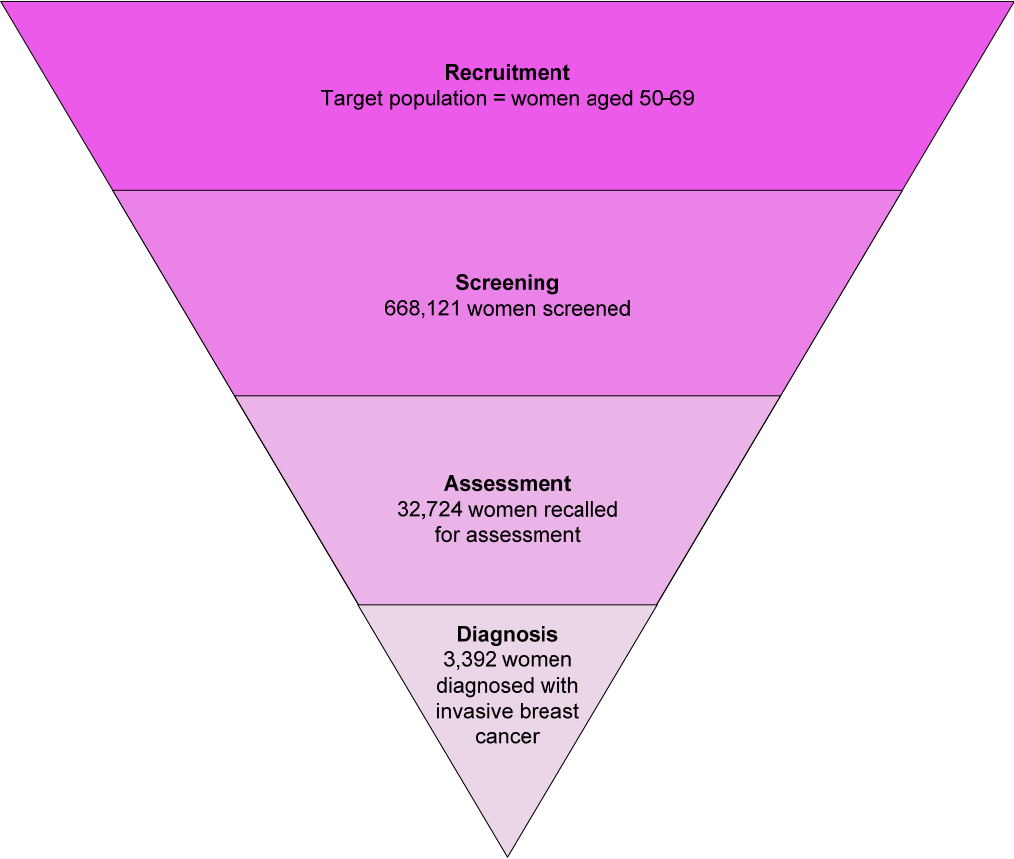


# Appendix A Additional data tables

Additional data tables that provide more detail on the data presented in this report can be found in the accompanying publication: *BreastScreen Australia monitoring report 2006–2007 and 2007–2008: supplementary data tables* (AIHW 2010a).

**Figure A1: Number of women aged 50–69 years in each stage of the BreastScreen Australia screening process over the 12 month period 1 January to 31 December 2008**



**Table A1: BreastScreen Australia participation, by selected population groups, women 50–69 years, 2007–2008**

	Number	ASR	95% CI
	50–69 years		
<b>State and territory</b>			
NSW	412,336	54.3	54.1–54.5
Vic	305,368	53.4	53.2–53.6
Qld	262,354	57.4	57.2–57.6
WA	125,611	55.3	55.0–55.6
SA	107,925	57.4	57.1–57.8
Tas	33,161	54.5	53.9–55.1
ACT	19,574	54.2	53.4–55.0
NT <sup>(a)</sup>	7,074	40.4	39.4–41.4
<b>Australia</b>	<b>1,273,403</b>	<b>54.9</b>	<b>54.8–55.0</b>
<b>Remoteness area</b>			
Major cities	827,202	53.8	53.7–54.0
Inner regional	288,243	56.7	56.5–56.9
Outer regional	134,677	58.3	58.0–58.6
Remote	16,924	56.3	55.5–57.2
Very remote	6,357	50.2	49.0–51.4
<b>Australia</b>	<b>1,273,403</b>	<b>54.9</b>	<b>54.8–55.0</b>
<b>Socioeconomic status</b>			
1 (lowest)	252,785	53.6	53.3–53.8
2	261,211	53.7	53.5–53.9
3	255,699	57.0	56.8–57.3
4	244,705	56.1	55.9–56.3
5 (highest)	259,004	54.4	54.2–54.6
<b>Australia</b>	<b>1,273,403</b>	<b>54.9</b>	<b>54.8–55.0</b>
<b>Aboriginal and Torres Strait Islander status</b>			
Aboriginal and Torres Strait Islander	10,189	36.0	35.3–36.7
Non-Indigenous	1,255,154	54.8	54.7–54.9
Not stated	8,060	..	..
<b>Australia</b>	<b>1,273,403</b>	<b>54.9</b>	<b>54.8–55.0</b>
<b>Main language spoken at home</b>			
English	1,099,997	56.7	56.6–56.8
Non-English	170,600	45.1	44.8–45.3
Not stated	2,806	..	..
<b>Australia</b>	<b>1,273,403</b>	<b>54.9</b>	<b>54.8–55.0</b>

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

Source: AIHW analysis of BreastScreen Australia data.

**Table A2: Number and proportion of women participating in BreastScreen Australia, by age, state and territory, 2007–2008**

Age group	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
<b>Number</b>									
40–44	15,421	10,239	38,619	8,615	5,820	3,810	469	328	83,321
45–49	29,294	19,591	57,974	16,780	11,850	6,468	1,217	990	144,164
<b>50–69</b>	<b>412,336</b>	<b>305,368</b>	<b>262,354</b>	<b>125,611</b>	<b>107,925</b>	<b>33,161</b>	<b>19,574</b>	<b>7,074</b>	<b>1,273,403</b>
70–74	15,694	29,052	32,750	6,219	7,312	3,073	799	107	95,006
75+	9,560	12,453	12,933	3,936	4,944	1,161	381	54	45,422
<b>Per cent</b>									
40–44	3.2	2.7	9.5	5.3	4.2	8.0	2.1	3.8	5.1
45–49	6.1	5.2	14.3	10.4	8.6	13.6	5.4	11.6	8.8
<b>50–69</b>	<b>85.5</b>	<b>81.1</b>	<b>64.8</b>	<b>77.9</b>	<b>78.3</b>	<b>69.6</b>	<b>87.2</b>	<b>82.7</b>	<b>77.6</b>
70–74	3.3	7.7	8.1	3.9	5.3	6.4	3.6	1.3	5.8
75+	2.0	3.3	3.2	2.4	3.6	2.4	1.7	0.6	2.8

Source: AIHW analysis of BreastScreen Australia data.

**Table A3: Number of women rescreening in BreastScreen Australia, by age, state and territory, index year 2005**

Age group	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
<b>Number</b>									
40–44	1,490	1,222	14,461	3,285	1,873	1,248	58	148	23,785
45–49	5,311	4,974	21,123	6,644	3,769	2,083	658	412	44,974
<b>50–67</b>	<b>140,677</b>	<b>102,031</b>	<b>93,460</b>	<b>46,451</b>	<b>33,777</b>	<b>10,198</b>	<b>7,854</b>	<b>2,130</b>	<b>436,578</b>
70–74	2,112	11,505	10,858	1,502	1,711	1,043	151	18	28,900
75+	1,345	1,254	1,999	796	994	212	64	11	6,675
<b>Per cent</b>									
40–44	1.0	1.0	10.2	5.6	4.4	8.4	0.7	5.4	4.4
45–49	3.5	4.1	14.9	11.3	8.9	14.1	7.5	15.2	8.3
<b>50–67</b>	<b>93.2</b>	<b>84.3</b>	<b>65.9</b>	<b>79.2</b>	<b>80.2</b>	<b>69.0</b>	<b>89.4</b>	<b>78.3</b>	<b>80.7</b>
70–74	1.4	9.5	7.7	2.6	4.1	7.1	1.7	0.7	5.3
75+	0.9	1.0	1.4	1.4	2.4	1.4	0.7	0.4	1.2

Source: AIHW analysis of BreastScreen Australia data.

**Table A4: Number and proportion of women recalled to assessment by BreastScreen Australia, by age, state and territory, 2008**

Age group	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
<b>Number</b>									
40–44	675	504	1,844	333	112	223	29	13	3,733
45–49	1,244	971	2,338	624	184	289	58	55	5,763
<b>50–69</b>	<b>10,700</b>	<b>8,677</b>	<b>7,689</b>	<b>2,662</b>	<b>1,445</b>	<b>921</b>	<b>408</b>	<b>222</b>	<b>32,724</b>
70–74	395	548	801	135	100	37	15	7	2,038
75+	257	224	350	84	66	30	8	1	1,020
<b>Per cent</b>									
40–44	5.1	4.6	14.2	8.7	5.9	14.9	5.6	4.4	8.2
45–49	9.4	8.9	18.0	16.3	9.6	19.3	11.2	18.5	12.7
<b>50–69</b>	<b>80.6</b>	<b>79.4</b>	<b>59.0</b>	<b>69.4</b>	<b>75.8</b>	<b>61.4</b>	<b>78.8</b>	<b>74.5</b>	<b>72.3</b>
70–74	3.0	5.0	6.2	3.5	5.2	2.5	2.9	2.3	4.5
75+	1.9	2.1	2.7	2.2	3.5	2.0	1.5	0.3	2.3

Source: AIHW analysis of BreastScreen Australia data.

**Table A5: Number and proportion of women with invasive breast cancer detected by BreastScreen Australia, by age, state and territory, 2008**

Age group	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
<b>Number</b>									
40–44	16	8	54	10	7	5	0	1	101
45–49	41	31	91	34	18	11	3	0	229
<b>50–69</b>	<b>1,060</b>	<b>790</b>	<b>751</b>	<b>348</b>	<b>284</b>	<b>84</b>	<b>58</b>	<b>17</b>	<b>3,392</b>
70–74	84	81	99	41	37	5	2	1	350
75+	57	44	55	29	25	5	1	1	217
<b>Per cent</b>									
40–44	1.3	0.8	5.1	2.2	1.9	4.5	0.0	5.0	2.4
45–49	3.3	3.2	8.7	7.4	4.9	10.0	4.7	0.0	5.3
<b>50–69</b>	<b>84.3</b>	<b>82.8</b>	<b>71.5</b>	<b>75.3</b>	<b>76.5</b>	<b>76.4</b>	<b>90.6</b>	<b>85.0</b>	<b>79.1</b>
70–74	6.7	8.5	9.4	8.9	10.0	4.5	3.1	5.0	8.2
75+	4.5	4.6	5.2	6.3	6.7	4.5	1.6	5.0	5.1

Source: AIHW analysis of BreastScreen Australia data.

**Table A6: Number and proportion of women with ductal carcinoma in situ detected by BreastScreen Australia, by age, state and territory, 2008**

Age group	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
<b>Number</b>									
40–49	19	22	43	17	4	5	1	0	111
<b>50–69</b>	<b>223</b>	<b>209</b>	<b>165</b>	<b>109</b>	<b>64</b>	<b>27</b>	<b>7</b>	<b>8</b>	<b>812</b>
70+	15	28	46	11	6	1	0	0	107
<b>Per cent</b>									
40–49	7.4	8.5	16.9	12.4	5.4	15.2	12.5	0.0	10.8
<b>50–69</b>	<b>86.8</b>	<b>80.7</b>	<b>65.0</b>	<b>79.6</b>	<b>86.5</b>	<b>81.8</b>	<b>87.5</b>	<b>100.0</b>	<b>78.8</b>
70+	5.8	10.8	18.1	8.0	8.1	3.0	0.0	0.0	10.4

Source: AIHW analysis of BreastScreen Australia data.

**Table A7: Number of screen-detected invasive breast cancers and interval cancers diagnosed, by age, state and territory, index years 2003–2005, 0–12 months following negative screening episode**

Age group	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
<b>Number of screen-detected cancers</b>									
40–49	286	115	370	102	66	35	13	9	996
<b>50–69</b>	<b>2,634</b>	<b>1,876</b>	<b>1,705</b>	<b>890</b>	<b>772</b>	<b>237</b>	<b>123</b>	<b>47</b>	<b>8,284</b>
70+	755	538	478	129	139	53	14	2	2,108
<b>Number of interval cancers</b>									
40–49	82	52	95	28	22	10	0	0	289
<b>50–69</b>	<b>352</b>	<b>298</b>	<b>237</b>	<b>119</b>	<b>91</b>	<b>41</b>	<b>10</b>	<b>3</b>	<b>1,151</b>
70+	62	40	37	14	8	6	1	0	168

Source: AIHW analysis of BreastScreen Australia data.

**Table A8: Incidence of invasive breast cancer, by selected population groups, women 50–69 years and all ages, 2002–2006**

	Number	ASR	95% CI
<b>50–69 years</b>			
<b>State and territory</b>			
NSW	10,116	290	284.3–295.7
Vic	7,163	276.4	270.0–282.9
Qld	5,843	291.2	283.8–298.8
WA	2,992	298.2	287.6–309.1
SA	2,624	304.5	292.9–316.4
Tas	803	292.3	272.4–313.3
ACT	548	339.6	311.6–369.5
NT	147	204.3	171.6–241.4
<b>Australia</b>	<b>30,236</b>	<b>289.1</b>	<b>285.8–292.4</b>
<b>Remoteness area</b>			
Major cities	20,417	299.3	295.2–303.4
Inner regional	6,556	277.8	271.1–284.6
Outer regional	2,803	256.4	247.0–266.1
Remote	339	239.1	214.3–266.0
Very remote	122	199.4	164.8–237.8
<b>Australia</b>	<b>30,236</b>	<b>289.1</b>	<b>285.8–292.4</b>
<b>All ages</b>			
<b>Aboriginal and Torres Strait Islander status</b>			
Aboriginal and Torres Strait Islander	234	69.1	59.5–79.7
Non-Indigenous	20,231	103.1	101.7–104.6
Not stated	2,299	..	..
<b>Australia</b>	<b>30,236</b>	<b>289.1</b>	<b>285.8–292.4</b>

Source: AIHW analysis of BreastScreen Australia data.

**Table A9: Mortality from invasive breast cancer, by selected population groups, women 50–69 years, 2003–2007**

	Number	ASR	95% CI
	50–69 years		
<b>State and territory</b>			
NSW	1,799	50.1	47.8–52.5
Vic	1,377	51.5	48.8–54.3
Qld	1,045	49.8	46.8–52.9
WA	502	48.1	44.0–52.5
SA	475	53.5	48.8–58.5
Tas	132	46.6	39.0–55.3
ACT	76	45.9	36.1–57.5
NT	36	46.8	32.3–65.3
<b>Australia</b>	<b>5,442</b>	<b>50.3</b>	<b>48.9–51.6</b>
<b>Remoteness area</b>			
Major cities	3,535	49.1	47.5–50.8
Inner regional	1,256	53.2	50.3–56.3
Outer regional	554	51.5	47.3–56.0
Remote	70	50.1	39.0–63.3
Very remote	27	51.7	33.7–75.3
<b>Australia</b>	<b>5,442</b>	<b>50.3</b>	<b>48.9–51.6</b>
<b>Aboriginal and Torres Strait Islander status</b>			
Aboriginal and Torres Strait Islander	64	61.2	46.9–78.3
Non-Indigenous	3,760	49.5	48.0–51.1
Not stated	33	..	..
<b>Australia</b>	<b>5,442</b>	<b>50.3</b>	<b>48.9–51.6</b>

Source: AIHW analysis of BreastScreen Australia data.

# Appendix B BreastScreen Australia information

## BreastScreen Australia definitions

### Target population

BreastScreen Australia selects women on the basis of age alone. BreastScreen Australia actively targets women aged 50–69 years through recruitment strategies and reminder letters. Although women aged 40–49 years and 70 years or over can also attend, these women are not actively recruited.

### Eligible population

Because BreastScreen Australia selects women on the basis of age alone, the eligible population, used as the denominator for the calculation of participation, is defined as 'women aged 50–69 years'.

### Aboriginal and Torres Strait Islander status

The *BreastScreen Australia data dictionary* (AIHW & DoHA 2005) 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.

In addition, some jurisdictions do not use the 'not stated' category. If Aboriginal and Torres Strait Islander status is not given, it is set to a default value. The default used is not the same for all jurisdictions. Therefore there are likely to be some Aboriginal and Torres Strait Islander women who are being 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 2008 female population



aged 50–69 years 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**

The *BreastScreen Australia data dictionary* (AIHW & DoHA 2005) recommends 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. In some jurisdictions, there may thus be some lack of comparability with the *BreastScreen Australia data dictionary* definition of ‘main language’.

In addition, some jurisdictions do not use the ‘not stated’ category. If the main language spoken at home is not given, it is set to a default value. The default used is not the same for all jurisdictions. This means that the analysis based upon the main language spoken at home should be interpreted with caution.

### **Tumour size**

Tumour size is the size in millimetres of the malignant lesion, and applies to invasive cancers only. For more details about this stratification, 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 national program is used for this stratification in this report. However, it is not always possible to determine the round in the national program, so, for some women, this stratification has been collected as the round number in the state or territory program.

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# 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	Description	Data source
1	Participation	BreastScreen Australia state and territory services
2	Cancer detection	BreastScreen Australia state and territory services
3	Sensitivity	BreastScreen Australia state and territory services
4	DCIS detection	BreastScreen Australia state and territory services
5	Recall to assessment	BreastScreen Australia state and territory services
6	Rescreening	BreastScreen Australia state and territory services
7a	Incidence (ICD-10 C50)	Australian Cancer Database, AIHW
7b	Incidence of DCIS	State and territory cancer registries
8	Mortality (ICD-9 174, ICD-10 C50)	National Mortality Database, AIHW

## BreastScreen Australia data

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

## Population data

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

Participation was calculated using the average of the 2006 and 2007, and 2007 and 2008, estimated resident female populations. The only exception to this was participation by socioeconomic status, by language spoken at home and by Aboriginal and Torres Strait Islander status.

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 statistical local area and socioeconomic status to the relevant estimated resident population by statistical local area counts.

The average of the ABS projected populations (ABS cat. no. 3238.0) (ABS 2009) for 2006 and 2007, and 2007 and 2008, 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.

## **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 produces reports on national incidence.

## **Mortality data**

Mortality data in this report come from the AIHW's National Mortality Database, which is a national collection of de-identified information for all deaths in Australia maintained by the AIHW. Information on the characteristics and causes of death of the deceased is provided by the Registrars of Births, Deaths and Marriages and coded nationally by the ABS. Information on the cause of death is supplied by the medical practitioner certifying the death, or by a coroner. The data are updated each calendar year.

Mortality data in this report are given for 1992–2007. During this time, changes have been made to the coding and processing of mortality data that affect comparability of the data. Data for holdings for 1987–1996 were manually coded using the ninth revision of the International Classification of Diseases (ICD-9). Data holdings for 1997 onwards were coded using ICD-10, using an automated system with slightly different coding rules. The change to the coding and processing of mortality data introduced a break in the data time series.

Data have been analysed using the year of occurrence of death for the period 1992–2006 and year of registration of death for 2007. This is because mortality data by year of occurrence of death is a more accurate reflection of mortality during a particular year than year of registration data; however, owing to late registrations, year of occurrence data for 2007 are still incomplete.

All states and territories have provision for the identification of Aboriginal and Torres Strait Islander deaths on their death registration forms. However, the coverage of deaths identified as Aboriginal and Torres Strait Islander varies across states and territories and over time. Although the identification of Aboriginal and Torres Strait Islander deaths is incomplete in all state and territory registration systems, five jurisdictions (New South Wales, Queensland, Western Australia, South Australia and the Northern Territory) have been assessed by the ABS and the AIHW as having adequate identification.

Some mortality figures are based on a reporting period of 5 years rather than 12 months. This longer period allows for a greater aggregation of information on issues that are subject to wide fluctuations, and for a more confident and meaningful estimate of the outcomes.

# 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 jurisdiction, both screens may be included in participation. This should, however, have a negligible effect on the reported participation.

## Geographic region

Geographic regions 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; the sixth 'migratory' area is not used in this report.

### Remoteness areas for the ASGC

Geographic region	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



Residential address postcodes of participants were mapped to CDs and then classified to the five main RAs, ranging from *Major cities* to *Very remote* areas. As some postcodes can span different RAs, a weighting for each RA is attributed to the postcode. This can result in non-integer counts for remoteness classifications. For example, the Northern Territory postal area 0822 is classified as 70.54% *Very remote*, 6.64% *Remote* and 22.82% *Outer regional*. Participants with postcode 0822 have their counts apportioned accordingly.

Tables in this report based on geographic location are rounded to integer values. Where figures are rounded, discrepancies may occur between totals and sums of the component items.

## **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 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.

## **BreastScreen Australia classifications**

See Appendix B for classifications specific to BreastScreen Australia.

# Appendix D Statistical methods

## Comparisons and tests of statistical significance

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

### Crude rates

A crude rate is defined as the number of events over a specified period of time (for example, a year) divided by the total population. For example, a crude cancer incidence rate is similarly defined as the number of new cases of cancer in a specified period of time divided by the population at risk. Crude mortality rates and cancer incidence rates are expressed in this report as number of deaths or new cases per 100,000 population. Crude participation 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 breast cancer incidence rate in females aged 50–54 years

$$= \frac{\text{New cases aged 50 – 54 years}}{\text{Female population aged 50 – 54 years}} \times 100,000$$

$$= \frac{1,585}{673,077} \times 100,000$$

$$= 235.5 \text{ per } 100,000$$

### Age-standardised rates (ASR)

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. 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.

As the *National health data dictionary* recommends the use of the 2001 Australian total estimated resident population as the standard population for health statistics, this population has been used for age standardising mortality, incidence and participation.

For statistics based on the population of women screened – that is, cancer detection rates, interval cancer rates and program sensitivity – rates are standardised to the 2008 population of women screened by BreastScreen Australia. Note that previous reports are age-standardised to the 1998 population of women screened by BreastScreen Australia. This means that historical rates will be different from those previously published.

The method used for this calculation comprises three steps:

1. Calculate the age-specific rate (as shown above) for each age group.
2. Calculate the expected number of cases in each 5-year age group 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).
3. To give the age-standardised rate, sum the expected number of cases in each group, divide by the total of the standard population and multiply by the appropriate factor (that is, 100,000 for mortality and incidence rate, and 100 for participation).

## Confidence intervals

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

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

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.

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.

# Glossary

**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. This includes women who choose assessment outside BreastScreen Australia.

**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 (for example, relative risk) 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*.

**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 death and disease. 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.

**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.

**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.

**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:** where rates are referred to as significantly different, or one rate is deemed significantly higher or lower than another, and these differences are statistically significant. 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.

**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 years 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 up until 12 months after the screening examination
- women who are recommended for routine rescreening are only at risk of an interval cancer up until 24 months after the screening examination.

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