Appendix A: Methods

Objective

The objective was to estimate the relative survival proportions for women with breast cancer in Australia.

The women included in this analysis were those diagnosed with breast cancer from 1982 to 1994 inclusive, with survival follow-up to 31 December 1994. The analysis provides survival estimates taking into account year and period of diagnosis, age at diagnosis, State or Territory of usual residence, and urban or rural area of usual residence.

Data sources

National Cancer Statistics Clearing House

Each year the National Cancer Statistics Clearing House (NCSCH) receives from the eight State and Territory cancer registries data on cancer diagnosed in residents of Australia. This commenced with cases first diagnosed in 1982. The data provided to the NCSCH enable record linkage to be performed and the analysis of cancer by site and behaviour.

National Death Index

The National Death Index (NDI) is a database maintained by the Australian Institute of Health and Welfare (AIHW). It contains data on all deaths that have occurred in Australia since 1980 and is current to mid-1998. The data contained in the NDI come from State and Territory Registrars of Births, Deaths and Marriages.

As part of normal NCSCH operating practices, the NCSCH is regularly linked to the NDI. This linkage is undertaken to assist State and Territory cancer registries to identify deaths occurring interstate or that were not notified to the cancer register for some reason (i.e. death clearance).

It should be noted that although the NDI is current to mid-1998, follow-up for the breast cancer survival analysis finished at 31 December 1994.

Confidentiality

Strict confidentiality and privacy provisions apply to the NCSCH and the NDI. Restrictions on the use and release of information are included in State and Territory legislation controlling the operation of the Registries of Births, Deaths and Marriages and the cancer registries. Within the Australian Institute of Health and Welfare the data are protected under the *Australian Institute of Health and Welfare Act 1987*. The *Privacy Act 1988*, the Australian Public Service Regulations and the *Commonwealth Crimes Act 1914* also control the release of

information by Institute staff. Further, the Institute maintains a secure physical and computer environment.

Applications to access either the NCSCH or the NDI must have ethics committee approval and strict controls are applied to the information provided to researchers due to the personal and confidential nature of the data. Ethics approval was sought and obtained for the survival analysis reported here.

Breast cancer incidence and mortality data

Initially, breast cancer incidence and mortality data, from 1982 to the most recent completed year of processing by the State and Territory cancer registries, were extracted from the NCSCH for all States and Territories. However, Queensland incidence and mortality data were not complete and were subsequently excluded from the survival analysis.

Preliminary analysis of the data extracted from the NCSCH indicated that the incidence information was relatively complete. However, the information relating to death, from breast cancer or any other cause, was incomplete. Discussions with cancer registries indicated that death information on the NCSCH could be incomplete for the following reasons.

- At the time of providing data to the NCSCH, a State or Territory cancer registry may not have been notified of all deaths that have occurred in people on the register (e.g. deaths occurring interstate).

- At the time of providing data to the NCSCH, a State or Territory cancer registry may not have been able to process and update all deaths information available to it.

To establish a comprehensive data collection for breast cancer incidence and mortality, cancer registries were asked to:

(a) provide updated incidence and mortality files where possible; and

(b) examine proposed deaths information provided by the Institute in its matching of breast cancer cases held in the NCSCH with all death information held in the NDI (see below).

NCSCH and NDI matching

The Institute used probabilistic matching to identify potential deaths from any cause among women diagnosed with breast cancer within the State or Territory of diagnosis or in another State or Territory. It did this by using the identifiable information held in the NDI and the NCSCH. For all States and Territories, except New South Wales, the same matching algorithms were used. In the case of New South Wales, due to the large file size, a modified algorithm was used to control the number of marginally plausible matches and to be consistent with the matching algorithm used by the New South Wales Cancer Registry for other death matching.

The matching algorithms allocated scores to each matching pair, with higher scores reflecting a greater probability of a correct match and lower scores a less likely match. Output files containing potential matches and their scores were sent to State and Territory cancer registries, via a secure means, for review. The information on these files related to the woman's name, date of birth, age at diagnosis, date of diagnosis, date of death, State or Territory of death, cancer incidence and death registration numbers, a matching score, and cause of death.

Inevitably there were variations in case details on the output files, e.g. missing middle names, variation in name spelling, and date of birth differences. Further, date of birth was not always available on the NDI as this information was not collected by the Registrars of Births, Deaths and Marriages in some jurisdictions over specific periods (Table A1). In this situation an estimated year of birth, based on a computation of the difference between the age at death and the year of death, was available. This calculation could, however, result in the estimated year of birth being up to one year out in either direction. This lack of precision for some jurisdictions reduces the certainty of the match between cancer and death records. Nationally, date of birth information was available from 1996; however most States and Territories had complete date of birth information by the early 1990s.

Table A1: National Death Index: availability of date of birth data by State and Territory

State/Territory	Date of birth not available	Date of birth available
New South Wales	1980–1991	1992–1997
Victoria	1980–1988	1989–1997
Western Australia	Nil[a]	1980–1997
South Australia	Nil[a]	1980–1997
Tasmania	1980–1994	1995–1997
Australian Capital Territory	1980–1992	1993–1997
Northern Territory	1982–1990	1991–1997

(a)   There are a few death registrations where date of birth was unavailable. These are spread across the whole period.

Each State and Territory cancer registry resolved possible matches according to local rules for accepting a cancer death notification. These rules are described in detail below. In general, cancer registries undertook validation checks on potential matches. These validation checks included checking their own database for the case, reviewing case file notes, and contacting hospitals, pathologists and specialists. Of the proposed matches sent to the State and Territory cancer registries for resolution, the majority (approximately 70%) were found to be valid.

The number of potential matches that were eventually accepted as matches varied by State and Territory (Table A2). This variation was partly due to:

- the number of women with breast cancer in each State or Territory;
- the length of time since the State or Territory cancer registry last updated its register with deaths information;
- the length of time since the NCSCH data were last linked to the NDI to assist the cancer registries with death clearance; and
- the differing local rules for case resolution.

Table A2: Results of breast cancer matching process by State and Territory

State/Territory	Years	Matched cases
New South Wales	1982–1994	3,955
Victoria	1982–1994	1,758
Western Australia	1982–1994	158
South Australia	1982–1994	30
Tasmania	1982–1994	39
Australian Capital Territory	1982–1994	40
Northern Territory	1982–1994	70

Some of the deaths identified by matching the NCSCH data to the NDI were already known to the cancer registries but had not been reported to the NCSCH. These deaths were subsequently added to the NCSCH. Other deaths were unknown to the cancer registries and were subsequently added to the relevant cancer registry's records and incorporated in the NCSCH. In some instances, cancer registries exchanged information about cases diagnosed in one jurisdiction and dying in another.

Cancer registries' practices in resolving matches between the NCSCH and the NDI

Each cancer registry appointed an experienced officer(s) to resolve proposed matches of NDI deaths with breast cancer cases. While there were some local variations to this practice the essential elements of the matching criteria are summarised here.

Officers either electronically or manually examined the breast cancer cases and the proposed NDI deaths, comparing them for:

- similarity of name, name combinations and name rarity;
- plausibility of death linkage e.g. diagnosis date or follow-up date later than death date;
- similarity of dates of birth, incidence and death, checking multiple reporting sources; and
- similarity of cause of death and the breast cancer diagnosis.

It was recognised that some latitude was required in handling these proposed matches as the recording of information from all cancer registry and death notification sources is not consistent and not always accurate, although the use of multiple checking sources helped to alleviate this problem. It was noted that there was a tendency to accept matches more readily where complete date of birth details were available from the cancer registry file and the NDI rather than an estimated year of birth.

Cancer registry officers applied the matching criteria described above and validated the linkage by:

- comparing the proposed NDI death with full case details on the cancer registry database;
- comparing the proposed NDI death with electoral roll details;
- comparing the proposed NDI death with hospital records;
- following up the proposed NDI death and case details with treating doctors; and
- comparing the case and proposed NDI death with details from other cancer registries.

Often more than one of these validation strategies was used to undertake the death clearance process. In circumstances where these strategies failed to confirm or reject the linkage clearly, the case, for the purposes of this analysis, was treated as being alive until further evidence was obtained. Cases registered in the Australian Capital Territory were handled mainly by the New South Wales Registry staff, while the South Australian Registry handled a large proportion of the Northern Territory cases, both situations being covered under existing contractual arrangements.

NCSCH internal matching

To ensure that incident cases were not counted more than once when they had recorded diagnoses in more than one State or Territory, a deduplication probabilistic linkage was

undertaken on the final database. Where positive matches were found, these were referred to the cancer registries for resolution using standard registration rules based on personal identification, date of diagnosis, histological comparisons (to check for multiple primaries) and place of usual residence at time of diagnosis. Where cancer registries were not able to resolve the cases in the available time the Institute made an allocation based on the available information. Only the most definite matches were accepted in this last phase, otherwise the matched pairs were treated as separate new cases.

Classification to urban and rural areas of usual residence

The survival analysis included an examination of differences in relative survival proportions by urban and rural areas of usual residence. To undertake this analysis it was necessary to allocate, to each breast cancer case, a code indicating whether the woman's geographic area of usual residence was urban or rural.

The Rural, Remote and Metropolitan Areas (RRMA) classification (DPIE & DHSH 1994) classifies each State and Territory into three groups—metropolitan areas, rural zones and remote zones—using information from the 1991 Census. Metropolitan areas are allocated according to total population. Rural and remote zones are allocated according to their index of remoteness, which is based on population density and distance to large population centres.

Electronic files converting postcodes and statistical local areas (SLAs) to the RRMA classification were used to classify each breast cancer case to either:

- an urban area of usual residence (i.e. a RRMA metropolitan area); or
- a rural area of usual residence (i.e. a RRMA rural or remote zone).

However, there was a small proportion of cases where postcode and SLA were missing or were not recognised by the RRMA conversion system. Each of these cases was manually reviewed and, where possible, allocated to an urban or rural area of usual residence. Less than 1% of all cases could not be allocated to an urban or rural area (Table A3).

Table A3: Per cent of breast cancer cases missing urban or rural status

State/Territory	Years	New cases	Per cent of cases missing urban or rural area of usual residence
New South Wales	1982–1994	31,792	0.75
Victoria	1982–1994	23,696	0.09
Western Australia	1982–1994	8,089	0.82
South Australia	1982–1994	8,038	<0.01
Tasmania	1982–1994	2,293	0
Australian Capital Territory	1982–1994	1,212	0.25
Northern Territory	1982–1994	278	2.52
Australia	1982–1994	90,090	0.69

Data validation

Quality assurance in data and in procedures was an important focus of this project. Cases were subjected to internal data consistency checks and external checks. A series of tables (see Appendix B) was used to assess the distribution of the incidence and mortality data for the cohort by year, State and Territory, age group, and geographic area of usual residence. Many of these tables were compared with data published by the cancer registries and mortality data extracted from the national mortality database.

Further investigation of the data was undertaken by calculating age-standardised incidence rates for most of the validation tables. These rates were compared with those published in previous cancer registry publications.

Relative survival analysis

Cause-specific survival and relative survival are two methods used to estimate the probability of surviving a specific disease (Estève et al. 1994). Cause-specific survival is used when cause of death is known with certainty. However, cause of death is not always easy to determine. Further, for most cancer patients, the risk of dying from other causes is not negligible and should be adjusted for when analysing their survival experience (Ederer et al. 1961). In contrast to cause-specific survival, relative survival does not require knowledge of the cause of death. For this national breast cancer survival project, not all causes of death were known with certainty, although the fact of death was known and therefore relative survival methods were appropriate.

Relative survival is defined as the ratio of the observed survival rate for a given cohort of patients to the expected survival rate (Ederer et al. 1961). The expected survival rate is that which the patient group should have experienced based on the lifetable of the general population from which they were diagnosed (Estève et al. 1990).

A relative survival of less than 100% implies that the patient group survived for less time than would be expected for a similar group from the general population. A relative survival of 100% implies that survival in the patient group is no different from that in the general population.

The relative survival analysis for this report was undertaken using the software program RELSURV (v2.0), which was written in 1995 by Guy Hédelin of Louis Pasteur University, Strasbourg, France (Hédelin 1995). The program calculates expected survival using the lifetable method and estimates relative survival using a Cox proportional hazards regression model.

Life tables

Lifetables by single-year ages (0–99 years) were derived for Australia and each State and Territory for each year from 1982 to 1994 using deaths data and estimates of resident population. Queensland data were excluded from each of these lifetables.

The derivation of lifetables for Australia by urban and rural areas of usual residence (excluding Queensland) was problematic and the following methods and assumptions were used to derive lifetables by single-year ages (0–98 years) for each year from 1982 to 1994.

Deaths data by urban and rural areas of usual residence

1. Deaths data were available by single-year ages and statistical local areas (SLAs) from 1985 onwards. For each year from 1985 to 1994, every death record was mapped to the RRMA classification using electronic SLA-to-RRMA concordance files. Deaths by RRMA were then aggregated to two levels:

    *   urban areas of usual residence (consisting of RRMA metropolitan codes M1 and M2); and

    *   rural areas of usual residence (consisting of RRMA rural codes R1, R2 and R3, and remote codes Rem1 and Rem 2).

2. Deaths data for each of the years 1982 to 1984 do not include SLA information and therefore could not be mapped to the RRMA classification. It was assumed that the number of deaths for each of the years 1982 to 1984, by single-year ages for urban and rural areas of usual residence, was the same as that in 1985.

Estimated resident population data by urban and rural areas of usual residence

1. Estimated resident population (ERP) data were available by SLA only for 5-year age groups from 1986 onwards, with the exception of 1991 for which ERP data by single-year ages from 0 to 98 years were available. For each year from 1986 to 1990 and from 1992 to 1994, ERP data by 5-year age group were mapped to the RRMA classification using electronic SLA-to-RRMA concordance files. The ERPs by 5-year age group and RRMA were then aggregated to two levels:

    *   urban areas of usual residence (consisting of RRMA metropolitan codes M1 and M2); and

    *   rural areas of usual residence (consisting of RRMA rural codes R1, R2, R3 and remote codes Rem1, Rem 2).

2. For 1991, ERP data by single-year ages (0–98 years) were mapped to the RRMA classification using electronic SLA-to-RRMA concordance files. The ERPs were then aggregated to urban and rural areas of usual residence. The single-year age ERPs were then further aggregated to 5-year age groups so that the distribution of single-year ages within each 5-year age group could be determined. For example, for the age group 0–4 years, the proportions of 0-year-olds, 1-year-olds, 2-year-olds, 3-year-olds and 4-year-olds were calculated. The distribution of single-year ages within each 5-year age group for 1991 was then applied to the ERP data for each of the years 1986 to 1990 and 1992 to 1994. This enabled the estimation of ERPs for these years by single-year ages (0–98) for urban and rural areas of usual residence.

3. ERP data for the years 1982 to 1985 were not available by SLA and therefore could not be mapped to the RRMA classification. It was assumed that the ERP for each of the years 1982 to 1985, by single-year ages for urban and rural areas of usual residence, was the same as that in 1986.

Lifetables by urban and rural areas of usual residence

The deaths data and estimated resident population data by urban and rural areas of usual residence described above were used to construct lifetables for each of the years 1986 to 1994. A lifetable for 1985 was constructed using ERP data for 1986. Lifetables for each of the years 1982 to 1984 were assumed to be the same as the lifetable for 1985.

Relative survival analysis methods

The RELSURV program required the input of two data files. The first contained hazard rates by birth cohort for each of the years 1982 to 1994 stratified by age and any other main variables included in the model. The second file contained the characteristics of each woman diagnosed with breast cancer between 1 January 1982 and 31 December 1994; this file contained the main variables and covariables included in the model.

Data files are provided to the RELSURV program in a specific format. The software is able to run interactively or in batch mode, the latter approach being adopted for this project. RELSURV returns a range of relative survival estimates, their confidence intervals and tests for differences between these estimates. Chapter 3 summarises these results.

Hazard rates

As discussed, the RELSURV software program requires hazard rates by single-year ages for each year of follow-up. These hazard rates, l_x, were calculated from lifetable information using the formula:

$$l_x = -\ln(1 - q_x)$$

where q_x is the probability of dying between exact ages x and x+1 and is calculated using the following standard approximation:

$$q_x = \frac{M_x}{(1 + M_x(1 - a_x))}$$

where M_x is the age-specific death rate of persons aged x; and

a_x is the assumed fraction of a year lived by those who die during the year.

The following assumptions were made for a_x:

- a_0 = 0.9 because deaths among the very young in Australia tend to be concentrated early in the first year of life; and

- $a_1 - a_{99}$ = 0.5 because those who die in the year will live, on average, half of a year during that year.

Records excluded from the analysis

Records with the following characteristics were excluded from the survival analysis (Table A4):

- any woman whose age at diagnosis was not known or was missing;

- any woman aged 100 years or over at diagnosis. This was due to the lack of precision in the hazard rates for women older than 99 years, the atypical nature of survival in this cohort, and the relatively few cases available for analysis when compared with younger women;

- all cases diagnosed in Queensland. This was due to the fact that survival status was incomplete for cases diagnosed in Queensland;

- any woman for whom there was ambiguity surrounding their exact date of diagnosis or death;

- death certificate-only cases (i.e. cases diagnosed at death) because the survival methods used by the RELSURV program do not allow for a survival time of zero;

- any woman who died within one month of diagnosis. This was because the calculation of survival time used only month and year of diagnosis and death (as day of diagnosis is unreliable) and therefore survival time was calculated as zero for these women;

- any woman who was diagnosed in December 1994 because these women had a follow-up time of less than one month and therefore survival time was calculated as zero;

- cases that could not be allocated to an urban or rural area of usual residence for analyses by area of usual residence.

Table A4: Characteristics of records excluded from survival analysis

Characteristic	Number of cases
Unknown/missing age at diagnosis	2
Women aged = 100 years of age at diagnosis	24
Cases diagnosed in Queensland	14,693
Death certificate-only cases	565
Women whose date of diagnosis or death could not be resolved	60
Women surviving less than one month or diagnosed in December 1994	475
Women diagnosed in December 1994	836
Unknown area of usual residence[a]	619
Total records excluded[b]	16,263

(a)   These cases were excluded only from analyses by area of usual residence.

(b)   The total is less than the sum of components because some records may have been excluded for more than one reason.

Key assumptions

1. One limitation of the RELSURV program is that it is not able to handle data files that are larger than 65,535 records. After excluding records with the characteristics described above, the breast cancer data file contained 73,827 records. Therefore it was not possible to use the whole file when undertaking the analysis at the 'Australia, all ages, 1982–1994' level. To account for this, a sample of 65,500 records (88.7% of all records) was systematically selected. Before selecting the sample, the whole file of 73,827 records was sorted by State or Territory of usual residence, geographic area of usual residence, diagnosis year, and age at diagnosis. Frequency tables by diagnosis year, age at diagnosis, survival time (in months), State or Territory of usual residence, and geographic area of usual residence were used to compare the distribution of records in the sample file with that in the whole file. The distribution of each variable in the sample file was almost always identical to that in the whole file. Where the distribution was not completely identical, it was different by only 0.1%. This indicated that the sample file was representative of the whole file and that use of the sample file for analysis at the 'Australia, all ages, 1982–1994' level would not introduce bias.

2. To estimate relative survival at all other levels (i.e. by age at diagnosis, period or year of diagnosis, State or Territory of usual residence, and urban or rural area of usual residence), the whole data file was split into files that were analysed separately. For example, to estimate relative survival by age at diagnosis, the whole file was split into two files:

- File A—all women aged 25–59 years at diagnosis; and

- File B—all women aged 60–99 years at diagnosis.

  File A was used to estimate relative survival proportions for women aged 25–39 years, 40–49 years and 50–59 years. File B was used to estimate relative survival for women aged 60–69 years, 70–79 years, 80–89 years and 90–99 years.

3. All cases were followed up to 31 December 1994, which was the censoring date. Unless a woman diagnosed with breast cancer was known to have died before 31 December 1994, it was assumed that she was still alive (i.e. censored).

Variables included in the relative survival analysis

Survival time (in months) and vital status were always included in the survival model.

Survival time

For women known to have died before 31 December 1994, survival time in months was calculated as:

  (year of death – year of diagnosis)*12 + (month of death – month of diagnosis)

For women still believed to be alive at 31 December 1994 (i.e. censored), survival time in months was calculated as:

  (1994 – year of diagnosis)*12 + (12 – month of diagnosis)

Vital status

Vital status = 0 if believed to be still alive at 31 December 1994 (i.e. censored)

  1 if dead

The following variables were included as necessary:

- year of diagnosis;

- State or Territory of usual residence at diagnosis;

- urban or rural area of usual residence at diagnosis;

- age at 1982 (this was required instead of age at diagnosis because of the way that RELSURV looks up the hazard rates when files by birth cohort are used).

To adjust for confounding variables, the following covariables were included in the survival models as necessary:

- age group at diagnosis (25–39, 40–49, 50–59, 60–69, 70–79, 80–89);

- period of diagnosis (1982–1987, 1988–1992, 1993–1994);

- State or Territory of usual residence at diagnosis.

Appendix B: Descriptive data analysis

Table B1: Breast cancer cohort: age-standardised incidence rates(a) by period of diagnosis, Australia(b)

Age group	1982–1994 New cases	1982–1994 Rate	1982–1987 New cases	1982–1987 Rate	1988–1992 New cases	1988–1992 Rate	1993–1994 New cases	1993–1994 Rate
25–39	5,909	27.7	2,528	27.3	2,397	28.2	984	27.8
40–49	14,407	131.4	5,262	120.4	6,168	136.0	2,977	144.6
50–59	15,648	188.2	6,104	162.0	6,202	194.3	3,342	245.0
60–69	17,672	236.0	6,851	208.1	7,181	239.3	3,640	304.9
70–79	14,139	273.0	5,519	250.9	5,774	277.8	2,846	315.7
80+	7,549	296.9	2,897	284.3	3,228	310.1	1,424	295.2
25+	75,324	131.1	29,161	118.7	30,950	134.4	15,213	154.8
All ages	**75,395**	**81.5**	**29,193**	**73.8**	**30,975**	**83.6**	**15,227**	**96.3**

(a)   Rates are expressed per 100,000 population and age-standardised to the total 1991 Australian population.

(b)   Excludes Queensland.

Table B2: Breast cancer cohort: age-standardised death rates(a) for deaths from all causes by period of death, Australia(b)

Age group	1982–1994 Deaths	1982–1994 Rate	1982–1987 Deaths	1982–1987 Rate	1988–1992 Deaths	1988–1992 Rate	1993–1994 Deaths	1993–1994 Rate
25–39	945	4.4	301	3.3	460	5.4	184	5.2
40–49	2,576	23.5	692	15.8	1,318	29.1	566	27.4
50–59	3,710	44.5	1,119	29.5	1,778	55.7	813	59.6
60–69	4,747	63.4	1,400	42.6	2,326	77.5	1,021	85.4
70–79	5,566	107.5	1,467	66.9	2,746	131.6	1,353	150.4
80+	6,170	238.9	1,330	129.0	3,098	292.8	1,742	354.2
25+	23,714	39.1	6,309	24.8	11,726	48.1	5,679	53.1
All ages	**23,724**	**24.3**	**6,313**	**15.4**	**11,730**	**29.9**	**5,681**	**33.0**

(a)   Rates are expressed per 100,000 population and age-standardised to the total 1991 Australian population.

(b)   Excludes Queensland.

Table B3: Breast cancer cohort: age-standardised incidence rates[a] by State and Territory and period of diagnosis

	1982–1994		1982–1987		1988–1992		1993–1994	
State	New cases	Rate	New cases	Rate	New cases	Rate	New cases	Rate
NSW	31,791	81.4	12,302	73.3	13,126	84.1	6,363	95.9
Vic	23,696	81.7	9,363	74.9	9,552	82.5	4,781	97.0
WA	8,087	86.4	3,016	78.7	3,462	90.2	1,609	95.7
SA	8,038	79.8	3,089	71.0	3,344	83.5	1,605	94.7
Tas	2,293	75.1	895	68.4	871	71.1	527	102.2
ACT	1,212	87.9	433	78.4	502	88.1	277	107.4
NT	278	52.7	95	44.6	118	56.6	65	58.8
Australia[b]	**75,395**	**81.5**	**29,193**	**73.8**	**30,975**	**83.6**	**15,227**	**96.3**

(a)   Rates are expressed per 100,000 population and age-standardised to the total 1991 Australian population.

(b)   Excludes Queensland.

Table B4: Breast cancer cohort: age-standardised death rates[a] for deaths from all causes by State and Territory and period of death

	1982–1994		1982–1987		1988–1992		1993–1994	
State	Deaths	Rate	Deaths	Rate	Deaths	Rate	Deaths	Rate
NSW	9,992	24.2	2,593	14.8	4,992	30.0	2,407	33.2
Vic	7,623	24.8	1,991	15.3	3,806	31.0	1,826	33.9
WA	2,532	26.3	747	19.3	1,216	30.7	569	31.9
SA	2,476	22.8	645	14.0	1,206	27.8	625	32.6
Tas	765	23.6	236	17.5	349	26.6	180	31.7
ACT	253	20.4	78	15.9	119	22.9	56	23.8
NT	83	20.9	23	14.3	42	25.0	18	24.6
Australia[b]	**23,724**	**24.3**	**6,313**	**15.4**	**11,730**	**29.9**	**5,681**	**33.0**

(a)   Rates are expressed per 100,000 population and age-standardised to the total 1991 Australian population.

(b)   Excludes Queensland.

Table B5: Breast cancer cohort: age-standardised incidence rates[a] by urban and rural area of usual residence[b] and year of diagnosis

Year of diagnosis	Urban		Rural	
	New cases	Rate	New cases	Rate
1982	3,326	(c)	1,004	(c)
1983	3,303	(c)	1,081	(c)
1984	3,582	(c)	1,161	(c)
1985	4,274	(c)	1,184	(c)
1986	3,893	76.7	1,177	67.5
1987	4,119	79.5	1,407	79.4
1988	4,258	80.5	1,362	75.1
1989	4,557	84.5	1,421	76.3
1990	4,578	83.5	1,478	77.0
1991	4,930	88.1	1,650	83.8
1992	4,936	86.5	1,663	82.2
1993	5,387	93.3	1,777	86.1
1994	6,044	103.0	1,997	94.7

(a)   Rates are expressed per 100,000 population and age-standardised to the total 1991 Australian population.

(b)   Excludes Queensland.

(c)   Rate could not be calculated because the base population data were not available.

Table B6: Breast cancer cohort: age-standardised death rates[a] for deaths from all causes by urban and rural area of usual residence[b] and year of diagnosis

Year of diagnosis	Urban		Rural	
	Deaths	Rate	Deaths	Rate
1982	141	(c)	37	(c)
1983	417	(c)	131	(c)
1984	681	(c)	237	(c)
1985	991	(c)	345	(c)
1986	1,141	21.6	353	19.8
1987	1,369	25.2	441	23.8
1988	1,531	27.4	545	28.4
1989	1,701	30.0	538	27.5
1990	1,697	29.2	595	29.8
1991	1,898	31.9	629	30.4
1992	1,880	30.9	643	29.8
1993	2,037	32.5	685	30.8
1994	2,131	33.3	800	34.1

(a)   Rates are expressed per 100,000 population and age-standardised to the total 1991 Australian population.

(b)   Excludes Queensland.

(c)   Rate could not be calculated because the base population data were not available.

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