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EXECUTIVE SUMMARY

Breast cancer is the most common cancer (apart from non-melanocytic skin cancer), in Australian women, accounting for 28% of new cancers and 17% of cancer related deaths in women in 1999. In the ACT, breast cancer represented 32% of all new cancers in women and 20% of cancer related deaths in ACT resident women between 1995 and 1999.

This paper uses descriptive epidemiology to present a discussion of mortality due to breast cancer in the ACT with reference to the characteristics of the ACT population, the incidence of breast cancer, participation in breast screening, rates of early cancer detection, treatment and relative survival.

Our analysis is limited by the availability of only relatively recent reliable information on breast cancer incidence, screening, treatment and mortality in the ACT.

The slightly (but not significantly) higher incidence of breast cancer in the ACT, when compared with Australian results, may be in part explained by a link between higher socio-economic status and an increased risk of breast cancer. The association reflects a number of characteristics of women of higher socio-economic status, including an average older age at the birth of their first child, a greater likelihood to not have children, earlier onset of menstruation and later age at menopause. These risk factors are not easily modifiable through public education or other interventions. However assuming that the incidence of breast cancer has not changed significantly over the last ten years, it is unlikely that the relatively small difference fully accounts for the higher mortality rate.

Participation in the BreastScreen program has been significantly higher among ACT women aged 50 to 69 years of age than observed nationally, as has the rate of early cancer detection in the BreastScreen program. The higher mortality rate is therefore unlikely to be related to poorer participation in screening. The overall incidence of large tumours at diagnosis in the ACT was slightly higher than observed nationally, however only one year of data is available, and it has not been possible to determine the significance, if any, of this.

Access to timely and high quality treatment is an important determinant of prognosis, and although detailed information on treatment for the period relevant to these mortality statistics is not available, a recent study has reported a strong concordance of practice in the ACT with established guidelines for breast cancer treatment. Further, the 1995 National Survey of Breast Cancer Treatment showed that a substantially higher proportion of women being treated for breast cancer in the ACT were being treated by experienced surgeons than reported nationally. Therefore based on the available information, the quality of treatment does not appear to be related to the higher mortality rate. It has not been possible to assess access to and timeliness of treatment.

Analysis of relative survival 5 years after a diagnosis of breast cancer shows that women in the ACT diagnosed between 1988 and 1992 had a better relative rate of survival (85%) than observed nationally (79%). This may be due to a higher screening rate, leading to the detection of cancers that would otherwise never have been diagnosed. However, as the BreastScreen program was initiated in 1991, towards the end of the period of diagnosis considered in this analysis, it is difficult to relate later high screening participation rates to these results.

In conclusion, analysis of the available information on the incidence, screening, detection rate, treatment and relative survival in the ACT does not fully explain the higher mortality observed. It is however, unlikely that the higher rate of mortality is due to the major modifiable determinants of mortality, namely participation in screening, or treatment by experienced surgeons according to established guidelines.

INTRODUCTION

The Productivity Commission publishes an annual report presenting performance indicators for the provision of Education, Health, Justice, Emergency Management, Community and Housing services in each State and Territory. Following the release of the 2002 report, attention was drawn to the higher rate of mortality due to breast cancer in the ACT. The Population Health Research Centre, a unit within the Population Health Division of ACT Health, has prepared this discussion paper on breast cancer in the ACT.

This paper discusses the determinants of breast cancer mortality in the ACT using the best available data. The risk factor profile of ACT women; incidence of breast cancer; participation in screening and treatment are also discussed.

BACKGROUND

The term cancer covers a group of neoplastic diseases in which there is a transformation of normal body cells into malignant cells.¹ Cells have a specific function in the body and under normal conditions they grow and multiply in an orderly way. However, they may multiply in an uncontrolled way and form tumours, or neoplasms. When the neoplasms are malignant (cancer) they have the ability to grow in an uncontrolled way, and invade other parts of the body.

Breast cancer remains a public health concern worldwide, despite the fact that mortality rates have declined in some countries in recent years as a result of improvements in adjuvant therapy and screening. In 1999, breast cancer was the most common cancer in Australian women (apart from non-melanocytic skin cancer), followed by colorectal, melanoma and lung cancer.²

Breast cancer is relatively uncommon in women under the age of 30, increasing in incidence with age, peaking in the 65 to 69 year age group. In the ACT, breast cancer represented 32% of all new cancers in women and 20% of cancer related deaths in ACT women between 1995-1999.³ The known risk factors detailed below explain about a third of diagnosed breast cancers.⁴

There is an increased risk of developing breast cancer with older age, with a six-fold increase in risk from ages 35 to 65 years.⁴ Early onset of menstruation is also associated with an increased risk of developing breast cancer⁵, as is later menopause.⁴ Never having carried a pregnancy increases the risk of developing breast cancer by 30%, while women who become pregnant for the first time after the age of 35 years have three times the risk of developing breast cancer when compared to women with a first full term pregnancy before the age of 20 years.^{4,6}

Research has shown that women whose mothers, sisters or daughters have had breast cancer are at twice the risk of developing the disease. If two first-degree relatives have breast cancer, the risk is increased four to six fold.⁴ Mutations in the BRCA1 and BRCA2 genes are responsible for approximately 10% of breast cancers.⁷

The use of oral contraceptives increases the risk of developing breast cancer by a small amount, generally during the period of use.⁸ The risk of developing breast cancer is increased in women using hormone replacement therapy (HRT), but is not evident five years after discontinuation of HRT.⁹

There is a well established link between obesity and an increased risk of breast cancer, linked to oestrogen production by adipose tissue.¹⁰ Consumption of alcohol has been shown to result in a small increase in the risk of breast cancer, with about a 7% increase in risk for an average consumption of one alcoholic drink per day.¹¹

A recent meta-analysis has shown that women who are moderately physically active can reduce their risk of breast cancer by over 20%.¹² Clinical and observational studies demonstrate that a relationship between physical activity and decreased risk of breast cancer exists in pre-, peri- and post-menopausal women.^{13,14,15,16} Figure 1 illustrates, in simple terms, some of the expected relationships between these factors.

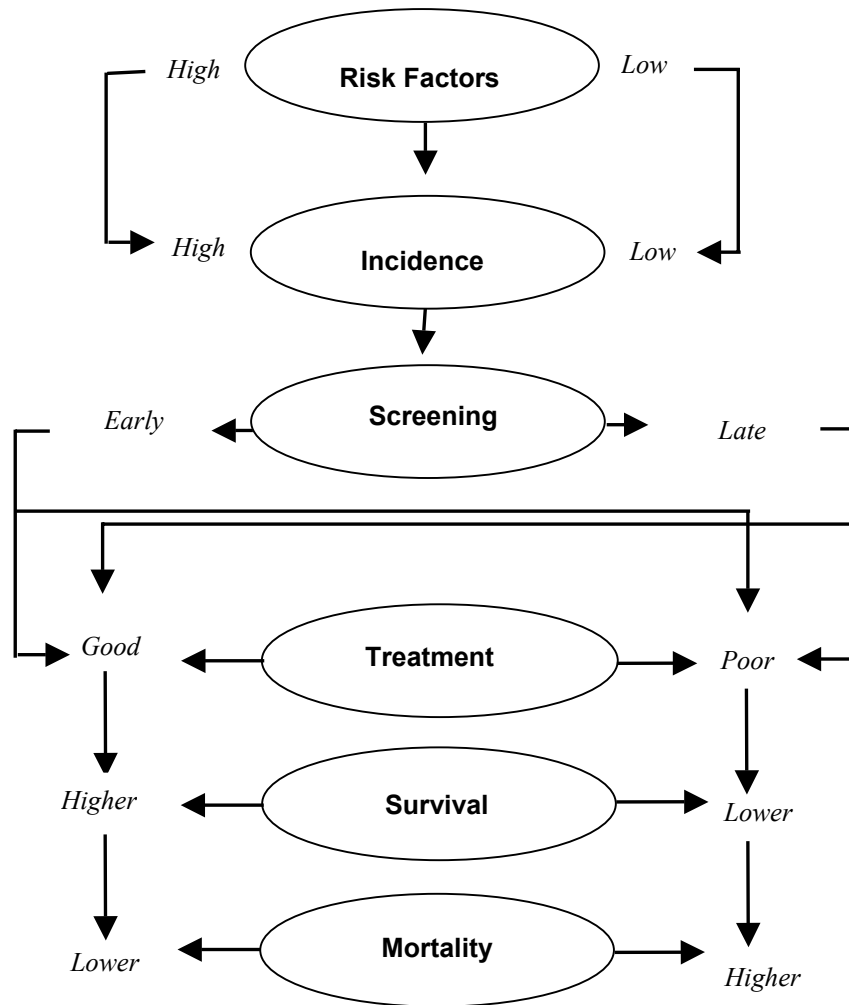


Figure 1 : Determinants of Breast Cancer Mortality

For example, a higher prevalence of risk factors for breast cancer in the population may result in a higher incidence of breast cancer. Lower participation in screening may delay diagnosis and treatment, which may result in a poorer outcome. Failure to access or receive good quality treatment may also result in a poorer outcome.

Data Sources and Methods

This paper presents data sourced from the ACT Cancer Registry as reported by the National Cancer Statistics Clearing House (at the Australian Institute of Health and Welfare) in collaboration with the Australasian Association of Cancer Registries. Notification of cancer incidence and mortality became mandatory in the ACT in 1994.

Mortality rates are sourced from the National Mortality Database as reported by the Australian Institute of Health and Welfare (AIHW). The AIHW mortality rates are reported to minimise the effect of under-reporting of deaths in the first years of the ACT Cancer Registry.

The AIHW mortality data may include deaths of individuals who moved to the ACT for treatment following diagnosis. These individuals would 'inflate' the mortality rates, which are calculated using the ACT resident population. However, a comparison with the later years of ACT Cancer Registry mortality statistics, which do not include individuals diagnosed outside of the ACT, shows that the difference in rates is minimal for the period 1995 to 1999 (AIHW: 31.8 per 100,000 vs ACT Cancer Registry: 29.6 per 100,000).

Based on this comparison, the impact of ‘medical migration’ into the ACT from the surrounding region for treatment following diagnosis is not considered significant. It has not been possible to assess the impact of medical migration for treatment prior to registration of diagnosis, or the impact of medical migration out of the ACT.

The most recently published national data available for comparison is for 1999. Incidence and mortality statistics for the ACT are reported as five-year averages (ie. 1994-1998 and 1995-1999) to minimise the natural variation observed in annual rates produced from relatively small populations.

Rates of participation in breast screening and early cancer detection are sourced from the BreastScreen Program.

Mortality due to breast cancer in the ACT

There are, on average, 43 deaths each year in the ACT due to breast cancer. Nationally, 2,512 women died from breast cancer in 1999. The breast cancer mortality rates for the ACT were higher than observed for Australia in both periods detailed in Table 1. These differences were statistically significant.

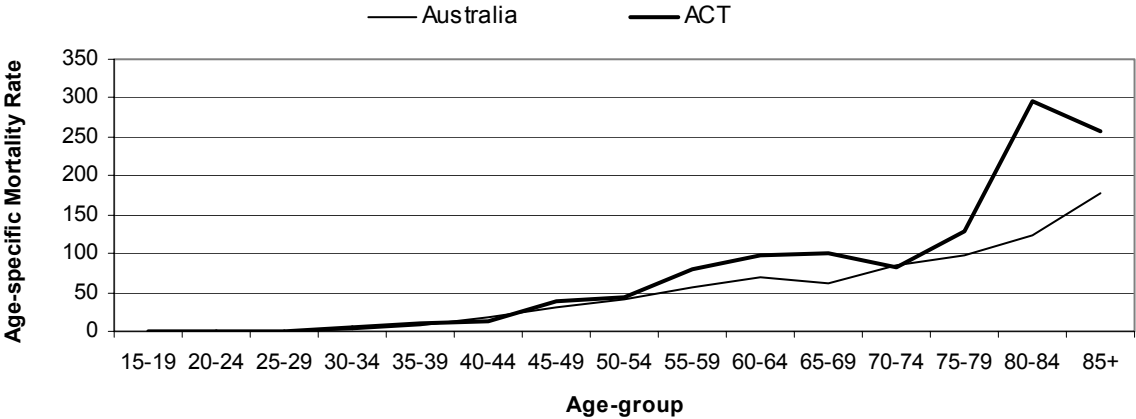
Table 1: Age-standardised female breast cancer mortality rates* per 100,000 (95% CI)

		1998 (ACT 1994-1998)	1999 (ACT 1995-1999)
ACT	AS Rate	31.0 (26.6-35.4)	31.8 (27.1-35.4)
	Lifetime Risk (0-74)	1 in 43	1 in 43
Australia	AS Rate	22.8 (21.9-23.7)	22.0 (21.1-22.9)
	Lifetime Risk (0-74)	1 in 53	1 in 53

*Rates are age standardised to the Australian 1991 Population.
Source: Cancer in Australia 1998 (AIHW 2001) and Cancer in Australia 1999 (AIHW 2002).

The age specific mortality rates for the ACT rates appear to be slightly higher than observed nationally for women aged 55 years and over (Figure 2). The much larger differences in the oldest age groups are likely to reflect very small numbers in these categories, and are not significant.

Figure 2: Age-specific breast cancer mortality, rates per 100,000, ACT (1995-1999) and Australia, 1999



Source: Cancer in the ACT 1995-2000, ACT Cancer Registry, ACT Health (In preparation).

There are several population level determinants of breast cancer mortality, including incidence, participation in screening and access to timely and high quality treatment. The incidence of breast cancer in the ACT is discussed in the following section.

The incidence of breast cancer in the ACT

Breast cancer incidence is primarily determined by the risk factor profile of the population. Independently of risk factor prevalence, participation in screening programs such as BreastScreen may also affect the incident rate in a population, as greater participation in screening might lead to the detection of cancers that wouldn't be detected in a population with a lower rate of participation.

On average, around 150 women are diagnosed with breast cancer each year in the ACT. Nationally, 10,592 women were diagnosed with breast cancer in 1999. The age-standardised breast cancer incidence rates for the ACT were slightly, but not significantly, higher than the Australian rates for the periods detailed in Table 2.

Table 2: Age-standardised female breast cancer incidence rates* per 100,000

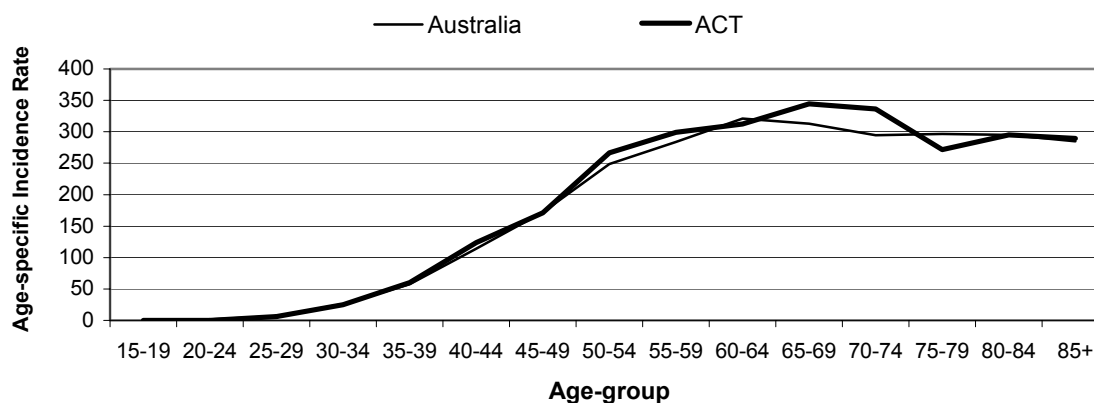
		1998 (ACT 1994-1998)	1999 (ACT 1995-1999)
ACT	AS Rate	104.0 (96.3-111.7)	100.8 (93.1-108.0)
	Lifetime Risk (0-74)	1 in 11	1 in 10.8
Australia	AS Rate	101.3 (99.4-103.3)	97.7 (95.9-99.6)
	Lifetime Risk (0-74)	1 in 10	1 in 11

*Rates are standardised to the 1991 Australian Population.

Source: Cancer in Australia 1998 (AIHW 2001) and Cancer in Australia 1999 (AIHW 2002).

Figure 3 presents the age-specific incidence rates for the ACT (1995-1999) and Australia (1999). The incidence rate in the ACT was marginally higher than the rate for Australia in the 65-75 year age-group.

Figure 3: Age-specific breast cancer incidence rates per 100,000 females



Source: Cancer in the ACT 1995-2000, ACT Cancer Registry, ACT Health (In preparation).

The data therefore indicate that women in the ACT had a slightly but not significantly higher incidence of breast cancer when compared to Australian women.

The slightly higher incidence observed may relate to the risk factor profile of the ACT population, as there is a well-established link between higher socio-economic status and a higher incidence of breast cancer, thought to reflect (primarily) fertility and reproductive mechanisms. For example, women who do not bear children are at an increased risk of developing breast cancer. Fertility in the ACT has decreased in the last 10 years, a trend also observed nationally, and in 2000 was lower in the ACT than reported nationally (ACT 1.61 vs Australia 1.75 in 2000).¹⁷ There has been also been an increase in the median age of ACT women giving birth in the last decade, from 28.8 years in 1990 to 30.2 in 2000.

There is little difference between ACT and Australian women in the more easily modified risk factors, such as high/risky alcohol consumption (11.6% in the ACT compared with 10.8% nationally).¹⁸ A higher proportion of women in the ACT (62.5%) undertake sufficient physical activity to confer a health benefit than observed nationally (56.0%),¹⁹ and there is a similar prevalence of self-reported obesity in ACT and Australian women (11%).¹⁸

The available information on incidence and known risk factors for breast cancer in ACT women suggests that while there are some differences between the ACT and Australia, they are not of sufficient magnitude to fully explain the higher mortality rate.

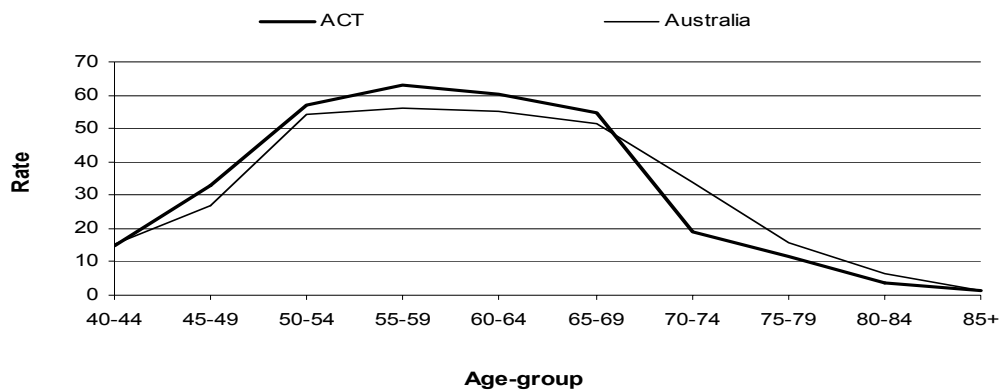
Screening and detection of breast cancer in the ACT

As with other forms of cancer, early detection and timely and effective treatment for breast cancer are associated with a favourable long-term prognosis. Mammography is used for the screening of breast cancer at an early stage where women are unlikely to be experiencing any symptoms.

In Australia, the National Program for the Early Detection of Breast Cancer was established in 1991, and since 1994 has been called “BreastScreen Australia”. The program recommends a mammogram every two years and aims to screen 70% of women aged 50 to 69 years. Women in the 40-49 and 70+ year age-groups are also thought to benefit from screening and have access to the screening program without charge (program resources permitting), but are not actively recruited to participate. In 1997, 33% of all breast cancers in the ACT were diagnosed through BreastScreen, nationally 30% of all breast cancer cases were diagnosed by BreastScreen.

Participation rates for the BreastScreen program for 1997-98 are presented in Figure 4. The participation rates for ACT women aged 40-69 years were higher than the rates observed for Australian women.

Figure 4: Participation Rates for BreastScreen Program, 1997-98



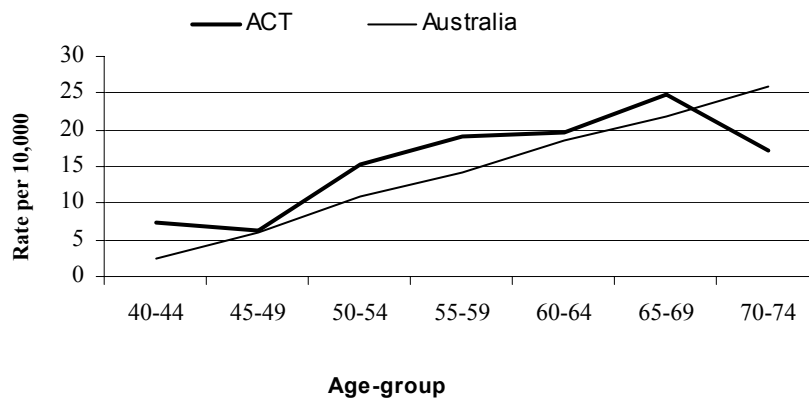
Source: AIHW: BreastScreen Australia Achievement Report 1997 and 1998. AIHW 2000.

Participation rates for both the ACT and Australia are lower after the age of 70, the decrease being more marked in the ACT.

Another important performance indicator for the BreastScreen program is the detection rate of small diameter cancers. The small cancer detection rate is the rate of small invasive breast cancers (<=10 mm) detected in women participating in screening programs in a given period.

Given the importance of the early detection of breast cancer, indicated by a small tumour size at diagnosis, it is useful to examine tumour size at diagnosis for all women diagnosed in the ACT, not just those diagnosed through BreastScreen. A higher incidence of larger tumours at diagnosis in the ACT may relate to a poorer outcome.

Figure 5: Age specific detection rates for small diameter (<=10 mm) invasive cancers, per 10,000 screened



Source: AIHW: BreastScreen Australia Achievement Report 1997 and 1998. AIHW 2000.
BreastScreen ACT – Participation Rates for 1995-2001 - Unpublished

Tumour size is not routinely recorded with ACT cancer notifications, however a national study in 1997 showed that ACT women had a slightly higher incidence of larger tumours (11mm or larger) at diagnosis (83.7%) than observed nationally (79.6%).²⁰ The proportion of the largest category of tumours recorded, (30mm or more) in the ACT was similar (17.0%) to that observed nationally (16.4%).

Table 3: Percentage of Large Diameter Cancers at Diagnosis, ACT and Australia 1997

Age-group	ACT %	Australia %
20-39	83.4	81.1
40-49	77.8	81.2
50-69	77.8	75.5
70+	82.0	84.7

Source: ACT Cancer Registry, unpublished.

When examined by age group, the ACT proportions are generally similar to those observed nationally (Table 3).

Treatment of Breast Cancer in the ACT

The stage of the breast cancer at diagnosis, or time of re-evaluation, is the main determinant for the treatment provided. While radical mastectomy was the most common procedure performed for most of the last century, recent developments in irradiation technology, chemotherapy and alternative surgical techniques have improved treatment options.²¹ With the latest techniques, such as breast conservation, an increased emphasis is now placed on improving quality of life while the ultimate goal is to improve survival prospects. However, given the increased risk of recurrence and poor survival due to breast conservation treatment, it is accepted as appropriate method of primary therapy only for women with early breast cancer.²²

Breast conservation therapy is a combination of a conservative surgery for resection of the primary tumour with or without surgical staging of the axilla, followed by radiotherapy with or without adjuvant systematic therapy. To meet the dual goals of optimum cosmetic results and minimum rates of recurrence after breast-conserving therapy, it is vital to select and administrate the most appropriate therapy combinations.²²

In Australia, radical or modified mastectomy has been the most recommended treatment over the past two decades. During the late 1990's, as a result of widespread screening programs, a decrease in the size of invasive tumours at diagnosis and an increase in the incidence of non-invasive breast

carcinoma have been observed. Consequently, as observed in other developed countries, breast-conservation therapy became an alternative to mastectomy in Australia and in the ACT.

The 1995 National Survey of Breast Cancer Treatment sought to describe the surgical management of breast cancer in Australia immediately prior to the dissemination of the first NHMRC Clinical practice guidelines for the management of early breast cancer. The treatment of 73 ACT women, 79% of patients with breast cancer in the six month study period, were included in the study. The majority of the results were reported at the national level, however the report does indicate that a substantially higher proportion of ACT patients (71%) were treated by experienced surgeons seeing 40 or more new patients each year than was reported nationally (38%).²³ A caseload of 30 patients or more per year has been associated with improved patient outcome.²⁴ Given the small number of patients from the ACT in the study, it is unlikely that further analysis of this data would be useful.

The ACT Breast Cancer Treatment Group, established in 1996, has more recently reported a strong concordance of practice in the ACT with clinical guidelines on the considered performance indicators.²⁵ Analyses of the first five years of data collection from this project are currently being undertaken.

The availability and timeliness of treatment is also important. It is not known whether this was a problem during the considered study periods.

Survival following breast cancer diagnosis

An analysis of 5-year relative survival for women diagnosed with breast cancer between 1982 and 1992 shows that relative survival proportions for the ACT were greater for each period of diagnosis when compared to Australia.²⁶ For instance, the relative survival proportions for Australia (excluding Queensland) and the ACT were 78.9% and 85.3% respectively, for the women diagnosed between 1988 and 1992.

Survival proportions for both Australian and ACT women increased over time (Table 4), with women diagnosed in the 1990s experiencing slightly better relative survival proportions than women diagnosed in the 1980s. This may reflect improvements in medical technology and treatment and the introduction of population-based screening programs for breast cancer.

Table 4: Breast Cancer 5-Year Relative Survival Proportions by Usual Residence

		Period of Diagnosis	
		1982-1987	1988-1992
5-Year Survival	ACT	80.9 (78.0-83.8)	85.3 (83.0-87.7)
	Australia*	74.4 (73.8-75.0)	78.9 (78.3-79.5)

*Excludes Queensland

Source: AIHW: Breast Cancer Survival in Australian Women 1982-1994.

It is possible that the higher survival in the ACT reflects a higher participation in screening. This is because a higher screening rate may result in the detection of cancers that would otherwise never have been diagnosed. Further, earlier diagnosis of breast cancer may result in a longer period from diagnosis to death that may not reflect an actual improvement in outcome. However, as the BreastScreen program was initiated in 1991, towards the end of the period of diagnosis considered in this analysis, it is difficult to relate later high screening participation rates to these results.

SUMMARY

This paper presents a discussion of mortality due to breast cancer in the ACT with reference to the characteristics of the ACT population, the incidence of breast cancer, participation in breast screening, rates of early-cancer detection, treatment and relative survival. Our analysis has been limited by the availability of only relatively recent reliable information on breast cancer in the ACT.

The incidence of breast cancer in the ACT is slightly but not significantly higher than observed nationally. Based on known risk factors for breast cancer, this may reflect the higher socio-economic status of the ACT population. The most notable difference between the risk factor profile of ACT and Australian women is in their choice on whether to have a child and their age at the birth of their first child. These risk factors are not easily modifiable through public education. However assuming that the incidence of breast cancer has not changed significantly over the last ten years, it is unlikely that the relatively small difference fully accounts for the higher mortality rate.

Participation in the BreastScreen program has been significantly higher among ACT women aged 50 to 69 years of age than observed nationally, as has the rate of early cancer detection in the BreastScreen program. The higher mortality rate is therefore unlikely to be related to poorer participation in screening. The overall incidence of large tumours at diagnosis in the ACT was slightly higher than observed nationally, however only one year of data is available, and it has not been possible to determine the significance, if any of this.

Access to timely and high quality treatment is an important determinant of prognosis, and although detailed information on treatment early in the period relevant to these mortality statistics is not available, a recent study has reported a strong concordance of practice within established guidelines for breast cancer treatment in the ACT. Further, the 1995 National Survey of Breast Cancer Treatment showed that a substantially higher proportion of women being treated for breast cancer in the ACT were being treated by experienced surgeons than reported nationally. Based on the information available, the higher mortality does not appear to be related to treatment quality. It has not been possible to assess access to and timeliness of treatment.

Analyses of relative survival 5 years after a diagnosis of breast cancer show that women in the ACT diagnosed between 1988 and 1992 had a better relative rate of survival (85%) than observed nationally (79%). It is possible that this may be due to a higher screening rate, leading to the detection of cancers that would otherwise never have been diagnosed. However as organised screening was not available until the early 1990's, it is difficult to confirm this.

A recent AIHW analysis of trends in deaths in Australia has shown a trend to an increasing rate of breast cancer mortality in populations with a higher socio-economic status, with an Australian rate of 240 per million (95% CI 228-252) in the lowest category of socio-economic status compared to a rate of 259 per million (95% CI 246-271) in the highest category of socio-economic status.²⁷ As the relationship between socio-economic status and mortality due to breast cancer is usually in the opposite direction, reflecting poorer access to screening and treatment in lower socio-economic status populations, this is an unusual trend. While it has not been possible to adjust the ACT and Australian rates by socio-economic status for comparison in this paper, the AIHW results above suggest that this analysis should be undertaken in the future. The mechanisms underlying a possible association between higher socio-economic status and a higher mortality rate are not clear.

In conclusion, analysis of the available information on the incidence, screening, detection rate, treatment and relative survival in the ACT does not fully explain the higher mortality observed. It is however, unlikely that the higher rate of mortality is due to the major modifiable determinants of mortality, namely participation in screening, or treatment by experienced surgeons according to established guidelines.

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