed to women aged 50–74.

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

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: The denominator for the interval cancer rate, it is the 'number of years at risk' of being diagnosed with an interval cancer, and takes into account women who screen annually rather than every 2 years (who would be at risk for the first year after their screen but not the second).

Note: Terms in **bold** within definitions are defined elsewhere in the glossary.

References

AIHW (Australian Institute of Health and Welfare) 2013. Health system expenditure on cancer and other neoplasms in Australia 2008–09. Cancer series no. 81. Cat. no. CAN 78. Canberra: AIHW.

AIHW 2014. Cancer in Australia: an overview 2014. Cancer series no. 90. Cat. no. CAN 88. Canberra: AIHW.

AIHW 2015a. Breast cancer in young women: key facts about breast cancer in women in their 20s and 30s. Cancer series no. 96. Cat. no. CAN 94. Canberra: AIHW.

AIHW 2015b. BreastScreen Australia monitoring report 2012–2013. Cancer series no. 95. Cat. no. CAN 93. Canberra: AIHW.

AIHW 2015c. BreastScreen Australia data dictionary: version 1.1. Cancer series no. 92. Cat. no. CAN 90. Canberra: AIHW.

AIHW & NBCC (National Breast Cancer Centre) 2007. Breast cancer survival by size and nodal status in Australia. Cancer series no. 39. Cat. no. CAN 34. Canberra: AIHW.

Breast Cancer Network Australia 2013. Family history fact sheet. Melbourne: Breast Cancer Network Australia. Viewed 23 July 2015, <https://www.bcna.org.au/media/2135/bcna_fact_sheet_family_history_1.pdf>.

BreastScreen Australia 2004. BreastScreen Australia National Accreditation Standards, developed by the National Quality Management Committee of BreastScreen Australia, endorsed by the Australian Screening Advisory Committee, November 2004. Canberra: Department of Health and Ageing.

BreastScreen Australia EAC (Evaluation Advisory Committee) 2009. BreastScreen Australia evaluation: evaluation final report. Canberra: Department of Health and Ageing. Viewed 3 September 2015, <http://cancerscreening.gov.au/internet/screening/publishing.nsf/Content/programme-evaluation>.

BreastScreen WA (Western Australia) 2008. BreastScreen WA: statistical report 2000–2005. Perth: BreastScreen WA.

Brenner H & Gefeller O 1996. An alternative approach to monitoring cancer patient survival. Cancer 78(9):2004–2010.

Cancer Australia 2009. Early detection of breast cancer. Sydney: Cancer Australia. Viewed 23 July 2015, <http://canceraustralia.gov.au/publications-and-resources/position-statements/early-detection-breast-cancer>.

Cancer Australia 2014. Overdiagnosis from mammographic screening. Sydney: Cancer Australia. Viewed 12 May 2015, <http://canceraustralia.gov.au/publications-and-resources/position-statements/overdiagnosis-mammographic-screening>.

Cancer Australia 2015a. Advice about familial aspects of breast cancer and epithelial ovarian cancer: a guide for health professionals. Sydney: Cancer Australia. Viewed 3 September 2015, <http://canceraustralia.gov.au/sites/default/files/publications/advice-about-familial-aspects-breast-cancer-and-epithelial-ovarian-cancer/pdf/2015_bog_familial_aspects_int.pdf>.

Cancer Australia 2015b. Genetic testing for breast/ovarian cancer risk. Sydney: Cancer Australia. Viewed 12 May 2015, <http://canceraustralia.gov.au/clinical-best-practice/gynaecological-cancers/familial-risk-assessment-fra-boc/genetic-testing>.

Cancer Research UK 2014. Breast cancer risk factors. London: Cancer Research UK. Viewed 12 May 2015, <http://www.cancerresearchuk.org/cancer-info/cancerstats/types/breast/riskfactors/breast-cancer-risk-factors>.

De P, Neutel CI, Olivotto I & Morrison H 2010. Breast cancer incidence and hormone replacement therapy in Canada. Journal of the National Cancer Institute 102:1489–95.

Dobson AJ, Kuulasma K, Eberle E & Scherer J 1991. Confidence intervals for weighted sums of Poisson parameters. Statistics in Medicine 10:457–62.

Duffy SW, Tabar L, Olsen AH, Vitak B, Allgood PC, Chen TH et al. 2010. Absolute numbers of lives saved and overdiagnosis in breast cancer screening, from a randomized trial and from the Breast Screening Programme in England. Journal of Medical Screening 17:25–30.

IARC (International Agency for Research on Cancer) 2002. IARC handbooks of cancer prevention. Vol. 7. Breast cancer screening. Lyon, France: IARC Press.

IARC 2015. Breast-Cancer Screening—viewpoint of the IARC Working Group. The New England Journal of Medicine. 372 (24):2353–2358.

Irwig L, Glasziou P, Barratt A & Salkeld G 1997. Review of the evidence about the value of mammographic screening in 40–49 year old women. Sydney: NHMRC (National Health and Medical Research Council) NBCC (National Breast Cancer Centre).

Jensen O, Parkin D, MacLennan R, Muir C & Skeet Re (eds) 1991. Cancer registration: principles and methods. IARC scientific publication no. 95. Lyon: International Agency for Research on Cancer.

Kavanagh AM, Amos AF & Marr GM 1999. The ascertainment and reporting of interval cancers within the BreastScreen Australia Program. Sydney: NHMRC (National Health and Medical Research Council) NBCC (National Breast Cancer Centre).

McPherson K, Steel CM & Dixon JM 2000. Breast cancer—epidemiology, risk factors, and genetics. British Medical Journal 321:624–8.

NBOCC (National Breast and Ovarian Cancer Centre) 2009. National Breast and Ovarian Cancer Centre and Royal Australasian College of Surgeons National Breast Cancer audit. Public Health Monitoring Series 2007 data. Sydney: NBOCC.

Roder D, Webster F, Zorbas H & Sinclair S 2012. Breast screening and breast cancer survival in Aboriginal and Torres Strait Islander women of Australia. Asian Pacific Journal of Cancer Prevention 13(1):147–55.

Sim M, Siva S, Ramli I, Fritschi L, Tresham J & Wylie E 2012. Effect of false-positive screening mammograms on rescreening in Western Australia. Medical Journal of Australia 196(11):93–5.

UICC (Union for International Cancer Control) 2014. IARC release the latest world cancer statistics. Geneva: UICC. Viewed 11 May 2015, <http://www.uicc.org/iarc-release-latest-world-cancer-statistics>.

WCRF/AICR (World Cancer Research Fund/American Institute for Cancer Research) 2007. Food, nutrition, physical activity, and the prevention of cancer: a global perspective. Washington DC: AICR (American Institute for Cancer Research).

List of tables

List of figures

List of boxes

Related publications

The *BreastScreen Australia monitoring report* is an annual report.

This and previous *BreastScreen Australia monitoring reports* and their supplementary data tables are available at <http://www.aihw.gov.au/publications/breast-cancer>.

You may also be interested in the following related publications:

- AIHW 2014. Analysis of bowel cancer outcomes for the National Bowel Cancer Screening Program. Cat. no. CAN 87. Canberra: AIHW.
- AIHW 2014. Cancer in Australia: an overview 2014. Cancer series no. 90. Cat. no. CAN 88. Canberra: AIHW.
- AIHW 2015. Breast cancer in young women: key facts about breast cancer in women in their 20s and 30s. Cancer series no. 96. Cat. no. CAN 94. Canberra: AIHW.
- AIHW 2016. Australian Cancer Incidence and Mortality (ACIM) books: breast cancer. Canberra: AIHW. <http://www.aihw.gov.au/acim-books>.
- AIHW 2016. Cervical screening in Australia 2013–2014. Cancer series no. 97. Cat. no. CAN 95. Canberra: AIHW.
- AIHW 2016. National Bowel Cancer Screening Program: monitoring report 2016. Cancer series no. 98. Cat. no. CAN 97. Canberra: AIHW.

Supplementary online data tables

Additional tables are available as online Excel tables at <www.aihw.gov.au>, under the ‘Additional material’ tab for this report. These tables contain detailed statistics for many of the tables and figures presented in summary form in both the body of the report and in Appendix A. Supplementary data tables have the prefix ‘S’ (for example, ‘Table S1.1’).

There are 8 Excel files, one for each performance indicator:

- Indicator 1 Participation
- Indicator 2 Rescreening
- Indicator 3 Recall to assessment
- Indicator 4 Invasive breast cancer detection
- Indicator 5 DCIS detection
- Indicator 6 Sensitivity
- Indicator 7 Incidence
- Indicator 8 Mortality

The *BreastScreen Australia monitoring report 2013–2014* presents the latest national statistics monitoring BreastScreen Australia, which 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. Around 54% of women in the target age group of 50–69 took part in the program, with almost 1.5 million women screening in 2013–2014.

Breast cancer mortality is at a historic low, at 42 deaths per 100,000 women.