

Appendix

Appendix

Appendix 1: Data and statistical issues

Data sources

Multiple data sources were analysed to produce this report and these are summarised below. All data used in this report are based on calendar years.

Indicator	Description	Data source
1	Participation rate	BreastScreen Australia State and Territory services
2	Detection rate for small cancers	BreastScreen Australia State and Territory services
3	Sensitivity	BreastScreen Australia State and Territory services
4	Incidence (ICD 174)	National Cancer Statistics Clearing House, AIHW
5	Mortality (ICD 174)	National Mortality Database, AIHW

Population data

The Australian Bureau of Statistics' estimated resident population has been used to calculate incidence and mortality rates. Participation rates were calculated using the average of the 1997 and 1998 estimated resident female populations (see Appendix 2 for tables). There may be some variation in published participation rates because national rates use estimated resident population data in the denominator whereas some local data analysis may use census counts.

Development of monitoring indicators

Epidemiologists, health economists, health statisticians and specialist medical professionals with an interest in breast cancer and screening provide input for indicator development for the BreastScreen Australia Program. The Monitoring and Evaluation Working Group of the National Advisory Committee to BreastScreen Australia and the National Screening Information Advisory Group to the Australian Institute of Health and Welfare are the main forums for discussion and debate on the indicators. The National Advisory Committee to BreastScreen Australia endorses the final indicators.

Developing indicators for the BreastScreen Australia Program is an ongoing process. The National Advisory

Committee is currently considering additional indicators that will allow the monitoring of factors that change slowly over time. These periodic indicators will include population level analyses that are possible because of the aggregation of data over extended periods of time. Examples of population level analyses include participation rates of women of varying socioeconomic status, women in rural and remote Australia, and Indigenous women. These periodic indicators will improve the ability of the Program to measure its effectiveness and efficiency in meeting its objectives.

The current indicators are summarised below. A more detailed description is presented in the section devoted to the data and analysis of each indicator.

Indicator 1: Participation rate for breast cancer screening

Percentage of eligible women attending for a mammogram within a 24-month period (1 January 1997 to 31 December 1998). The percentages are presented by age and State/Territory where a woman is resident.

Indicator 2: Detection rate for small cancers

The rate of detection of small invasive breast cancers (≤ 10 mm) in 1998 by age and State/Territory where a woman is resident. The overall invasive cancer detection rate is presented in addition to rates for first and subsequent attenders to the Program.

A screen-detected cancer is an invasive breast cancer diagnosed within the BreastScreen Australia Program during a screening episode (Kavanagh et al. 1999).

Indicator 3: Sensitivity

3a: Interval cancer rate. The rate of breast cancers diagnosed after completion of a negative screening episode and before the next screening examination.

3b: Program sensitivity. The percentage of breast cancers detected by the Program amongst all breast cancers (interval cancers plus screen-detected cancers) found in Program-screened women in a specified period.

Indicator 4: Incidence of breast cancer

The rate of all new cases of breast cancer in each State and Territory and nationally by age.

Indicator 5: Mortality from breast cancer

The death rate from breast cancer for each State and Territory and for the whole of Australia by age.

Matching data from BreastScreen Australia and cancer registry databases

In order to develop a consistent method of reporting interval cancer rates and program sensitivity, a national protocol for matching data from BreastScreen Australia and cancer registry databases should be developed. BreastScreen Australia State/Territory Programs have taken the first step in this direction by developing a process of matching to their own State/Territory cancer registries in a way that is suitable to the size of their screening populations. For example, States with large population sizes have larger numbers of women to match with the cancer registries. In these cases, the volume of matching needs to be facilitated by an

automated matching program. Smaller State/Territories may be able to do their matching manually with the aid of SQL-based queries. Regardless of method, it is important that each State and Territory uses a comparable set of variables for their matches. The recommended variables (Kavanagh et al. 1999) to extract from both BreastScreen databases and the cancer registry databases are:

- first name
- last name
- date of birth
- address (including number, street, suburb/town and postcode)
- date of cancer diagnosis
- date of death (or last contact)
- second given name
- alias/maiden name
- tumour details.

Additional information required from the BreastScreen Australia databases include:

- symptomatic status (at first screen and at rescreen within 24 months)
- date of screen
- outcome of screening episode (cancer detected, routine recall or early review).

A validation of the methods used by States and Territories to match data is needed to ensure that each State/Territory Program is accurate in its matching process. Accurate matching is necessary for comparable interval cancer rates and program sensitivity between States and Territories. Future reports will aim to have matching processes validated nationally. The sensitivity chapter provides further information about sensitivity data issues.

Statistical analysis of BreastScreen monitoring indicators

Crude rates

A crude rate is defined as the number of events over a specified period of time (e.g. 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 death rates and cancer incidence rates are expressed in this report as annual rates per 100,000 population. Rates for cancer detection are calculated per 10,000 women screened.

Age-specific rates

Age-specific rates are calculated by dividing the number of deaths, cancer cases or women participating in the screening program in each specified age group by the corresponding population in the same age group. The rates are expressed per 100,000 population for mortality and cancer incidence, per 10,000 population for cancer detection and as a percentage for participation.

Age-standardised rates (ASR)

Age-standardised rates enable comparisons to be made between populations which have different age structures. 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.

The National Health Data Committee has advocated the use of the 1991 Australian total estimated resident population as the standard population until the year 2001. Mortality, incidence and participation rates are age-standardised to the 1991 (final) Australian total population.

For statistics based on the population of women screened, i.e. cancer detection rates, interval cancer rates and program sensitivity, the rates are standardised to the 1998 population of women screened by BreastScreen

Australia. The standard populations used in this report are found in Appendix 2.

The method used for all of these calculations is composed of three steps:

Step 1: Calculate the age-specific rate for each age group.

Step 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 100,000 (or 10,000 or 100 depending on the type of rate) to get the expected number of cases.

Step 3: Sum the expected number of cases in each age group and divide by the total of the standard population and multiply by the appropriate factor (i.e. 100,000 for mortality and incidence rates, 10,000 for cancer detection and sensitivity rates and 100 for the participation rate).

Confidence intervals

The 95% confidence intervals in this report were calculated using the software package Palisade @Risk (<http://www.palisade.com>). These calculations were based on 1000 simulations using a binomial or Poisson distribution with the observed data to calculate the distribution parameters. The confidence intervals represent a range of values within which it is 95% certain that the true value of the rate is present.

Statistical tests

While confidence intervals provide an indication of the variability of the age-standardised rates, the application of a statistical test provides a more rigorous basis for the comparison between rates. For example, the confidence intervals of two different rates may overlap while the rates themselves are statistically significantly different.

To compare the age-standardised rates calculated by the direct method, the methods of Boyle and Parkin (1991) were used. We calculated a standardised rate ratio for those age-standardised rates that we wanted to compare. The statistical significance of each

standardised rate ratio was obtained by calculating a confidence interval for the rate ratio. An approximation of the exact confidence interval of the standardised rate ratio was used as follows:

$$(ASR_1/ASR_2)^{1 \pm (X)Z_{\alpha/2}}$$

Where ASR_1 and ASR_2 are the standardised rates to be compared using the standardised rate ratio and

$$X = \frac{(ASR_1 - ASR_2)}{\sqrt{se(ASR_1)^2 + se(ASR_2)^2}}$$

where $se(ASR_1)$ and $se(ASR_2)$ are the standard errors for the standardised rates and

$$Z_{\alpha/2} = 1.96$$

for a 95% confidence interval. If this interval includes 1.0 then the standardised rates, ASR_1 and ASR_2 are not significantly different at the 5% level.

Where age-standardised rates were compared for States and Territories, the method described above was used. Where a particular State or Territory (e.g. NSW) was compared with the national rate, the State/Territory in question was removed from the national rate before undertaking the comparison. This is referred to as a comparison with the 'rest of Australia' (e.g. NSW compared with Australia minus NSW).

Analysis by geographic area

Analysis of mortality data by geographic area uses the Rural, Remote and Metropolitan Areas classification. This classification, developed in 1994 by the then Department of Primary Industries and Energy and the then Department of Human Services and Health, is used as a framework for examining breast cancer mortality data at a national level. Seven categories are included — two metropolitan, three rural and two remote zones (see the following table). The classification is based on Statistical Local Areas (SLA) and allocates each SLA in Australia to a category based primarily on population numbers and an

index of remoteness (DPIE & DSHS 1994). Both the size of SLAs and the distribution of population within SLAs vary significantly. This can mean that within a remote SLA there can be pockets that are rural rather than remote and vice versa.

Structure of the Rural, Remote and Metropolitan Areas classification

Zone	Category
Metropolitan	Capital cities
	Other metropolitan centres (urban centre population > 100,000)
Rural	Large rural centres (urban centre population 25,000–99,000)
	Small rural centres (urban centre population 10,000–24,999)
	Other rural centres (urban centre population ≤ 10,000)
Remote	Remote centres (urban centre population > 5,000)
	Other remote areas (urban centre population ≤ 5,000)

Sources: DPIE and DSHS 1994.

Appendix 2: Population data

Table 32

Estimated resident female population, by State and Territory, June 1997

Age group	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
0-4	213,602	153,004	117,741	61,641	47,117	16,167	10,805	8,754	628,975
5-9	215,452	155,910	120,659	64,705	48,050	17,118	10,981	8,052	641,103
10-14	212,957	153,621	122,265	65,724	49,787	17,717	11,007	7,267	640,506
15-19	208,613	154,677	120,201	63,526	48,055	16,633	12,200	6,573	630,537
20-24	222,995	168,887	128,552	66,530	50,239	15,359	14,108	8,402	675,157
25-29	243,236	185,747	133,382	70,032	53,699	16,493	13,501	9,460	725,686
30-34	241,527	180,658	129,315	69,898	54,861	17,239	12,652	8,419	714,742
35-39	250,552	183,985	135,043	73,076	58,587	19,143	13,021	7,723	741,273
40-44	231,972	172,446	125,622	69,750	55,418	17,846	12,457	6,796	692,443
45-49	213,725	159,502	117,362	62,781	52,430	16,375	12,263	5,713	640,228
50-54	182,009	133,847	98,769	49,912	44,573	13,841	9,382	4,135	536,531
55-59	144,389	106,269	75,098	39,083	34,991	11,294	6,170	2,497	419,831
60-64	127,041	93,703	62,228	32,483	31,324	9,820	4,551	1,611	362,779
65-69	125,247	90,505	59,640	30,029	31,355	9,473	3,923	1,111	351,299
70-74	117,239	85,779	54,277	26,452	31,035	8,838	3,599	774	327,997
75-79	91,554	65,723	43,003	20,398	24,558	7,169	2,596	494	255,497
80-84	63,698	46,473	29,632	14,781	17,125	5,130	1,682	297	178,825
85+	53,221	40,121	24,362	12,919	14,683	4,041	1,235	238	150,822
Total	3,159,029	2,330,857	1,697,151	893,720	747,887	239,696	156,133	88,316	9,314,231

Source: Australian Bureau of Statistics 1998.

Table 33**Estimated resident female population, by State and Territory, June 1998**

Age group	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
0-4	211,964	151,230	118,238	61,590	46,451	15,566	10,462	8,599	624,234
5-9	216,598	156,623	122,769	64,891	48,262	16,882	10,785	8,227	645,215
10-14	212,926	154,468	121,554	66,277	49,492	17,415	10,863	7,568	640,736
15-19	211,691	156,110	122,923	64,859	48,307	16,804	11,724	6,801	639,297
20-24	219,602	167,409	126,100	67,118	49,190	15,037	13,223	7,940	665,691
25-29	246,280	186,409	136,225	71,206	53,605	16,466	13,292	9,531	733,145
30-34	237,843	180,162	128,250	69,463	53,750	16,601	12,265	8,436	706,925
35-39	253,091	185,703	137,485	73,996	58,855	18,924	12,781	7,923	748,913
40-44	235,756	174,788	128,226	70,927	55,553	17,901	12,324	7,007	702,629
45-49	216,581	161,284	119,578	64,508	53,063	16,475	12,174	5,783	649,539
50-54	192,250	142,523	105,601	53,595	47,242	14,574	9,998	4,445	570,287
55-59	147,772	108,537	78,235	40,092	35,929	11,424	6,505	2,646	431,183
60-64	129,092	95,392	63,813	33,488	31,816	9,980	4,771	1,754	370,123
65-69	123,457	90,160	59,496	30,121	30,876	9,500	3,946	1,136	348,707
70-74	117,664	86,057	55,247	26,908	30,802	8,806	3,614	806	329,909
75-79	95,504	69,353	44,979	21,587	25,717	7,403	2,866	513	267,923
80-84	64,393	46,276	30,230	14,665	17,197	5,165	1,752	316	180,000
85+	54,706	41,424	25,580	13,305	15,255	4,173	1,310	249	156,006
Total	3,187,170	2,353,908	1,724,529	908,596	751,362	239,096	154,655	89,680	9,410,462

Source: Australian Bureau of Statistics 1998.

Table 34**Australian population of women attending a BreastScreen service in 1998**

Age group	
40-44	59,000
45-49	94,336
50-54	160,633
55-59	127,960
60-64	109,214
65-69	96,139
70-74	61,757
75-79	22,573
80-84	6,340
85+	1,393
All ages	739,345
Ages 50-69	493,946

Source: BreastScreen Australia.

Table 35**Australian 1991 Standard Population**

Age group	
0-4	1,271,703
5-9	1,272,208
10-14	1,241,619
15-19	1,364,074
20-24	1,396,764
25-29	1,399,663
30-34	1,425,735
35-39	1,328,387
40-44	1,294,271
45-49	1,029,145
50-54	846,934
55-59	725,950
60-64	736,868
65-69	671,390
70-74	510,755
75-79	384,495
80-84	229,828
85+	154,247
Total	17,284,036

Source: Australian Bureau of Statistics 1998.

Appendix 3: The National Advisory Committee's role

The National Advisory Committee to the BreastScreen Australia Program is the body which coordinates advice on national policy related to BreastScreen Australia, integrating feedback from individual States and Territories, the Commonwealth, relevant professional bodies and Indigenous and consumer representatives. Its terms of reference are to:

- advise Commonwealth, State and Territory Governments on national policy and quality standards for the BreastScreen Australia Program;
- develop and implement a work program addressing agreed and emerging Program priorities;
- provide a focus for informed comment and debate on issues relating to breast cancer screening, particularly in respect of medical/technical developments, research and epidemiological evidence and other relevant issues; and
- oversee the monitoring and evaluation of the Program.

The membership of the National Advisory Committee consists of an independent chair, eight State and Territory representatives, one representative from the Commonwealth Department of Health and Aged Care and representatives of relevant medical colleges, various peak bodies and specialist groups.

Working groups

To assist the National Advisory Committee to achieve its objectives, a number of working groups have been established to examine and progress priorities established in the National Advisory Committee's work program. The working groups are formed around the following issues:

- monitoring and evaluation;
- communication and education;
- workforce and training; and
- policy review.

The working groups are responsible for:

- making recommendations to the National Advisory Committee on priority projects in their areas of responsibility;
- progressing projects approved by the National Advisory Committee;
- finalising work plans, tender and policy documentation as appropriate; and
- providing progress reports on approved projects to the National Advisory Committee.

A National Quality Management Committee monitors and advises on quality management and oversees the accreditation of BreastScreen Australia services.

