

Health Reports

Cancer in Canada: Stage at diagnosis

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Cancer in Canada: Stage at diagnosis

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Abstract

This article presents national data (excluding Quebec) on cancer incidence by stage at diagnosis for lung, colorectal, female breast and prostate cancers. Data from the Canadian Cancer Registry are combined for the diagnosis years 2011 to 2015. Half of all new lung cancers were diagnosed at stage IV, and of the two types of lung cancer, small cell was more often diagnosed at this stage than non-small cell. About half of colorectal cancers were diagnosed at stages III and IV, and stage-specific incidence rates were generally higher for males than females. More than 80% of female breast and almost three-quarters of prostate cancers were diagnosed at stages I and II. Later-stage diagnosis was more common in older age groups for both cancers.

Keywords: Cancer staging, incidence, lung cancer, colorectal cancer, breast cancer, prostate cancer

Cancer stage is an important indicator of the progression of the disease and is used to plan treatment programs. Aggregate statistics on cancer incidence by stage can be used by healthcare providers, researchers and policy analysts to identify trends in diagnosis by cancer site and to evaluate the effectiveness of early detection programs.¹

The four most frequently diagnosed cancers in Canada in 2015 were lung, colorectal, female breast and prostate, which comprised almost half (48.2%) of all new cancer diagnoses in that year.² These four cancers also accounted for half (49.9%) of cancer-related deaths in the same year.³

In 2015, cancer incidence among males was highest for prostate (21.4% of new cases), followed by colorectal (13.0%) and lung (12.3%). Among females, breast cancer was the most common cancer diagnosis (26.6%), then lung (12.5%) and colorectal (10.6%).² Furthermore, lung and colorectal cancers are the leading causes of cancer-related death in Canada (2015, respectively) for both sexes combined.³

Cancer staging is a way of classifying the disease according to its extent and spread at the time of diagnosis. Since 2004, data in the Canadian Cancer Registry (CCR) have been staged using the Collaborative Stage (CS) Data Collection System, which incorporates the TNM staging system—a globally accepted way to classify the extent of the disease.⁴ More information on the TNM staging system is available elsewhere.⁵ The cancer stage data in this analysis were obtained through the CS system, which is based on the seventh edition of the American Joint Committee on Cancer's (AJCC) staging manual.⁵

Once a cancer has been classified under the TNM categories, it is assigned a stage group. Stage groupings range from 0 to 4 and are expressed as 0, I, II, III and IV. The analyses in this study were restricted to invasive tumours, excluding stage 0 tumours. As the stage group increases from I to IV, the size and the spread of the cancer increase. For example, stage I is when the tumour is relatively small and contained within the organ, while stage IV

is considered advanced disease: the cancer has spread through the blood and lymphatic system to a distant site in the body. A detailed description of each stage group can be found elsewhere.¹ Cancer cases that could not be staged due to a lack of information were categorized as “unknown.” This category excludes cases classified as “unstageable” or cases for which the CS algorithm was not run.¹ Cases staged as “unknown” were included in the analysis; however, “unstageable” cases were excluded.

Since 2010, the provinces and territories have systematically collected data on stage for the four most commonly diagnosed cancers, with the exception of Quebec, which started in 2014.¹ Although stage information on the top four cancers has been included in the CCR for several years for most jurisdictions, it has not been examined in detail. Therefore, this study presents cancer incidence by stage at diagnosis for the top four cancers, using data from the CCR for the combined period of 2011–2015.

Data and methods

Data source

The [Canadian Cancer Registry \(CCR\)](#) is a person-oriented, dynamic database in which cancer information collected by the provincial and territorial cancer registries (PTCRs) is compiled to create a national database following standardized collection, coding and reporting criteria. The PTCRs have prioritized the routine collection of stage data for lung, colorectal, breast and prostate cancers since the 2010 diagnosis year, and stage data are available for at least 90% of cases for each of these four cancers for all jurisdictions except Quebec.¹

The data for this article were obtained from the November 2017 CCR incidence Tabulation Master File, using the Surveillance, Epidemiology and End Results (SEER) rules for determining multiple primaries. Cancer cases were defined using the International Classification of Diseases for Oncology, Third Edition (ICD-O-3).

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The stage data in this study were coded using Collaborative Stage (CS), a system that regulates the quality and completeness of stage data by standardizing various aspects of cancer data collection, such as timing, clinical and pathological assessments, and cancer type descriptions.

Methods

The data for Canada in this report exclude Quebec, because Quebec began collecting stage data for cancers diagnosed in 2014 onward, and these data are not yet a part of the CCR.¹ Cancer cases that are not covered under the AJCC's seventh edition of CS are considered "unstageable" and were excluded from the analysis. Therefore, the denominator used in calculating stage distributions for each cancer includes only cases that were assigned a stage (I to IV or unknown). Stage distribution was calculated using rounded case counts for each cancer by stage. Random rounding to the nearest multiple of 5 was used to prevent the inappropriate disclosure of health information, and numbers ending in 0 or 5

were not rounded. Although data on stage 0 are collected for female breast cancer, these were also excluded from analyses to be consistent with the calculations for the other cancers.

The distributions represent the population aged 18 to 79. Age-specific incidence rates were calculated using sex-specific population estimates, as of July 1, 2017, for each age group at the national level for the combined period of 2011 to 2015.¹ For more information on the data and methods, please see *Canadian Cancer Statistics: A 2018 Special Report on Cancer Incidence by Stage*.

Half of lung cancer cases were diagnosed at stage IV

During the period of study, 2011–2015, half (49.6%) of all new lung cancer cases were diagnosed at stage IV (Figure 1). The two main types of lung cancer are non-small cell lung cancer (NSCLC) and small cell lung cancer (SCLC). SCLC had a higher percentage of stage IV cases than NSCLC, with almost 7 out of 10 (67.4%) diagnosed at stage IV. SCLC is

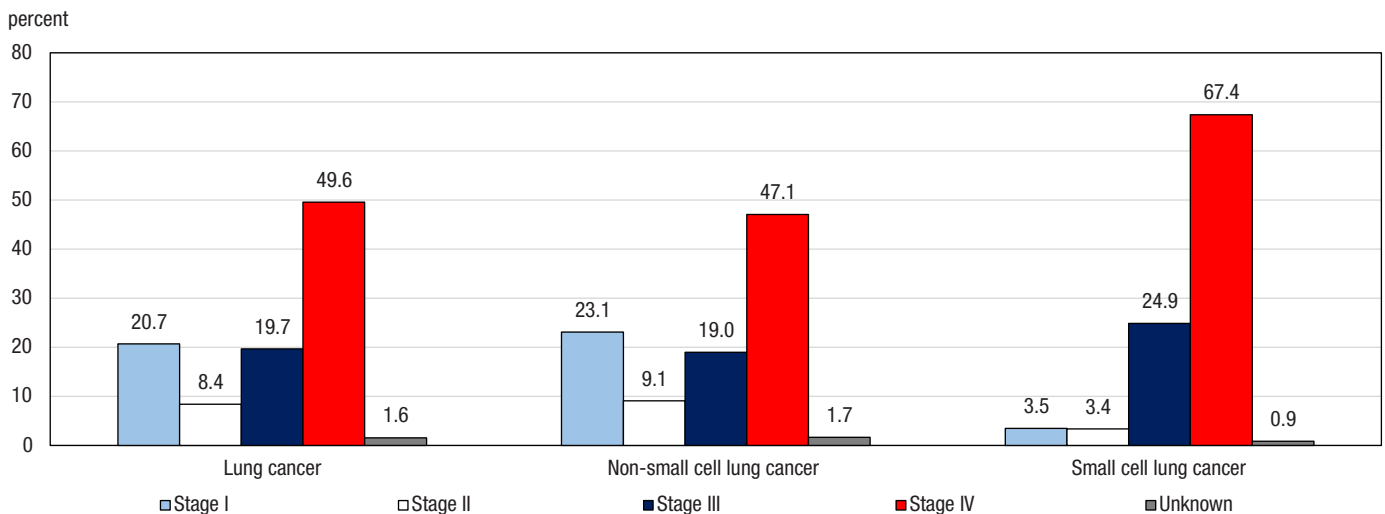
known to be the more aggressive form of lung cancer, with a higher potential for spreading throughout the body (metastasis).¹ Less than 4% of SCLC diagnoses were diagnosed at stage I.

Males aged 60 to 79 were more often diagnosed with stage IV lung cancer than their female counterparts (Table 1). For example, males aged 70 to 79 had an incidence rate of 194.9 stage IV cases per 100,000 population, whereas the rate of stage IV cases was 144.5 per 100,000 among females in the same age group.

Colorectal cancers frequently identified late

Almost half (49%) of colorectal cancer cases were diagnosed at stages III and IV, while just over 20% of cases were diagnosed at stage I (Figure 2). The stage-specific distributions for colon and rectum cancers were relatively similar; however, rectum cancers were more often diagnosed at stage III (34.1% versus 26.4% for colon cancers) and less likely to be diagnosed at stage II (18.7% versus 26.4% for colon cancers).

Figure 1
Distribution of lung cancer cases by type of lung cancer and stage at diagnosis for the population aged 18 to 79, Canada excluding Quebec, 2011-2015



Source: Canadian Cancer Registry database, 2011-2015, combined.

Table 1
Age-specific incidence rate per 100,000 by stage at diagnosis, sex and age group for the four most common cancers, Canada excluding Quebec, 2011-2015

	Cancer stage				
	I	II	III	IV	Unknown
	rate per 100,000 population				
Lung cancer					
Males					
18 to 59	2.3	1.1	3.2	9.2	0.2
60 to 69	31.8	15.2	37.8	97.6	2.6
70 to 79	79.3	36.7	77.6	194.9	9.2
Females					
18 to 59	3.8	1.3	3.6	9.6	0.2
60 to 69	40.2	14.6	33.3	79.2	1.9
70 to 79	81.1	29.1	62.0	144.5	5.8
Colorectal cancer					
Males					
18 to 59	5.8	5.4	8.4	6.0	1.1
60 to 69	43.1	40.4	54.6	36.3	6.3
70 to 79	82.5	88.8	88.2	60.9	14.1
Females					
18 to 59	5.0	4.2	6.5	4.6	0.8
60 to 69	25.8	25.9	33.1	23.0	3.9
70 to 79	50.8	61.6	59.3	36.9	8.4
Female breast cancer					
18 to 59	39.8	38.2	15.0	4.7	0.8
60 to 69	182.6	109.6	35.2	16.0	2.8
70 to 79	210.1	131.5	39.0	23.3	5.1
Prostate cancer (males)					
18 to 59	10.8	18.2	6.0	2.6	1.0
60 to 69	103.3	218.5	70.6	33.9	12.3
70 to 79	100.4	336.3	54.3	64.1	23.6

Source: Canadian Cancer Registry database, 2011-2015, combined.

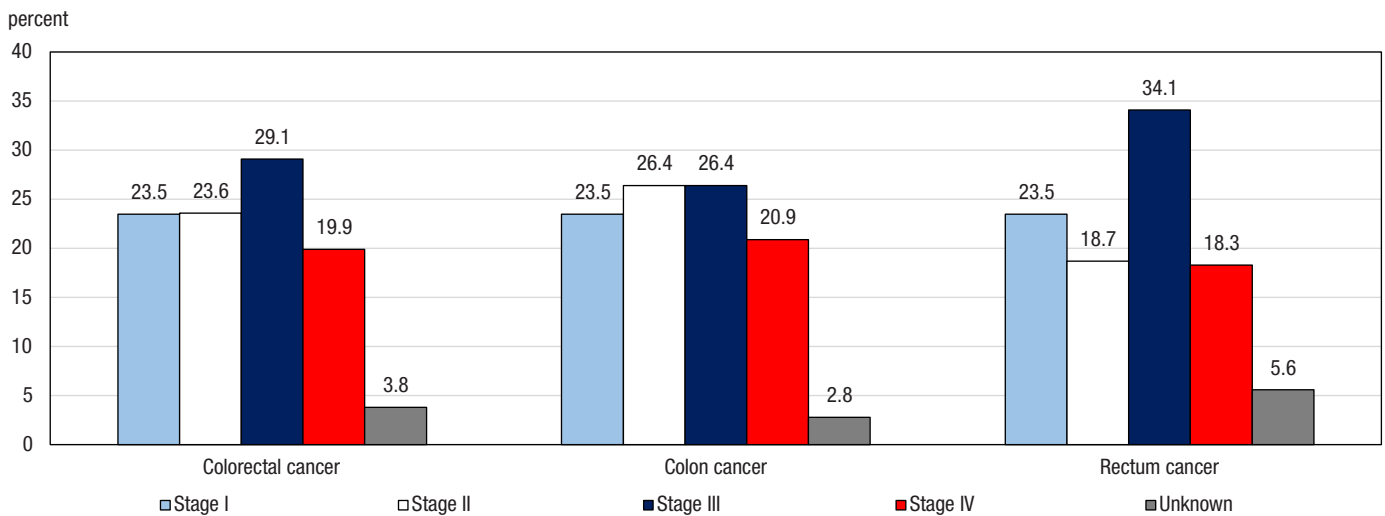
Stage-specific incidence rates of colorectal cancer among the population aged 18 to 79 were generally higher for males than females (Table 1). For example, among the population aged 70 to 79, 59.3 per 100,000 females were diagnosed with stage III colorectal cancer, versus 88.2 per 100,000 males.

Early detection of colorectal cancer is strongly associated with increased survival.¹⁻⁶ Most provinces and territories in Canada have an organized colorectal cancer screening program,³ and the high number of cases diagnosed at stages III and IV may be related to low participation in these programs.¹⁻⁶ Data from the 2017 Canadian Community Health Survey have shown that only about 40% of Canadians meet colorectal cancer screening guidelines. This is significantly lower than participation in breast cancer (mammography, about 79%) and cervical cancer (Pap smear, 74%) screening.⁷

Majority of female breast cancer detected early

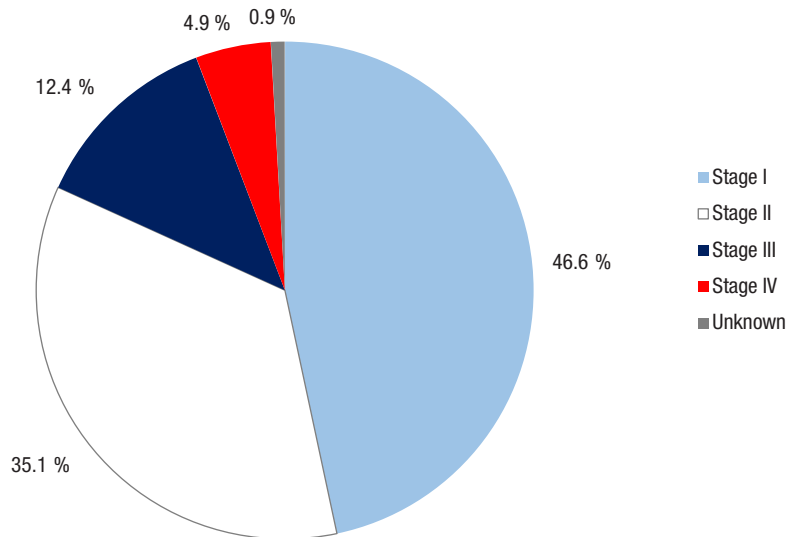
More than 80% of female breast cancer cases were diagnosed at stages I and

Figure 2
Distribution of colorectal cancer cases by site and stage at diagnosis for the population aged 18 to 79, Canada excluding Quebec, 2011-2015



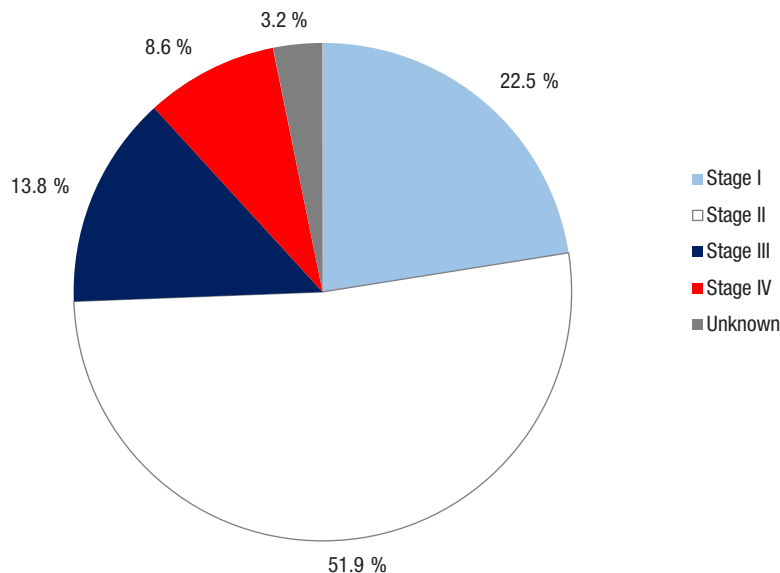
Source: Canadian Cancer Registry database, 2011-2015, combined.

Figure 3
Distribution of breast cancer cases by stage at diagnosis among females aged 18 to 79, Canada excluding Quebec, 2011-2015



Source: Canadian Cancer Registry database, 2011-2015, combined.

Figure 4
Distribution of prostate cancer cases by stage at diagnosis among males aged 18 to 79, Canada excluding Quebec, 2011-2015



Source: Canadian Cancer Registry database, 2011-2015, combined.

II, and less than 5% were diagnosed at stage IV (Figure 3). Stage-specific incidence rates for female breast cancer were highest among the oldest age groups (Table 1). Although incidence rates were highest at stages I and II, females aged 60 to 79 had higher rates at stage

IV than their younger counterparts aged 18 to 59. For example, there were 23.3 stage IV diagnoses per 100,000 among females aged 70 to 79, compared with 16.0 per 100,000 among females aged 60 to 69 and 4.7 stage IV cases per 100,000 among females aged 18 to 59 years.

The high incidence of breast cancer diagnoses at stages I and II likely reflects the impact of breast cancer screening programs that are available in all provinces and territories.¹

Almost three in four prostate cancers diagnosed at stages I and II

For the 2011–2015 study period, close to three-quarters (74%) of all prostate cancers were diagnosed at stages I and II (Figure 4). Less than 9% of prostate cancers were stage IV at diagnosis (Figure 4).

Males aged 18 to 59 had lower incidence rates across all stage groups when compared with males aged 60 to 69 and 70 to 79 (10.8 stage I cases per 100,000 males versus 103.3 and 100.4 stage I cases per 100,000 males, respectively) (Table 1).

Limitations

One of the main limitations of these data is the lack of stage data from Quebec, one of the most populous provinces in Canada. In addition, there may be differences in the coding of cancer diagnoses and stage across and within provinces and territories that would have an effect on the quality and completeness of the data presented herein. Through standardized training and coordinated data collection planning, Statistics Canada, in collaboration with the Canadian Council of Cancer Registries, aims to ensure that the data submitted to the CCR are comparable across all participating jurisdictions. However, the quality of the data included in the CCR is the responsibility of the submitting jurisdiction. It can be affected by many factors at the jurisdiction level, including the quality of medical records, the level of expertise of the coders and the information available within the patient records to determine the stage.

Conclusion

Of the four most commonly diagnosed cancers in Canada, lung and colorectal

were most likely to be diagnosed late, at stages III and IV, after the cancers have started to spread to nearby tissues or throughout the body. Conversely, the majority of female breast and pros-

tate cancer cases were detected early, at stages I and II. Ongoing monitoring of cancer incidence by stage is essential for planning and evaluating cancer control efforts. ■

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