Appendixes

Appendix A: Data sources and limitations

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

Table A1: Breast cancer screening indicators data sources

Indicator	Description	Data source
1	Participation rate for breast cancer screening	BreastScreen programs
2	Detection rate for small cancers	BreastScreen programs
4	Incidence of breast cancer (ICD 174)	National Cancer Statistics Clearing House, AIHW
5	Mortality from breast cancer (ICD 174)	AIHW Mortality Database, ABS, Registrars of Births, Deaths and Marriages

Table A2: Cervical cancer screening indicators data sources

Indicator	Description	Data source
1	Participation rate for cervical cancer screening	National Cervical Screening Program
2	Early rescreening	National Cervical Screening Program
3	Low-grade abnormality detection	National Cervical Screening Program
4	High-grade abnormality detection	National Cervical Screening Program
5	Incidence of micro-invasive cervical cancer (ICD 180)	National Cancer Statistics Clearing House
6	Incidence of squamous, adenocarcinoma, adeno-squamous and other cervical cancer (ICD 180)	National Cancer Statistics Clearing House
7	Mortality from cervical cancer (ICD 180)	AIHW Mortality Database

Population data

The Australian Bureau of Statistics estimated resident female population has been used to calculate incidence and mortality rates. Participation rates were calculated using the average of the 1996 and 1997 estimated resident female population (see Appendix C for tables). There may be some variation in published participation rates because national rates use estimated resident population data in the denominator whereas local data analysis may use census counts. The denominator population used to calculate cervical screening participation rates has been adjusted by the estimated proportion of women who have had a hysterectomy by age. These data were derived from the 1995 National Health Survey, and are tabled in Appendix C.

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. The Australian age-standardised rates in this publication are calculated using this standard population. Both the Australian and World Standard Populations are in Appendix C.

Breast cancer screening

BreastScreen Australia does not routinely screen symptomatic women, however, policies vary between States and Territories. Given the variation in policies the participation data in

this report include all women whether symptomatic or not. There are also varying practices across the State and Territory programs with regard to screening interstate women and how they are reported. For the purposes of this report, Victoria, Western Australia and the Australian Capital Territory have only reported women screened with a residential address within the program State or Territory. All other States and Territories have included women screened from their own jurisdiction as well as those from interstate.

Cervical cancer screening

Indicators 1–4 do not include data from Queensland because the cervical cancer screening register in Queensland is not yet operational. The incidence and mortality data used in Indicators 5 to 7 include Queensland.

The New South Wales Pap Test register began operations in July 1996 leaving it almost 7 months short of data compared with the other States and Territories. New South Wales advised us that the best way of overcoming this problem was to use a conversion factor of 1.27, which is based on their modelling of screening data and extrapolating back. The Northern Territory Pap smear register began operations in March 1996, and participation rates have been estimated for the period January to March 1996 using a factor of 1.08.

Other data limitations:

- All States and Territories were able to provide data for the target age group 20–69 years, however not all programs were able to supply data for women beyond this age group.
- Hysterectomy fractions are calculated using national data derived from the National Health Survey using aggregate data that does not necessarily reflect variation at the State or Territory level.
- Participation rates will be under-estimates to the extent that a small percentage of women choose to opt-off local registers.
- Participation rates published by State and Territory programs may differ from those in this publication because of variation in denominators used.

Appendix B: Methods

This section describes the methods employed to calculate the estimates presented in the tables in the body of this publication.

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 rate per l00,000 population. This rate may be calculated for particular age and sex groupings, e.g.

$$\text{Age-specific breast cancer incidence rates in females aged 50–54} = \frac{\text{New cases 1995 aged 50–54 years}}{\text{1995 female population aged 50–54 years}} \times 100{,}000$$

$$= \frac{1240}{475{,}987} \times 100{,}000$$

$$= 260.5 \text{ per } 100{,}000$$

Age-standardised rates (AS Rate)

Rates are adjusted for age to facilitate comparisons between populations that have different age structures, e.g. between youthful and ageing communities. There are two different methods commonly used to adjust for age. In this publication we use direct standardisation in which age-specific rates are multiplied against a constant population (the Australian 1991 Population Standard unless otherwise specified). This effectively removes the influence of age structure on the summary rate that is described as the age-standardised rate. The method may be used for both incidence and mortality calculations. The method used for this calculation comprises three steps.

Step 1 Calculate the age-specific rate (as shown above) 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, giving you the expected number of cases.

Step 3 Sum the expected number of cases in each age group to give the age-standardised rate. Divide this sum by the total of the standard population and multiply by 100,000.

$$\text{CI approximation} = \text{AS Rate} \pm 1.96 \times \frac{\text{AS Rate}}{\sqrt{\text{Number of cases}}}$$

Appendix C: Population data

Table C1: Australian Standard Population[(1)] and World Standard Population[(2)]

Age group	World Standard Population (W)	Australian 1991 Population Standard (A)
0–4	12,000	1,271,703
5–9	10,000	1,272,208
10–14	9,000	1,241,619
15–19	9,000	1,364,074
20–24	8,000	1,396,764
25–29	8,000	1,399,663
30–34	6,000	1,425,735
35–39	6,000	1,328,387
40–44	6,000	1,294,271
45–49	6,000	1,029,145
50–54	5,000	846,934
55–59	4,000	725,950
60–64	4,000	736,868
65–69	3,000	671,390
70–74	2,000	510,755
75–79	1,000	384,495
80–84	500	229,828
85+	500	154,247
Total	**100,000**	**17,284,036**

Source: (1) Australian Bureau of Statistics (1993); (2) Doll and Smith (1982).

Table C2: Hysterectomy fractions for women aged 15–80+ years, Australia, 1995

Age group	% of women who have not had a hysterectomy
15–19	98.4
20–24	99.8
25–29	99.3
30–34	98.0
35–39	91.9
40–44	85.2
45–49	79.1
50–54	68.5
55–59	68.5
60–64	67.8
65–69	68.8
70–74	66.8
75–79	66.8
80+	61.5
Total	84.3

Source: Australian Bureau of Statistics.

Table C3: Estimated resident female populations, by State and Territory, June 1996

Age group	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
0–4	214,002	153,660	118,321	61,548	47,539	16,647	10,889	8,675	631,438
5–9	213,920	155,188	118,289	64,688	48,315	17,243	11,147	7,842	636,798
10–14	212,007	153,472	121,161	64,848	49,927	17,864	11,195	7,363	637,990
15–19	206,369	153,115	118,529	62,414	47,910	16,574	12,314	6,491	623,774
20–24	228,714	172,247	130,572	66,419	51,370	16,244	14,160	8,142	687,960
25–29	236,664	181,545	128,986	68,056	53,347	16,611	13,096	9,115	707,561
30–34	245,083	182,462	130,170	70,315	56,376	17,901	12,966	8,345	723,796
35–39	246,612	181,594	131,332	71,556	58,317	19,122	13,042	7,614	729,327
40–44	227,153	169,291	122,373	68,309	54,851	17,585	12,657	6,596	678,946
45–49	213,602	159,970	116,625	62,164	52,968	16,457	12341	5,506	639,704
50–54	169,624	124,297	90,977	45,873	41,390	12,942	8,449	3,799	497,412
55–59	140,822	103,750	71,747	37,489	34,394	11,050	5,952	2,306	407,540
60–64	125,398	92,727	60,171	31,680	30,966	9,724	4,428	1,546	356,656
65–69	126,433	91,908	59,638	30,052	32,210	9,484	3,901	1,099	354,740
70–74	117,234	85,347	53,966	26,158	31,030	8,965	3,563	751	327,017
75–79	87,561	62,641	41,102	19,230	23,430	6,915	2,432	484	243,799
80–84	62,680	46,305	28,862	14,815	16,996	5,046	1,620	273	176,603
85+	49,806	37,987	22,829	12,065	13,768	3,767	1,146	228	141,598
Total	**3,123,684**	**2,307,506**	**1,665,650**	**877,679**	**745,104**	**240,141**	**155,298**	**86,175**	**9,202,659**

Source: Australian Bureau of Statistics 1997.

Table C4: Estimated resident female populations, 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.

Glossary

ABS: Australian Bureau of Statistics

ACT: Australian Capital Territory—a land-locked Territory of Australia situated within the State of New South Wales on the eastern seaboard with a population of 309,794 (1997). Its capital city is Canberra, which is also Australia's capital city.

Adjuvant: enhancing or administered to enhance the effectiveness of a treatment or substance.

AIHW: Australian Institute of Health and Welfare

AS rate: age-standardised rate

Axilla: the region between the arm and the chest wall—the armpit.

Basement membrane: the delicate , noncellular layer on which an epithelium is seated. The epithelium forms the surface portion of the skin and lines hollow organs and all passages of the respiratory, digestive and genito-urinary systems.

Benign: not malignant

Cancer (malignant neoplasm): a term used to describe one of several diseases which 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. This tumour may expand locally by invasion or systemically by metastasis via the lymphatic or vascular systems. If left untreated most malignant tumours will eventually result in death.

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

CIN: cervical intra-epithelial neoplasia

DHFS: Commonwealth Department of Health and Family Services (to October 1998)

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

Epidemiology: the quantitative study of the distribution and determinants of health-related states and events in populations, and the application of this study to the control of health problems.

Fibrocystic lumps: pertaining to fibrocystic disease or cystic disease of the breast. A benign condition affecting women usually in their thirties or forties, characterised by the rapid development of one of more fairly large cysts.

Hysterectomy: refers to the surgical procedure whereby all or part of the uterus is removed.

Hysterectomy fractions: the proportion of women who have had their uterus removed by hysterectomy.

HPV: Human papilloma virus

ICD-9: International Classification of Disease—a coding system used to identify the primary site of the malignancy. This classification is in its ninth revision.

Incidence: see new cancer case

Invasive cancer: a tumour whose cells have a tendency to invade healthy or normal tissues.

Lymph node: masses of lymphatic tissue, often bean shaped that produce lymphocytes and through which lymph filters. These are located throughout the body.

Mammogram: a radiographic depiction of the breast.

Metastasis: the process by which a disease is transferred from one part of the body to another, for example, via the lymphatic system or the bloodstream.

Mortality: see cancer death

NBCC: the National Breast Cancer Centre

New cancer case: a person who has a new cancer diagnosed for the first time. One person may 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).

NSW: New South Wales—a State of Australia on the eastern seaboard which has the largest capital city in Australia, Sydney, and a population of 6,274,370 (1997).

NT: Northern Territory—a Territory in the north of Australia with a population of 187,132 (1997) and Darwin as its capital city.

Oestrogen receptor: a protein on breast cancer cells that binds oestrogens. It indicates that the tumour may respond to hormonal therapies. Tumours with a high oestrogen receptor status have a better prognosis than those which do not.

Pap smear: a test prepared for the study of exfoliated cells from the cervix.

Post partum: following childbirth.

Radiation therapy: the treatment of disease with any type of radiation, most commonly with ionizing radiation, such as x-rays, beta rays, and gamma rays.

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.

Sensitivity: the proportion of individuals with the disease whom the screening test labels positive.

Stroma: the supporting framework of an organ.

Qld: Queensland—a State in the north-east of Australia with a population of 3,401,232 (1997) and Brisbane as its capital city.

SA: South Australia—a State in the southern part of Australia with a population of 1,479,806 (1997) and Adelaide as its capital city.

Ablative therapy: the destruction of cells on the surface of the cervix using laser therapy, chemicals or diathermy.

Tas: Tasmania—an island State in the south-east of Australia with a population of 473,501 (1997) and Hobart as its capital city.

The Institute: The Australian Institute of Health and Welfare

Vic: Victoria—a State in the south-east of Australia with a population of 4,605,148 (1997) and Melbourne as its capital city.

WA: Western Australia—the largest State in Australia, located in the west with a population of 1,798,129 (1997) and Perth as its capital city.

WHO: World Health Organization

References

Anderson GH, Flynn KJ, Hickey LA, Le Riche JC, Matisic JP & Suen KC 1988. Organisation and results for the cervical cytology screening programme in British Columbia, 1955–85. British Medical Journal 296:975–8.

Australian Bureau of Statistics 1993. Estimated resident population by age and sex: Australian States and Territories, June 1987 to June 1992. ABS Cat. No. 3201.0. Canberra: ABS.

Australian Bureau of Statistics 1997. Estimated resident population by age and sex: Australian States and Territories, June 1992 to June 1997. ABS Cat. No. 3201.0. Canberra: ABS.

Australian Health Ministers' Advisory Council (AHMAC) 1990. Breast Cancer Screening Evaluation Committee. Breast cancer screening in Australia: future directions. Australian Institute of Health: Prevention Program Evaluation Series, No. 1. Canberra: AGPS.

Australian Health Ministers' Advisory Council (AHMAC) 1991. Cervical Cancer Screening Evaluation Committee. Cervical cancer screening in Australia: options for change. Australian Institute of Health: Prevention Program Evaluation Series, No. 2. Canberra: AGPS.

Australian Institute of Health and Welfare (AIHW) 1998. Diagnostic mammography, 1991–1996, Australia. Unpublished brief prepared for the Department of Health and Family Services.

Barratt AL, Cockburn J, Redman S, Paul C & Perkins J 1997. Mammographic screening: results from the 1996 National Breast Health Survey. Medical Journal of Australia 167 Nov.: 521–4.

Barrett P & Straton JAY 1996. Cervical cytology registry of Western Australia: 1996 statistical report—WA Cervical Cancer Prevention Program. Perth: Health Department of Western Australia.

Bell J & Ward J 1998. Cervical screening: linking practice, policy and research in women's health. Cancer Forum 22(1):6–11.

BreastScreen Australia 1996. BreastScreen Australia statistical report 1996. Canberra: BreastScreen Australia.

BreastScreen Victoria 1997. BreastScreen Victoria's annual report 1996–97. Melbourne: BreastScreen Victoria.

Colditz GA, Hoaglin DC & Berkey CS 1997. Cancer incidence and mortality: the priority of screening frequency and population coverage. The Milbank Quarterly 75(2):147–73.

Commonwealth Department of Health and Family Services (DHSH) 1998. Screening for the prevention of cervical cancer, Publications Production Unit (Public Affairs, Parliamentary and Access Branch). Canberra: AGPS.

Commonwealth Department of Human Services and Health (DHSH) 1994a. National Program for the Early Detection of Breast Cancer—evaluation of phase one: 1 July 1991 – 30 June 1994. Canberra: AGPS.

Commonwealth Department of Human Services and Health (DHSH) 1994b. National Program for the Early Detection of Breast Cancer— minimum data set: for screening and assessment services 1994b. Canberra: AGPS.

Commonwealth Department of Human Services and Health (DHSH) 1994c. National Program for the Early Detection of Breast Cancer—national accreditation requirements. Canberra: Commonwealth Department of Human Services and Health.

Commonwealth Department of Human Services and Health (DHSH) 1994d. Summary of NHMRC guidelines for the management of women with screen-detected abnormalities. Canberra: AGPS.

Commonwealth Department of Human Services and Health (DHSH) 1994e. Screening to prevent cervical cancer: Guidelines for the management of women with screen detected abnormalities. Canberra: AGPS.

Jelfs P 1998. Using cancer registries to evaluate cancer screening programs. Cancer Forum 22(1):3–6.

Jensen OM, Parkin DM, Machennan R & Muir C (eds) 1991. Cancer registration: principles and methods. Lyons: International Agency for Research on Cancer.

Kopans DB 1993. Mammography screening for breast cancer. Cancer 72(6):1809–12.

Kricker A & Jelfs P 1996. Breast cancer in Australian women 1921–1994. Cancer Series No. 7. Canberra: Australian Institute of Health and Welfare.

Marcus AC & Crane LA 1998. A review of cervical cancer screening intervention research: implications for public health programs and future research. Preventive Medicine 27:13–31.

McInroe WA, McLean MR, Jones RW & Mullins PR 1984. The invasive potential of carcinoma in situ of the cervix. Obstetric Gynaecology. 64:451–8.

National Health Service (NHS) Breast Screening Programme 1998. NHS breast screening review 1997. UK: NHS Breast Screening Programme.

Nyström L, Rutqvist LE, Wall S, Lindgren A, Lindqvist M, Rydén S, Andersson I, Bjurstam N, Fagerberg G, Frisell J, Tabár L & Larsson LG 1993. Breast cancer screening with mammography: overview of Swedish randomised trials. The Lancet 341:973–8.

Ostor AG & Mulvany N 1996. The pathology of cervical neoplasia. Current Opinion in Obstetrics and Gynecology 8:69–73.

Snider JA & Beauvais JE 1998. Pap smear utilization in Canada: estimates after adjusting the eligible population for hysterectomy status. Chronic Diseases in Canada 19(1):19–24.

Related publications

Andersson I, Aspegren K et al. 1988. Mammographic screening and mortality from breast cancer: the Malmo mammographic screening trail. British Medical Journal 297:943–7.

Ashbury D, Boggis CRM, Sheals D, Threlfall AG & Woodman CBJ 1996. NHS breast screening program: is the high incidence of interval cancers inevitable? British Medical Journal 313:1369–70.

Austoker J 1994. Screening and self-examination for breast cancer. British Medical Journal 309:168–74.

Baines C J 1994. The Canadian national breast cancer screening study: a perspective on criticisms. Annals of Internal Medicine 120(4):326–34.

Coleman EA & Feuer EJ 1992. Breast cancer screening among women from 65 to 74 years of age in 1987–88 and 1991. Ann Intern Med 117(11):961–6.

Department of Health (DHUK) 1997. Statistical bulletin—cervical screening programme, England: 1996–97. UK: Government Statistical Service.

Department of Health (DHUK) 1998. Statistical bulletin: breast screening programme, England: 1996–97. Bulletin 1998/10. UK: Government Statistical Service.

Duffy SW, Chen HH et al. 1996. Sojourn time, sensitivity and positive predictive value of mammography screening for breast cancer in women aged 40–49. Int J Epidemiol 25(6): 1139–45.

Duncan AA & Wallis MG 1995. Classifying interval cancers. Clinical Radiology 50: 774–7.

Furnival C 1994. Breast cancer screening. Cancer Forum 18:88–92.

Hennekens CH & Buring J 1987. Epidemiology in medicine. Boston, United States: Little, Brown and Company.

Kavanangh AM & Broom DH 1997. Women's understanding of abnormal cervical smear test results: a qualitative interview study. British Medical Journal 314:1388–91.

Lundgren B 1984. Breast cancer screening: expected and observed incidence and stages of female breast cancer in Gavleborg County, Sweden, and implications for mortality. Recent Results in Cancer Research 90:101–4.

Mathers C, Penm R, Sanson-Fisher R, Carter R & Campbell E 1998. Health system costs of cancer in Australia 1993–94. (in press) Canberra: Australian Institute of Health and Welfare Health and Welfare Expenditure Series No. 4.

Mitchell H 1997. Measures of the breast cancer screening process that may predict success in reducing mortality—definition, trends and issues in future measurement. Canberra: paper presented to the First National Breast Cancer Screening Conference.

Mitchell H & Higgins V 1997. Statistical Report 1996. Carlton South: Victorian Cervical Cytology Registry.

Mushlin AI 1993. Breast cancer screening with mammography: a meta-analysis. ACP Journal Club 119:30–38.

National Coordination Group for Surgeons working in Breast Cancer 1992. Quality assurance guidelines for surgeons in breast cancer screening. NHSBSP Publication No. 20: 1–33.

Peeters PH, Beckers MC et al. 1994. Effect on breast cancer screening response in the Netherlands of inviting women for an additional scientific investigation. J Epidemiol Community Health 48:175–7.

Peeters PH, Verbeek MALM et al. 1989. Screening for breast cancer in Nijmegen, report of 6 screening rounds, 1975–1986. Int J Cancer 43:226–30.

Rickard MT, Lee W et al. 1991. Breast cancer diagnosis by screening mammography: early results of the Central Sydney Area Health Service Breast X-ray Programme. Medical Journal of Australia 154:126–31.

Roberts MM, Alexander FE et al. 1990. Edinburgh trial of screening for breast cancer: mortality at seven years. Lancet 335: 241–6.

Shapiro S 1994. The call for change in breast cancer screening guidelines. Am J Public Health 84:10–11.

Sigurdsson KS, Adalsteinsson et al. 1991. Trends in cervical and breast cancer in Iceland: a statistical evaluation of trends in incidence and mortality for the period 1955–1989, their relation to screening and prediction to the year 2000. Int J Cancer 48:523–8.

Skrabanek P 1985. Breast cancer screening. Lancet July:94–5.

Skrabanek P 1985. Breast cancer screening. Lancet Oct.:940–1.

Towler BP, Irwig LM & Shelley JM 1993. The adequacy of management of women with CIN 2 and CIN 3 Pap smear abnormalities. Medical Journal of Australia 159:523–8.

Verbeek ALM, Holland R et al. 1984. Reduction of breast cancer mortality through mass screening with modern mammography. Lancet June:1,222–4.

Wain G, Ward J & Towler BP 1995. Gynaecological care of women with abnormal Pap smears: how varied is current practice? Medical Journal of Australia 162:348–53.

Worden JK, Mickey RM et al. 1994. Development of a community breast cancer screening promotion program using baseline data. Prev Med 23:267–75.

Zapka JG 1994. Promoting participation in breast cancer screening. Am J Public Health 84: 12–13.