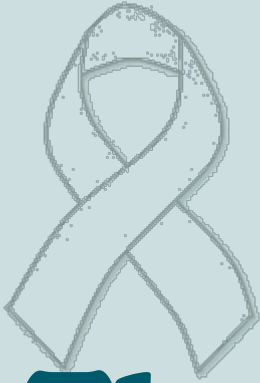


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# **The Cancer Effect**

**An “Exploring Cancer” Series**

**Western Australia**

## **Breast Cancer Relative Survival 1985–2014**

Western Australia Cancer Registry  
and the Epidemiology Branch  
WA Department of Health

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## WA Cancer Registry

The WA Cancer Registry is part of the Department of Health (WA). The Registry records all cancer notifications (i.e. cancer diagnoses) for WA residents. The notification (reporting) of cancers, by pathologists and radiation oncologists (amongst others), to the Department of Health has been a legal requirement under the *Health (Miscellaneous Provisions) Act 1911* since 1981. These current regulations are available as [Health \(Western Australian Cancer Register\) Regulations 2011](#).

## Acknowledgements

The Epidemiology Branch of the Department of Health WA designed the analysis tools used in this relative survival analysis study as well as conducting the analysis. The Epidemiology Branch also provided the WA Cancer Registry feedback on the report. The WA Cancer Registry also extends thanks to the individuals across the WA Department of Health who contributed to the production of this report.

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## 1.0 Introduction

This publication, *The Cancer Effect - Breast Cancer Relative Survival 1985-2014*, is the second in a series of Department of Health WA publications and describes the relative survival outcomes of breast cancer in Western Australia (WA). The first publication in the series, *The Cancer Effect - All Cancers Survival 2010-2014*, detailed the methodologies used in this report, and presented key cancer facts for major cancer types by age and sex. According to this report, breast cancer had the third highest relative survival rate of all cancers in WA, male and female combined. (1)

This report considers five year relative survival rates, an epidemiological measure that compares the observed five year survival rate from the date of diagnosis, with the five year survival rate of the general population. Data is presented in five year blocks, with the first block representing all patients with a cancer diagnosis between the years 1985 and 1989 inclusive, the next block representing patients with a cancer diagnosis between the years 1990 and 1994, and so on until the final five year block between 2010 and 2014. When comparing breast cancer against all cancers, only the most recent five year block, 2010 to 2014, is used.

Relative survival is generally accepted as one of the methods of choice for estimating population-based cancer survival. The methodology used provides a measure of survival that is adjusted for other causes of death in the general population. It provides an appropriate measure of cancer survival that can be compared over time and within age groups. (2) (3)

It is worth noting that the life expectancy of all females in Australia has increased by eight (8.0) years from 1977 to 2015 as per results in the Australian Bureau of statistics publication, *Life expectancy improvements in Australia over the past 125 years*. The life tables used in the calculation of relative survival relate to the years selected in each five year block, ensuring the general increase in life expectancy has been accounted for enabling accurate comparisons over time. (4)

Presented for the first time are WA preliminary results of a national collaborative study with Cancer Australia on survival rates by stage of breast cancer. Ongoing monitoring of breast cancer survival rates is vital to monitor population changes in survival rates with positive changes reflecting success in early detection, screening and awareness raising or advocacy programs as well as improvements in surgical and medical treatments.

## 2.0 Incidence of breast cancer in WA

According to the WA Cancer Registry Annual Report 2014, breast cancer has the highest incidence (number of new cancer cases) of all cancer types among females in WA. There were 1,737 new breast cancer cases, representing 31.3 per cent of all new cancer diagnoses in females. Breast cancer had the second highest number of deaths (249) making up 14.1 per cent of all cancer deaths in females. (5)

## 3.0 Relative survival - All cancers

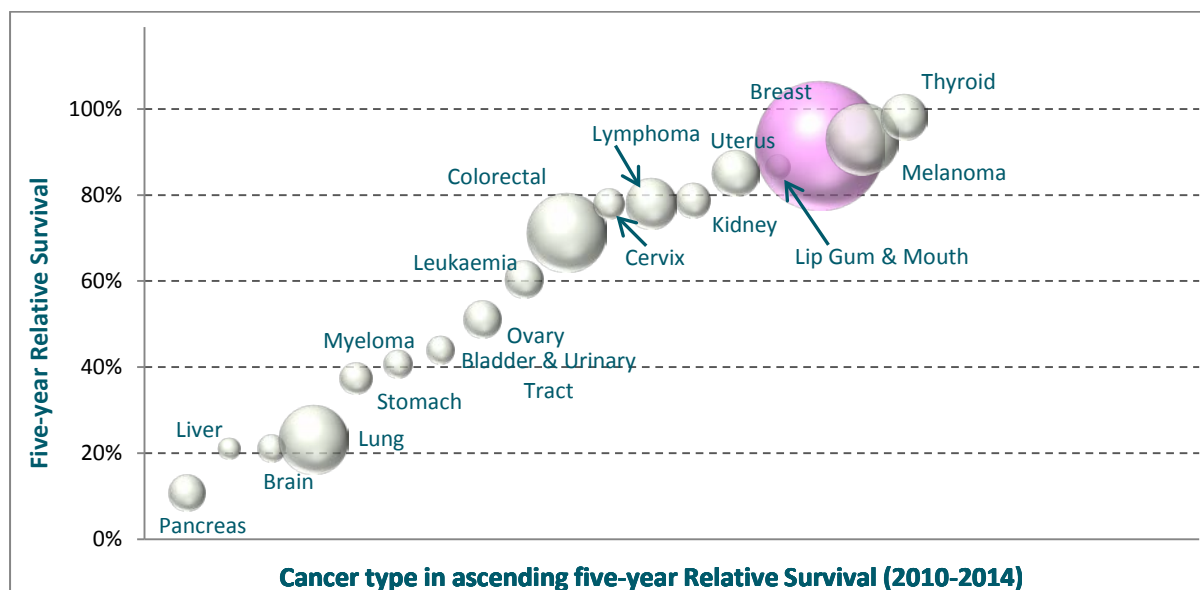
This section considers the relative survival rates of breast cancer compared to all other cancer types for the period 2010-2014 for females in WA.

Figures 1 and 2 highlight the five year relative survival between the periods 2010-2014 for each of the major cancer groups. This data identifies breast cancer has the third highest relative survival of the presented cancer types with a rate of 91.5 per cent.

The following notes will assist in interpreting Figure 1:

- The centre of each “bubble”, as measured on the vertical axis, is an indication of the survival rate for that type of cancer (i.e. the higher the “bubble” the greater the relative survival rate).
- The size (diameter) of the “bubble” is the incidence (new cases of cancer) aggregated over 2010-2014. This demonstrates that breast cancer has the highest incidence of all major cancer types for females (5).

**Figure 1 The relationship between relative survival and number of cancer notifications, 2010-2014; Female; WA**



**Figure 2 Five-year relative survival for common cancer groups, 2010-2014; Female; WA**

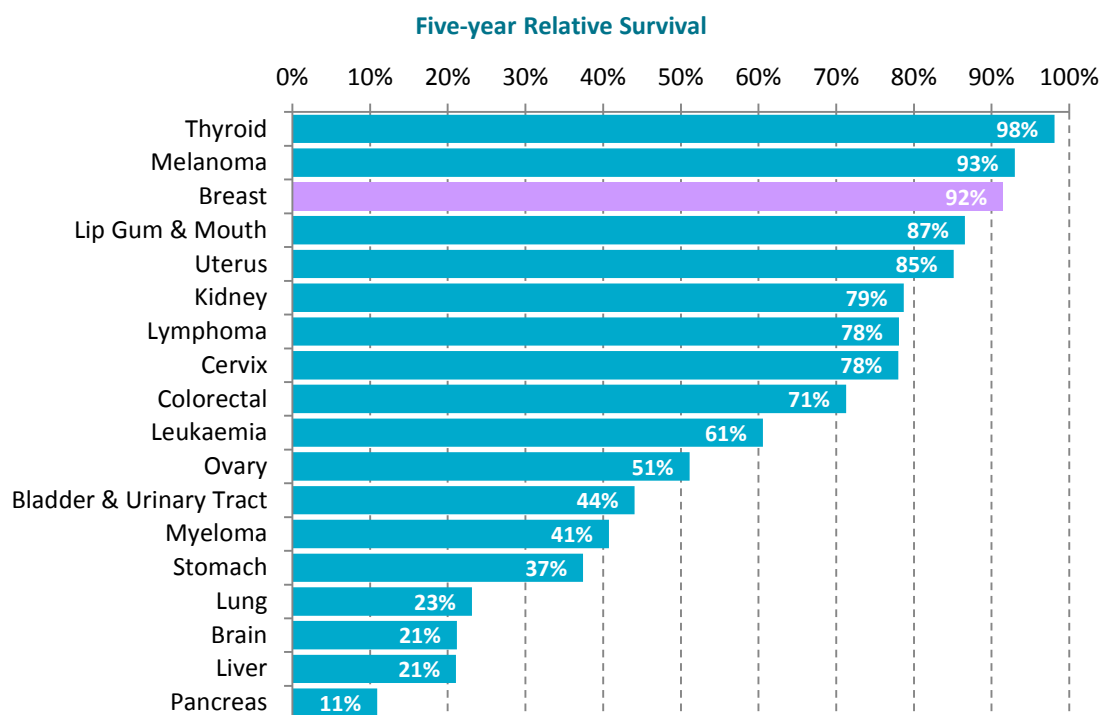


Table 1 below presents relative survival for the major cancer types for females in WA, including the incidence over the same time period. The incidence of breast cancer over five years is the largest (7,797 cases), more than double the second largest cancer type, colorectal cancer (2,924 cases).

**Table 1 The relationship between relative survival and number of cancer notifications, 2010-2014; Female; WA**

Cancer type	Five-year relative survival	Incidence over five years
Thyroid	98.1%	967
Melanoma	93.0%	2,355
<b>Breast</b>	<b>91.5%</b>	<b>7,797</b>
Lip Gum & Mouth	86.6%	281
Uterus	85.1%	982
Kidney	78.7%	538
Lymphoma	78.1%	1,166
Cervix	78.0%	447
Colorectal	71.3%	2,924
Leukaemia	60.5%	662
Ovary	51.1%	655
Bladder & Urinary Tract	44.1%	351
Myeloma	40.7%	369
Stomach	37.4%	481
Lung	23.1%	2,217
Brain	21.2%	349
Liver	21.1%	212
Pancreas	10.9%	612

## 4.0 Relative survival - Breast cancer

This section contains an overview of the relative survival rates following diagnosis of breast cancer. The trends over time are investigated, along with differences between age groups.

### 4.1 Trends in relative survival for breast cancer

The change in relative survival over time provides an insight into the effectiveness of clinical and public health improvements, including breast cancer screening programs and treatment and medication options. (3) (6)

It can be noted from Figure 3 that in 1985 to 1989 the relative survival rate was 74 per cent for breast cancer in WA. From 2000, rates of survival increased to 90 per cent or greater. This represents an 18 per cent increase in the survival of breast cancer diagnosis relative to the survival of the general population over 20 years.

**Figure 3 Breast cancer five-year relative survival, in five year periods, 1985-1989 to 2010-2014; Female; WA**

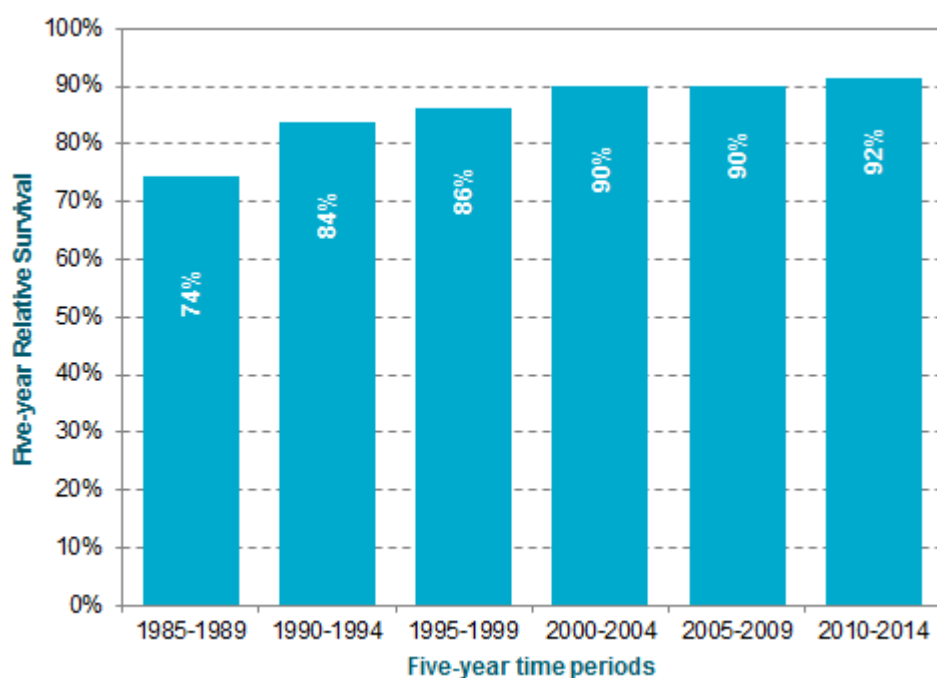
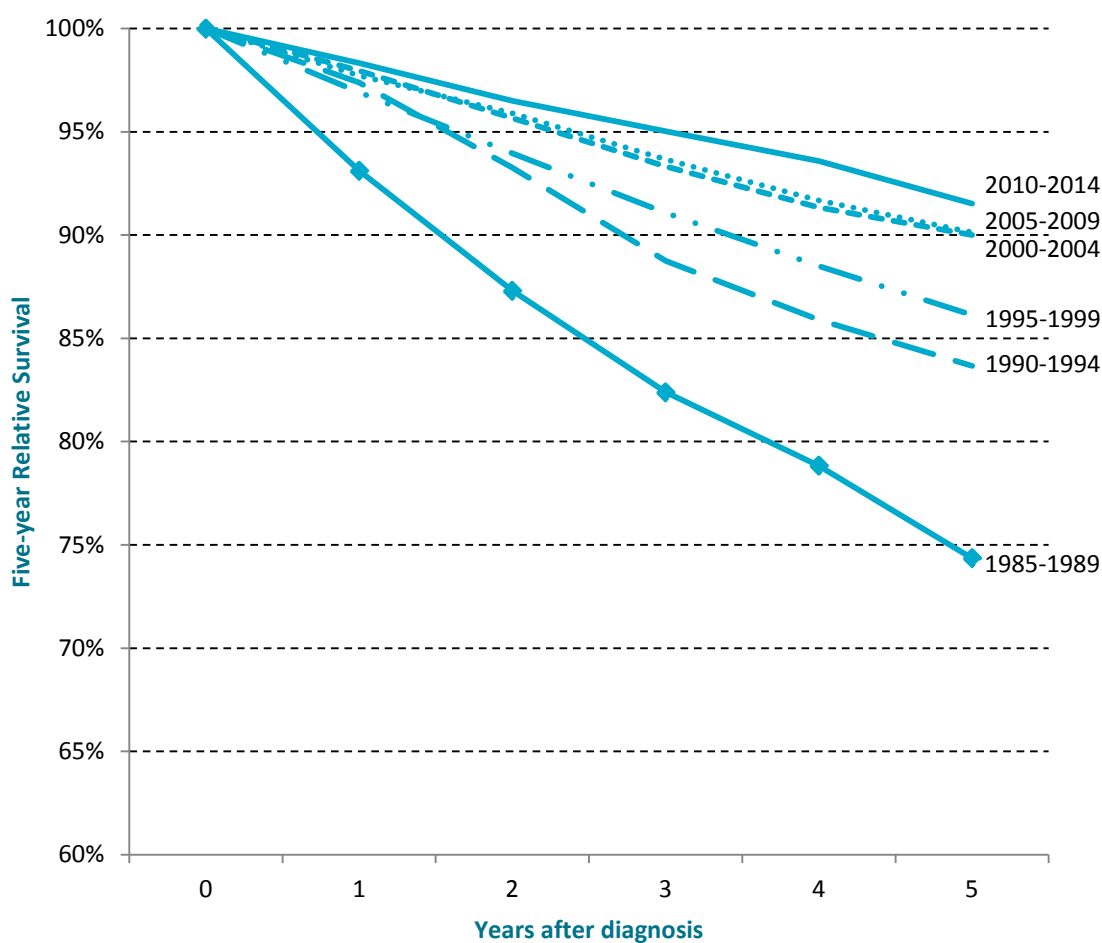


Figure 4 and Table 2 examine six of these time periods in more detail, reporting on the relative survival over time between the immediate years following breast cancer diagnosis. Whilst there was an increase of 9.2 percentage points in relative survival between the first two five-year time periods between 1985 and 1994, there has been a larger increase of 17.1 percentage points in relative survival over the complete 30-year period.

**Figure 4 Breast cancer relative survival, one to five-year relative survival for each five-year time periods from 1985-1989 to 2010-2014; Female; WA**



**Table 2 Breast cancer relative survival in each year following diagnosis, for each five-year time periods from 1985-1989 to 2010-2014; Female; WA**

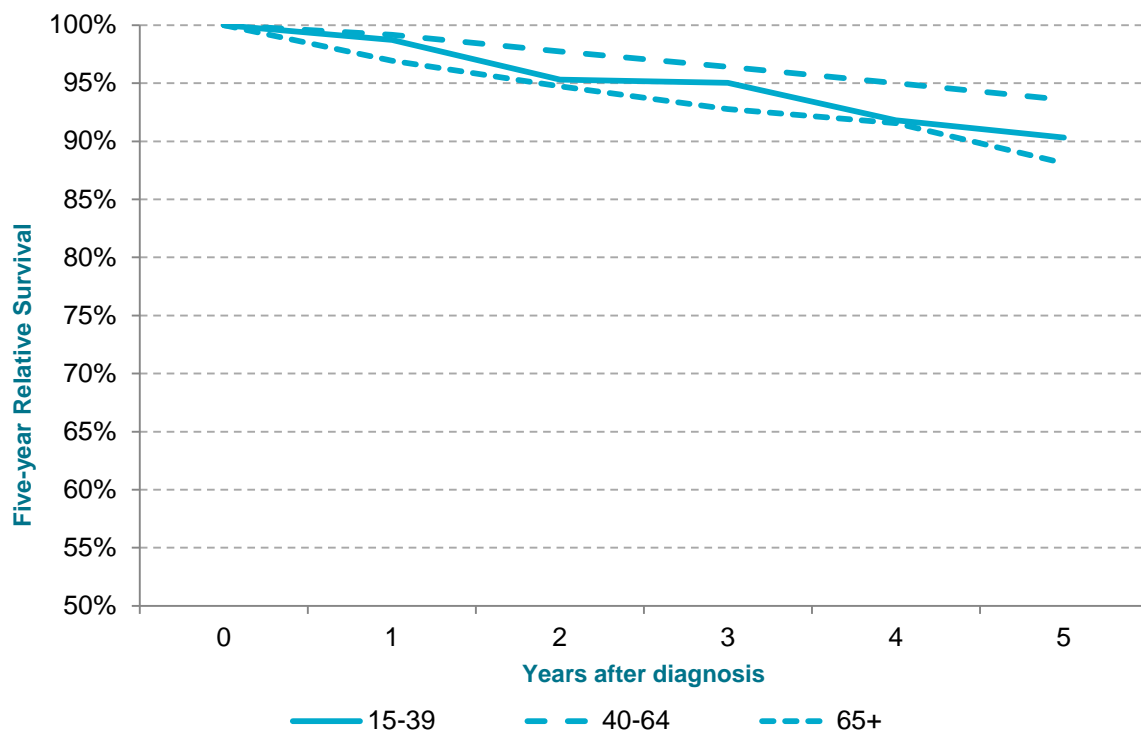
Time period of incidence	Years following diagnosis				
	1 year	2 years	3 years	4 years	5 years
1985-1989	93.1%	87.3%	82.4%	78.8%	74.4%
1990-1994	97.4%	93.3%	88.8%	85.9%	83.7%
1995-1999	96.9%	94.0%	91.1%	88.5%	86.1%
2000-2004	98.0%	95.7%	93.3%	91.3%	90.0%
2005-2009	97.7%	95.9%	93.7%	91.7%	90.1%
2010-2014	98.3%	96.5%	95.0%	93.6%	91.5%



## 4.2 Breast cancer relative survival by age groups

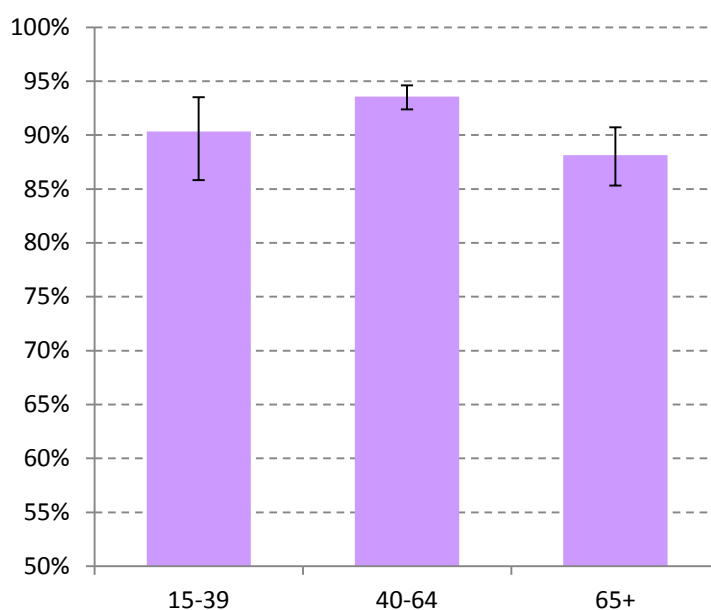
Examining relative survival, by age groups, enables the identification of significant differences in relative survival rates between these cohorts. The age of the patient is calculated from the age at initial diagnosis. Figure 5 presents the age cohorts 15-39 years, 40-64 years, and 65 years and older.

**Figure 5 Breast cancer relative survival, relative survival in each year following diagnosis, by age groups, 2010-2014; Female; WA**



In Figure 6 and Table 3 there is a statistically significant difference in the relative survival of females aged 40-64 years and females 65 years and older. Patients in the 40-64 year cohort have a significantly higher survival rate than those 65 years and older.

**Figure 6 Breast cancer relative survival five years after diagnosis, by age groups, 2010-2014; Female; WA**



Notes:  
1. Error bars represent 95% confidence intervals

**Table 3 Breast cancer relative survival, by year following diagnosis including confidence intervals, 2010-2014; Female; WA**

	Age group	Relative survival rate	Confidence interval
<b>1 year after diagnoses</b>	<b>15-39</b>	98.7%	97.1% - 99.5%
	<b>40-64</b>	99.2%	98.8% - 99.4%
	<b>65+</b>	96.9%	96.0% - 97.8%
<b>2 years after diagnoses</b>	<b>15-39</b>	95.3%	92.7% - 97.0%
	<b>40-64</b>	97.7%	97.2% - 98.2%
	<b>65+</b>	94.7%	93.4% - 95.9%
<b>3 years after diagnoses</b>	<b>15-39</b>	95.0%	92.4% - 96.8%
	<b>40-64</b>	96.4%	95.7% - 97.0%
	<b>65+</b>	92.8%	91.1% - 94.3%
<b>4 years after diagnoses</b>	<b>15-39</b>	91.8%	88.0% - 94.5%
	<b>40-64</b>	95.0%	94.1% - 95.8%
	<b>65+</b>	91.6%	89.5% - 93.4%
<b>5 years after diagnoses</b>	<b>15-39</b>	90.3%	85.8% - 93.5%
	<b>40-64</b>	93.6%	92.4% - 94.6%
	<b>65+</b>	88.1%	85.3% - 90.7%

## 5.0 Preliminary look at breast cancer five year survival by staging

The WA Cancer Registry recently completed a national collaborative project with Cancer Australia to investigate cancer staging. Cancer notifications from 2011 for five cancer types were retrospectively staged. This project successfully included 1,338 breast cancer cases, representing 94 per cent of all breast cancer incidence cases in 2011.

Staging in cancer is a measure of the clinical progression of a diagnosed cancer that reflects the attributes of that cancer in terms of size, lymph node involvement and metastasis. The degree to which a cancer has spread within an individual will affect that person's likelihood of long term survival (7).

Five year survival has been calculated by linking staged 2011 breast cancer cases with record of a death notification before the end of 2016. This is a simpler epidemiological measure as a probability of mortality and should not be compared with relative survival rates but is nonetheless useful for exploring the survival rates of this particular cohort.

The data in Table 4 shows a major decrease in the five year survival rates between female patients in WA diagnosed with Stage 4 cancer have a lower survival than patients diagnosed with Stage 1 to 3 cancer.

**Table 4 Breast cancer staging incidence and five year survival; Female; WA**

Cancer stage	2011 incidence sample	5 year survival (by 2016)
Stage 1	619	99%
Stage 2	469	92%
Stage 3	178	82%
Stage 4	72	32%

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## 6.0 Conclusion

The data shows a clear improvement in survival in breast cancer in WA since 1985-1989 and the most recent available data, 2010-2014. This is likely to be due to a combination of early detection and screening, and improvements in treatment modalities. Recent Australian Institute of Health and Wellbeing data revealed that WA recorded a breast screening participation rate of 56.6 per cent for 50-74 year old women, higher than the Australian average of 54.8 per cent. (7)

Survival remains best in middle aged (40 – 64 year old) women with the greatest improvements over time being observed 4 and 5 years after diagnosis. Overall five year survival is 92 per cent with survival being best in early stage disease. Recent indications suggest survival with Stages 1 to 3 remain above 80 per cent with outcomes for Stage 4 disease being poorer at 32 per cent.

Factors that contribute to this include that mortality in the first two years could be attributed to diagnoses that are more aggressive, or presented late and therefore further advanced. These tumours are more challenging for clinicians to treat. Larger gains in relative survival in the fourth and fifth years could be attributed to improvements and advancements in the effectiveness of treatments.

These results align with the shifting perception that a diagnosis of breast cancer, for the majority of patients, is a disease that people live longer term with. The longer term survival, treatment and monitoring of cancers for patients are typical of the characteristics of chronic disease. Further analysis could provide deeper insight into this perception such as exploring ten year survival and conditional survival.

Whilst this analysis is focused on statewide cancer diagnoses, it is recognised that smaller population groups may have different outcomes than those presented. Further analyses could consider variations in survival rates of sub-population groups such as Aboriginal and Torres Strait Islanders, or women living in regional and remote populations.

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