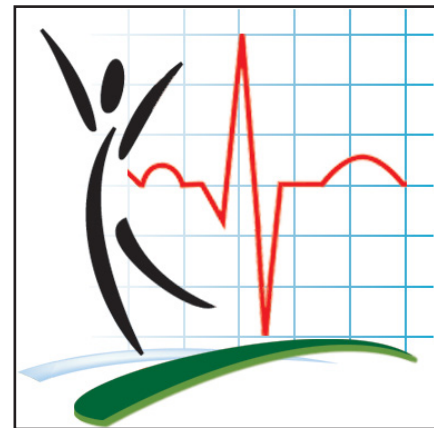


Health at a Glance

Ovarian cancer: Survival statistics

by Tanya Navaneelan and Lawrence Ellison

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- .. not available for a specific reference period
- ... not applicable
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- ^P preliminary
- ^r revised
- X suppressed to meet the confidentiality requirements of the *Statistics Act*
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- * significantly different from reference category ($p < 0.05$)

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Health *at a Glance*

Ovarian cancer: Survival statistics

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Highlights

- Among Canadian women diagnosed between 2006 and 2008, survival from ovarian cancer was lower than survival from other common cancers of the female reproductive system.
- Women diagnosed with ovarian cancer between 2006 and 2008 were 45% as likely to survive for five years as comparable women without ovarian cancer.
- Over time, the likelihood of surviving the first year after diagnosis did not improve as much as the likelihood of surviving three, five and ten years.
- Younger women, those diagnosed before the age of 45, had significantly better survival after five years than women diagnosed at older ages.
- Among the age groups, middle-aged (45 to 54 years) women had the greatest improvement in five-year survival between 1992–1994 and 2006–2008.

Ovarian cancer occurs when an invasive tumour develops in one of the three main types of cells that make up the ovaries. The majority (about 90%) of ovarian cancers develop in the epithelial cells that cover the outer surface of the ovary.¹

While the underlying causes of ovarian cancer are not well understood, a number of factors can increase a woman's risk of developing the disease. These include having a family history of the disease, increasing age, never having been pregnant and having never taken oral contraceptives, as well as lifestyle factors such as smoking and obesity.¹

Ovarian cancer is the ninth most commonly diagnosed cancer among Canadian women, is the fifth most common cause of death from cancer among women, and has the highest mortality rate of all cancers of the female reproductive system.^{2,3,4}

Mortality reflects both the number of cases of cancer and the prognosis following diagnosis with that cancer. A person's prognosis after being diagnosed with cancer can be affected by a number of factors including, the type of cancer, the type of tumour, stage at diagnosis (e.g., whether the cancer

Measuring survival

Survival from cancer can be measured in a number of different ways. This article uses the relative survival ratio (RSR), a common method of estimating survival in population-based studies. It compares the observed survival for a group of people with cancer to the expected survival for people in the general population who are assumed to be free of cancer and otherwise have the same characteristics – such as sex, age, and province of residence – as the group with cancer. In this article, the term ‘survival’ refers to the RSR. Survival estimates can be an important indicator of the severity of a cancer diagnosis as well as progress in treatment and control over time.⁶

Survival estimates are presented for the combined years 2006–2008 (the most recent data available). These estimates are considered predictive, since the period method of analysis was used. Data from 1992–1994 and 1999–2001 are used for historical comparisons. Survival estimates for these years were determined using the cohort method of survival analysis, which uses the actual observed survival of people diagnosed with cancer.⁷

has spread), and the quality and effectiveness of treatment. In addition, the person’s age, the presence of other chronic conditions and lifestyle factors can also affect survival.⁵

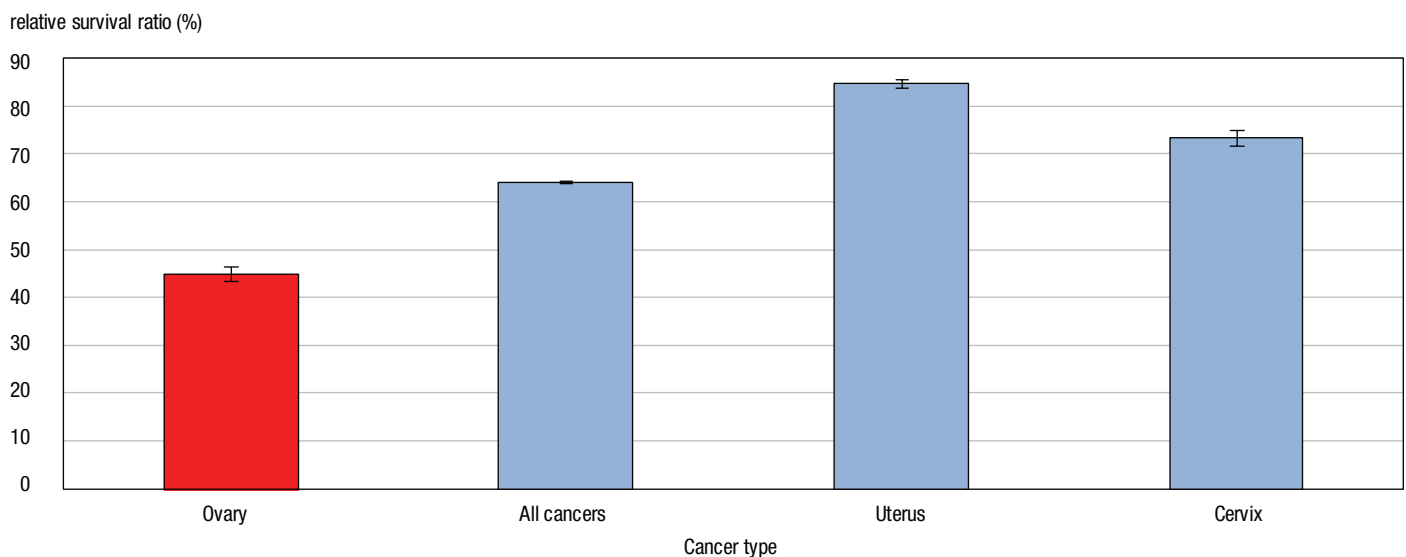
This article presents relative survival estimates for Canadian women diagnosed with ovarian cancer between the ages of 15 and 99 using data from the Canadian Cancer Registry. Survival data for three years are combined to increase the stability of the estimates by reducing random variation.

Survival from ovarian cancer lower than survival from all cancer

Among Canadian⁸ women diagnosed between 2006 and 2008, survival (RSR) from ovarian cancer was lower than survival from all cancers combined and from the other major female reproductive system cancers (uterine and cervical) (Chart 1). Five years after diagnosis (five-year survival), survival from all cancers in women was 64.2% while it was 45.0% for ovarian cancer. This means that women diagnosed with any type of cancer during this time period were 64.2% as likely to survive five years as comparable women without cancer. Women diagnosed with ovarian cancer, on the other hand, were 45.0% as likely to survive five years as comparable women without ovarian cancer. In comparison, over the same time period, five-year survival with female breast cancer was 87.5% (data not shown).

Chart 1

Five-year relative survival ratios,¹ by type of cancer, females, aged 15 to 99 at diagnosis, Canada excluding Quebec, 2006-2008²



1. The relative survival ratio is the ratio of the observed survival (the proportion of people still alive after a specified period of time) in a group of people diagnosed with cancer to the survival in a comparable group of people in the general population.

2. Year of diagnosis.

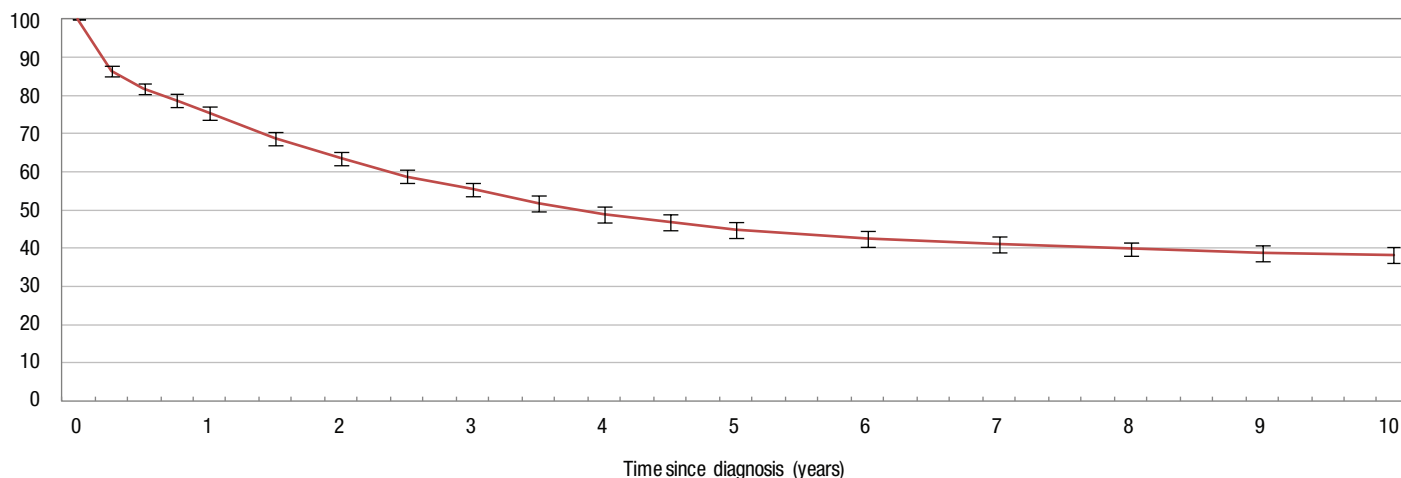
Note: The vertical lines overlaid on the bars in this chart indicate the 95% confidence intervals. Confidence intervals indicate the degree of variability in the estimate and enable more valid comparisons of differences between estimates.

Source: Statistics Canada, Canadian Cancer Registry.

Chart 2

Ovarian cancer relative survival ratios,¹ aged 15 to 99 at diagnosis, Canada excluding Quebec, 2006-2008²

relative survival ratio (%)



1. The relative survival ratio is the ratio of the observed survival (the proportion of people still alive after a specified period of time) in a group of people diagnosed with cancer to the survival in a comparable group of people in the general population.

2. Year of diagnosis.

Note: The vertical lines overlaid on the trend lines in this chart indicate the 95% confidence intervals. Confidence intervals indicate the degree of variability in the estimate and enable more valid comparisons of differences between estimates.

Source: Statistics Canada, Canadian Cancer Registry.

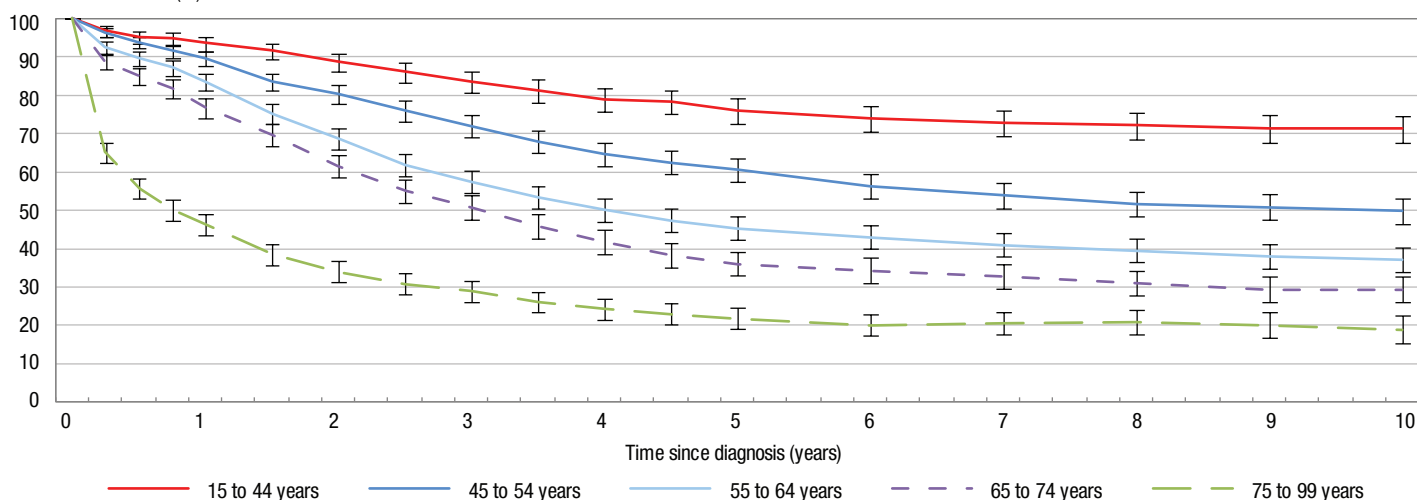
Most women diagnosed with ovarian cancer, who are still alive after five years, are probably living with the disease rather than living cancer-free.⁹ In fact, ovarian cancer is considered by some experts to be a chronic disease.⁹ Lower survival from ovarian cancer is due, in part, to the fact that

most cases of ovarian cancer are not diagnosed until they have progressed to an advanced stage and the cancer has already spread beyond the ovaries.¹ In addition, the physical location of the ovaries can make treatment difficult.¹⁰

Chart 3

Ovarian cancer relative survival ratios,¹ by age at diagnosis, Canada excluding Quebec, 2006-2008²

relative survival ratio (%)



1. The relative survival ratio is the ratio of the observed survival (the proportion of people still alive after a specified period of time) in a group of people diagnosed with cancer to the survival in a comparable group of people in the general population.

2. Year of diagnosis.

Note: The vertical lines overlaid on the trend lines in this chart indicate the 95% confidence intervals. Confidence intervals indicate the degree of variability in the estimate and enable more valid comparisons of differences between estimates.

Source: Statistics Canada, Canadian Cancer Registry.

The greatest number of deaths occurs in the year following diagnosis

As with many cancers, death from ovarian cancer was highest during the first year following diagnosis (one-year survival). At the time of diagnosis, survival is assumed to be 100%, as everyone is still alive at this point. As shown in Chart 2, survival decreased to 75.3% one year after diagnosis. This means that women diagnosed with ovarian cancer between 2006 and 2008 were 75.3% as likely to survive another year as comparable women without this cancer.

Interpreting survival numbers

Population-based survival estimates represent an average for the population of interest. They are not intended to forecast an individual person's chances of survival. Confidence intervals for survival estimates indicate the statistical variation around an estimate, not the range of possible outcomes for a person with cancer.

Additionally, survival estimates describe the survival experience of people diagnosed in the past and therefore may not reflect recent advances in detection or treatment that could lead to improved cancer survival.⁶

During the first five years after diagnosis (five-year survival), there was a steady decrease in survival from ovarian cancer for all age groups combined. Over this time period, survival decreased by 55.0 percentage points. However after five years, survival remained relatively stable and survival only decreased by 6.7 percentage points between five and ten years after diagnosis.

Survival from ovarian cancer better for younger women

Survival also varied considerably by age at diagnosis (Chart 3). In general, women diagnosed at younger ages had higher five-year survival than women of all ages combined (45.0%). Specifically, five-year survival was 76.1% for women aged 15 to 44 at diagnosis, while it was 60.6% for women aged 45 and 54 at diagnosis.

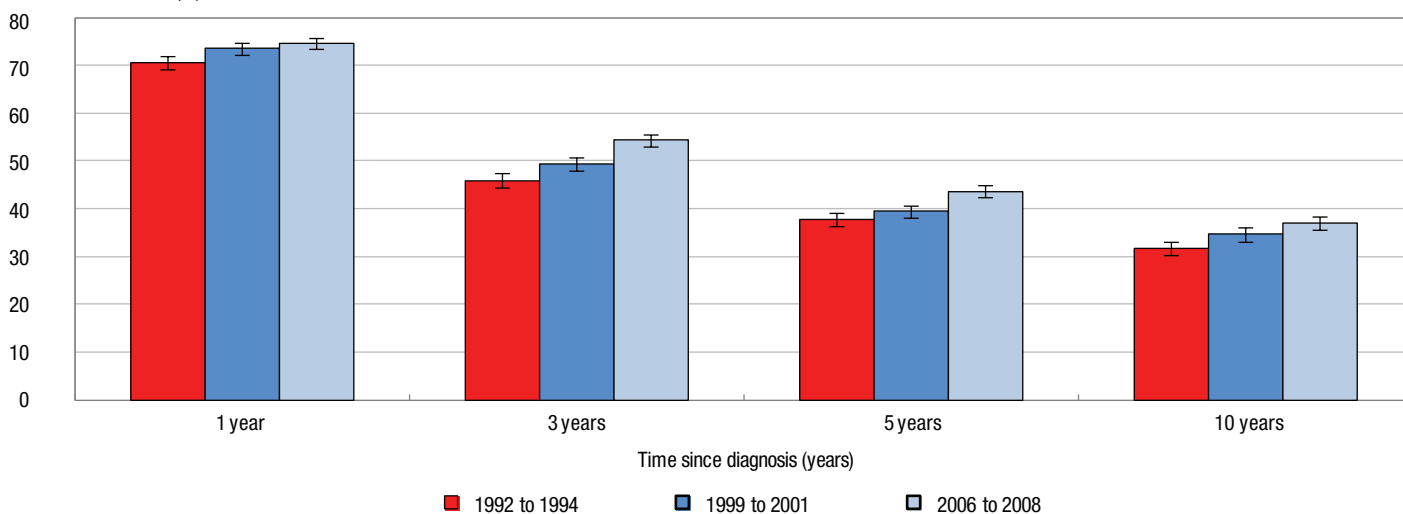
In contrast, older women (those diagnosed between ages 65 and 99) had lower survival than women of all ages combined (45.0%). Among women aged 65 to 74 at diagnosis, five-year survival was 36.1% while it was 21.9% among women diagnosed between 75 and 99 years of age.

Better survival in younger women may be related to the fact that older women are more likely to have other health problems.¹¹ In addition, ovarian cancer may be diagnosed earlier in pre-menopausal women than in post-menopausal

Chart 4

Age-standardized ovarian cancer relative survival ratios,¹ by time since diagnosis and year of diagnosis, ages 15 to 99 at diagnosis, Canada excluding Quebec, selected years²

relative survival ratio (%)



1. The relative survival ratio is the ratio of the observed survival (the proportion of people still alive after a specified period of time) in a group of people diagnosed with cancer to the survival in a comparable group of people in the general population.

2. Year of diagnosis.

Note: The vertical lines overlaid on the bars in this chart indicate the 95% confidence intervals. Confidence intervals indicate the degree of variability in the estimate and enable more valid comparisons of differences between estimates.

Source: Statistics Canada, Canadian Cancer Registry.

women, because one major symptom used to identify ovarian cancer is a change in menstruation.¹¹ Pre-menopausal women are also more likely to develop types of tumours that are easier to detect.¹² Earlier diagnosis means that the cancer is less likely to have spread beyond the ovaries and therefore, the chances of survival are better.

Survival from ovarian cancer improving

Age-standardized survival at one, three, five and ten years after diagnosis improved significantly for women diagnosed between 2006–2008 compared with women diagnosed between 1992–1994 (Chart 4). While one-year survival increased by 3.9 percentage points, the largest increase in survival, 8.4 percentage points, occurred at three years after diagnosis. Significant increases were also seen for five and ten-year survival between 1992–1994 and 2006–2008.

Improvements in survival also varied by age at diagnosis (Chart 5). The greatest increase (12.6 percentage points) in five-year survival between 1992–1994 and 2006–2008 occurred among middle-aged women aged 45 to 54 years at diagnosis. Significant increases in survival were also seen among women diagnosed between the ages of 55 to 64 (7.2 percentage points) and 65 to 74 (6.9 percentage points).

There was no significant improvement in five-year survival for those diagnosed between 1992–1994 and 2006–2008 among women aged 15 to 44 or 75 to 99 at diagnosis. As survival was already relatively high among women diagnosed between the ages of 15 to 44, despite experiencing no significant improvement over time, this group still had the highest survival during all time periods measured.

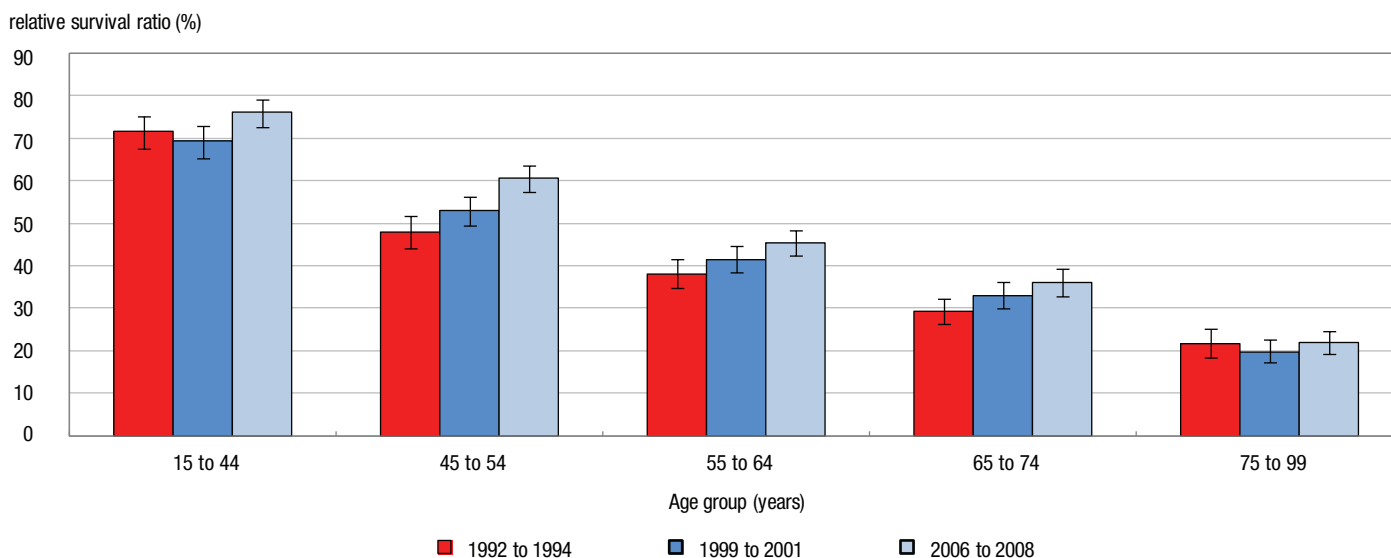
In conclusion, among women, survival from ovarian cancer was lower than survival from all cancers combined, and lowest among the main cancers of the reproductive system. Survival was noticeably higher for women diagnosed before the age of 55 compared with women diagnosed later in life. There was significant improvement over time in the likelihood of surviving one, three, five and ten years after diagnosis and among women diagnosed between the ages of 45 and 74.

Future research on survival from ovarian cancer among Canadian women, by stage at diagnosis (e.g., how much the cancer has progressed and how far it has spread) would be useful for examining the impact of early diagnosis on survival.

Tanya Navaneelan and Lawrence Ellison are analysts with the Health Statistics Division.

Chart 5

Ovarian cancer five-year relative survival ratios,¹ by age at diagnosis and time period, Canada excluding Quebec, selected years²



1. The relative survival ratio is the ratio of the observed survival (the proportion of people still alive after a specified period of time) in a group of people diagnosed with cancer to the survival in a comparable group of people in the general population.

2. Year of diagnosis.

Note: The vertical lines overlaid on the bars in this chart indicate the 95% confidence intervals. Confidence intervals indicate the degree of variability in the estimate and enable more valid comparisons of differences between estimates.

Source: Statistics Canada, Canadian Cancer Registry.

Data sources, methods and definitions

Data sources

The data in this article are from the October 2011 version of the Canadian Cancer Registry (CCR) and population life tables. The CCR is a dynamic administrative database of all Canadian residents, alive or dead, who have been diagnosed with cancer since 1992. The CCR is a person-based system that includes the type and number (incidence) of primary cancers diagnosed for each person until death. Beginning with cases diagnosed in 1992, cancer incidence data collected by provincial and territorial cancer registries (PTCRs) have been reported to the CCR, which is maintained by Statistics Canada.

Analyses were carried out using a tabulation master file. This master file was created by applying the International Rules for Multiple Primary Cancers¹³ to a copy of the CCR limited to invasive tumours and in situ bladder tumours.

Life tables are required to estimate relative survival. Sex-specific provincial life tables are produced by Statistics Canada. Information about life tables is available on the Statistics Canada website.¹⁴

Deaths of people diagnosed with cancer are identified through the Canadian Vital Statistics – Death Database (excluding deaths registered in the province of Quebec) and from information reported by provincial or territorial cancer registries. At the time of the analysis, registration of new cases and follow-up for vital status were complete through December 31, 2008.

Data from Quebec were excluded, in part, because the method for ascertaining the date of cancer diagnosis in Quebec differs from the method used by other provinces and territories and because of issues in correctly determining the vital status of cases.

Methods

When survival estimates from different time periods were compared (e.g., in Chart 4 data from 1992–1994, 1999–2001 and 2006–2008 were compared), the estimates were age-standardized. Age-standardization is used to compare statistics between different time periods as it accounts for the differences in the age distribution of diagnosed cases. In this study, age-standardized estimates were calculated using the direct method which means that the age structure of the population of interest (those diagnosed with ovarian cancer) were mathematically adjusted to have the same age structure as a standard population. The standard population used in this article was women diagnosed with ovarian cancer between 2001 and 2005.

Relative survival estimates presented for all cancers combined and female breast cancer were calculated using life tables adjusted for cancer mortality. Relative survival estimates for ovarian cancer were not adjusted because the difference between adjusted and non-adjusted relative survival estimates is negligible for this cancer.¹⁵

Cancer cases were defined using the International Classification of Disease for Oncology, Third Edition (ICD-O-3)¹⁶ and classified using the Surveillance, Epidemiology and End Results (SEER) Program grouping definitions.¹⁷

Definitions

Relative survival ratio (RSR): The ratio of the observed survival (the proportion of people still alive after a specified period of time) in a group of people diagnosed with cancer to the survival in a comparable group of people—free of the cancer of interest—in the general population.¹⁸ Relative survival estimates the excess mortality that may be attributed to a diagnosis.

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