



Australian Government

**Australian Institute of
Health and Welfare**

BreastScreen Australia monitoring report 2009–2010

BreastScreen
AUSTRALIA

A joint Commonwealth/State and Territory Program

CANCER SERIES NO. 72



Australian Government

**Australian Institute of
Health and Welfare**

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

CANCER SERIES

No. 72

BreastScreen Australia monitoring report 2009–2010

**Australian Institute of Health and Welfare and
Australian Government Department of Health and Ageing
for BreastScreen Australia**

Australian Institute of Health and Welfare
Canberra

Cat. no. CAN 68

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

© Australian Institute of Health and Welfare 2012



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/>>.

Enquiries relating to copyright should be addressed to the Head of the Communications, Media and Marketing Unit, Australian Institute of Health and Welfare, GPO Box 570, Canberra ACT 2601.

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 1039-3307

ISBN 978-1-74249-359-6

Suggested citation

Australian Institute of Health and Welfare 2012. BreastScreen Australia monitoring report 2009–2010. Cancer series no. 72. Cat. no. CAN 68. Canberra: AIHW.

Australian Institute of Health and Welfare

Board Chair

Dr Andrew Refshauge

Director

David Kalisch

Any enquiries about or comments on this publication should be directed to:

Communications, Media and Marketing Unit

Australian Institute of Health and Welfare

GPO Box 570

Canberra ACT 2601

Tel: (02) 6244 1032

Email: info@aihw.gov.au

Published by the Australian Institute of Health and Welfare

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	iv
Abbreviations	v
Summary	vi
Data at a glance	1
Section 1 Introductory material	2
Structure of this report	2
Overview of breast cancer and breast cancer screening	2
Data considerations.....	7
Terminology and concepts used in this report	8
Section 2 Performance indicators	10
Indicator 1 Participation	10
Indicator 2 Rescreening.....	19
Indicator 3 Recall to assessment	23
Indicator 4 Invasive breast cancer detection.....	26
Indicator 5 Ductal carcinoma in situ detection.....	31
Indicator 6a Interval cancers.....	35
Indicator 6b Program sensitivity.....	39
Indicator 7a Invasive breast cancer incidence	42
Indicator 7b Ductal carcinoma in situ incidence.....	52
Indicator 8 Mortality	55
Appendix A Additional data	64
Appendix B BreastScreen Australia information	66
Appendix C Data sources and classifications	69
Appendix D BreastScreen Australia 2009–2010 Data Quality Statement	73
Appendix E Statistical methods	76
Glossary	78
References	81
List of tables	83
List of figures	85
Related publications	87

Acknowledgments

Ms Theresa Negrello, Dr Alison Budd and Ms Anne Bech prepared this report under the direction of Ms Lisa McGlynn.

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

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

The financial support and professional assistance of the Screening Section of the Australian Government Department of Health and Ageing is gratefully acknowledged.

BreastScreen Australia

New South Wales

Ms Dianne Eggins
Dr Gordana Culjak
Mr Bolivar Morejon

Victoria

Ms Louise Galloway
Ms Vicki Pridmore
Ms Jenny Brosi
Ms Suzen Maljevac

Queensland

Ms Jennifer Muller
Mr Nathan Dunn

Western Australia

Dr Liz Wylie
Ms Jan Tresham

South Australia

Ms Lou Williamson
Mr Stephen Corns
Ms Ada Childs

Tasmania

Ms Gail Ward
Mr Dylan Sutton
Ms Carol Ramsey

Australian Capital Territory

Ms Yvonne Epping
Mr Victor Meng

Northern Territory

Ms Karen Forster
Mr Guillermo Enciso

Australian Government Department of Health and Ageing

Dr Tracey Bessell
Ms Alison Lang

Abbreviations

ABS	Australian Bureau of Statistics
ACD	Australian Cancer Database
ACT	Australian Capital Territory
AIHW	Australian Institute of Health and Welfare
AS	age-standardised
ASGC	Australian Standard Geographic Classification
CI	confidence interval
DCIS	ductal carcinoma in situ
DoHA	Australian Government Department of Health and Ageing
NAS	National Accreditation Standards
NBOCC	National Breast and Ovarian Cancer Centre
NQMC	National Quality Management Committee
NSW	New South Wales
NT	Northern Territory
Qld	Queensland
RA	remoteness area
SA	South Australia
SEIFA	Socioeconomic Indexes for Areas
Tas	Tasmania
Vic	Victoria
WA	Western Australia
WHO	World Health Organization

Symbols

..	not applicable
≤	less than or equal to
<	less than
>	greater than
n.a.	not available

Summary

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

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

New South Wales data for participation by main language spoken at home, rescreening, recall to assessment, detection of invasive breast cancer, detection of ductal carcinoma in situ (DCIS) and sensitivity were not available for inclusion because of issues relating to the implementation of a new business information system. It is anticipated that future reports will include data for these years.

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

In 2008, there were 6,948 new cases of invasive breast cancer diagnosed in Australian women aged 50–69 (or 294 women diagnosed per 100,000 women in the population). This equates to around 19 women aged 50–69 diagnosed with this disease every day.

In 2010, a total of 1,098 women aged 50–69 died from breast cancer (or 43 per 100,000 women in the population). This equates to around 3 women dying from this disease every day, making breast cancer the second most common cause of cancer-related death for Australian women after lung cancer.

How many women participated in BreastScreen Australia?

More than 1.3 million women aged 50–69 had a screening mammogram through BreastScreen Australia in 2009–2010. This was 55% of women in the target age group.

While participation increased with improving socioeconomic status, this trend was small, with all socioeconomic groups of women aged 50–69 recording participation rates between 53% and 56%.

The difference between Aboriginal and Torres Strait Islander and non-Indigenous women was greater, with 36% of Aboriginal and Torres Strait Islander women aged 50–69 having a screening mammogram in 2009–2010, compared with 55% of non-Indigenous women.

How many women were recalled for further investigation?

In 2010, 12% of women aged 50–69 screened for the first time were recalled for further investigation; for women attending subsequent screens, 4% were recalled.

How many women had a small breast cancer detected?

Small breast cancers (≤ 15 mm in diameter) are associated with better treatment options and improved survival. A high proportion of invasive breast cancers detected in women aged 50–69 were small – around half (47%) of invasive breast cancers detected in those attending their first screen, and nearly two-thirds (63%) in those attending subsequent screens.

Data at a glance

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

Definitions for the performance indicators are provided in the relevant chapters of Section 2.

New South Wales data for participation by main language spoken at home (a disaggregation of participation), rescreening, recall to assessment, invasive breast cancer detection, DCIS detection, and sensitivity were not available because of issues relating to the implementation of a new business information system. It is anticipated that future reports will include data for these years. Where New South Wales data are not included, a total for the other states is provided and trend data are not provided.

Summary table: Key performance indicators for BreastScreen Australia, women aged 50–69

Performance Indicator	NAS	Reporting period	Statistic
Participation	>70%	2009–2010	55.0
Rescreening			
After first screening round	>75%	2008	59.1
After second screening round	>90%	2008	67.8
After third and subsequent screening rounds	>90%	2008	82.2
Recall to assessment			
First screening round	<10%	2010	12.2
Subsequent screening rounds	<5%	2010	4.0
Invasive breast cancer detection			
After first screening round	>50	2010	97.0
After second screening round	>35	2010	45.6
Small size cancer detection	>25	2010	29.9
Ductal carcinoma in situ detection			
After first screening round	≥12	2010	24.3
After second screening round	≥7	2010	11.8
Invasive breast cancer incidence	..	2008	294.2
Mortality	..	2010	43.3

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

Notes

1. All rates are for women aged 50–69 and are age-standardised.
2. Participation is the per cent of screened women in the population. NSW data were not available for participation by main language spoken at home, a disaggregation of participation, but were available for the computation of the Australian participation rate (which is 55.0%).
3. Rescreening is the per cent of women who rescreen within 27 months.
4. Recall to assessment is the per cent of women screened who are recalled for further investigation.
5. Invasive breast cancer detection and DCIS detection are the number of women diagnosed per 10,000 women screened.
6. Invasive breast cancer incidence is the number of new cases per 100,000 women.
7. Mortality is the number of deaths from invasive breast cancer per 100,000 women.

Section 1 Introductory material

Structure of this report

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

The second section presents the latest national data against the eight BreastScreen Australia performance indicators. The start of each performance indicator section delivers a summary that includes its definition and rationale, followed by key results to provide an indication of the main findings. More detailed analyses, as well as background information where appropriate, follow this summary material.

More detailed data than those shown in this report are available in the *BreastScreen Australia monitoring report 2009–2010: supplementary data tables* available on the AIHW website <www.aihw.gov.au>.

Overview of breast cancer and breast cancer screening

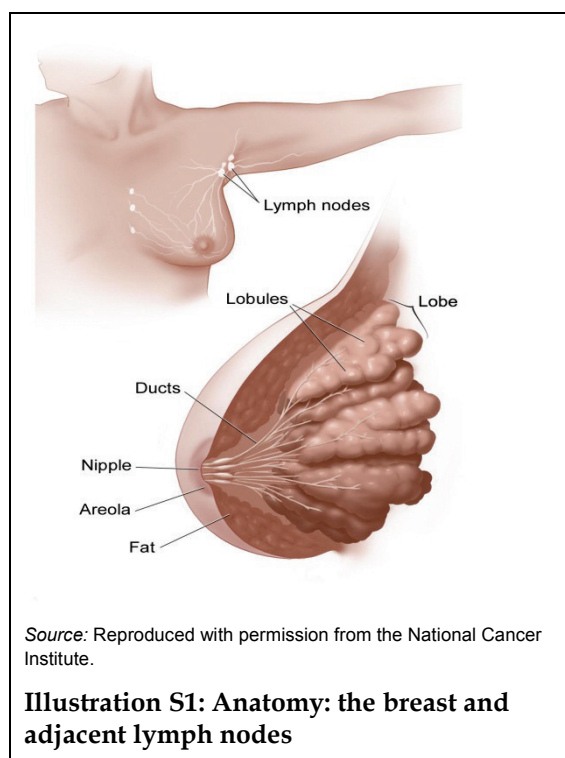
What is breast cancer?

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

For more information on breast cancer see the Cancer Australia website <www.canceraustralia.gov.au>.

How common is breast cancer in Australia?

Breast cancer is the most common cancer affecting Australian women (excluding basal and squamous cell carcinoma of the skin). In 2008, 13,567 new cases were diagnosed or 115.4 new cases per 100,000 women. It is the second most common cause of cancer mortality in Australian women behind lung cancer, with 2,840 deaths, or 21.6 deaths per 100,000 women in 2010.



Aboriginal and Torres Strait Islander women have fewer cases of breast cancer diagnosed than their non-Indigenous counterparts (81.2 and 103.1 new cases per 100,000 women in 2004–2008, respectively). Despite this, death rates do not differ between Aboriginal and Torres Strait Islander and non-Indigenous women.

Box S1.1: What is ductal carcinoma in situ (DCIS)?

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

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

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

What are the known risk factors for breast cancer?

Many risk factors, both established and probable, have been identified for breast cancer in women.

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

Age is the biggest risk factor in developing breast cancer, with most breast cancers occurring in women over the age of 50. A family history of breast cancer can also increase a woman's risk, although most women who develop breast cancer do not have a family history of the disease. Other factors that may increase a woman's risk of developing breast cancer include not having carried or given birth to any children, late age at birth of first child, early menstruation and late menopause. Oral contraception use can cause a small increase in the risk of breast cancer, as can hormone replacement therapy, which causes an increase in risk consistent with late menopause (De et al. 2010; McPherson et al. 2000).

Box S1.2: Family history of breast cancer

Women are considered to have about twice the risk of breast cancer if they have a first-degree relative (mother, sister or daughter) diagnosed with breast cancer before the age of 50 (McPherson et al. 2000). The risk increases with a greater number of relatives with breast cancer, and younger age of breast cancer in affected relatives, as well as other factors such as family history of bilateral breast cancer, breast cancer before the age of 40 and male breast cancer (NBCC 2006).

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

How do we screen for breast cancer?

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

Why screen for breast cancer?

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

Compared with breast cancers detected outside BreastScreen Australia of which 28% are small, 54% of breast cancers detected by BreastScreen Australia are small. Likewise, treatment of breast cancers detected through BreastScreen Australia is more likely to be breast-conserving surgery (74% compared with 56% outside the program) (NBOCC 2009), which is associated with decreased morbidity.

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

How is breast cancer screening managed in Australia?

Australia's national breast cancer screening program was established in 1991 as the National Program for the Early Detection of Breast Cancer. This program is now known as BreastScreen Australia, and is a joint program of the Australian and state and territory governments. BreastScreen Australia aims to reduce mortality and morbidity from breast cancer. A list of its aims and objectives is in Box S1.3.

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). If any images are found to be suspicious for breast cancer, these women will be 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 S1.3 Aims and objectives of BreastScreen Australia

Aims

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

Objectives

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

Who is eligible to participate in BreastScreen Australia?

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

How is BreastScreen Australia monitored?

Performance indicators

For a population-based cancer screening program such as BreastScreen Australia, there is a need to assess its performance as this relates to the underlying aims of the program. At the national level, this is achieved by reporting data against a series of performance indicators (Table S1.1) 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 BreastScreen Australia's progress towards achieving reductions in morbidity and mortality from breast cancer.

Table S1: BreastScreen Australia performance indicators

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 ductal carcinoma in situ detected through BreastScreen Australia
6 Sensitivity	The ability of screening mammography to successfully detect cancers
6a Interval cancers	
6b Program sensitivity	
7 Incidence	The number of new cases of invasive breast cancer or DCIS
7a Invasive breast cancer incidence	
7b Ductal carcinoma in situ incidence	
8 Mortality	The number of deaths from invasive breast cancer

Accreditation standards

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

A number of NAS are consistent with the performance indicators in this report. For this reason, where appropriate, the data in this report are benchmarked against the NAS. These are used as a guide to interpretation only, since the NAS were not designed to be used as standards for the BreastScreen Australia performance indicators. While they provide useful benchmarks that aid in the interpretation of data presented, differences in definitions or data may exist.

See <www.cancerscreening.gov.au> for further information about BreastScreen Australia.

Data considerations

Data sources

The main sources of data for performance indicators are the state and territory BreastScreen registers. Analyses of these data allow monitoring of participation, rescreening, recall to assessment, detection of invasive breast cancer, detection of DCIS, and sensitivity (Indicators 1 to 6 in Table S1.1).

Additional to these sources are the AIHW Australian Cancer Database, which is the source of breast cancer incidence data (Indicator 7a, Table S1.1), the state and territory cancer registries, which are the source of DCIS incidence data (Indicator 7b, Table S1.1), and the National Mortality Database, which is the source of breast cancer mortality data (Indicator 8, Table S1.1). More detail on these data sources and classifications is provided in Appendix C.

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

New South Wales data were not available for all performance indicators

New South Wales data for participation by main language spoken at home (a disaggregation of participation), rescreening, recall to assessment, invasive breast cancer detection, DCIS detection, and sensitivity were not available because of issues relating to the implementation of a new business information system in New South Wales. It is anticipated that future reports will include New South Wales data for these years.

Where New South Wales data are not included, a total for the other states is provided.

Because New South Wales data were included in all preceding years, and because New South Wales comprises 34% of women aged 50–69 who participate in BreastScreen Australia, trend data are of limited usefulness and therefore are not provided for affected indicators.

National trend data for earlier years is presented in the *BreastScreen Australia monitoring report 2008–2009* available on the AIHW website <www.aihw.gov.au/publications/>.

This does not affect breast cancer incidence or mortality data, which – being sourced from outside BreastScreen Australia – include data from all states and territories.

Aboriginal and Torres Strait Islander women

Of the performance indicators used to monitor BreastScreen Australia, participation, incidence and mortality are disaggregated by Aboriginal and Torres Strait Islander status.

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

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

Reporting women with symptoms

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

Terminology and concepts used in this report

Reporting periods

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

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

Age groups

Data are presented for women aged 50–69 who, as the target age group of BreastScreen Australia, are actively invited to participate in the program. Where appropriate, data are also presented for women aged 40–49 and 70+, who are also eligible to have free screening mammograms through BreastScreen Australia. More detailed data for these age groups are also presented in the *BreastScreen Australia monitoring report 2009–2010: supplementary data tables* available on the AIHW website <www.aihw.gov.au>.

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 2009–2010 was 55.3%). However, comparisons over time, or across states/territories or population subgroups require that crude rates are *age-standardised* to remove the underlying differences in age-structure over time or between groups. These allow analyses of trends and differentials, and are therefore preferentially reported in these situations (for example, *age-standardised* participation in 2009–2010 was 55.0%).

Statistical significance

In this report, 95% confidence intervals have been used to determine if a statistically significant difference exists between age-standardised 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 (See Box S1.4). Because overlapping confidence intervals do not imply that the difference between two age-standardised rates is definitely due to chance, it can only be stated that no statistically significant differences were found, and not that no differences exist.

Box S1.4: The use of confidence intervals for non-sample data

The AIHW is reviewing the provision of confidence intervals when data arise from sources that provide information on all subjects rather than from a sample. This review will include analysis of the methods used to calculate confidence intervals, as well as the appropriateness of reporting confidence intervals for such data. It aims to ensure that statistical methods remain robust and appropriately inform understanding and decision making.

Differences that are described as ‘significant’ refer to a statistically significant difference. Judgment should, however, be exercised in deciding whether or not the difference is of any practical or clinical significance. This is particularly relevant to a national dataset, the analysis of which can result in statistically significant differences that may not be of any clinical significance or policy relevance.

For more information on the calculation and interpretation of confidence intervals, see Appendix E.

Section 2 Performance indicators

Indicator 1 Participation

What do we mean by participation?

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

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

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

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

State and territory BreastScreen registers are the source of participation data. NSW data are not included in the analysis of participation by main language spoken at home.

The most recent participation data are for women who had a screening mammogram in 2009 and 2010.

Key results

Women who participated in 2009-2010

- 1,710,312 women participated in BreastScreen Australia, of whom 1,352,112 (79.1%) were aged 50-69. This is 55.3% of women in the target age group, which when age-standardised to allow analyses of trends and differentials, equates to a participation rate of 55.0%.
- While participation progressively increased with improving socioeconomic status, this trend was small, with participation ranging between 53.3% and 55.6%. This indicates that BreastScreen Australia is accessible to all women.

Trends

- Participation has remained steady between 55% and 57% for most years from 1997-1998, when reporting began, to 2009-2010, despite a steady increase in the actual number of women participating over this time.
- In the decade to 2009-2010, participation by Aboriginal and Torres Strait Islander women increased from 34.9% to 36.2%. However, it remained significantly lower than that of non-Indigenous women (54.9%) in the latest reporting period.

Detailed analyses

Participation in 2009–2010

In 2009–2010, 1,710,312 women participated in BreastScreen Australia (that is, had at least one screening mammogram over the 2 years), of whom 1,352,112 were aged 50–69.

These 1,352,112 women represent 55.3% of women in the target age group which when age-standardised to allow analysis of trends and differentials, equates to a participation rate of 55.0%.

Although the NAS for participation has not been met at the national level (*NAS 1.1.1 being that at least 70% of women aged 50–69 participate in screening in the most recent 24-month period*), a reduction in breast cancer mortality has been observed with the current participation rate of 55.0%

Participation trends

Table 1.1 shows the trend in participation nationally, from 1996–1997, when reporting began, to 2009–2010, the most recent national data available.

Table 1.1: Number and age-standardised rate of women aged 50–69 participating in BreastScreen Australia, 1996–1997 to 2009–2010

Reporting period	Participants ^(a)	Population ^(b)	AS rate ^(c)	95% CI
1996–1997	845,143	1,645,331	51.5	51.4–51.6
1997–1998	927,735	1,700,951	54.6	54.5–54.7
1998–1999	976,182	1,754,254	55.7	55.6–55.8
1999–2000	1,012,184	1,809,735	55.9	55.8–56.1
2000–2001	1,064,246	1,868,832	57.0	56.8–57.1
2001–2002	1,102,642	1,928,878	57.1	57.0–57.3
2002–2003	1,118,823	1,989,802	56.2	56.1–56.3
2003–2004	1,144,008	2,051,480	55.7	55.6–55.8
2004–2005	1,188,955	2,114,036	56.1	56.0–56.2
2005–2006	1,242,210	2,177,660	56.9	56.8–57.0
2006–2007	1,262,334	2,242,133	56.1	56.0–56.2
2007–2008	1,273,317	2,308,680	54.9	54.8–55.0
2008–2009	1,319,771	2,376,559	55.2	55.1–55.3
2009–2010	1,352,112	2,444,680	55.0	54.9–55.0

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

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

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

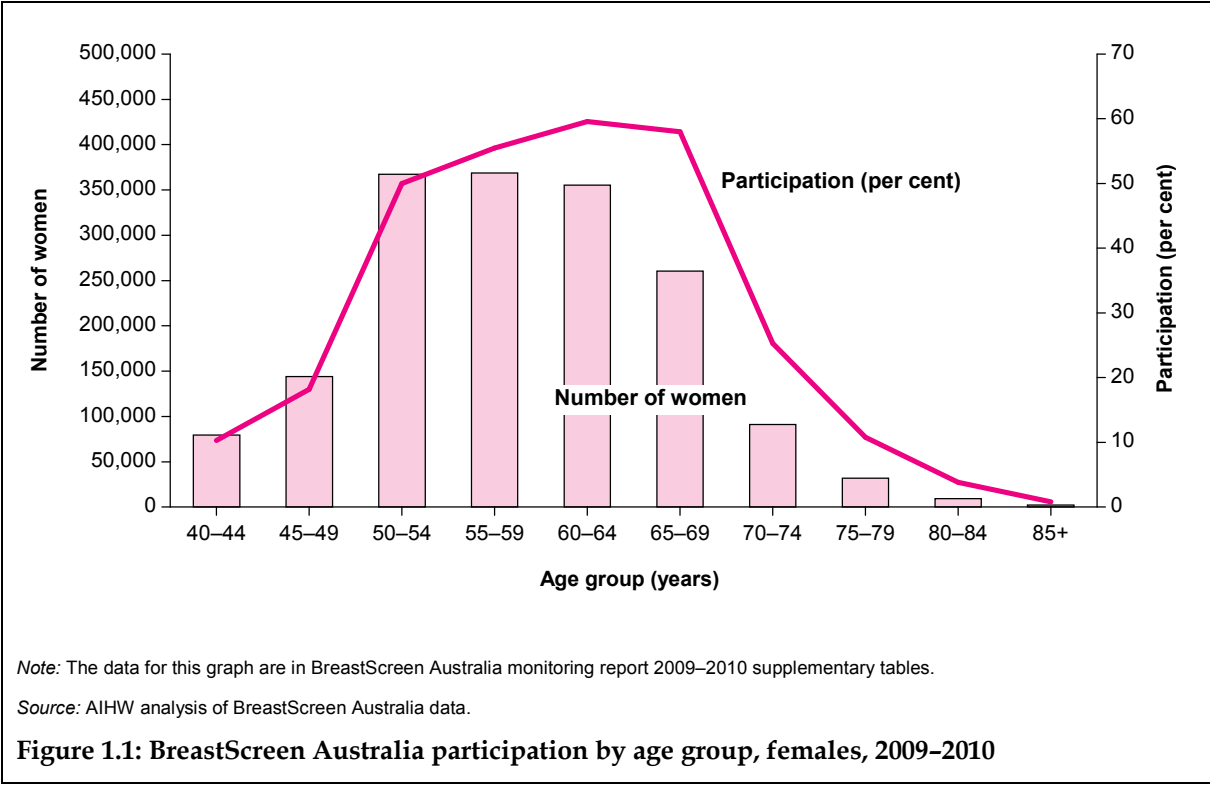
Source: AIHW analysis of BreastScreen Australia data.

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

Participation by age

In 2009–2010, the proportion of women screened was highest in women aged 50–69, in line with BreastScreen Australia’s aim to maximise the proportion of women in the target age group who are screened every 2 years. Further, the proportion of women participating was equal to or above 50% for all 5-year age groups within the target age group, peaking at 59.6% in women aged 60–64 (Figure 1.1).

The proportion of women screened outside the target age group dropped away steeply, with 14.3% of women aged 40–49 and 11.6% of women aged 70 and over screening in 2009–2010, compared with 55.3% of women aged 50–69 (all crude rates) (Figure 1.1).



The breakdown of women screened, into the age groups 40–49, 50–69 and 70 and over, is shown in Figure 1.2 for the reporting periods 1999–2000 and 2009–2010.

In the 10 years between 1999–2000 and 2009–2010, women in the target age group have comprised an increasing proportion of all women screened, from 67.6% in 1999–2000 to 79.1% in 2009–2010. Concurrent to this has been a decrease in the 40–49 age group from 19.0% to 13.1% and in the 70 and over age group from 13.4% to 7.9% (Figure 1.2).



Participation by state and territory

In 2009–2010, participation across most states and territories ranged between 53% and 58%. Participation increased between 2007–2008 and 2009–2010 in Victoria, Western Australia and Tasmania (Table 1.2; Figure 1.3).

In the 10 years between 1999–2000 and 2009–2010, there was either no change or a decrease in participation rates for all states except Western Australia (Appendix table A1; Figure 1.3).

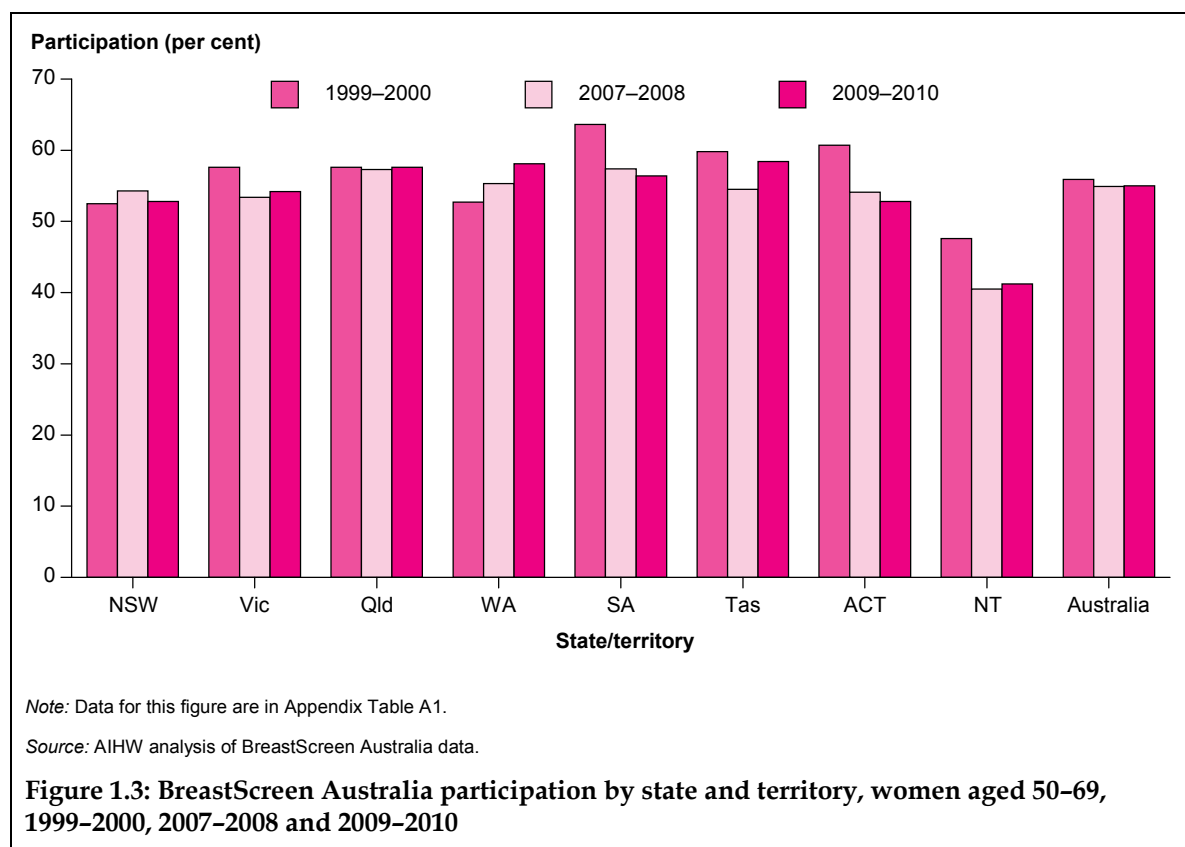
Table 1.2: BreastScreen Australia participation by remoteness area, women aged 50–69, 2009–2010

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
Number	424,539	328,313	281,585	141,030	111,081	37,529	20,171	7,864	1,352,112
AS rate	52.8	54.2	57.6	58.1	56.4	58.4	52.8	41.2	55.0
95% CI	52.6–53.0	54.0–54.3	57.4–57.8	57.8–58.4	56.1–56.8	57.8–59.0	52.0–53.5	40.2–42.1	54.9–55.0

Notes

1. Participants are the number of women screened through BreastScreen Australia in each 2-year reporting period. The screening periods cover 1 January 2009 to 31 December 2010.
2. Rates are the number of women screened as a percentage of the eligible female population calculated as the average of the ABS's estimated resident population and age-standardised to the Australian population at 30 June 2001.
3. Direct comparisons between the states and territories of Australia are not advised due to the substantial differences that exist between the jurisdictions including population, geographic size and structure, policies and other factors.

Source: AIHW analysis of BreastScreen Australia data.



Participation by remoteness area

In 2009-2010, participation was highest in *Outer regional* areas (58.2%), and lowest in *Very remote* areas (47.2%) (Table 1.3; Figure 1.4A).

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

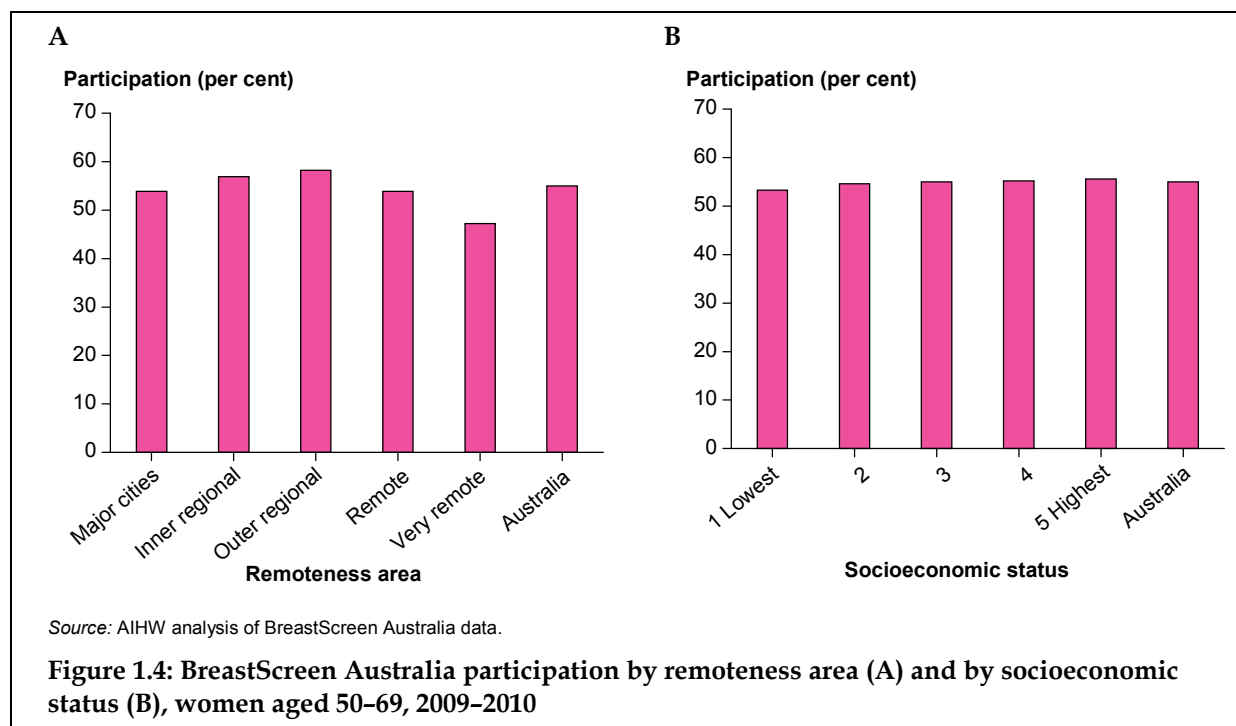
Table 1.3: BreastScreen Australia participation by remoteness area, women aged 50-69, 2009-2010

	Major cities	Inner regional	Outer regional	Remote	Very remote	Australia
Number	876,864	309,759	140,879	17,265	6,710	1,352,112
AS rate (95% CI)	53.9 (53.8-54.0)	56.9 (56.7-57.1)	58.2 (57.9-58.5)	53.9 (53.1-54.7)	47.2 (46.0-48.3)	55.0 (54.9-55.0)

Notes

1. Rates are the number of women screened as a percentage of the eligible female population calculated as the average of the ABS's estimated resident population and age-standardised to the Australian population at 30 June 2001. Period covers 1 January 2009 to 31 December 2010.
2. Remoteness areas were assigned using the woman's residential postcode according to the Australian Standard Geographic Classification for 2006.

Source: AIHW analysis of BreastScreen Australia data.



Participation by socioeconomic status

There was little variation in participation across socioeconomic groups. Although participation progressively increased with improving socioeconomic status, this trend was small, with all socioeconomic groups recording participation rates between 53% and 56% (Figure 1.4B; Table 1.4). This indicates that BreastScreen Australia is accessible to all women.

Table 1.4: BreastScreen Australia participation by socioeconomic status, women aged 50–69, 2009–2010

	1 (Lowest)	2	3	4	5 (Highest)	Australia
Number	261,771	277,338	269,680	262,143	275,581	1,352,112
AS rate (95% CI)	53.3 (53.1–53.5)	54.6 (54.4–54.8)	55.0 (54.8–55.2)	55.2 (55.0–55.4)	55.6 (55.4–55.8)	55.0 (54.9–55.0)

Notes

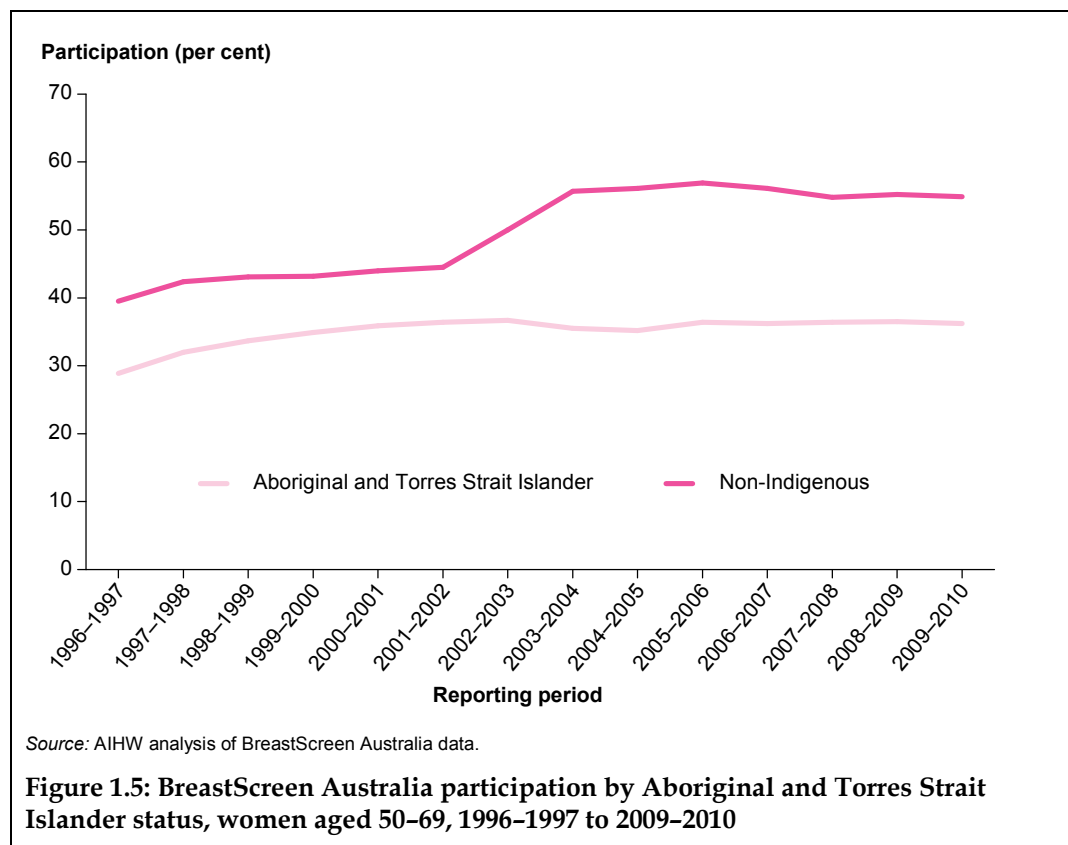
1. Rates are the number of women screened as a percentage of the eligible female population calculated as the average of the ABS's estimated resident population and age-standardised to the Australian population at 30 June 2001. Period covers 1 January 2009 to 31 December 2010.
2. Socioeconomic status was assigned using the woman's residential postcode according to the Socioeconomic Index for Areas (SEIFA) Index of Relative Socioeconomic Disadvantage for 2006. 1 (lowest socioeconomic group) corresponds to the most disadvantaged socioeconomic status and 5 (highest socioeconomic group) to the least disadvantaged socioeconomic status.

Source: AIHW analysis of BreastScreen Australia data.

Participation by Aboriginal and Torres Strait Islander status

Aboriginal and Torres Strait Islander women participate in BreastScreen Australia at a lower rate than non-Indigenous women. This was true for all reporting periods between 1996–1997 and 2009–2010 (Figure 1.5).

However, participation rates for Aboriginal and Torres Strait Islander women have increased from 34.9% in 1999–2000 to 36.2% in 2009–2010 (Table 1.5).



In 2009-2010, participation of Aboriginal and Torres Strait Islander women aged 50-69 was 36.2% compared with non-Indigenous participation of 54.9% – an 18.7 percentage point difference (Table 1.5).

Table 1.5: BreastScreen Australia participation by Aboriginal and Torres Strait Islander status, women aged 50-69, 1999-2000 and 2009-2010

	Aboriginal and Torres Strait Islander	Non-Indigenous	Australia ^(a)
1999-2000			
Number	6,479	773,574	1,012,184
AS rate (95% CI)	34.9 (34.0-35.8)	43.2 (43.1-43.3)	55.9 (55.8-56.1)
2009-2010			
Number	11,374	1,332,597	1,352,112
AS rate (95% CI)	36.2 (35.5-36.9)	54.9 (54.8-55.0)	55.0 (54.9-55.0)

(a) Includes women in the 'not stated' category for Aboriginal and Torres Strait Islander status. Therefore, columns may not sum to the Australia column.

Notes

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

Source: AIHW analysis of BreastScreen Australia data.

Many of the state and territory BreastScreen programs have developed, and continue to develop, strategies and initiatives to encourage greater participation by Aboriginal and Torres Strait Islander women. These are based on research to ensure that strategies and initiatives are sensitive and appropriate to the knowledge, attitudes and beliefs of Aboriginal and Torres Strait Islander women (see for example, BreastScreen Queensland 2009; BreastScreen SA 2003; BreastScreen WA 2008).

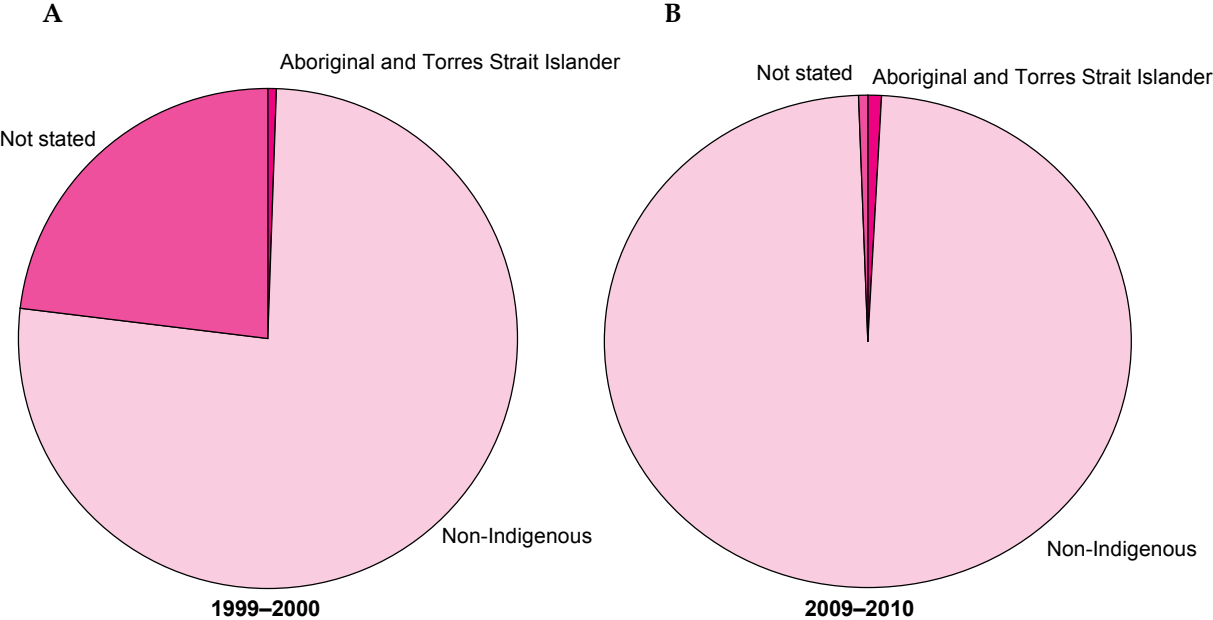
Strategies to encourage participation include dedicated and appropriate communication resources, and block and group bookings. BreastScreen programs also liaise closely with Aboriginal Health Workers and Aboriginal and Torres Strait Islander community groups to increase acceptance of screening.

Box 1.1 How does self-reporting of Aboriginal and Torres Strait Islander status affect participation rates?

A greater proportion of women identifying as Aboriginal or Torres Strait Islander at a BreastScreen service in 2009–2010 compared with 1999–2000 may influence the trends described.

Of the 1,352,112 women aged 50–69 who participated in BreastScreen Australia in 2009–2010, 11,374 (0.8%) identified as Aboriginal or Torres Strait Islander. This is an increase from 1999–2000, when 0.6% (6,479) of women screened self-identified as Aboriginal or Torres Strait Islander.

Additionally, as shown in Figure 1.6, there has been a marked reduction in women being allocated to the ‘not stated’ category, which adds further complexity when interpreting trends in participation of Aboriginal and Torres Strait Islander women.



Source: AIHW analysis of BreastScreen Australia data.

Figure 1.6: Proportion of women aged 50–69 screened by BreastScreen Australia, by Aboriginal and Torres Strait Islander status, 1999–2000 (A) and 2009–2010 (B)

Participation by main language spoken at home

In 2009–2010, excluding New South Wales data, the difference in participation between English-speaking women and those who reported that they speak a language other than English at home was 21.8 percentage points (Table 1.6).

Table 1.6: BreastScreen Australia participation by main language spoken at home, women aged 50–69, 2009–2010

	English-speaking	Non-English-speaking	Total ^{(a)(b)}
Number	823,688	102,114	927,573
AS rate (95% CI)	59.5 (59.4–59.6)	37.7 (37.5–37.9)	56.0 (55.9–56.1)

(a) NSW data are not included.

(b) 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 upon main language spoken at home should be interpreted with caution. Limitations are detailed in Appendix B.
2. Rates are the number of women screened as a percentage of the eligible female population calculated as the average of the ABS's estimated resident population and age-standardised to the Australian population at 30 June 2001. The screening periods cover 1 January of the initial year to 31 December of the latter year indicated.

Source: AIHW analysis of BreastScreen Australia data.

Indicator 2 Rescreening

What do we mean by rescreening?

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

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

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

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

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

State and territory BreastScreen registers are the source of rescreening data. New South Wales rescreening data were not available for inclusion in this section because of issues relating to the implementation of a new business information system. A total for the other states is provided in place of an Australian total. Trend data are not provided but can be found in the *BreastScreen Australia monitoring report 2008–2009* (AIHW 2011).

The most recent rescreening data are for women screened in the index year 2008.

Rescreening data are several years behind participation, recall and detection data, as 27 months needs to have passed after a woman's last screen to know whether or not she rescreened within this interval.

Key results

Women rescreening after a screen in 2008

- The proportion of women aged 50–67 who screened in 2008 and rescreened within 27 months ranged from 59.1% after the first screening round to 67.8% after the second screening round and 82.2% after the third and subsequent screening rounds.

Background information

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

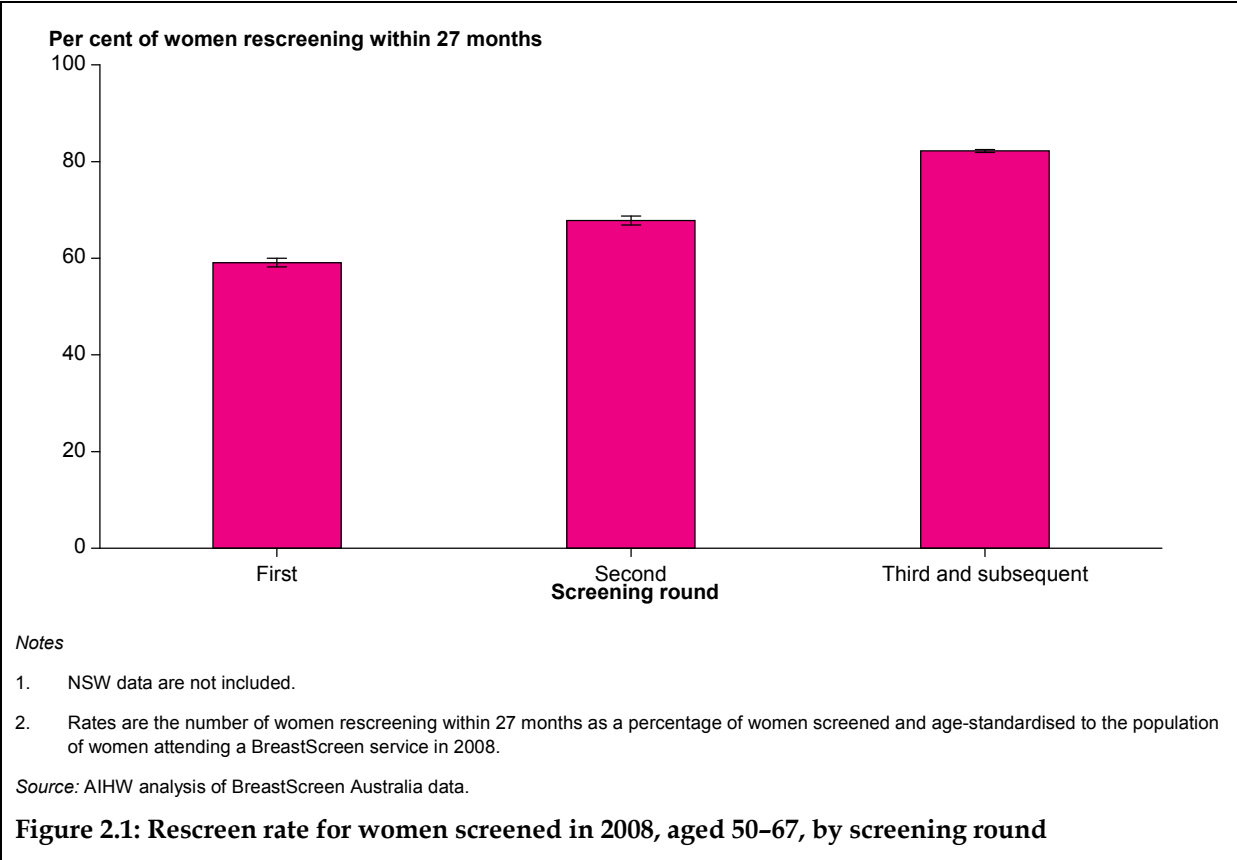
Box 2.1: Terminology

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

Detailed analyses

Rescreening after a screen in 2008

The proportion of women aged 50–67 who returned for a rescreen within 27 months increased with the number of screens or ‘screening rounds’ (see the terminology box above) previously attended (Figure 2.1).



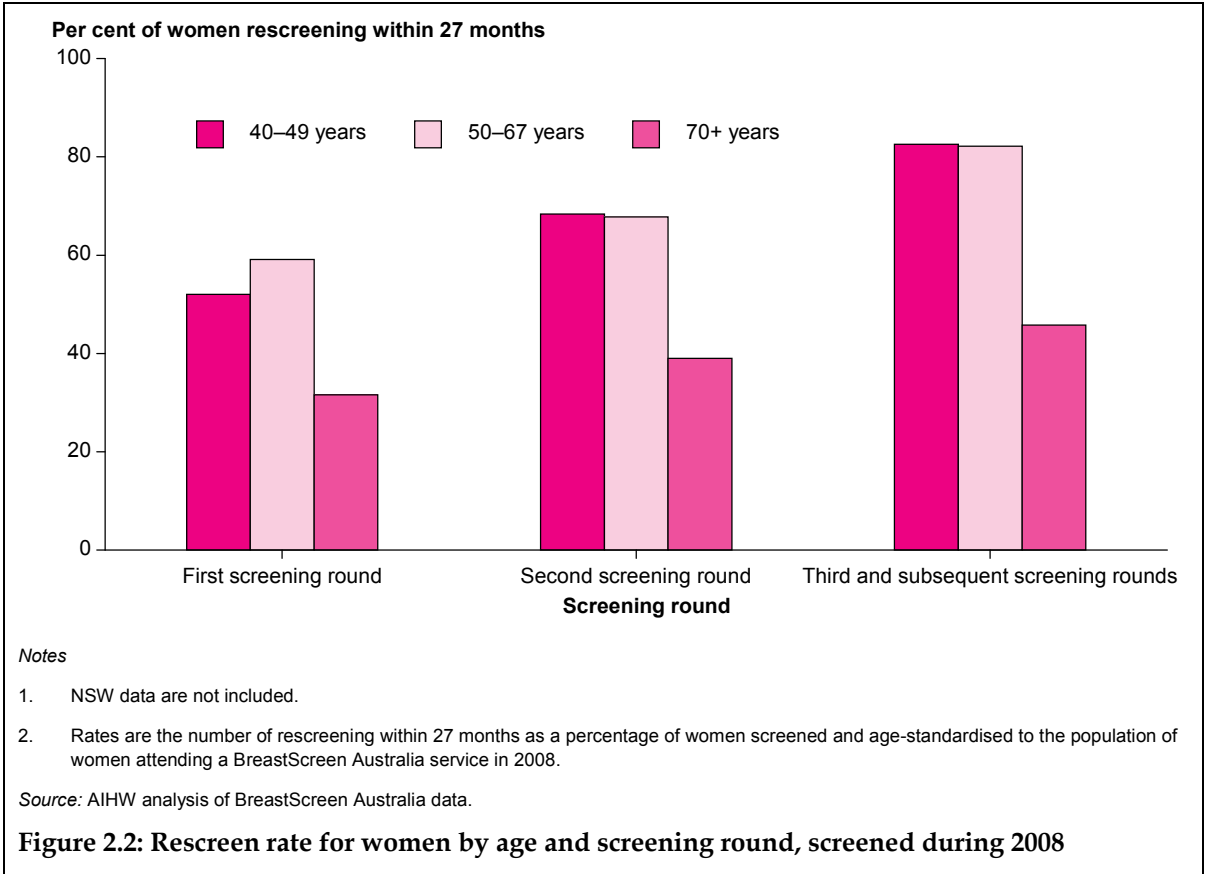
The proportion of women aged 50–67 who were screened in 2008 and returned within 27 months increased from 59.1% after the first screening round to 67.8% after the second screening round, and to 82.2% after the third and subsequent screening rounds (Figure 2.1).

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

Rescreening by age

For women screened for the first time in 2008, the highest rescreen rates were for women aged 50–67, followed by women aged 40–49. Rescreen rates were similar for women aged 50–67 and 40–49 following second or third and subsequent screening rounds. Women aged 70 and over had far lower rescreen rates regardless of screening round (Figure 2.2).

In 2008, 56.7% of the women rescreening after the first screening round were aged 50–67. Of those rescreening after the second screening round, 64.6% were aged 50–67, and of the women rescreening after the third and subsequent screening rounds, 81.5% were aged 50–67 (see *BreastScreen Australia monitoring report 2009–2010 supplementary data tables*).



Rescreening by state and territory

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

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

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
	(per cent)								
First screening round									
AS rate	n.a.	52.2	62.6	61.8	64.9	71.9	49.2	52.2	59.1
95% CI	n.a.	50.6–53.8	61.0–64.2	59.3–64.3	60.5–69.4	67.1–76.9	45.6–53.1	45.3–59.7	58.2–60.1
Second screening round									
AS rate	n.a.	63.8	71.3	69.0	66.5	78.3	61.4	66.1	67.8
95% CI	n.a.	62.2–65.4	69.8–73.0	66.5–71.5	63.1–69.9	73.7–83.2	57.9–65.1	57.5–75.4	66.9–68.8
Third and subsequent screening rounds									
AS rate	n.a.	77.8	85.6	84.2	82.4	88.5	74.4	80.2	82.2
95% CI	n.a.	77.3–78.4	85.1–86.2	83.3–85.0	81.5–83.3	86.9–90.2	72.7–76.1	76.3–84.3	81.9–82.6

n.a. not available.

Notes

- 1 NSW data are not included.
- 2 Rates are the number of rescreening within 27 months as a percentage of women screened and age-standardised to the population of women attending a BreastScreen Australia service in 2008.

Source: AIHW analysis of BreastScreen Australia data.

Indicator 3 Recall to assessment

What do we mean by recall to assessment?

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

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

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

Changes to recall to assessment rates cannot be considered in the absence of corresponding invasive cancer detection rates. A higher recall to assessment rate may be considered acceptable if it leads to higher breast cancer detection rates.

State and territory BreastScreen registers are the source of recall to assessment data. New South Wales recall to assessment data were not available for inclusion in this section because of issues relating to the implementation of a new business information system. A total for the other states is provided in place of an Australian total. Trend data are not provided but can be found in the *BreastScreen Australia monitoring report 2008–2009* (AIHW 2011).

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

Key results

Women screened in 2010 who were recalled to assessment

- For women aged 50–69, 12.2% of women screened for the first time were recalled to assessment, while 4.0% attending subsequent screens were recalled.

Background information

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

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

Detailed analyses

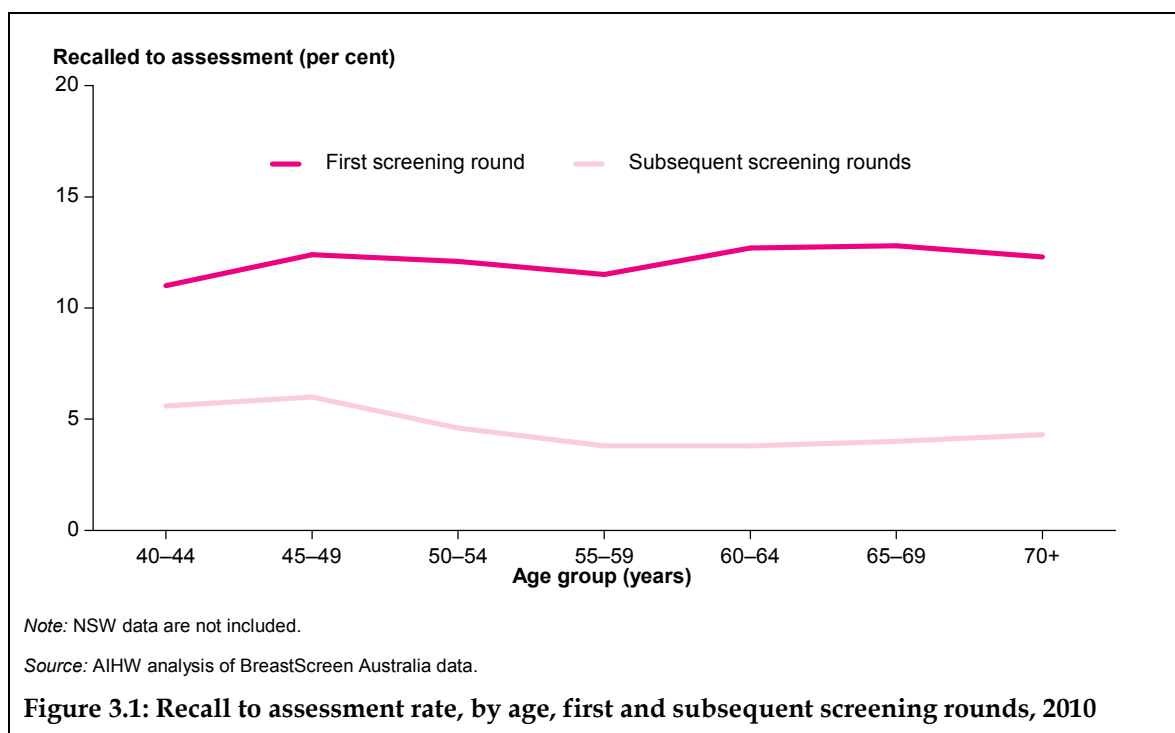
Recall to assessment after a screen in 2010

Of the 52,851 women aged 50–69 attending their first screen, 6,394 (12.1%) were recalled to assessment. This equates to 12.2% when age-standardised. The NAS for recall to assessment for women who attend for their first screen have not been met at the national level (NAS 2.6.1 being that *less than 10% of women aged 50–69 who attend for their first screen are recalled for assessment*).

Of the 433,352 women aged 50–69 attending a subsequent screen, 17,344 (4.0%) were recalled to assessment (also 4.0% age-standardised). These data do not include women recalled for assessment in New South Wales. These rates are well within the NAS for women attending a subsequent screen (NAS 2.6.2 being that *less than 5% of women aged 50–69 who attend for their second or subsequent screen are recalled for assessment*).

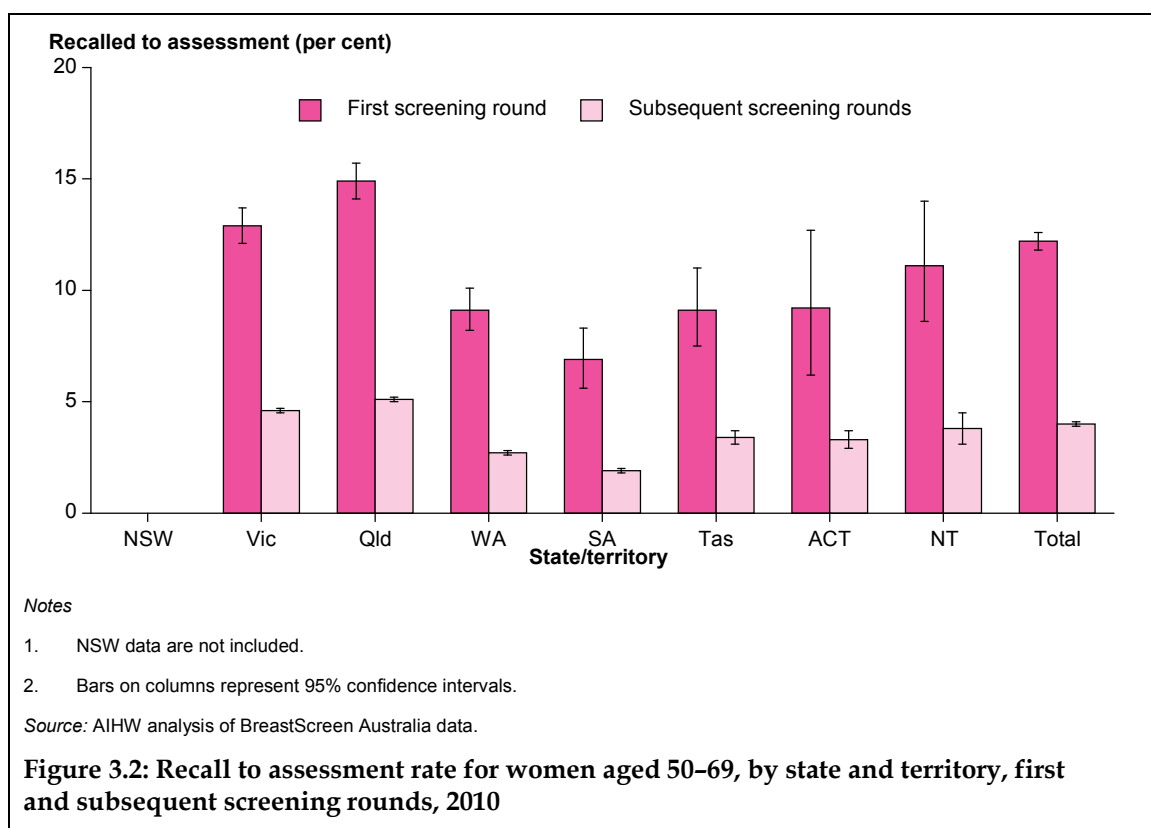
Recall to assessment by age

In 2010, recall to assessment rates for the first screening round were lowest in women aged 40–44 (11.0%) and highest in women aged 60–64 and 65–69 (12.7% and 12.8%), with little variation in the other age groups. In subsequent screening rounds, the proportion of women recalled to assessment tended to be higher in younger age groups (Figure 3.1).



Recall to assessment by state and territory

In 2010, recall to assessment for women aged 50–69 varied considerably across states and territories (Figure 3.2).



Recall to assessment rates for women aged 50–69 attending their first screen ranged between 6.9% and 14.9%. While recall to assessment rates for women aged 50–69 attending subsequent screens ranged between 1.9% and 5.1% (Table 3.1).

Table 3.1: Recall to assessment rate for women aged 50–69, by state and territory, first and subsequent screening rounds, 2010

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Total ^(a)
First screening round									
Number	n.a.	3,054	1,851	835	297	148	104	105	6,394
AS rate	n.a.	12.9	14.9	9.1	6.9	9.1	9.2	11.1	12.2
95% CI		12.1–13.7	14.1–15.7	8.2–10.1	5.6–8.4	7.5–11.2	6.2–12.8	8.7–14.0	11.8–12.6
Subsequent screening rounds									
Number	n.a.	6,672	6,858	1,822	985	602	279	126	17,344
AS rate	n.a.	4.6	5.1	2.7	1.9	3.4	3.3	3.8	4.0
95% CI		4.5–4.7	5.0–5.2	2.6–2.8	1.8–2.0	3.1–3.6	2.9–3.7	3.2–4.6	4.0–4.1

n.a. not available.

(a) NSW data are not included.

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

Source: AIHW analysis of BreastScreen Australia data.

Indicator 4 Invasive breast cancer detection

What do we mean by invasive breast cancer detection?

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

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

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

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

State and territory BreastScreen registers are the source of invasive breast cancer detection data. New South Wales data were not available for inclusion in this section because of issues relating to the implementation of a new business information system. A total for the other states is provided in place of an Australian total. Trend data are not provided but can be found in the *BreastScreen Australia monitoring report 2008–2009* (AIHW 2011).

The most recent all-size and small cancer detection data are for women screened in 2010.

Key results

Women screened in 2010 who had an invasive breast cancer detected

- For women aged 50–69, 97.0 per 10,000 women screened were diagnosed with invasive breast cancer in the first screening round, and 45.6 per 10,000 were diagnosed in subsequent screening rounds.
- For women aged 50–69, 60.6% of all invasive breast cancers detected were small (≤ 15 mm) and when all screening rounds combined are considered, 29.9 per 10,000 women screened were diagnosed with small invasive breast cancer.

Detailed analyses

Invasive breast cancer detection after a screen in 2010

Excluding New South Wales data, 3,207 women were diagnosed with invasive breast cancer, of whom 2,414 (75.2%) were aged 50–69, 300 (9.4%) were aged 40–49, and 493 (15.4%) were aged 70 or over.

Of the 2,414 women aged 50–69 diagnosed with invasive breast cancer, 381 were attending their first screen, which is equivalent to 72.1 women diagnosed per 10,000 women screened, and 2,033 were attending a subsequent screen, equivalent to 46.9 per 10,000. When age-standardised to allow analyses of trends and differentials, these rates are 97.0 per 10,000 in the first screening round, and 45.6 per 10,000 in subsequent rounds (Table 4.1).

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

	Number	AS rate	95% CI
All size			
First screening round	381	97.0	84.2–110.8
Subsequent screening rounds	2,033	45.6	43.6–47.6
Small size			
All screening rounds	1,463	29.9	28.4–31.5

Notes

1. NSW data are not included.
2. Rates are the number of women with invasive breast cancer detected per 10,000 women screened and age-standardised to the population of women attending a BreastScreen Australia service in 2008.

Source: AIHW analysis of BreastScreen Australia data.

Of the 2,414 women aged 50–69 diagnosed with invasive breast cancer, 1,463 had a small (≤ 15 mm) cancer diagnosed (30.1 per 10,000 women screened). This is 60.6% of all cancers diagnosed in women aged 50–69 through BreastScreen Australia. Age-standardised, this is 29.9 per 10,000 women screened.

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

Small invasive breast cancer detection after a screen in 2010

Box 4.1: Terminology

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

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

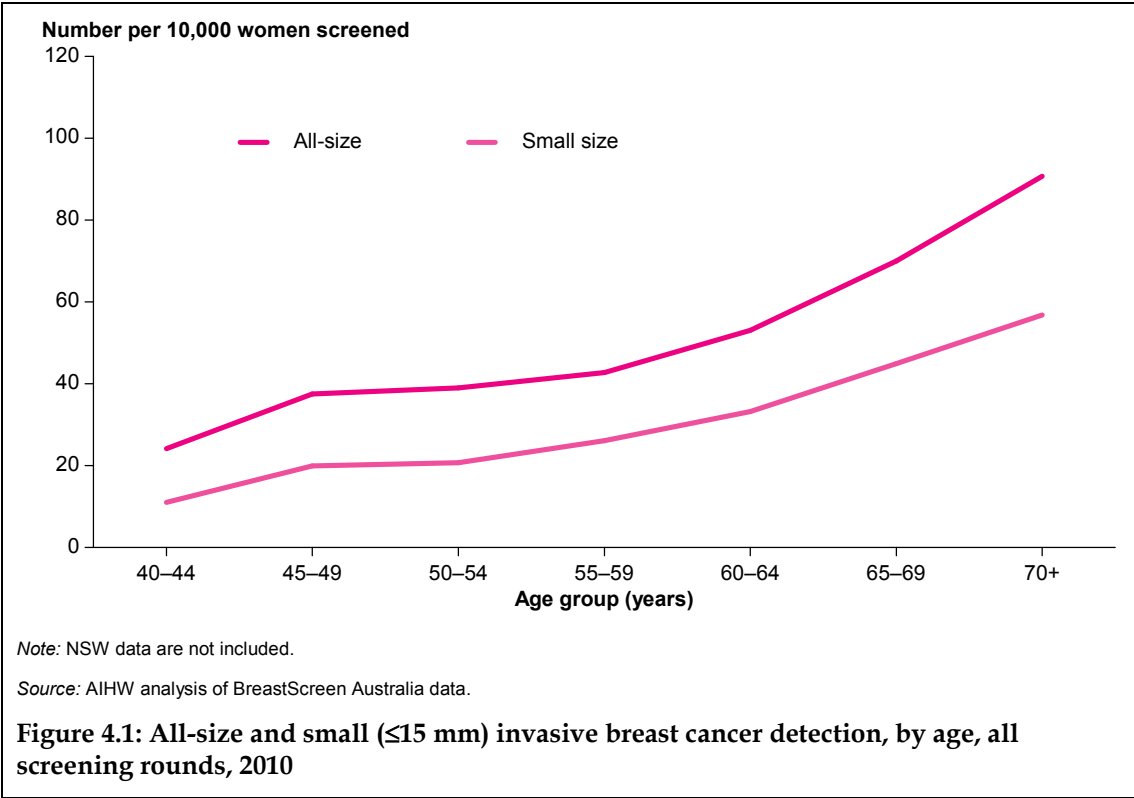
A woman is more likely to be diagnosed with a small cancer in subsequent screening visits than her first visit, since her first screening mammogram detects prevalent cancers that may have been present for some time, whereas subsequent screens detect incident cancers that have grown between screens (Kavanagh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

Accordingly, the proportion of small cancers detected in 2010 was lower in the first screening round (46.7%) than in subsequent screening rounds (63.2%) (data not shown).

The proportion of small invasive breast cancers was lower in younger age groups, being 51.0% of cancers for women aged 40–49, compared with 60.6% for women aged 50–69 and 62.7% for those aged 70 and over (data from *supplementary data table S4.7*). This may be related to greater breast density in younger women, which makes small invasive breast cancers more difficult to visualise using screening mammography (Irwig et al. 1997).

Invasive breast cancer detection by age

Detection of invasive breast cancers increased with age (Figure 4.1), reflecting the increase in incidence that occurs with age, as described in Indicator 7a.



In 2010, invasive breast cancer detection increased from 24.1 per 10,000 women screened for women aged 40–44 to 90.7 for women aged 70 or over (Table 4.2). Small invasive breast cancers increased in the same year; from 11.0 per 10,000 women screened in women aged 40–44 to 56.8 for women aged 70 or over.

Table 4.2: All-size and small (≤ 15 mm) invasive breast cancer detection rates, by age, all screening rounds, 2010

	Age group (years)						
	40–44	45–49	50–54	55–59	60–64	65–69	70+
All-size							
Number	77	223	523	561	678	652	493
Rate	24.1	37.5	39.1	42.7	53.0	70.0	90.7
Small							
Number	35	118	277	344	424	418	309
Rate	11.0	19.9	20.7	26.2	33.2	44.9	56.8

Notes

1. NSW data are not included.
2. Rates are age specific rates.

Source: AIHW analysis of BreastScreen Australia data.

Invasive breast cancer detection by state and territory

The number of women with invasive breast cancer diagnosed per 10,000 women screened showed considerable variation among states and territories. These data should be interpreted with caution because, due to small numbers, none of the observed differences were statistically significant (Figure 4.2; Table 4.3).

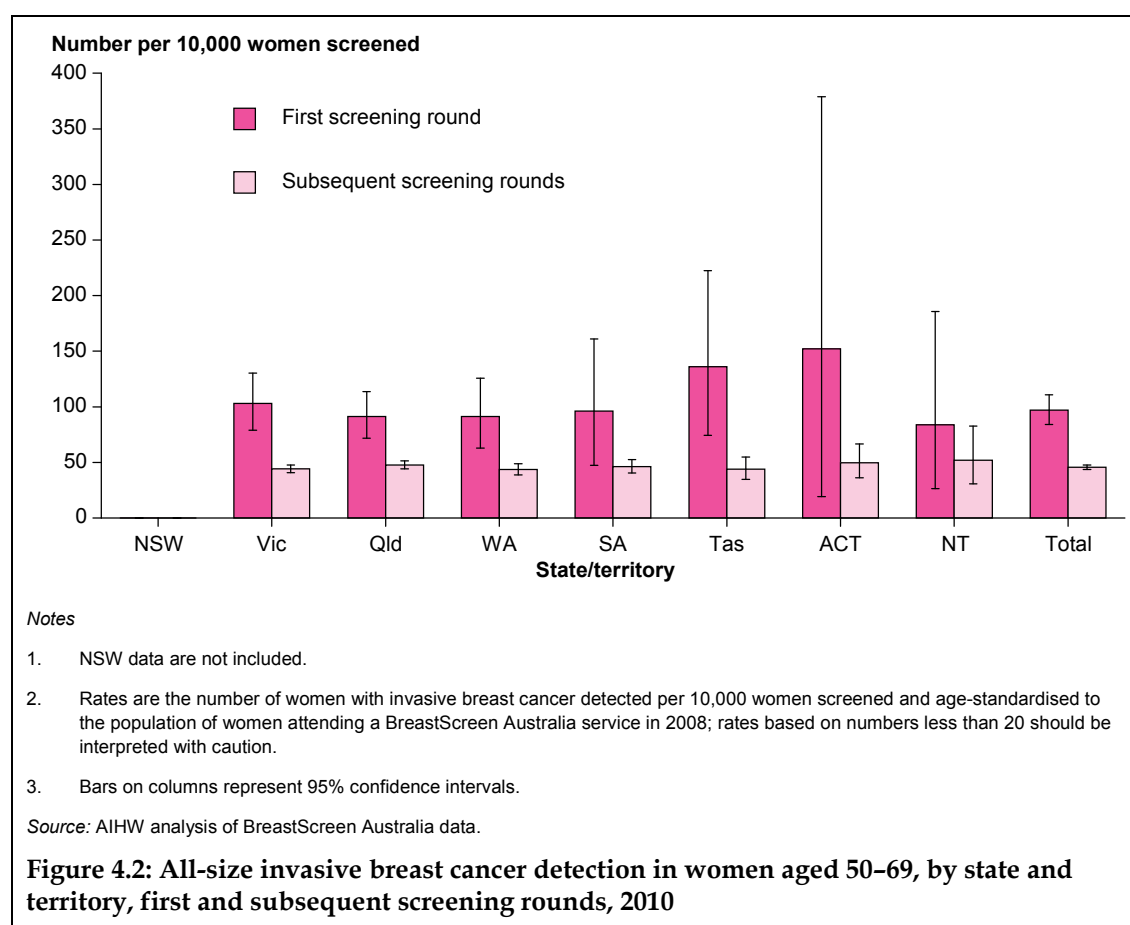


Table 4.3: All-size and small (≤ 15 mm) invasive breast cancer detection rates in women aged 50–69, by state and territory, 2010

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Total ^(a)
All-size, first screening round									
Number	n.a.	150	100	68	28	20	8	7	381
AS rate	n.a.	103.1	91.2	91.4	96.3	136.0	152.1	83.9	97.0
95% CI		79.1–130.3	71.7–113.7	62.8–125.8	47.5–161.1	74.2–222.3	19.3–379.0	26.5–185.6	84.2–110.8
All size, subsequent screening rounds									
Number	n.a.	675	655	309	249	81	46	18	2,033
AS rate	n.a.	44.1	47.7	43.6	46.3	43.9	49.8	52.1	45.6
95% CI		40.7–47.6	44.1–51.5	38.8–48.7	40.7–52.5	34.8–54.7	36.3–66.6	30.6–82.7	43.6–47.6
Small, all screening rounds									
Number	n.a.	479	478	211	187	57	37	14	1,463
AS rate	n.a.	27.9	32.3	27.2	32.3	28.4	37.2	34.6	29.9
95% CI		25.5–30.6	29.5–35.4	23.7–31.2	27.9–37.3	21.5–36.8	26.2–51.3	18.6–58.5	28.4–31.5

n.a. not available.

(a) NSW data are not included.

Notes

1. Rates are the number of women with invasive breast cancer detected per 10,000 women screened and age-standardised to the population of women attending a BreastScreen Australia service in 2008; rates based on numbers less than 20 should be interpreted with caution.
2. State and territory differences, along with the size of the 95% confidence intervals (particularly in the smaller states and territories), need to be taken into consideration when interpreting cancer detection results.
3. In some states and territories, age-standardised rates vary considerably from crude rates. Crude rates are available in the *BreastScreen Australia monitoring report 2009–2010 supplementary tables*.

Source: AIHW analysis of BreastScreen Australia data.

Indicator 5 Ductal carcinoma in situ detection

What do we mean by ductal carcinoma in situ detection?

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

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

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

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

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

State and territory BreastScreen registers are the source of DCIS detection data. New South Wales data were not available for inclusion in this section because of issues relating to the implementation of a new business information system. A total for the other states is provided in place of an Australian total. Trend data are not provided but can be found in the *BreastScreen Australia monitoring report 2008–2009* (AIHW 2011).

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

Key results

Women screened in 2010 who had a DCIS detected

- For women aged 50–69, 24.3 per 10,000 women screened were diagnosed with DCIS in the first screening round, and 11.8 per 10,000 in subsequent rounds.

Background information

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

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

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

Detailed analyses

DCIS detection after a screen in 2010

Excluding New South Wales data, 815 women were diagnosed with DCIS by BreastScreen Australia, of whom 623 (76.4%) were aged 50–69.

Of the 623 women aged 50–69 diagnosed with DCIS, 106 were attending their first screen, equivalent to 20.1 women diagnosed per 10,000 women screened, and 517 were attending a subsequent screen, equivalent to 11.9 per 10,000 women screened.

When age-standardised, these rates are 24.3 per 10,000 women screened in the first screening round, and 11.8 per 10,000 in subsequent screening rounds (Table 5.1).

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

Table 5.1: Ductal carcinoma in situ detection in women aged 50–69, first and subsequent screening rounds, 2010

	Number	AS rate	95% CI
First screening round	106	24.3	18.1–31.6
Subsequent screening rounds	517	11.8	10.8–12.8

Notes

1. NSW data are not included.
2. Rates are the number of women with DCIS detected per 10,000 women screened and age-standardised to the population of women attending a BreastScreen Australia service in 2008.

Source: AIHW analysis of BreastScreen Australia data.

Detection of DCIS by age

Similar to invasive breast cancer detection, DCIS detection increases with age. In 2010, the rate of women diagnosed with DCIS per 10,000 women screened increased from 11.0 for women aged 40–49 to 12.0 for women aged 50–59, 13.8 for women aged 60–69 and 16.9 for women aged 70 and over (Table 5.2).

Table 5.2: Age-specific detection rates for ductal carcinoma in situ, all screening rounds, by age, 2010

	Age group (years)			
	40–49	50–59	60–69	70+
Number	100	319	304	92
Age-specific rate	11.0	12.0	13.8	16.9

Notes

1. NSW data are not included.
2. Rates are the number of women with DCIS detected per 10,000 women screened.

Source: AIHW analysis of BreastScreen Australia data.

Detection of DCIS by state and territory

DCIS detection across states and territories for all screening rounds combined in 2010 is shown in Figure 5.1 and Table 5.3.

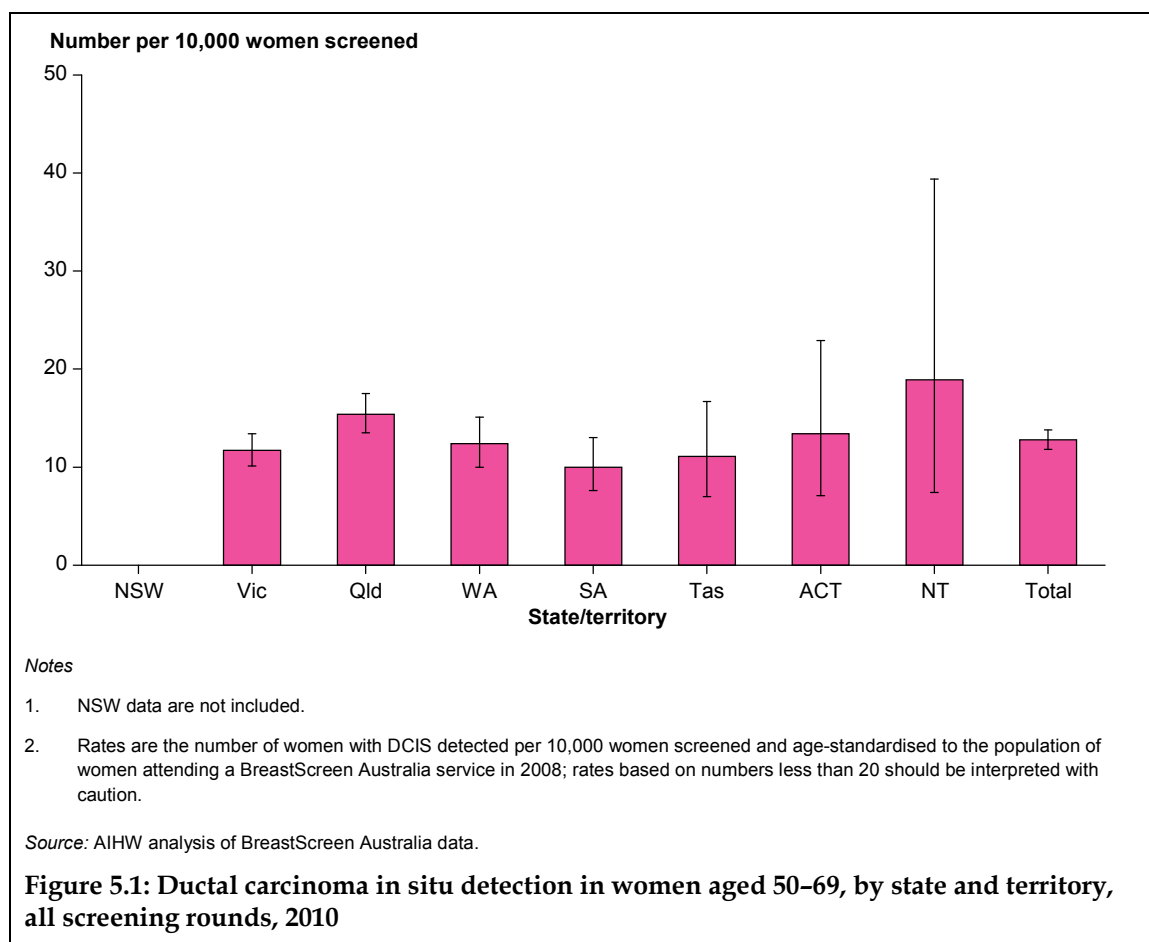


Table 5.3: Ductal carcinoma in situ detection in women aged 50–69, by state and territory, all screening rounds, 2010

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Total ^(a)
Number	n.a.	200	227	96	57	23	13	7	623
AS rate	n.a.	11.7	15.4	12.4	10.0	11.1	13.4	18.9	12.8
95% CI		10.1–13.5	13.4–17.5	10.1–15.2	7.6–12.9	7.1–16.7	7.1–22.9	7.4–39.4	11.8–13.8

n.a. not available.

(a) NSW data are not included.

Notes

1. Rates are the number of women with DCIS detected per 10,000 women screened and age-standardised to the population of women attending a BreastScreen Australia service in 2008; rates based on numbers less than 20 should be interpreted with caution.
2. State and territory differences, along with the size of the 95% confidence intervals (particularly in the smaller states and territories), need to be taken into consideration when interpreting DCIS detection results.
3. In some states and territories, the age-standardised rates vary considerably from the crude rates. Crude rates are available in the BreastScreen Australia monitoring report 2009–2010 supplementary tables.

Source: AIHW analysis of BreastScreen Australia data.

Indicator 6a Interval cancers

What do we mean by interval cancers?

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

Rationale: The ability of screening mammography to successfully detect invasive breast cancer in women in the target age group can be assessed by considering the relative number of invasive breast cancers detected at screening episodes; invasive breast cancers diagnosed 0–12 months after a screening episode detected no cancer; and invasive breast cancers diagnosed 13–24 months after a screening episode detected no cancer.

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

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

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

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

State and territory BreastScreen registers are the source of interval cancer data. New South Wales interval cancer data were not available for inclusion in this section because of issues relating to the implementation of a new business information system. A total for the other states is provided in place of an Australian total. Trend data are not provided but can be found in the *BreastScreen Australia monitoring report 2008–2009* (AIHW 2011).

The most recent interval cancer data are for women screened in the index years 2005, 2006 and 2007 combined. Interval cancer data are several years behind participation, recall and detection data, as 2 years need to have passed to know whether a woman was diagnosed with an interval cancer in the 2 years after her last screen.

Key results

Interval cancers for the index years 2005, 2006 and 2007

- In the 0–12 months after a woman's first negative screening episode there were 4.9 interval cancers per 10,000 women-years. In the 0–12 months after subsequent negative screening episodes, there were 6.6 interval cancers per 10,000 women-years.
- In the 13–24 months after a woman's first negative screening episode, there were 13.5 interval cancers per 10,000 women-years. In the 13–24 months after subsequent negative screening episodes, there were 11.6 interval cancers per 10,000 women-years.

Background information

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

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

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

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

Box 6a.1: What is a screening episode?

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

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

Detailed analyses

Interval cancers for the index years 2005, 2006 and 2007

Excluding New South Wales data, in the 0–12 months after a woman's first negative screening episode, there were 4.9 interval cancers per 10,000 women-years, and in the 0–12 months after subsequent negative screening episodes there were 6.6 interval cancers per 10,000 women-years (Table 6.1).

These rates are well within the NAS (*NAS 2.4.2(a) being that less than 7.5 interval cancers per 10,000 women aged 50–69 are diagnosed in women who attend for screening less than 12 months after a negative screening episode*).

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

Excluding New South Wales data, in the 13–24 months after a woman's first negative screening episode there were 13.5 interval cancers per 10,000 women-years, and in the 13–24

months after subsequent negative screening episodes there were 11.6 interval cancers per 10,000 women-years (Table 6.2).

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

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Total
First screening round									
AS rate	n.a.	5.9	5.3	1.8	3.5	5.8	3.0	3.5	4.9
95% CI		3.4–8.9	3.2–8.2	0.7–3.9	1.4–7.1	0.1–22.8	0.4–10.8	0.1–19.3	3.6–6.4
Subsequent screening rounds									
AS rate	n.a.	6.8	6.7	5.9	6.3	8.4	5.6	2.6	6.6
95% CI		6.0–7.7	5.9–7.6	4.8–7.2	5.1–7.7	5.9–11.6	3.1–9.2	0.3–9.6	6.1–7.1

n.a. not available.

Notes

1. NSW data are not included.
2. Rates are the number of interval cancers detected per 10,000 women-years and age-standardised to the population of women attending a BreastScreen Australia service in 2008.

Source: AIHW analysis of BreastScreen Australia data.

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

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

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Total
First screening round									
AS rate	n.a.	18.6	9.4	20.0	7.2	4.4	4.7	0.0	13.5
95% CI		12.9–25.3	5.9–14.1	11.0–31.8	1.0–17.9	0.5–16.0	1.0–13.8	..	10.8–16.6
Subsequent screening rounds									
AS rate	n.a.	12.6	11.3	9.4	12.5	9.5	9.4	7.7	11.6
95% CI		11.5–13.7	9.9–12.8	7.9–11.0	10.7–14.5	6.2–14.0	5.9–14.2	2.8–16.8	10.9–12.3

n.a. not available.

Notes

1. NSW data are not included. Interval cancer data for Qld and Tas are based on the index years 2005 and 2006 only.
2. Rates are the number of interval cancers detected per 10,000 women-years and age-standardised to the population of women attending a BreastScreen Australia service in 2008.

Source: AIHW analysis of BreastScreen Australia data.

Interval cancer by age

When looking at the pattern of interval cancer by age, 10-year age groups and data for all screening rounds combined are used to produce meaningful rates from the relatively small number of cases.

Excluding New South Wales data, the interval cancer rate was higher in the 13–24 months after a negative screening episode than in the 0–12 months for each 10-year age group (Table 6.3).

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

Time since screen (months)		Age group (years)			
		40–49	50–59	60–69	70+
0–12 months	Number	202	477	352	126
	Crude rate	7.0	6.4	6.6	6.9
13–24 months	Number	277	725	552	206
	Crude rate	12.5	11.4	12.2	13.2

Notes

1. NSW data are not included. Interval cancer data for Qld and Tas are based on the index years 2005 and 2006 only.
2. Rates are the number of interval cancers detected per 10,000 women-years and age-standardised to the population of women attending a BreastScreen Australia service in 2008.

Source: AIHW analysis of BreastScreen Australia data.

Interval cancer by state and territory

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

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

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

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Total
First screening round									
AS rate	n.a.	12.2	7.0	11.7	5.3	5.3	3.8	1.7	9.1
95% CI		9.1–15.8	5.0–9.4	6.5–18.2	1.9–10.3	0.9–14.7	1.2–8.9	0.0–9.7	7.4–10.9
Subsequent screening rounds									
AS rate	n.a.	9.7	8.5	7.5	9.3	8.8	7.3	5.1	8.6
95% CI		9.0–10.4	7.8–9.3	6.6–8.6	8.2–10.5	6.8–11.3	5.2–10.1	2.2–10.2	8.2–9.0

n.a. not available.

Notes

1. NSW data are not included. Interval cancer data for Qld and Tas are based on the index years 2005 and 2006 only.
2. Rates are the number of interval cancers detected per 10,000 women-years and age-standardised to the population of women attending a BreastScreen Australia service in 2008.

Source: AIHW analysis of BreastScreen Australia data.

Indicator 6b Program sensitivity

What do we mean by program sensitivity?

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

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

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

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

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

State and territory BreastScreen registers are the source of sensitivity data. New South Wales interval cancer data were not available for inclusion in this section because of issues relating to the implementation of a new business information system. A total for the other states is provided in place of an Australian total. Trend data are not provided but can be found in the *BreastScreen Australia monitoring report 2008–2009* (AIHW 2011).

The most recent program sensitivity data are for women screened in the index years 2005, 2006 and 2007 combined. Program sensitivity data are several years behind participation, recall and detection data, as 2 years need to have passed to know whether a woman was diagnosed with an interval cancer in the 2 years after her last screen.

Key results

Program sensitivity for the index years 2005, 2006 and 2007

- Program sensitivity for 0–12 months was 93.4% for the first screening round and 86.5% for subsequent screening rounds. For the same years, program sensitivity for 0–24 months was 82.0% for the first screening round and 73.3% for subsequent screening rounds.
- For all screening rounds combined, program sensitivity for 0–12 months increased with age, from 79.6% in women aged 40–49 to 85.6% and 89.8% for women aged 50–59 and 60–69 respectively, and 91.7% for women aged 70 or over. Lower sensitivity means that BreastScreen Australia is less able to detect invasive breast cancers in women aged 40–49 who attend for screening.

Detailed analyses

Program sensitivity for the index years 2005, 2006 and 2007

Excluding New South Wales data, program sensitivity for 0–12 months was 93.4% for the first screening round and 86.5% for subsequent screening rounds (Table 6.5). Overall program sensitivity (0–24 months) was 82.0% for the first screening round and 73.3% for subsequent screening rounds (Table 6.6).

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

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Total
First screening round									
AS rate	n.a.	91.6	93.3	97.5	93.8	94.3	95.7	93.0	93.4
95% CI		79.8– 100.0	82.2– 100.0	78.4– 100.0	70.5– 100.0	64.9– 100.0	58.5– 100.0	50.8– 100.0	86.7– 100.0
Subsequent screening rounds									
AS rates	n.a.	85.6	87.1	86.9	88.0	80.9	88.8	94.6	86.5
95% CI		81.4– 89.9	82.7– 91.6	80.6– 93.5	81.3– 95.1	69.4– 93.8	73.2– 100.0	65.9– 100.0	84.1– 89.0

n.a. not available.

Notes

1. NSW data are not included.
2. Rates are the number of screen-detected cancers as a percentage of all cancers (screen-detected and interval cancers) and age-standardised to the population of women attending a BreastScreen Australia service in 2008.

Source: AIHW analysis of BreastScreen Australia data.

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

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

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Total
First screening round									
AS rates	n.a.	75.0	86.3	81.6	86.4	85.7	93.8	93.0	82.0
95%CI		65.2– 85.6	76.0– 97.7	66.3– 98.9	64.7– 100.0	52.7– 100.0	56.9– 100.0	50.8– 100.0	75.9– 88.3
Subsequent screening rounds									
AS rates	n.a.	67.6	76.2	83.4	71.8	67.5	83.4	81.4	73.3
95%CI		64.3– 70.9	72.4– 80.1	77.3– 89.9	66.4– 77.6	56.2– 80.5	69.0– 100.0	56.7– 100.0	71.2– 75.4

n.a. not available.

Notes

1. NSW data are not included; program sensitivity data for Qld and Tas are based on the index years 2005 and 2006 only.
2. Rates are the number of screen-detected cancers as a percentage of all cancers (screen-detected and interval cancers) and age-standardised to the population of women attending a BreastScreen Australia service in 2008.

Source: AIHW analysis of BreastScreen Australia data.

Program sensitivity by age

Program sensitivity was lowest in women aged 40–49, thereafter increasing with age (Table 6.7). Lower sensitivity means that BreastScreen Australia is less able to detect invasive breast cancers in women aged 40–49 who attend for screening.

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

Time since screen (months)	Age group (years)			
	40–49	50–59	60–69	70+
0–12 months	79.6	85.6	89.8	91.7
0–24 months	63.3	71.7	78.0	81.1

Notes

1. NSW data are not included; interval cancer data for Qld and Tas are based on the index years 2005 and 2006 only.
2. Rates are the number of interval cancers detected per 10,000 women-years and age-standardised to the population of women attending a BreastScreen Australia service in 2008.

Source: AIHW analysis of BreastScreen Australia data.

Program sensitivity by state and territory

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

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

Indicator 7a Invasive breast cancer incidence

What do we mean by invasive breast cancer incidence?

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

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

Guide to interpretation: These data include both screen-detected breast cancers (detected through BreastScreen Australia) and breast cancers detected outside BreastScreen Australia. Incidence data are reported per 100,000 women in the population.

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

The Australian Cancer Database is the source of breast cancer incidence data. Unlike state and territory BreastScreen data (used for Indicators 1 to 6), invasive breast cancer incidence data include New South Wales.

The most recent invasive breast cancer incidence data are for new cases diagnosed in 2008.

Key results

Invasive breast cancer incidence in 2008

- There were 6,948 new cases of breast cancer in women aged 50–69, the target population of BreastScreen Australia, or 294.2 new cases per 100,000 women. There were 13,567 new cases, or 115.4 new cases per 100,000 women, in women of all ages.
- New cases of invasive breast cancer diagnosed in women aged 50–69 comprised 51.2% of all invasive breast cancers diagnosed that year.

In 2004–2008

- The incidence of invasive breast cancer in women aged 50–69 decreased with increasing remoteness, being highest (287.4 new cases per 100,000 women) in *Major cities* and lowest (186.0 per 100,000) in *Very remote* areas.
- The incidence of invasive breast cancer in women aged 50–69 tended to increase with improving socioeconomic status.
- Invasive breast cancer incidence in Aboriginal and Torres Strait Islander women from New South Wales, Queensland, Western Australia and the Northern Territory was significantly lower than non-Indigenous women from these states and territories, at 210.0 new cases per 100,000 women aged 50–69 compared with the non-Indigenous rate of 261.8 per 100,000.

Background information

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

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

Detailed analysis

Invasive breast cancer incidence in 2008

There were 13,567 new cases of breast cancer in Australian women in 2008. This is equivalent to 125.6 new cases for every 100,000 women in the population which, when age-standardised to allow analysis of trends and differentials, equates to an incidence rate of 115.4.

Of the 13,567 new cases, 6,948 (51.2%) were in women aged 50–69, equivalent to 296.6 new cases for every 100,000 women in the population. When age-standardised to allow analyses of trends and differentials, this equates to an incidence rate of 294.2 for women aged 50–69.

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

Excluding New South Wales data since BreastScreen data for New South Wales were unavailable, it was estimated that 51% of invasive breast cancers diagnosed in women aged 50–69, and 37% of breast cancers in women aged 40 and over, were detected through BreastScreen Australia in 2008.

In the broader context of cancers diagnosed in Australian women, breast cancer was the most commonly diagnosed cancer (excluding basal cell and squamous cell carcinoma of the skin) in Australian women in 2008, comprising 28.2% of all cancers diagnosed in women that year, as well as being the most prevalent.

The mean age at first diagnosis was 60.4, and the risk of being diagnosed with breast cancer was 1 in 11 by age 75 and 1 in 8 by age 85.

Invasive breast cancer incidence trends

The number of new breast cancer cases in women aged 50–69 has more than doubled over the 25 years from 2,450 new cases in 1982 (the year in which national incidence data were first available) to 6,948 in 2008 (Figure 7.1; Supplementary data table S7.1).

For all age groups combined, the overall increase in the number of new cases of invasive breast cancer also more than doubled from 5,310 in 1982 to 13,567 in 2008, an increase of 155% (Supplementary data table S7.1).

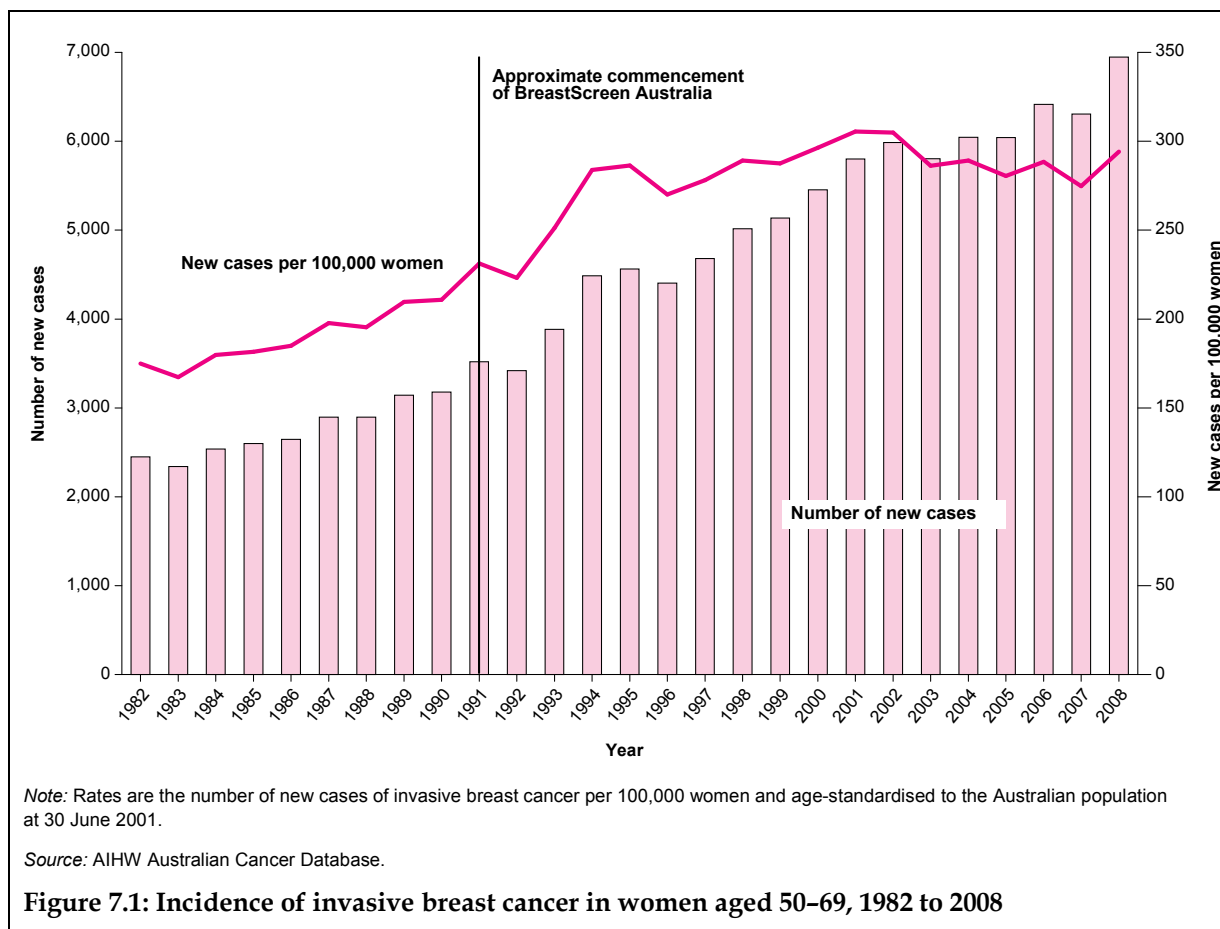
Table 7.1: Incidence of invasive breast cancer, 1982 to 2008

Year of diagnosis	All ages	Age group (years)		
		<50	50–69	70+
1982	81.1	33.8	174.9	250.0
1983	80.8	34.5	167.3	258.6
1984	83.9	34.1	179.8	268.1
1985	84.6	34.9	181.6	266.8
1986	85.3	33.2	185.0	280.1
1987	91.5	38.3	197.7	280.7
1988	90.0	37.0	195.4	280.1
1989	94.0	37.5	209.6	288.8
1990	95.3	38.4	210.8	293.9
1991	100.8	38.9	231.3	305.8
1992	98.6	39.9	223.2	290.6
1993	105.6	40.5	251.3	303.3
1994	114.6	41.4	283.9	323.8
1995	116.0	41.7	286.3	332.6
1996	109.7	40.3	270.1	308.7
1997	111.8	39.6	278.1	320.2
1998	114.9	40.4	289.2	324.2
1999	111.4	39.1	287.6	299.3
2000	116.1	40.9	296.4	318.3
2001	117.6	40.6	305.5	317.6
2002	117.5	41.4	304.9	310.7
2003	112.6	41.3	286.2	298.6
2004	113.5	40.6	289.2	306.3
2005	111.6	42.6	280.5	289.3
2006	112.9	41.9	288.4	291.8
2007	109.5	41.1	274.7	291.0
2008	115.4	42.4	294.2	303.1

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

Source: AIHW Australian Cancer Database.

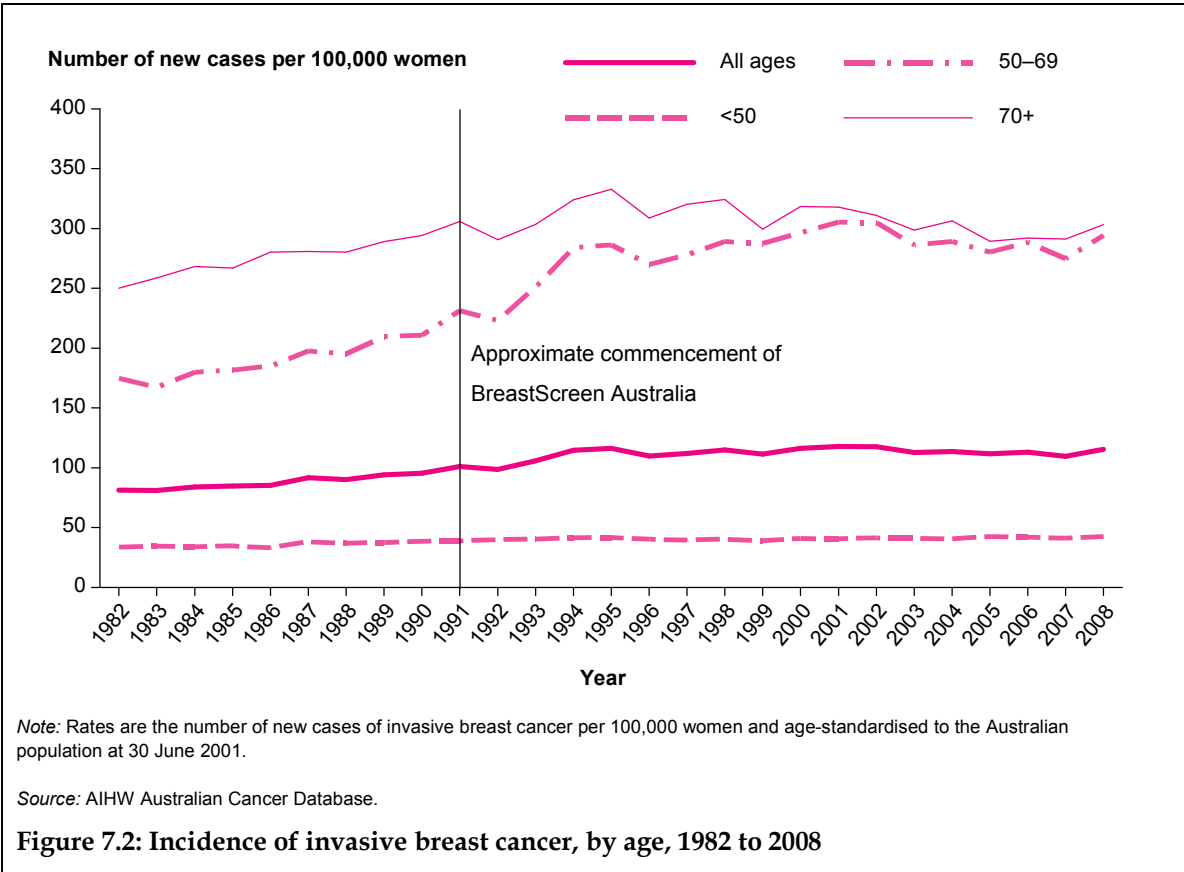
BreastScreen Australia began in 1991. While the age-standardised incidence rate for women aged 50–69 had been increasing steadily before BreastScreen Australia began, from 174.9 new cases per 100,000 women in 1982 (the first year for which data are available) to 210.8 in 1990; incidence increased more sharply from 231.3 in 1991 to a peak of 305.5 new cases per 100,000 women in 2001 (Table 7.1; Figure 7.1). Thereafter, the rate decreased between 2002 and 2008 from 304.9 to 294.2 new cases per 100,000 (Figure 7.1).



Invasive breast cancer incidence trends by age

When comparing trends in the incidence of invasive breast cancer across broad age groups, the pattern for women aged 50–69 appears to be mirrored in women aged 70 and over (Figure 7.2). While incidence was historically highest in women aged 70 and over, incidence has been indistinguishable from that in women aged 50–69 since 2005. Incidence for women aged 50 remained steady at between about 39 and 42 new cases per 100,000 women between 1991 and 2008.

It is also interesting to note that in 2008, new cases of invasive breast cancer diagnosed in women aged 50–69 comprised 51.2% of all invasive breast cancers. This is an increase from 46.6% in 1998, and 42.8% in 1988. BreastScreen Australia targets women aged 50–69.



For invasive breast cancer diagnosed in 2008, analysis of 5-year age groups reveals that incidence was highest for women aged 65-69, at 378.3 new cases per 100,000 women (Table 7.2; Figure 7.3).

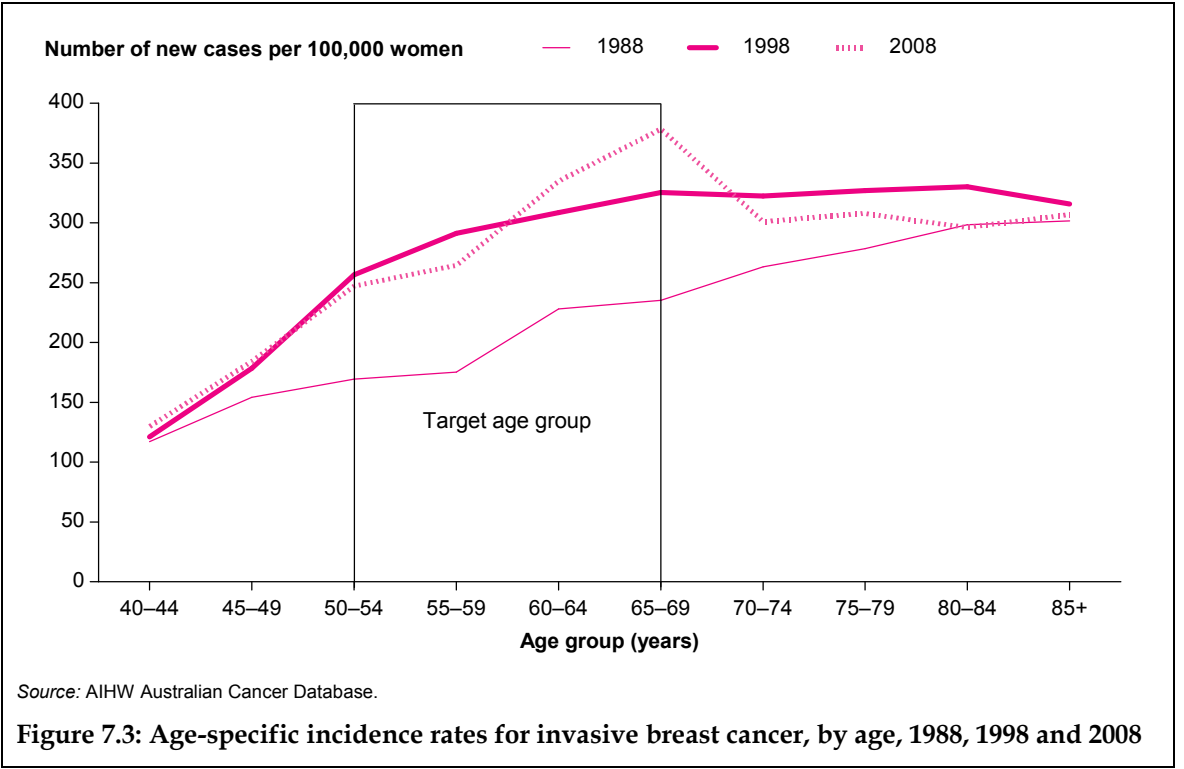


Table 7.2: Age-specific incidence of invasive breast cancer, by age, 2008

	Age group (years)									
	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85+
New cases	992	1,445	1,759	1,712	1,887	1,590	1,035	915	729	732
Crude rate	129.9	184.3	247.3	264.5	334.9	378.3	301.0	307.9	296.3	306.9

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

Source: AIHW Australian Cancer Database.

Figure 7.3 shows age-specific incidence rates for invasive breast cancer for 1988, 1998 and 2008. While women aged 65–69 had the highest incidence of invasive breast cancer in 2008 and in 1998, (325.2 new cases per 100,000 women), the 1998 trend across 5-year age groups was notably flatter with the incidence rate between 310 and 330 new cases per 100,000 women for all 5 year age groups between 60–64 and 80–84.

Going back another 10 years to 1988, before BreastScreen Australia began, incidence was lower than in 1998 and 2008 for all age groups from 45–49 to 75–79, and about the same for women aged 40–44, 80–84 and 85 and over.

Invasive breast cancer incidence by state and territory

In 2004–2008, the incidence of invasive breast cancer for women aged 50–69 was relatively stable across states and territories, with most around the national rate of 285.5 new cases per 100,000 women (Table 7.3).

The exceptions were the least populated states and territories – the Australian Capital Territory, with a higher incidence of 321.1 new cases per 100,000 women, and the Northern Territory, with a lower incidence of 207.1. It should be noted, however, that the data for the two least-populated jurisdictions are subject to variation due to smaller numbers, even with 5 years of data combined.

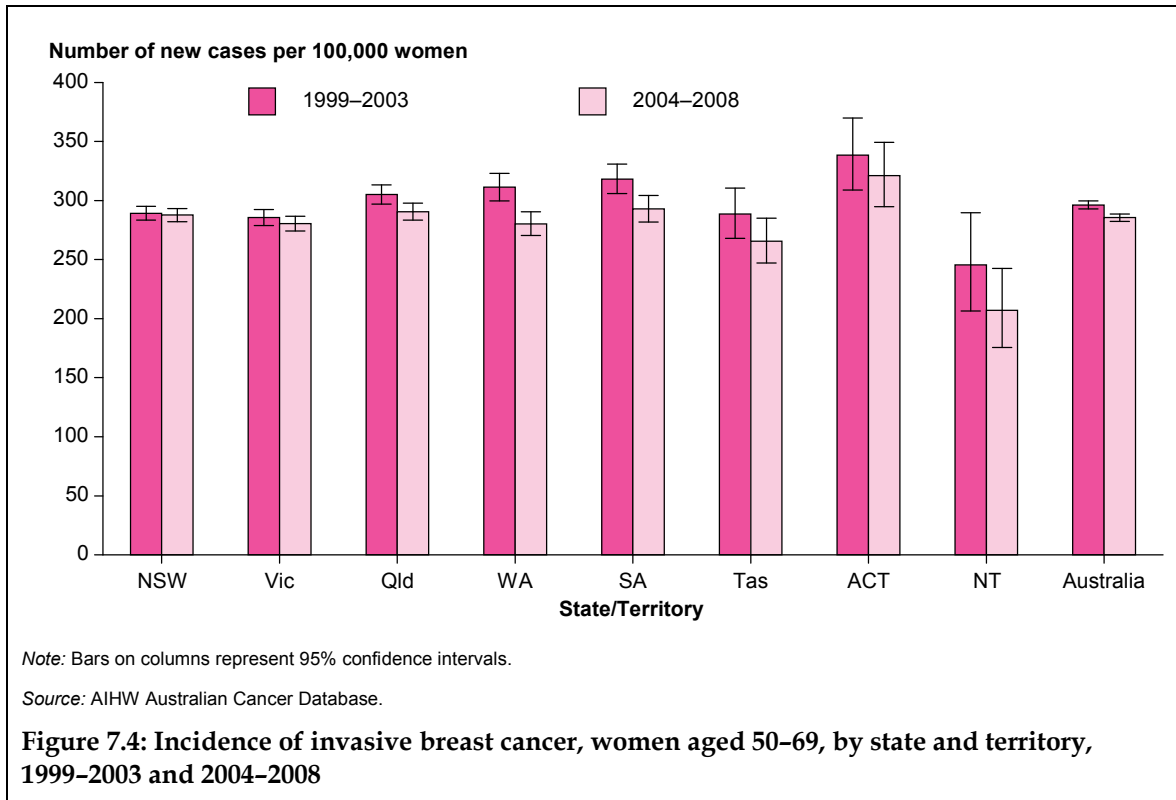
Table 7.3: Incidence of invasive breast cancer, women aged 50–69, by state and territory, 1999–2003 and 2004–2008

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
2004–2008									
New cases	10,568	7,702	6,314	3,019	2,664	777	550	162	31,756
AS rate	287.7	280.5	290.4	280.2	293.0	265.6	321.1	207.1	285.5
95% CI	282.2– 293.3	274.2– 286.8	283.2– 297.6	270.3– 290.4	281.9– 304.4	247.2– 285.0	294.7– 349.2	175.5– 242.6	282.4– 288.7
1999–2003									
New cases	9,354	6,809	5,348	2,781	2,528	718	493	150	28,181
AS rate	289.1	285.6	305.0	311.2	318.1	288.7	338.3	245.5	296.2
95% CI	283.3– 295.0	278.9– 292.5	296.9– 313.3	299.8– 323.0	305.8– 330.8	267.9– 310.6	308.9– 369.8	206.5– 289.6	292.7– 299.6

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

Source: AIHW Australian Cancer Database.

Trends across states and territories between 1999–2003 and 2004–2008 are shown in Figure 7.4.



Invasive breast cancer incidence by remoteness area

The incidence of invasive breast cancer in women aged 50-69 decreased with increasing level of remoteness. In 2004-2008, incidence decreased from 287.4 new cases per 100,000 women in *Major cities* to 186.0 in *Very remote* locations (Figure 7.5A; Table 7.4).

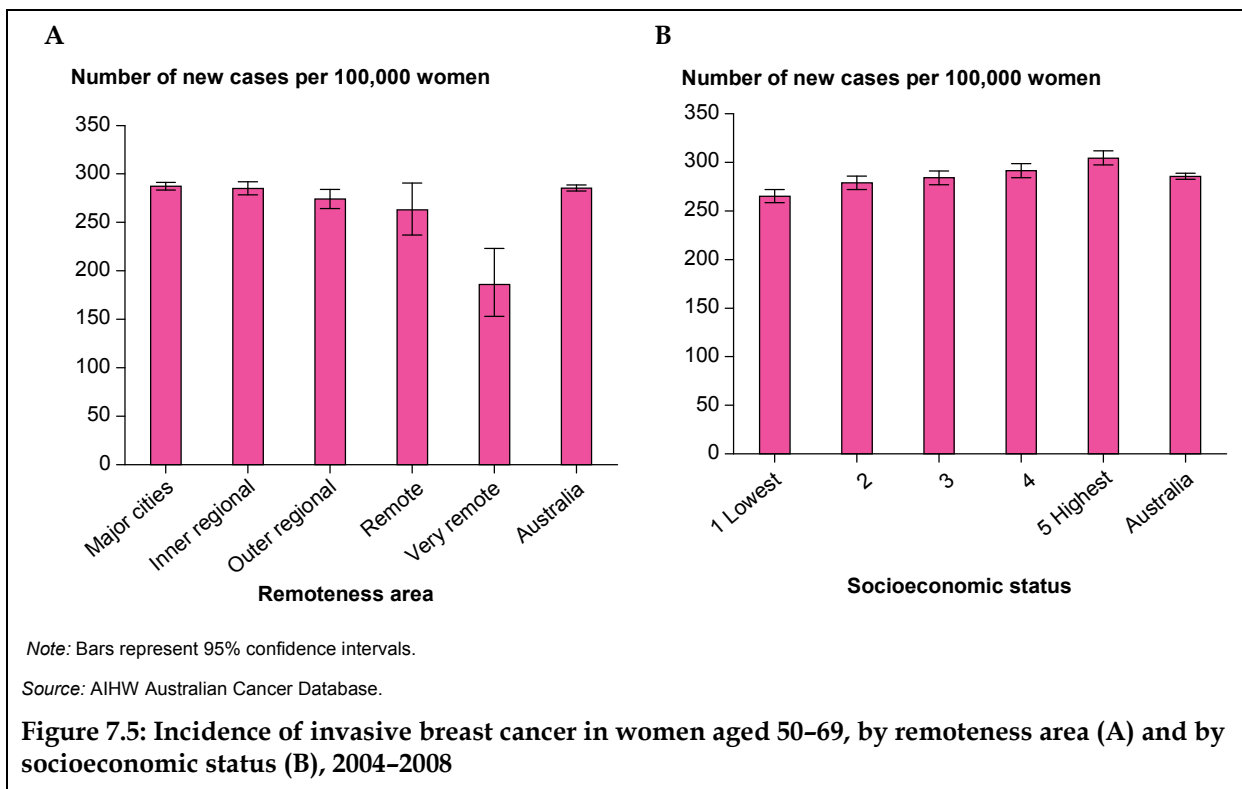


Table 7.4: Incidence of invasive breast cancer, women aged 50–69, by remoteness area, 2004–2008

	Major cities	Inner regional	Outer regional	Remote	Very remote	Australia
New cases	21,225	6,946	3,008	382	115	31,756
AS rate	287.4	285.0	274.0	262.9	186.0	285.5
95% CI	283.6–291.3	278.3–291.9	264.3–284.0	237.2–290.7	152.8–223.0	282.4–288.7

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

Source: AIHW Australian Cancer Database.

Invasive breast cancer incidence by socioeconomic status

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

	1 (Lowest)	2	3	4	5 (Highest)	Australia
New cases	6,036	6,392	6,263	6,168	6,814	31,756
AS rate	265.2	278.8	284.1	291.4	304.4	285.5
95% CI	258.6–272.1	272.0–285.8	277.1–291.3	284.1–298.8	297.2–311.7	282.4–288.7

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

Source: AIHW Australian Cancer Database.

In 2004–2008, the incidence of invasive breast cancer in women aged 50–69 increased progressively with improving socioeconomic status. Consistent with this, women living in areas with the highest socioeconomic status (that is, group 5) had a significantly higher invasive breast cancer incidence rate (304.4 cases per 100,000 women) than women living in areas with the lowest socioeconomic status (group 1, 265.2 cases per 100,000 women) (Table 7.5; Figure 7.5B).

Invasive breast cancer incidence by Aboriginal and Torres Strait Islander status

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

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

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

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

In 2004–2008 for women in New South Wales, Queensland, Western Australia and the Northern Territory, Aboriginal and Torres Strait Islander women aged 50–69 had a significantly lower incidence of invasive breast cancer (210.0 new cases per 100,000 women) compared with non-Indigenous women from these states and territories (261.8 new cases per 100,000 women) (Figure 7.6; Table 7.6).

This was also true for Aboriginal and Torres Strait Islander women of all ages, with an age-standardised incidence rate of 81.2 new cases per 100,000 women compared with the non-Indigenous rate of 103.1. Despite a lower rate, breast cancer is the most commonly diagnosed cancer for Aboriginal and Torres Strait Islander women in New South Wales, Queensland, Western Australia and the Northern Territory.

Table 7.6: Incidence of breast cancer (New South Wales, Queensland, Western Australia and Northern Territory) by Aboriginal and Torres Strait Islander status, women aged 50–69 and women of all ages, 2004–2008

	New South Wales, Queensland, Western Australia and the Northern Territory ^(a)			Australia
	Aboriginal and Torres Strait Islander	Non-Indigenous	Total ^(b)	
50–69 years				
New cases	224	18,046	20,063	31,756
Crude rate	202.1	263.4	288.1	287.3
AS rate (95% CI)	210.0 (183.0–239.7)	261.8 (258.0–265.7)	286.5 (285.7–286.5)	285.5 (282.4–288.7)
All ages				
New cases	432	35,663	39,647	63,322
Crude rate	39.8	111.2	119.6	121.3
AS rate (95% CI)	81.2 (72.9–90.1)	103.1 (102.0–104.2)	193.0 (191.1–194.9)	112.6 (111.7–113.5)

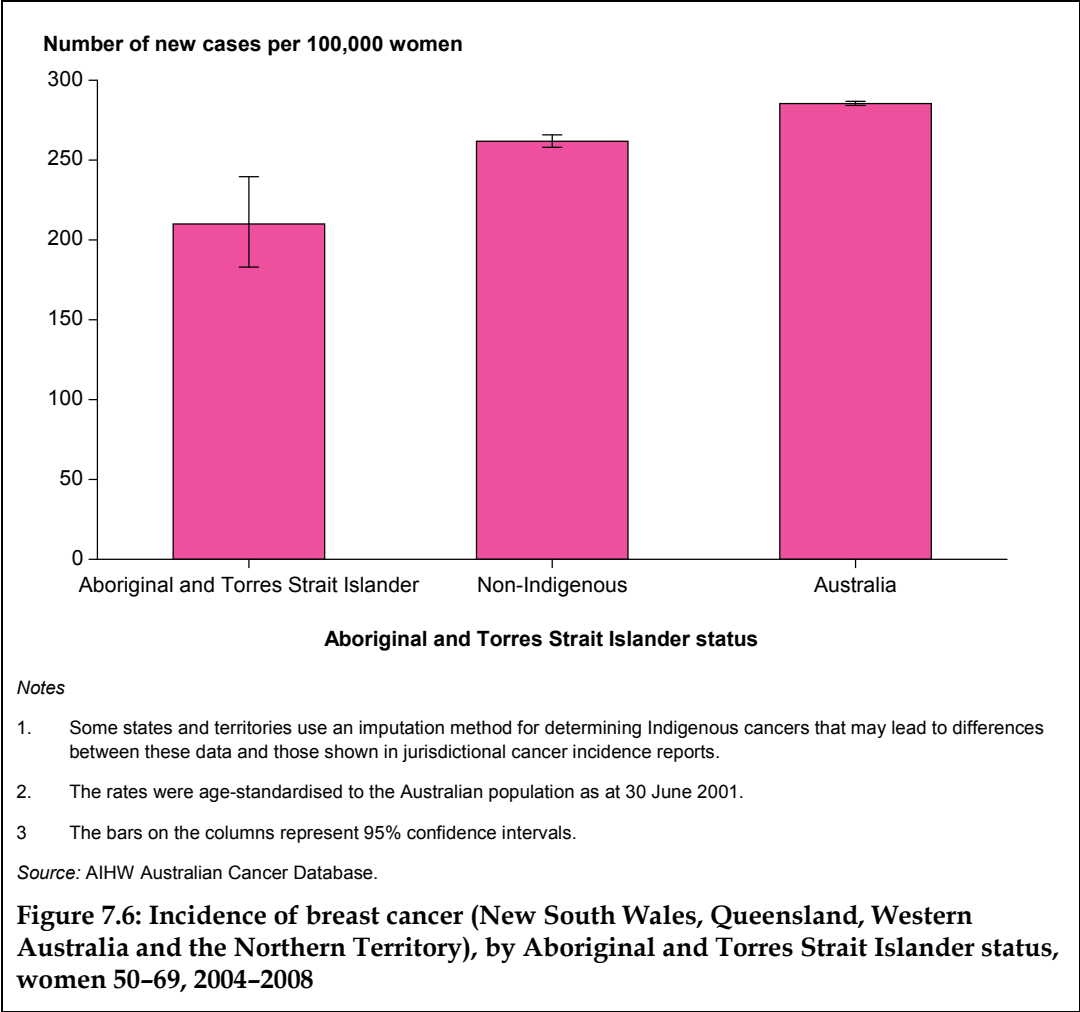
(a) 'Aboriginal and Torres Strait Islander' and 'Non-Indigenous' and 'Total' are for NSW, Qld, WA and NT only. Data from these jurisdictions were considered to have adequate levels of Indigenous identification in cancer registration data at the time this report was prepared.

(b) 'Total' includes Aboriginal and Torres Strait Islander, non-Indigenous and women in the 'not-stated' category for Aboriginal and Torres Strait Islander status for NSW, Qld, WA and NT only.

Notes

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

Source: AIHW Australian Cancer Database.



Indicator 7b Ductal carcinoma in situ incidence

What do we mean by ductal carcinoma in situ incidence?

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

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

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

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

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

State and territory cancer registries are the source of DCIS incidence data. Unlike state and territory BreastScreen data used for Indicators 1 to 6, DCIS incidence data include New South Wales.

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

Key results

Ductal carcinoma in situ incidence in 2008

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

Background information

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.

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

Detailed analyses

Ductal carcinoma in situ incidence 2008

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

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

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

Excluding New South Wales data since BreastScreen data for New South Wales were unavailable, in 2008 it was estimated that 82% of DCIS cases diagnosed in women aged 50–69, and 71% of DCIS cases in women aged 40 or over, were detected through BreastScreen Australia in 2008.

Ductal carcinoma in situ incidence trends

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

Table 7.7: Incidence of ductal carcinoma in situ, women aged 50–69, 1996 to 2008

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

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

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

Ductal carcinoma in situ incidence by age

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

Table 7.8: Age-specific incidence rates for ductal carcinoma in situ, by age, 2008

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

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

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

Ductal carcinoma in situ incidence by state and territory

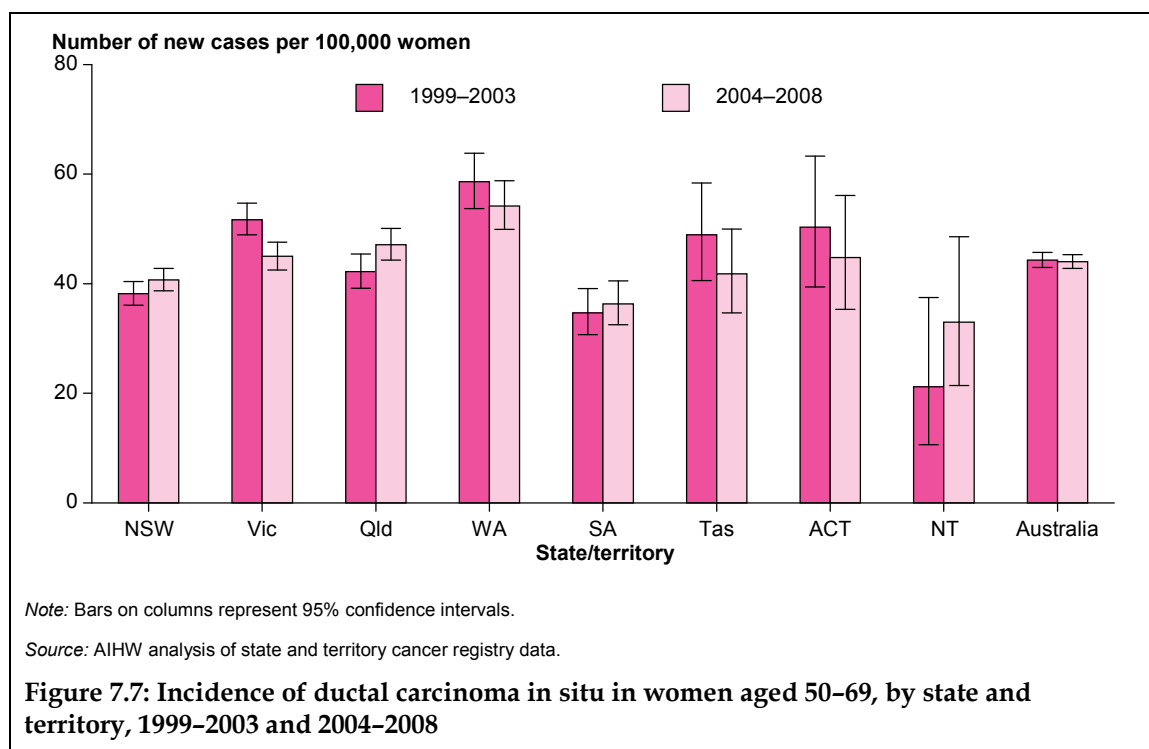
In 2004–2008, the incidence of DCIS across the states and territories for women aged 50–69 varied between 33.0 and 54.2 new cases per 100,000 women (Table 7.9), although caution should be used when interpreting rates from small numbers such as these. There was little change in the DCIS incidence rates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

Table 7.9: Incidence of ductal carcinoma in situ, women aged 50–69, by state and territory 2004–2008

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

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

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



Indicator 8 Mortality

What do we mean by mortality?

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

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

Guide to interpretation: These data include mortality from all breast cancers, whether or not they were detected through BreastScreen Australia.

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

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

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

The most recent data for mortality from breast cancer are for deaths in 2010.

Key results

Mortality in 2010

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

Mortality from invasive breast cancer for different population groups

In 2006–2010, mortality from invasive breast cancer for women aged 50–69 was relatively similar across remoteness areas (between 44.6 and 47.9 deaths per 100,000 women).

Aboriginal and Torres Strait Islander women have fewer cases of breast cancer diagnosed than their non-Indigenous counterparts (210.0 and 261.8 new cases per 100,000 women in 2004–2008, respectively). Despite this, deaths did not differ between Aboriginal and Torres Strait Islander women and non-Indigenous women (54.5 and 45.4 per 100,000 women, respectively, for the 2006–2010 period).

Background information

Mortality data are some of the most comprehensively collected national data in Australia. Registration of death is a legal requirement in Australia and, as a result, the dataset is virtually complete. Registration of deaths is the responsibility of the Registrar of Births, Deaths and Marriages in each state and territory. The mortality data used in this report were provided by the Registries of Births, Deaths and Marriages, the Australian Bureau of Statistics and the National Coroners Information System. These data are maintained at the Australian Institute of Health and Welfare in the National Mortality Database.

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

Detailed analyses

Mortality in 2010

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

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

In the broader context of cancer deaths in Australian women, breast cancer was the second most common cancer causing death in Australian women in 2010 (behind lung cancer), comprising 15.3% of all cancer deaths in women that year.

Also in 2010, the mean age of death of 69.0, and the risk of dying from breast cancer was 1 in 67 by age 75 and 1 in 39 by age 85.

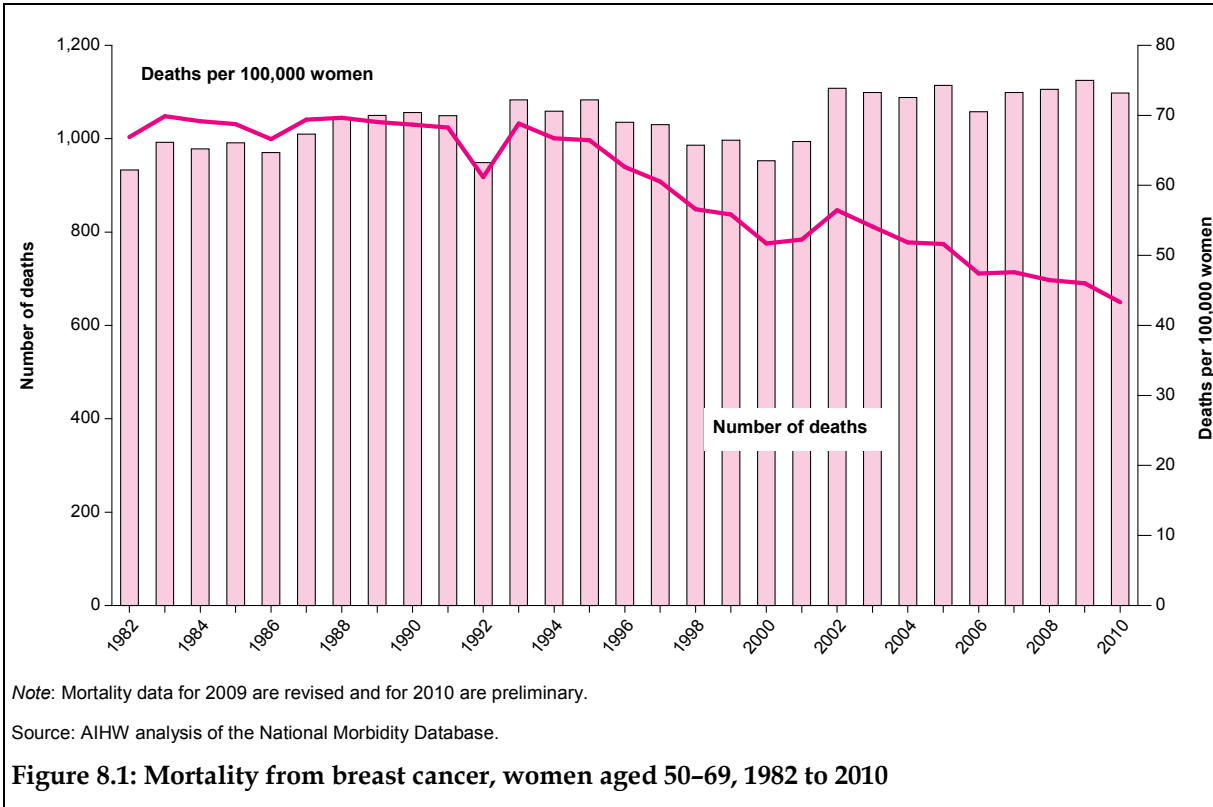
Mortality trends

Mortality from invasive breast cancer has decreased over time in Australia.

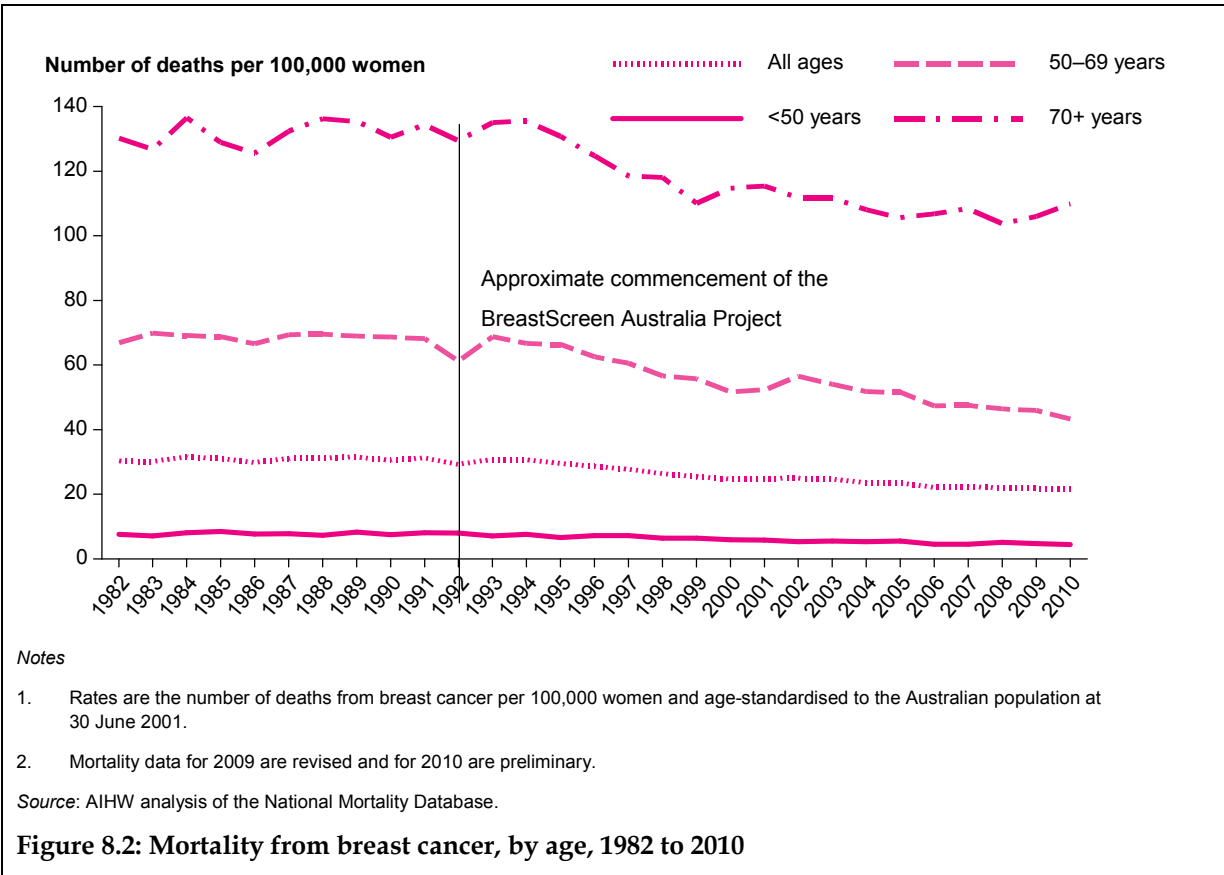
For women aged 50–69, mortality remained relatively steady between 1982 and 1990 (the year prior to the introduction of BreastScreen Australia).

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

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



Breast cancer mortality by age



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

Table 8.1: Mortality rates from breast cancer, 1982 to 2007

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

Notes

1. Rates are the number of deaths from breast cancer per 100,000 women and age-standardised to the Australian population at 30 June 2001.
2. Mortality data for 2009 are revised and for 2010 are preliminary.

Source: AIHW National Mortality Database.

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

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

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

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

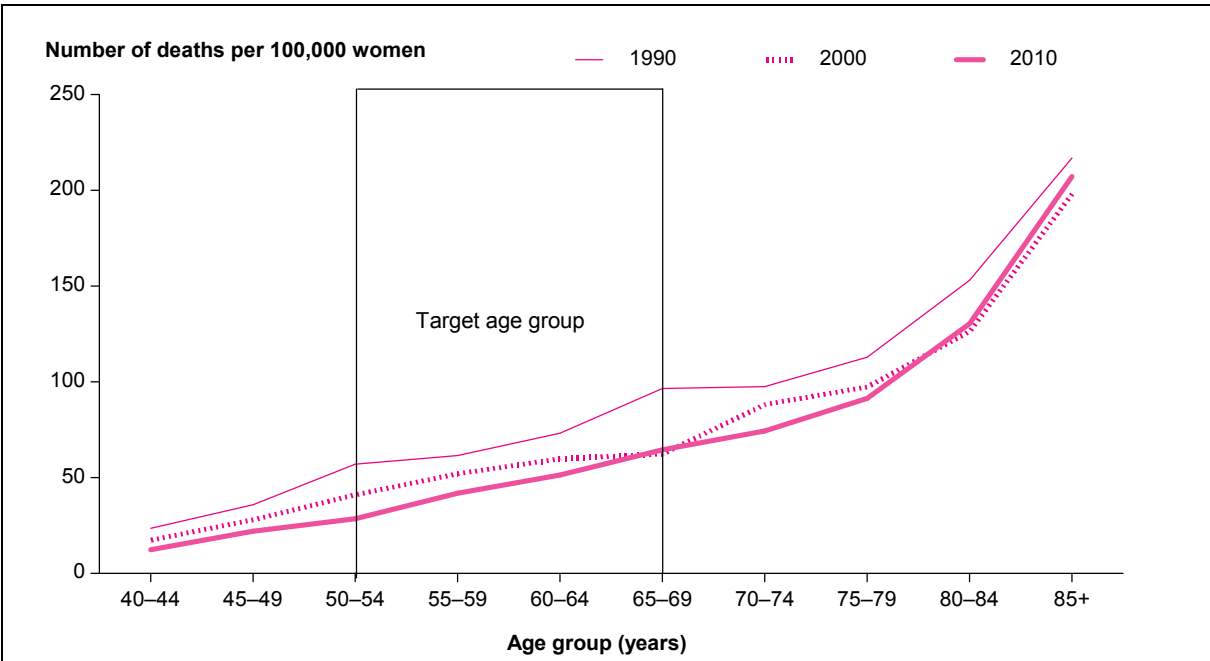
	Age group (years)									
	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85+
Deaths	96	174	211	279	312	296	272	270	327	535
Crude rate	12.3	21.9	28.4	41.7	51.3	64.5	74.2	91.2	130.3	207.1

Notes

- 1. Rates are the number of deaths from breast cancer per 100,000 women.
- 2. Mortality data for 2010 are preliminary

Source: AIHW National Mortality Database.

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



Notes

- 1. Rates are the number of deaths from breast cancer per 100,000 women and age-standardised to the Australian population at 30 June 2001.
- 2. Mortality data for 2010 are preliminary

Source: AIHW National Mortality Database.

Figure 8.3: Age-specific mortality rates for breast cancer, 1990, 2000 and 2010

Mortality from invasive breast cancer by state and territory

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

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

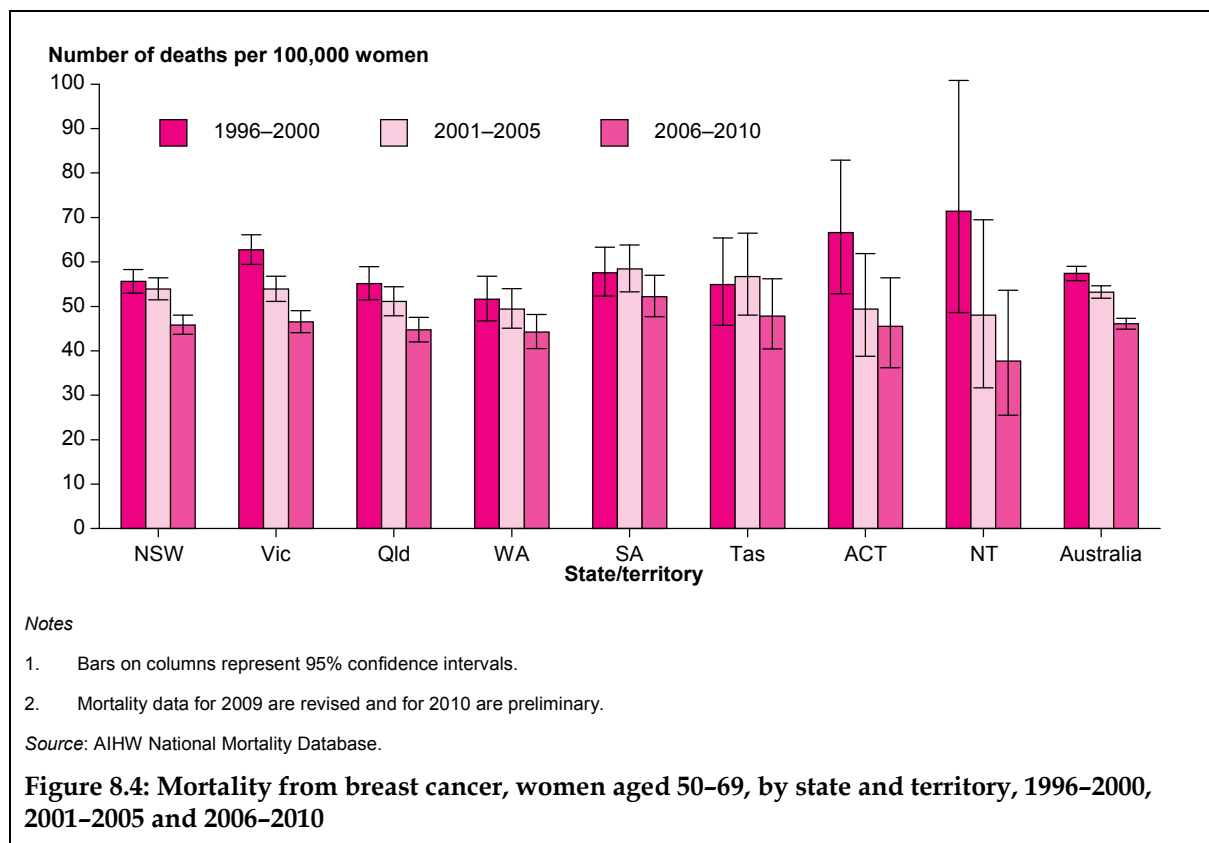
	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
50–69 years									
Deaths	1,788	1,366	1,053	515	501	148	83	32	5,486
AS rate	45.8	46.5	44.7	44.2	52.2	47.8	45.5	37.7	46.1
95% CI	43.7–48.0	44.1–49.1	42.0–47.5	40.5–48.2	47.7–57.0	40.3–56.1	36.2–56.4	25.5–53.6	44.9–47.3
All ages									
Deaths	4,679	3,524	2,431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

Notes

1. Rates are the number of deaths from breast cancer per 100,000 women and age-standardised to the Australian population at 30 June 2001.
2. Mortality data for 2010 are preliminary.

Source: AIHW National Mortality Database.

Decreases in mortality between 2001–2005 and 2006–2010 were statistically significant for women aged 50–69 in the more populated states and territories (New South Wales, Victoria and Queensland) and for Australia. This trend is mirrored when comparing mortality between 1996–2000 and 2006–2010 (Table 8.3; Figure 8.4).



Mortality from invasive breast cancer by remoteness area

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

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

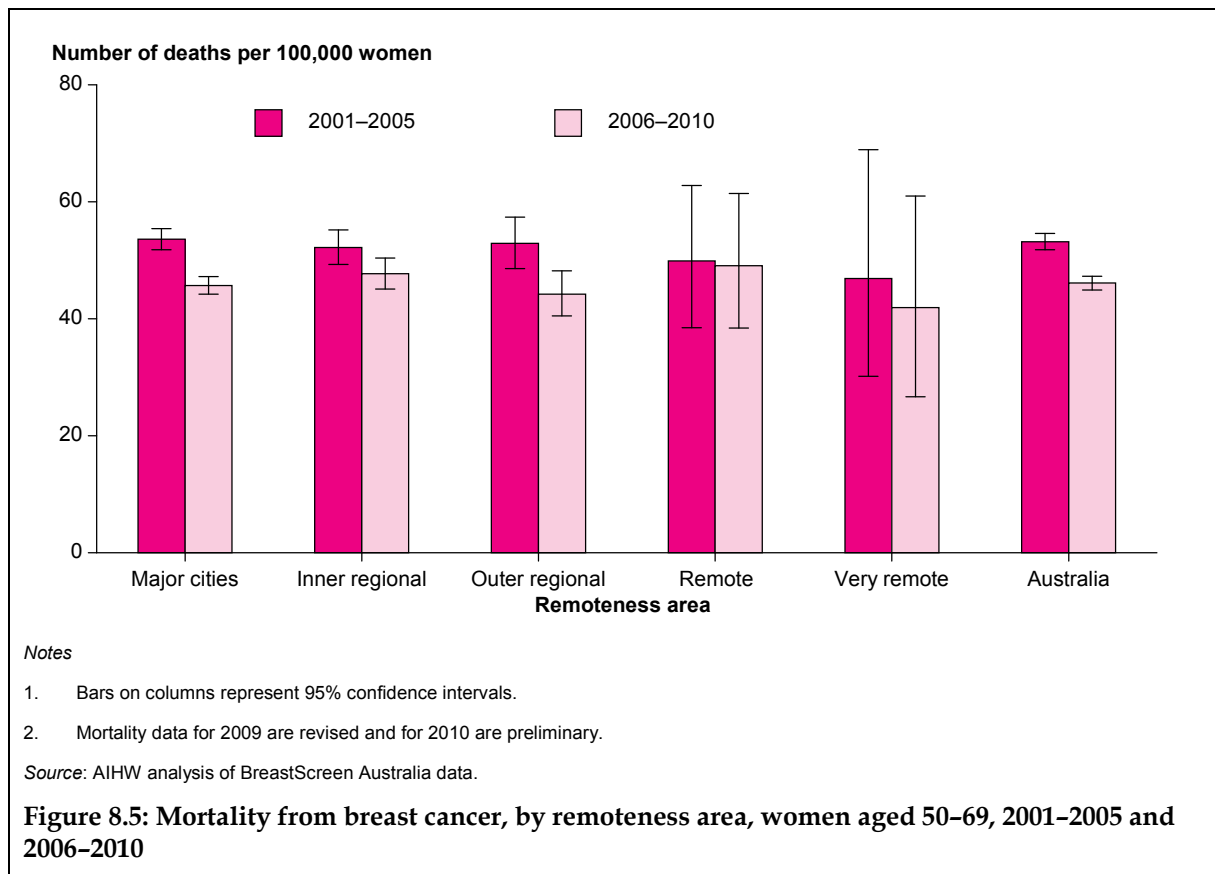
	Major cities	Inner regional	Outer regional	Remote	Very remote	Australia
50–69 years						
Deaths	3,596	1,260	523	74	26	5,486
AS rate	45.7	47.7	44.2	49.1	41.9	46.1
95% CI	44.3–47.3	45.1–50.4	40.5–48.2	38.4–61.4	26.8–61.0	44.9–47.3
All ages						
Deaths	9,154	3,066	1,277	145	52	13,716
AS rate	21.9	22.6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

Notes

1. Rates are the number of deaths from breast cancer per 100,000 women and age-standardised to the Australian population at 30 June 2001.
2. Mortality data for 2010 are preliminary.

Source: AIHW National Mortality Database.

Mortality in *Major cities* decreased significantly between 2001–2005 and 2006–2010, along with the national rate (Figure 8.5). Apparent decreases in other remoteness areas were not statistically significant.



Mortality from breast cancer by Aboriginal and Torres Strait Islander status

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

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

These data show that in 2006–2010, despite invasive breast cancer incidence being significantly lower in Aboriginal and Torres Strait Islander women, mortality from invasive breast cancer did not differ between Indigenous women and non-Indigenous women.

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

Mortality for women of all ages was 27.1 deaths per 100,000 women for Aboriginal and Torres Strait Islander women compared with the non-Indigenous rate of 22.0 (Table 8.5).

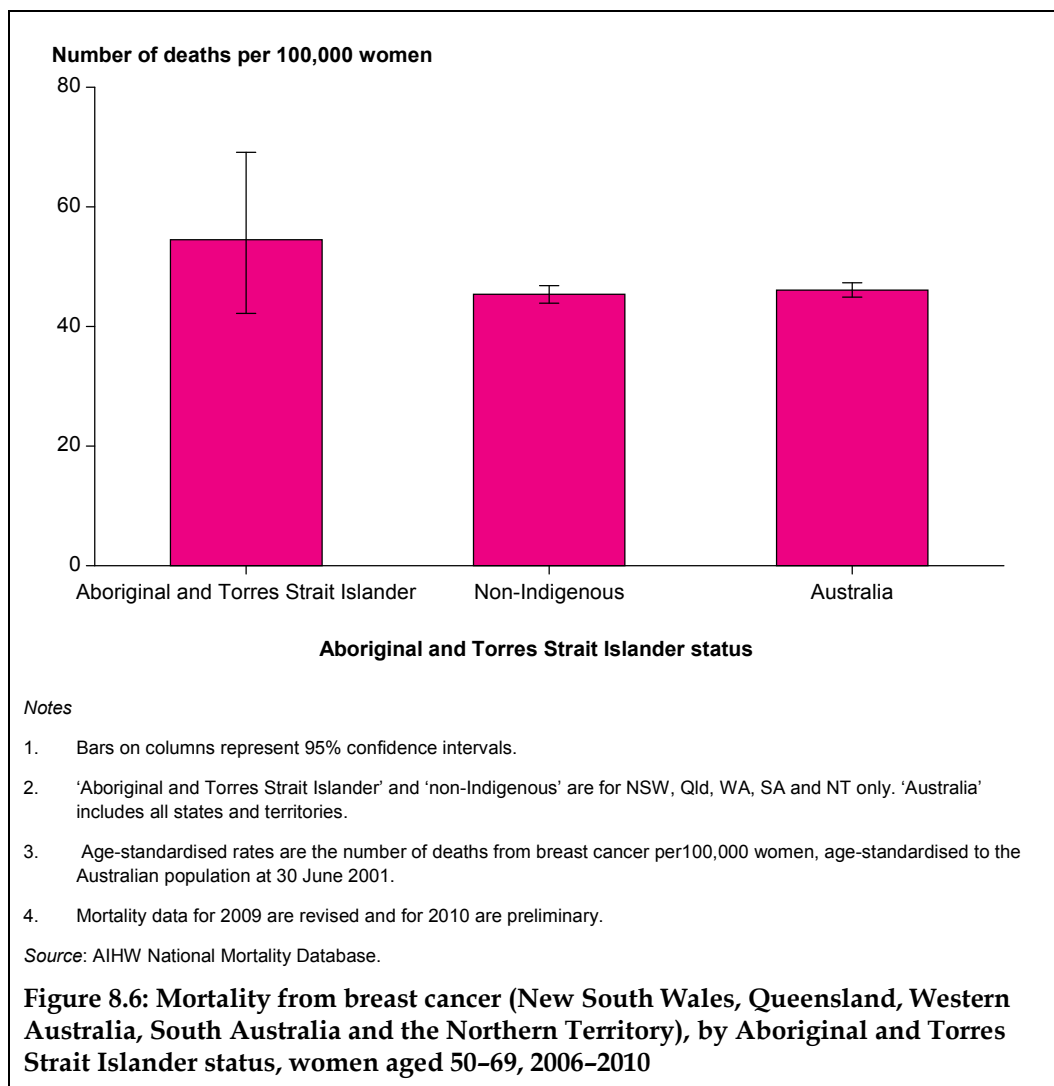


Table 8.5: Mortality from breast cancer (New South Wales, Queensland, Western Australia, South Australia and Northern Territory) by Aboriginal and Torres Strait Islander status, women aged 50–69 and women of all ages, 2006–2010

	New South Wales, Queensland, Western Australia, South Australia and the Northern Territory ^(a)			Australia ^(c)
	Aboriginal and Torres Strait Islander	Non-Indigenous	Total ^(b)	
50–69 years				
Deaths	69	3,784	3,889	5,486
Crude rate	52.8	46.1	46.6	46.8
AS rate	54.5	45.4	45.9	46.1
95% CI	42.2–69.1	43.9–46.8	44.5–47.4	44.9–47.3
All ages				
Deaths	137	9,407	9,628	13,716
Crude rate	11.4	25.3	25.0	25.4
AS rate	27.4	21.6	21.9	22.0
95% CI	22.3–33.1	21.2–22.0	21.4–22.3	21.7–22.4

(a) 'Aboriginal and Torres Strait Islander' and '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.

(b) 'Total' includes Aboriginal and Torres Strait Islander, non-Indigenous and women in the 'not-stated' category for Aboriginal and Torres Strait Islander status for New South Wales, Queensland, Western Australia, South Australia and the Northern Territory only.

(c) All women in Australia.

Notes

1. Crude rates are the number of deaths from breast cancer per 100,000 women.
2. Age-standardised rates are the number of deaths from breast cancer per 100,000 women, age-standardised to the Australian population at 30 June 2001.
3. Mortality data for 2009 are revised and for 2010 are preliminary.

Source: AIHW National Mortality Database.

Appendix A Additional data



Notes

1. The outline symbols are the average 2009 and 2010 Australian Bureau of Statistics estimated resident population for women aged 50–69.
2. The lighter highlighted symbols represent the proportion of women screened in 2009–2010.
3. The darker highlighted symbols represent the proportion of women recalled to assessment in 2010.
4. The single darkest highlighted symbol represents the proportion of women who have an invasive breast cancer detected through BreastScreen Australia.

Source: AIHW analysis of BreastScreen Australia data.

Figure A1: Women in BreastScreen Australia aged 50–69, 2009–2010

Table A1: BreastScreen Australia participation by state and territory, women aged 50–69, 1999–2000, 2007–2008 and 2009–2010

State and territory	AS rates (95% CI)		
	1999–2000	2007–2008	2009–2010
NSW	52.5 (52.3–52.7)	54.3 (54.1–54.5)	52.8 (52.6–53.0)
Vic	56.9 (56.6–57.1)	53.4 (53.2–53.5)	54.2 (54.0–54.3)
Qld	57.6 (57.4–57.9)	57.3 (57.1–57.5)	57.6 (57.4–57.8)
WA	52.7 (52.4–53.1)	55.3 (55.0–55.6)	58.1 (57.8–58.4)
SA	63.6 (63.2–64.0)	57.4 (57.1–57.8)	56.4 (56.1–56.8)
Tas	59.8 (59.1–60.5)	54.5 (53.9–55.1)	58.4 (57.8–59.0)
ACT	60.7 (59.7–61.6)	54.1 (53.4–54.9)	52.8 (52.0–53.5)
NT	47.6 (46.3–49.0)	40.5 (39.5–41.4)	41.2 (40.2–42.1)
Australia	55.9 (55.8–56.1)	54.9 (54.8–55.0)	55.0 (54.9–55.0)

Notes

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

Source: AIHW analysis of BreastScreen Australia data.

Appendix B BreastScreen Australia information

Table B1: Contacts and links for the state and territory and Commonwealth components of BreastScreen Australia

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

BreastScreen Australia definitions

Target age group

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

Aboriginal and Torres Strait Islander status

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

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

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

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

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

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

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

Main language spoken at home

Main language spoken at home is also a self-reported category that is supplied at the time of screening. Women who are reported as 'non-English-speaking' have reported that they

speak a language other than English at home, which can be interpreted as an indication of 'active ethnicity'. Since a different cultural and linguistic background may present a barrier to screening, this self-reported category is used to identify women who may have difficulties accessing services due to their cultural or language background.

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

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

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

Tumour size

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

Screening round

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

Appendix C Data sources and classifications

Data sources

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

Indicator	Data source	Epoch and latest data available
1 Participation	State and territory BreastScreen registers	2 years (to align with recommended screening interval); latest data are for women screened in 2009 or 2010.
2 Rescreening	State and territory BreastScreen registers	1 year; latest data are for women screened in 2008 (27 months needs to have passed since last screen to calculate this indicator)
3 Recall to assessment	State and territory BreastScreen registers	1 year; latest data are for women screened in 2010
4 Invasive breast cancer detection	State and territory BreastScreen registers	1 year; latest data are for women screened in 2010
5 DCIS detection	State and territory BreastScreen registers	1 year; latest data are for women screened in 2010
6 Sensitivity	State and territory BreastScreen registers	3 years are combined due to small numbers (2005, 2006, and 2007); latest data are for women screened in 2007 (2 years needs to have passed since last screen to calculate this indicator)
7a Invasive breast cancer incidence (ICD-10 C50)	Australian Cancer Database, AIHW	1 year; latest data are for new cases diagnosed in 2008
7b DCIS incidence	State and territory cancer registries	1 year; latest data are for new cases diagnosed in 2008
8 Mortality (ICD-9 174, ICD-10 C50)	National Mortality Database, AIHW	1 year; latest data are for deaths registered in 2010

BreastScreen Australia data

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

New South Wales data for participation by main language spoken at home (a disaggregation of participation), rescreening, recall to assessment, invasive breast cancer detection, ductal carcinoma in situ (DCIS) detection, and sensitivity were not available because of issues relating to the implementation of a new business information system in New South Wales. It is anticipated that future reports will include New South Wales data for these years. For these performance indicators, data are provided for Victoria, Queensland, Western Australia, South Australia, Tasmania, the Australian Capital Territory and the Northern Territory, along with a total for these states. New South Wales population data were not included in the denominator when calculating these indicators. Trend data are not provided.

Incidence data

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

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

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

Mortality data

The mortality data used in this report were provided by the Registries of Births, Deaths and Marriages, the Australian Bureau of Statistics and the National Coroners Information System. These data are maintained at the Australian Institute of Health and Welfare in the National Mortality Database

The registration of deaths has been compulsory since the mid-1850s and this information is registered with the relevant state and territory Registrar of Births, Deaths and Marriages. Information on the cause of death is supplied by the medical practitioner certifying the death, or by a coroner. State refers to state of residence. Since 1906, the Commonwealth Statistician has compiled the information collected by the Registrars and published national death information.

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

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

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

Queensland mortality data by Aboriginal and Torres Strait Islander status have been adjusted for late registrations in 2010. More information is available in the ABS causes of death for 2010 (ABS cat 3303.0) from <www.abs.gov.au>.

Population data

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

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

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

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

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

Classifications

Age

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

State or territory

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

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

Remoteness area

Remoteness areas are classified according to the ABS's Australian Standard Geographic Classification (ASGC) Remoteness Structure (ABS 2006), which groups geographic areas into six categories. These categories, called Remoteness Areas (RAs), are based on Census Collection Districts (CDs) and defined using the Accessibility/Remoteness Index for Australia (ARIA). ARIA is a measure of the remoteness of a location from the services provided by large towns or cities. Accessibility is judged purely on distance to one of the

metropolitan centres. A higher ARIA score denotes a more remote location. The six RAs of the ASGC Remoteness Structure are listed in the table below (Table C4); the sixth 'migratory' area is not used in this report.

Table C1: Remoteness areas for the ASGC

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

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

Socioeconomic status

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

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

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

BreastScreen Australia classifications

See Appendix B *BreastScreen Australia definitions* for classifications specific to BreastScreen Australia.

Appendix D BreastScreen Australia 2009–2010 Data Quality Statement

Summary of key data quality issues

- All states and territories maintain a population-based BreastScreen register which records the data collected during a woman's contact with a BreastScreen service.
- The AIHW compiles BreastScreen Australia data supplied from state and territory BreastScreen registers in order to monitor BreastScreen Australia annually at a national level.
- State and territory BreastScreen registers change every day, adding new records and improving the quality of existing records as new information becomes available. BreastScreen Australia data may therefore change from year to year.
- For 2009–2010 data, New South Wales data are not available for participation by main language spoken at home, rescreening, recall to assessment, invasive breast cancer and DCIS detection and sensitivity due issues relating to the implementation of a new business information system in New South Wales. It is anticipated that future reports will include data for these years.

Description

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

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

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

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

Institutional environment

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

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

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

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

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

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

For further information see the AIHW website <www.aihw.gov.au>.

The AIHW has been receiving BreastScreen data since 1996.

Timeliness

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

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

The current BreastScreen Australia database contains data on women who participated in BreastScreen Australia between 1996 and 2010.

Accessibility

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

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

Interpretability

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

Relevance

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

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

Accuracy

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

Women attending a BreastScreen service are able to self-report Aboriginal and Torres Strait Islander status; this database field is therefore considered to be of high quality. However, use of the 'not stated' category has decreased substantially over time, which provides much more accurate data on current participation in BreastScreen Australia by Aboriginal and Torres Strait Islander status, but makes trend data difficult to interpret.

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

Coherence

BreastScreen data are reported and published annually by the AIHW.

For 2009–2010 data, New South Wales data are not available for participation by main language spoken at home, rescreening, recall to assessment, invasive breast cancer and DCIS detection and sensitivity due to issues relating to the implementation of a new business information system. It is anticipated that future reports will include data for these years.

Appendix E Statistical methods

Comparisons and tests of statistical significance

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

Crude rates

A crude rate is defined as the number of events over a specified period of time (for example, a year) divided by the total population. For example, a crude cancer incidence rate is defined as the number of new cases of cancer in a specified period of time divided by the population at risk. Crude mortality rates and cancer incidence rates are expressed in this report as number of deaths or new cases per 100,000 population. Crude participation rate is expressed as a percentage.

Age-specific rates

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

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

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

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

= 10.7 per 100,000

Age-standardised rates (AS rates)

Rates are adjusted for age to facilitate comparisons between populations that have different age structures, for example, between youthful and ageing communities. There are two different methods commonly used to adjust for age. This publication uses direct standardisation, in which the age-specific rates are multiplied by a constant population (the 2001 Australian Standard Population unless otherwise specified). This effectively removes the influence of the age structure on the summary rate.

It is important to be aware that for some data presented in this report, indirect age standardisation would be more appropriate due to small numbers (most commonly for the Australian Capital Territory and the Northern Territory), but direct age standardisation has been used for consistency. This can result in relatively large differences between crude and age-standardised rates. In these cases, crude rates should also be considered when interpreting data.

The method used for this calculation comprises that first, the age-specific rate is calculated (as shown above) for each age group. Second, the expected number of cases in each 5-year age group is calculated by multiplying the age-specific rates by the corresponding standard population and dividing by the appropriate factor (that is, 100,000 for mortality and

incidence rates, and 100 for participation). Third, to give the age-standardised rate, the expected number of cases in each group are summed, divide by the total of the standard population and multiplied by the appropriate factor (for example 100,000 for mortality and incidence rate, and 100 for participation).

Confidence intervals

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

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

Interpretation of confidence intervals

Where indicators include a comparison (such as between states and territories), a 95% confidence interval is presented along with the rates. This is because the observed value of a rate may vary due to chance, even where there is no variation in 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 at the 95% level.

It is important to note that overlapping confidence intervals does not imply that the difference between two rates is definitely due to chance. Instead, an overlapping confidence interval represents a difference in rates that is too small to allow differentiation between a real difference and one that is due to chance variation. It can, therefore, 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 two rates are statistically significantly different from each other, this means that the difference is unlikely to have arisen by chance. Judgment should, however, be exercised in deciding whether or not the difference is of any clinical significance.

Small counts

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

Glossary

Aboriginal: A person of Aboriginal descent who identifies as an Aboriginal and is accepted as such by the community in which he or she lives.

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

Age-standardised rate: weighted average of age-specific rates according to a standard distribution of the population by age to eliminate the effect of different age distributions and thus facilitate valid comparisons of groups with differing age compositions.

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

Benign: not cancerous.

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

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

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

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

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

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

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

First screening round: see *Screening round*.

Incidence: see *New cancer case*.

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

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

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

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

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

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

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

Invasive cancer: a tumour whose cells have invaded healthy or normal tissue.

Mammogram: a radiographic depiction of the breast.

Morbidity: illness.

Mortality: see Cancer death.

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

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

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

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

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

Screening: the performance of tests on apparently well people in order to detect a medical condition at an earlier stage than would otherwise be the case. Because a screening test is not intended to be diagnostic, a person with a positive or suspicious result must be referred for diagnosis and treatment if necessary.

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

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

- the woman dies.

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

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

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

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

Significant difference: Rates are deemed statistically significantly different when their confidence intervals do not overlap, because their difference is greater than what could be explained by chance. See 'confidence intervals' in Appendix D for more information.

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

Target population: women aged 50–69.

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.

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

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

References

- ABS (Australian Bureau of Statistics) 2006. Statistical Geography Volume 1 - Australian Standard Geographical Classification (ASGC). Canberra: ABS. Viewed 21 September 2012, <<http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/1216.0Main+Features1Jul%202006?OpenDocument>>.
- ABS 2007. Deaths, Australia, 2006. Canberra: ABS. Viewed 21 September 2012, <<http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/3302.0Explanatory%20Notes12006?OpenDocument>>.
- ABS 2008. Information Paper: An Introduction to Socio-Economic Indexes for Areas (SEIFA) 2006. Canberra: ABS. Viewed 21 September 2012, <<http://www.abs.gov.au/ausstats/abs@.nsf/mf/2039.0/>>.
- ABS 2009. Experimental Estimates and Projections, Aboriginal and Torres Strait Islander Australians, 1991 to 2021. ABS Cat. no. 3238.0. Canberra: ABS.
- AIHW (Australian Institute of Health and Welfare) 2010a. Risk of invasive breast cancer in women diagnosed with ductal carcinoma in situ in Australia between 1995 and 2005. Cancer series no. 51. Cat. no. CAN 47. Canberra: AIHW.
- AIHW 2010b. National best practice guidelines for collecting Indigenous status in health data sets. Cat. no. IHW 29. Canberra: AIHW.
- AIHW 2011. BreastScreen Australia monitoring report 2008-2009. Cancer series no. 63. Cat. no. CAN 60. Canberra: AIHW.
- AIHW & DoHA (Australian Government Department of Health and Ageing) 2005. BreastScreen Australia Data Dictionary. Canberra: AIHW & DoHA.
- AIHW & NBCC (National Breast Cancer Centre) 2007. Breast cancer survival by size and nodal status. Cancer series no. 39. Cat. no. CAN 34. Canberra: AIHW.
- American Cancer Society 2011. Breast cancer overview. Georgia. American Cancer Society. Viewed 21 September 2012, <<http://www.cancer.org/Cancer/BreastCancer/OverviewGuide/breast-cancer-overview-what-causes>>.
- 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: DoHA.
- BreastScreen Australia EAC (Evaluation Advisory Committee) 2009a. BreastScreen Australia Evaluation: Evaluation Final Report. Canberra: DoHA. Viewed 18 September 2012, <<http://www.cancerscreening.gov.au/internet/screening/publishing.nsf/Content/br-evaluation-report-cnt>>.
- BreastScreen Australia EAC 2009b. BreastScreen Australia Evaluation: Participation and Performance Trends. Canberra: DoHA. Viewed 19 September 2012, <<http://www.cancerscreening.gov.au/internet/screening/publishing.nsf/Content/br-participation-cnt>>.
- BreastScreen Queensland 2009. Every woman: Aboriginal and Torres Strait Islander women. Brisbane: BreastScreen Queensland. Viewed 17 August 2012, <<http://www.health.qld.gov.au/breastscreen/aboriginal-tsi-women.asp>>.
- BreastScreen SA (South Australia) 2003. Keeping Abreast: Screening Indigenous women in SA. Vol. 3. Adelaide: SA Health, Government of South Australia

- BreastScreen SA 2010. The impact of BreastScreen SA, 20 year report 1989–2008: with trend data for 1989–2004. Adelaide: Central Northern Adelaide Health Service, SA Health, Government of South Australia.
- BreastScreen WA (Western Australia) 2008. BreastScreen WA: Statistical Report 2000–2005. Perth: BreastScreen WA.
- Cancer Australia 2009. Lobular Carcinoma in Situ. Sydney: Cancer Australia. Viewed 21 September 2012, < <http://www.canceraustralia.gov.au/clinical-best-practice/breast-cancer/lobular-carcinoma-situ-icis-and-atypical> >.
- 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.
- 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.
- Eusebi V, Feudale E, Foschini MP, Micheli A, Conti A, Riva C et al. 1994. Long-term follow-up of in situ carcinoma of the breast. *Seminars in Diagnostic Pathology* 11:223–35.
- 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.
- Jensen O, Parkin D, MacLennan R, Muir C & Skeet Re (eds) 1991. *Cancer registration: principles and methods*. IARC scientific publications 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 NBCC.
- Kerlikowske K, Molinaro AM, Gauthier ML, Berman HK, Waldman F, Bennington J et al. 2010. Biomarker Expression and Risk of Subsequent Tumors After Initial Ductal Carcinoma In Situ Diagnosis. *Journal of the National Cancer Institute* 102:627–37.
- Luke C, Priest K & Roder D 2006. Changes in incidence of in situ and invasive breast cancer by histology type following mammography screening. *Asian Pacific Journal of Cancer Prevention* 7:69–74.
- McPherson K, Steel CM & Dixon JM 2000. Breast cancer – epidemiology, risk factors, and genetics. *British Medical Journal* 321:624–8.
- NBCC, AACR (Australasian Association of Cancer Registries), BreastScreen Australia, DHAC (Australian Government Department of Health and Aged Care) & AIHW 2000. Ductal carcinoma in situ (DCIS). *Cancer Monitoring No 1*. December 2000. Canberra: AIHW.
- NBCC 2006. Advice about familial aspects of breast cancer and epithelial ovarian cancer: a guide for health professionals. Camperdown: NBCC.
- 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.
- Virnig BA, Tuttle TM, Shamliyan T & Kane RL 2010. Ductal carcinoma in situ of the breast: a systematic review of incidence, treatment, and outcomes. *Journal of the National Cancer Institute* 102:170–8.
- WHO (World Health Organization) & IARC (International Agency for Research on Cancer) 2002. Breast cancer screening. IARC handbooks of cancer prevention. Lyon: IARC Press.

List of tables

Summary table:	Key performance indicators for BreastScreen Australia, women aged 50–69	1
Table S1:	BreastScreen Australia performance indicators	6
Table 1.1:	Number and age-standardised rate of women aged 50–69 participating in BreastScreen Australia, 1996–1997 to 2009–2010.....	11
Table 1.2:	BreastScreen Australia participation by remoteness area, women aged 50–69, 2009–2010.....	13
Table 1.3:	BreastScreen Australia participation by remoteness area, women aged 50–69, 2009–2010.....	14
Table 1.4:	BreastScreen Australia participation by socioeconomic status, women aged 50–69, 2009–2010.....	15
Table 1.5:	BreastScreen Australia participation by Aboriginal and Torres Strait Islander status, women aged 50–69, 1999–2000 and 2009–2010	16
Table 1.6:	BreastScreen Australia participation by main language spoken at home, women aged 50–69, 2009–2010	18
Table 2.1:	Rescreen rate for women aged 50–67, screened during 2008.....	22
Table 3.1:	Recall to assessment rate for women aged 50–69, by state and territory, first and subsequent screening rounds, 2010	25
Table 4.1:	All-size and small invasive breast cancer detection in women aged 50–69, first and subsequent screening rounds for all-size, and all screening rounds for small cancers, 2010	27
Table 4.2:	All-size and small (≤ 15 mm) invasive breast cancer detection rates, by age, all screening rounds, 2010	29
Table 4.3:	All-size and small (≤ 15 mm) invasive breast cancer detection rates in women aged 50–69, by state and territory, 2010	30
Table 5.1:	Ductal carcinoma in situ detection in women aged 50–69, first and subsequent screening rounds, 2010	32
Table 5.2:	Age-specific detection rates for ductal carcinoma in situ, all screening rounds, by age, 2010	33
Table 5.3:	Ductal carcinoma in situ detection in women aged 50–69, by state and territory, all screening rounds, 2010	34
Table 6.1:	Interval cancer rate for women aged 50–69, screened in index years 2005–2007, by state and territory, first and subsequent screening rounds, 0–12 months follow-up	37
Table 6.2:	Interval cancer rate for women aged 50–69, screened in index years 2005–2007, by state and territory, first and subsequent screening rounds, 13–24 months follow-up.....	37
Table 6.3:	Interval cancer rate for women screened in index years 2005–2007, all screening rounds, by age, 0–12 months and 13–24 months follow-up	38
Table 6.4:	Interval cancer rate for women aged 50–69, screened in index years 2005–2007, first and subsequent screening rounds, 0–24 months follow-up	38

Table 6.5:	Program sensitivity for women aged 50–69, screened in index years 2005–2007 by state and territory, first and subsequent screening rounds, 0–12 months follow-up	40
Table 6.6:	Program sensitivity for women aged 50–69, screened in index years 2005–2007, by state and territory, first screening round, 0–24 months follow-up	40
Table 6.7:	Program sensitivity for women screened in index years 2005–2007, all screening rounds, by age, 0–12 months and 0–24 months follow-up	41
Table 7.1:	Incidence of invasive breast cancer, 1982 to 2008	44
Table 7.2:	Age-specific incidence of invasive breast cancer, by age, 2008.....	47
Table 7.3:	Incidence of invasive breast cancer, women aged 50–69, by state and territory, 1999–2003 and 2004–2008	47
Table 7.4:	Incidence of invasive breast cancer, women aged 50–69, by remoteness area, 2004–2008.....	49
Table 7.5:	Incidence of invasive breast cancer, women aged 50–69, by socioeconomic status, 2004–2008	49
Table 7.6:	Incidence of breast cancer (New South Wales, Queensland, Western Australia and Northern Territory) by Aboriginal and Torres Strait Islander status, women aged 50–69 and women of all ages, 2004–2008	50
Table 7.7:	Incidence of ductal carcinoma in situ, women aged 50–69, 1996 to 2008	53
Table 7.8:	Age-specific incidence rates for ductal carcinoma in situ, by age, 2008	54
Table 7.9:	Incidence of ductal carcinoma in situ, women aged 50–69, by state and territory 2004–2008.....	54
Table 8.1:	Mortality rates from breast cancer, 1982 to 2010.....	Error! Bookmark not defined.
Table 8.2:	Age-specific mortality rates for breast cancer, 2010	Error! Bookmark not defined.
Table 8.3:	Mortality from breast cancer, women aged 50–69 and women of all ages, by state and territory, 2006–2010	Error! Bookmark not defined.
Table 8.4:	Mortality from breast cancer, by remoteness area, women aged 50–69 and women of all ages, 2006–2010.....	Error! Bookmark not defined.
Table 8.5:	Mortality from breast cancer (New South Wales, Queensland, Western Australia, South Australia and Northern Territory) by Aboriginal and Torres Strait Islander status, women aged 50–69 and women of all ages, 2006–2010.....	Error! Bookmark not defined.
Table A1:	BreastScreen Australia participation by state and territory, women aged 50–69, 1999–2000, 2007–2008 and 2009–2010	65
Table B1:	Contacts and links for the state and territory and Commonwealth components of BreastScreen Australia	66
Table C1:	Remoteness areas for the ASGC	72

List of figures

Illustration S1:	Anatomy: the breast and adjacent lymph nodes	2
Figure 1.1:	BreastScreen Australia participation by age group, females, 2009–2010.....	12
Figure 1.2:	Age distribution of women aged 40 or over screened by BreastScreen Australia, 1999–2000 (A) and 2009–2010 (B)	13
Figure 1.3:	BreastScreen Australia participation by state and territory, women aged 50–69, 1999–2000, 2007–2008 and 2009–2010	14
Figure 1.4:	BreastScreen Australia participation by remoteness area (A) and by socioeconomic status (B), women aged 50–69, 2009–2010	15
Figure 1.5:	BreastScreen Australia participation by Aboriginal and Torres Strait Islander status, women aged 50–69, 1996–1997 to 2009–2010	16
Figure 1.6:	Proportion of women aged 50–69 screened by BreastScreen Australia, by Aboriginal and Torres Strait Islander status, 1999–2000 (A) and 2009–2010 (B).....	17
Figure 2.1:	Rescreen rate for women screened in 2008, aged 50–67, by screening round	20
Figure 2.2:	Rescreen rate for women by age and screening round, screened during 2008.....	21
Figure 3.1:	Recall to assessment rate, by age, first and subsequent screening rounds, 2010	24
Figure 3.2:	Recall to assessment rate for women aged 50–69, by state and territory, first and subsequent screening rounds, 2010	25
Figure 4.1:	All-size and small (≤ 15 mm) invasive breast cancer detection, by age, all screening rounds, 2010	28
Figure 4.2:	All-size invasive breast cancer detection in women aged 50–69, by state and territory, first and subsequent screening rounds, 2010.....	29
Figure 5.1:	Ductal carcinoma in situ detection in women aged 50–69, by state and territory, all screening rounds, 2010	33
Figure 7.1:	Incidence of invasive breast cancer in women aged 50–69, 1982 to 2008	45
Figure 7.2:	Incidence of invasive breast cancer, by age, 1982 to 2008.....	46
Figure 7.3:	Age-specific incidence rates for invasive breast cancer, by age, 1988, 1998 and 2008.....	46
Figure 7.4:	Incidence of invasive breast cancer, women aged 50–69, by state and territory, 1999–2003 and 2004–2008	48
Figure 7.5:	Incidence of invasive breast cancer in women aged 50–69, by remoteness area (A) and by socioeconomic status (B), 2004–2008	48
Figure 7.6:	Incidence of breast cancer (New South Wales, Queensland, Western Australia and the Northern Territory), by Aboriginal and Torres Strait Islander status, women 50–69, 2004–2008.....	51
Figure 7.7:	Incidence of ductal carcinoma in situ in women aged 50–69, by state and territory, 1999–2003 and 2004–2008	54
Figure 8.1:	Mortality from breast cancer, women aged 50–69, 1982 to 2010	Error! Bookmark not defined.
Figure 8.2:	Mortality from breast cancer, by age, 1982 to 2010.....	57

Figure 8.3:	Age-specific mortality rates for breast cancer, 1990, 2000 and 2010	Error! Bookmark not defined.
Figure 8.4:	Mortality from breast cancer, women aged 50–69, by state and territory, 1996–2000, 2001–2005 and 2006–2010	60
Figure 8.5:	Mortality from breast cancer, by remoteness area, women aged 50–69, 2001–2005 and 2006–2010	Error! Bookmark not defined.
Figure 8.6:	Mortality from breast cancer (New South Wales, Queensland, Western Australia, South Australia and the Northern Territory), by Aboriginal and Torres Strait Islander status, women aged 50–69, 2006–2010	Error! Bookmark not defined.
Figure A1:	Women in BreastScreen Australia aged 50–69, 2009–2010	64

Related publications

This report, *BreastScreen Australia monitoring report 2009–2010*, is part of an annual series. Earlier editions and any published subsequently can be downloaded for free from the AIHW website <<http://www.aihw.gov.au/publications>>. The website also includes information on ordering printed copies.

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

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

More than 1.3 million women in the target age group of 50–69 were screened in 2009–2010, a participation rate of 55%. Breast cancer mortality is at a historic low, at 43 deaths per 100,000 women.