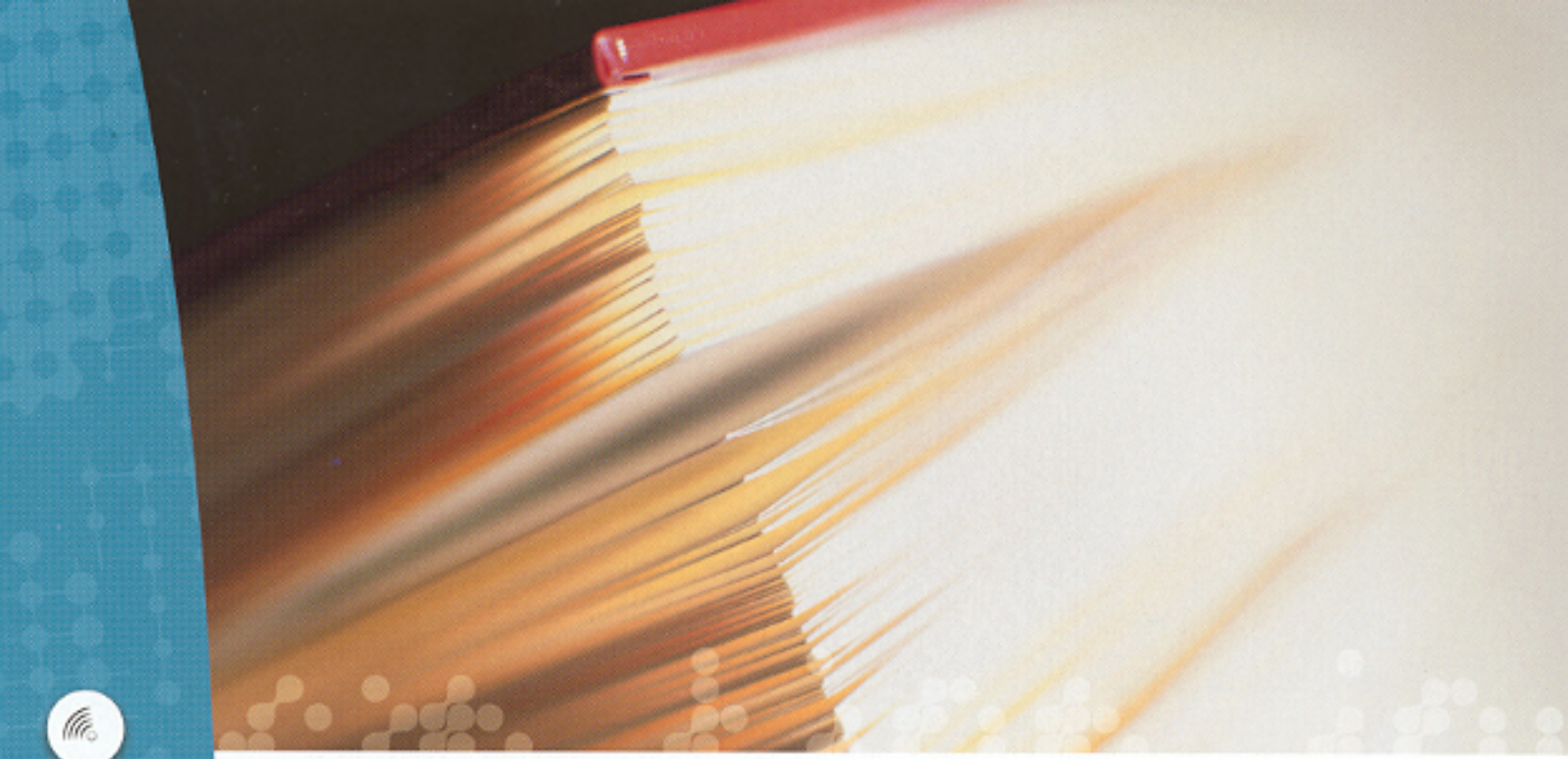

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THE PREVALENCE OF CANCER IN QUEBEC IN 1999

INSTITUT NATIONAL DE SANTÉ PUBLIQUE DU QUÉBEC

Québec

THE PREVALENCE OF CANCER IN QUEBEC IN 1999

DIRECTION PLANIFICATION, RECHERCHE ET INNOVATION

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Institut national de santé publique Québec

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1. INTRODUCTION

Since 2000, cancer has been the main cause of death in Quebec (Institut de la statistique du Québec, 2003). However, the standardized death rate due to cancer, like most other causes of death, has been declining steadily since the early 1990s (ministère de la Santé et des Services sociaux, 2003; ministère de la Santé et des Services sociaux, 2004), while life expectancy at birth of the Quebec population has increased in recent decades. With the number of seniors growing steadily and the risk of cancer increasing with age, there is a parallel increase in the incidence of cancer. In addition, as a result of earlier diagnoses and more effective treatments, cancer patients are surviving longer, leading to a high demand for health care as follow-up for these individuals.

A number of indicators can be used to monitor cancer and measure the burden that it represents for society. The most well-known ones are the number of new cases reported annually (incidence), mortality, relative survival, potential years of life lost, or the number of people still living who received a diagnosis of cancer over a period of 5, 10 or 15 years, i.e. prevalence (National Cancer Institute of the United States, 2004). Cancer prevalence statistics are useful in estimating the burden on the health system attributable in particular to the treatments required (surgery, chemotherapy, radiation therapy, support treatments), monitoring to detect recurrence, and changes in health that may be permanent as a result of cancer.

To date, it has been impossible to measure the prevalence of cancer among Quebecers because there is no active follow up of new cases reported annually. However, with the recent linkage of the Tumour File with the Deaths File to calculate survival tables, it is now possible to do it.

This report is a brief descriptive analysis of 5, 10 and 15-year prevalence for the main cancer sites by age and sex in 1999.

2. OBJECTIVES

The main objective of this report on cancer prevalence is to estimate the burden, in terms of the number of cases of cancer that may have required care, in Quebec, in 1999.

More specifically:

- To calculate the number of 5, 10 and 15-year prevalent cases and the relative prevalence adjusted for age by cancer site;
- To calculate the number of 5-year prevalent cases and the relative prevalence adjusted for age, by area and cancer site;
- To calculate the number of 5-year prevalent cases and the relative prevalence by age group and cancer site.

3. METHODOLOGY

3.1. Interpretation of prevalence statistics

People may experience more than one primary cancer during their lifetime. For example, a first cancer reported during one's forties may be followed by another 20 years later, at a different site or organ. The prevalence of cancer can therefore be calculated in two ways (Capocaccia et *al.* 2002): the number of people afflicted or the number of cases diagnosed in a given population.

If prevalence relates to the number of people, only the first primary cancer that an individual experiences is considered. If prevalence relates to the number of cases of cancer, all primary cancers diagnosed for an individual are considered. The latter number is more relevant in evaluating the care required by the affected population. The difference between the two measures can be substantial, especially among seniors. In fact, 8,002 individuals among the 362,179 reported in the Tumour Registry between 1984 and 1998, had more than one primary cancer, for a total of 20,530 cases over a period of 10 years. For the purpose of our analysis, we have used the number of cases of cancer.

Prevalence can be determined for a small or large number of years following the diagnosis (5 years, 10 years, and 15 years) without taking into consideration whether the person afflicted is still under treatment or cured. Long-term prevalence is of more limited usefulness. Indeed, many long-term survivors are essentially "cured" and no longer represent a burden on health services. That is why prevalence statistics must be interpreted differently depending on the period considered (Micheli et *al.* 2002). Thus, two broad categories of prevalence can be identified, each of which offers a different perspective in terms of the allocation of resources. The two categories are:

- Short-term prevalence (5 years) which includes, for the most part, cases recently diagnosed, those in the primary treatment phase and requiring close monitoring, or those in the terminal phase;
- Long-term prevalence (10 to 15 years), which adds to the short-term prevalent cases individuals considered cured of their cancer, those who have recurrences and others whose status is undetermined.

3.2. Data sources: incidence and mortality data

Data on the incidence of cancer diagnosed in Quebec between 1984 and 1999 inclusive come from the Quebec Cancer Registry. It should be noted that the Quebec Cancer Registry uses data from discharge records from general and specialized care hospitals. The date of diagnosis recorded on the Quebec Cancer Registry is the date of first mention of a diagnosis of cancer at the time of hospitalization (date of hospital stay) or admission to a day-care surgery unit.

To determine the vital status of a person whose cancer has been reported to the Quebec Cancer Registry, the incidence file is linked with the Quebec Deaths File for 1985 to 1999. The details of this linkage are described in the report “Cancer Survival of Newly Diagnosed Cases, Quebec, 1992” (Louchini, 2002), in the section dealing with the quality of data.

3.3. Calculation of prevalence

Prevalence was estimated using the incidence data and mortality (or survival) data for the period 1985 to 1999. The prevalence calculation is based on two important statistics: incidence and the risk of death among cancer patients.

The number of prevalent cases was calculated using the direct method (Feldman et *al.* 1986; Gail et *al.* 1999). It consists of counting all cases of incidence that are still living at a given moment. In other words, prevalence is the sum of cases of incidence during a given period minus the number of deaths.

In these analyses, since prevalence has been established based on the number of cases of cancer and not on the number of persons with the disease, all primary cancers have been considered.

Prevalence was calculated for three periods, specifically, 15 years, 10 years and 5 years. To calculate 15, 10 and 5-year prevalence in 1999, the counting of cases begins respectively in 1985, 1990 and 1995. For comparisons between regions and age groups, only 5-year prevalence was used.

The age presented is the age in 1999. For example, in 1999, the age of a person diagnosed with lung cancer at age 44 in 1994 is 49. The cancer site codes used are the ones given in the Ninth Revision of the International Classification of Diseases.

Three indicators were calculated: the number of prevalent cases, which is the number of cases in the population living with cancer, relative prevalence, which is the ratio between the number of prevalent cases and the population during the period, and lastly, adjusted relative prevalence, which is prevalence standardized according to the age structure of a reference population to allow comparisons. The population used for prevalence rates were provided by Institut de la statistique du Québec (Statistic institute of Quebec). Rates were standardized to the 1991 Canada census population.

4. RESULTS

4.1. Presentation of the data

The data on the prevalence of cancer in Quebec in 1999 are presented in tables and graphs by cancer site, region of residence, sex, age group and period of time following the diagnosis. Regional data are presented by the areas of Quebec, except for the Nord-du-Québec, Nunavik and Terres-Cries-de-la-Baie-James regions, because of the small number of cancers in these regions. The data are then broken down by the 10 major cancer groupings and by the most frequent cancer sites.

4.2. Five, 10 and 15-year prevalence of cancer by sex

In Quebec, the number of prevalent cases of cancer diagnosed between 1995 and 1999 was 97,615, among which 46,333 were for males and 51,282 for females. For a 10-year period ending in 1999, the number of survivor cases was 153,682, of which 71,726 for males and 81,956 for females. Finally, all cancers diagnosed in Quebec for the 15 years between 1985 and 1999, the number of survivor cases was 190,178, of which 86,368 for males and 103,810 for females (Table 1).

Among women, the number of breast cancers accounts for over one-third of all prevalent cases (38% for the 5-year period) and this proportion remains almost constant for the 10-year and 15-year periods. Cancers of the reproductive organs are next with 14% at (5 years), 15% (at 10 years and 15 years). Colorectal cancers rank third with 13%, which remains constant at 5, 10 and 15 years after diagnosis (Figure 1).

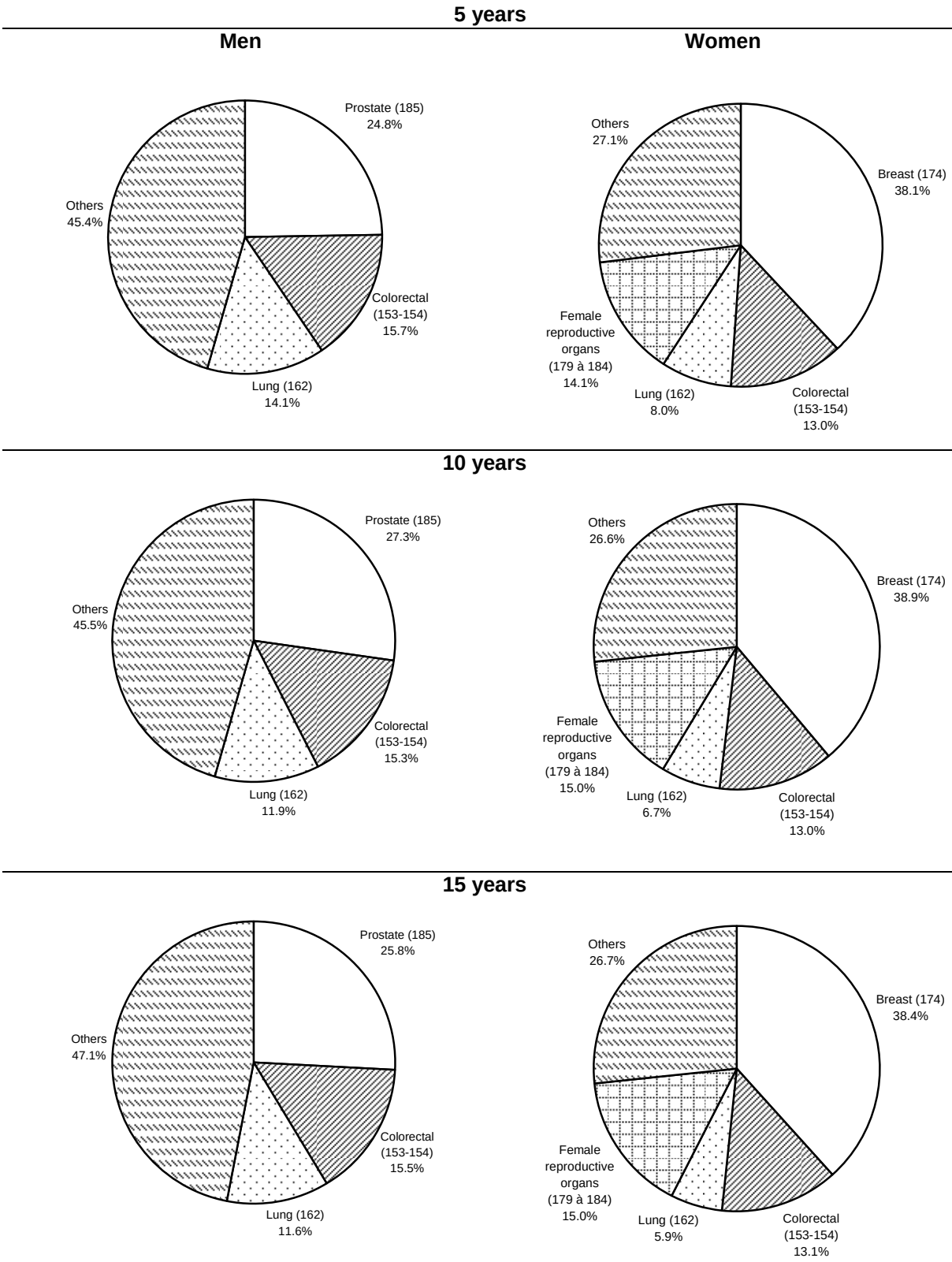
Among men, prostate cancer is the most prevalent at 25%, followed by colorectal cancer at 16% and lung cancer at 14%. There is little variation in these percentages depending on the periods of prevalence, except in the case of lung cancer, which is only 12% of the prevalence among men at 10 years and 15 years after diagnosis (Figure 1). While lung cancer is the main cancer site reported in the Quebec Cancer Registry for men, it ranks third in terms of prevalence because of the low survival rate associated with it.

Table 1: Number of 5, 10 or 15-year prevalent cases of cancer by site and sex, Quebec, 1999

Cancer site	Number of prevalent cases								
	Since 1995 (5 yrs)			Since 1990 (10 yrs)			Since 1985 (15 yrs)		
	M	F	T	M	F	T	M	F	T
Oral cavity and pharynx (140 to 149)	**1,590**	**722**	**2,312**	**2,527**	**1,172**	**3,699**	**3,237**	**1,526**	**4,763**
Digestive tract (150 to 159)	**10,190**	**8,894**	**19,084**	**14,721**	**13,600**	**28,321**	**17,844**	**17,270**	**35,114**
Stomach (151)	1,019	658	1,677	1,421	943	2,364	1,761	1,225	2,986
Colorectal (153-154)	7,266	6,686	13,952	10,957	10,644	21,601	13,381	13,639	27,020
Pancreas (157)	645	612	1,257	759	742	1,501	869	867	1,736
Respiratory tract (160 to 165)	**8,183**	**4,603**	**12,786**	**11,207**	**6,288**	**17,495**	**13,440**	**7,271**	**20,711**
Lung (162)	6,532	4,122	10,654	8,560	5,455	14,015	10,037	6,159	16,196
Bone, connective tissue and malignant skin melanoma (170 to 172)	**1,373**	**1,390**	**2,763**	**2,176**	**2,383**	**4,559**	**2,754**	**3,145**	**5,899**
Breast (174)		19,542			31,899			39,902	
Reproductive organs (179 to 187)	**12,303**	**7,053**	**19,356**	**21,111**	**12,143**	**33,254**	**24,287**	**16,382**	**40,669**
Cervix (180)		1,257			2,346			3,436	
Uterus (182)		3,201			5,738			7,769	
Ovaries (183)		2,013			3,085			3,817	
Prostate (185)	11,482			19,593			22,287		
Urinary organs (188-189)	**6,524**	**2,868**	**9,392**	**10,591**	**4,725**	**15,316**	**13,152**	**6,065**	**19,217**
Bladder (188)	4,626	1,582	6,208	7,617	2,655	10,272	9,470	3,401	12,871
Kidney (189)	1,898	1,286	3,184	2,974	2,070	5,044	3,682	2,664	6,346
Brain and central nervous system (191-192)	**749**	**623**	**1,372**	**1,112**	**952**	**2,064**	**1,381**	**1,201**	**2,582**
Endocrine glands (193-194)	**516**	**1,416**	**1,932**	**846**	**2,366**	**3,212**	**1,069**	**2,984**	**4,053**
Other haematopoietic and lymphatic tissues (200 to 203)	**3,295**	**2,925**	**6,220**	**5,037**	**4,538**	**9,575**	**6,259**	**5,710**	**11,969**
Leukaemia (204 to 208)	**1,357**	**1,110**	**2,467**	**1,966**	**1,649**	**3,615**	**2,399**	**2,042**	**4,441**
All sites (140 to 208)*	**46,333**	**51,282**	**97,615**	**71,726**	**81,956**	**153,682**	**86,368**	**103,810**	**190,178**

* Excluding skin cancer other than melanoma (ICD-9 173) and undefined sites (ICD-9 196 to 199).

Figure 1: Distribution of prevalent cases of cancer by primary site in Quebec in 1999



Tables 2 and 3 present the 5, 10 or 15-year relative prevalence of cancer per 100,000 people by site and age in Quebec in 1999.

Overall, the main observation from Table 2 is the fact that the rate of adjusted relative prevalence per 100,000 people is always higher among men than among women (except for endocrine glands), even though the total number of prevalent cases in Table 1 is higher for women than for men for all observed periods of time (5, 10, 15 years). Two factors explain this situation: first, cancer occurs at a relatively earlier age among women, especially in the case of genital and breast cancers and second, the male population is smaller in numbers than the female population in the older age groups where the majority of cancers occur.

To put these data on prevalence into perspective, it is possible to represent these numbers as a percentage of the total Quebec population in 1999, estimated at 3,624,563 men and 3,720,832 women. Thus, in 1999, 1.3% of the male population and 1.3% of the female population had received a diagnosis of cancer in the previous five years and were still living in 1999. These percentages are respectively 2.0% for men and 2.2% for women who were counted over the previous 10 years, and 2.4% of the male population and 2.8% of the female population if the calculation is done over 15 years.

In general, for sites or groups of sites common to both sexes, the adjusted relative prevalence for age is higher among men than among women, the gap being up to 0.13 percentage points for cancers of the respiratory tract. By site, the largest differences are found for bladder, and then lung, whether at 5, 10 or 15 years.

Among women, the relative prevalence adjusted for age in 1999 is highest for breast cancer for all three periods of the prevalence calculation (5, 10 and 15 years). About 0.53% of women in Quebec require active care (5-year prevalence) for breast cancer alone and 0.24% for cancers of the digestive tract, including colorectal cancer, which alone represents 0.18%.

For men, prostate cancer is the most prevalent. Approximately 0.32% of men are living with prostate cancer reported in the previous 5 years. This percentage climbs to 0.54% and 0.62% for the adjusted relative prevalence at 10 and 15 years. As these figures show, prevalence almost doubled between 5 and 15 years for prostate cancer. In contrast, prevalence for lung cancer increased only 53% between 5 and 15 years.

Table 2: Five, 10 or 15-year adjusted relative prevalence of cancer per 100,000 people by site and sex, Quebec, 1999

Cancer site	Adjusted relative prevalence in 1999 per 100,000 people								
	Since 1995 (5 yrs)			Since 1990 (10 yrs)			Since 1985 (15 yrs)		
	M	F	T	M	F	T	M	F	T
Oral cavity and pharynx (140 to 149)	**42.0**	**16.1**	**27.7**	**68.1**	**26.1**	**44.5**	**88.9**	**33.7**	**57.4**
Digestive tract (150 to 159)	**287.7**	**186.1**	**229.7**	**421.5**	**282.6**	**341.0**	**518.6**	**355.3**	**422.5**
Stomach (151)	29.0	13.7	20.2	41.0	19.4	28.4	51.6	24.8	35.8
Colon-rectum (153-154)	205.2	139.9	167.8	314.5	220.9	259.9	389.8	280.5	325.0
Pancreas (157)	18.3	12.8	15.2	21.6	15.4	18.1	25.1	17.8	20.9
Respiratory tract (160 to 165)	**227.4**	**101.4**	**154.6**	**313.7**	**137.9**	**211.7**	**381.4**	**158.8**	**250.8**
Lung (162)	182.2	90.6	128.7	240.8	119.3	169.3	286.5	134.0	195.7
Bone, connective tissue and malignant skin melanoma (170 to 172)	**36.7**	**32.9**	**34.3**	**58.3**	**56.0**	**56.4**	**73.9**	**73.5**	**72.8**
Breast (174)		427.9			692.5			860.8	
Reproductive organs (179 to 187)	**358.1**	**158.8**	**238.2**	**625.4**	**271.4**	**408.2**	**730.0**	**362.2**	**497.1**
Cervix (180)		30.5			55.5			79.3	
Uterus (182)		70.0			124.7			167.2	
Ovaries (183)		45.6			70.2			86.6	
Prostate (185)	334.4			582.9			675.0		
Urinary organs (188-189)	**183.1**	**61.7**	**113.2**	**301.2**	**101.0**	**184.7**	**378.3**	**129.2**	**231.8**
Bladder (188)	131.4	33.5	74.8	219.5	55.9	123.8	276.0	71.1	155.1
Kidney (189)	51.7	28.1	38.4	81.7	45.1	60.9	102.4	58.1	76.7
Brain and central nervous system (191-192)	**20.2**	**15.5**	**17.8**	**30.1**	**24.1**	**26.9**	**37.5**	**30.2**	**33.7**
Endocrine glands (193-194)	**13.9**	**35.8**	**24.9**	**22.6**	**59.1**	**41.0**	**28.5**	**73.6**	**51.4**
Other haematopoietic and lymphatic tissues (200 to 203)	**89.3**	**66.7**	**77.0**	**136.2**	**104.6**	**119.3**	**169.7**	**131.1**	**149.2**
Leukaemia (204 to 208)	**39.4**	**25.6**	**31.3**	**57.2**	**38.6**	**46.3**	**70.1**	**48.1**	**57.2**
All sites (140 to 208)*	**1,304.9**	**1,131.6**	**1,183.9**	**2,046.5**	**1,799.5**	**1,864.3**	**2,492.4**	**2,263.8**	**2,305.8**

* Excluding skin cancer other than melanoma (ICD-9 173) and undefined sites (ICD-9 196 to 199).

Table 3: Five, 10 or 15-year relative prevalence of cancer per 100,000 people by site and sex, Quebec, 1999

Cancer site	Relative prevalence in 1999 per 100,000 people								
	Since 1995 (5 yrs)			Since 1990 (10 yrs)			Since 1985 (15 yrs)		
	M	F	T	M	F	T	M	F	T
Oral cavity and pharynx (140 to 149)	**43.9**	**19.4**	**31.5**	**69.7**	**31.5**	**50.4**	**89.3**	**41.0**	**64.8**
Digestive tract (150 to 159)	**281.1**	**239.0**	**259.8**	**406.1**	**365.5**	**385.6**	**492.3**	**464.1**	**478.0**
Stomach (151)	28.1	17.7		39.2	25.3		48.6	32.9	
Colon-rectum (153-154)	200.5	179.7	189.9	302.3	286.1	294.1	369.2	366.6	367.8
Pancreas (157)	17.8	16.4		20.9	19.9		24.0	23.3	
Respiratory tract (160 to 165)	**225.8**	**123.7**		**309.2**	**169.0**		**370.8**	**195.4**	
Lung (162)	180.2	110.8		236.2	146.6		276.9	165.5	
Bone, connective tissue and malignant skin melanoma (170 to 172)	**37.9**	**37.4**	**37.6**	**60.0**	**64.0**	**62.1**	**76.0**	**84.5**	**80.3**
Breast (174)		525.2		0.0	857.3		0.0	1,072.4	
Reproductive organs (179 to 187)	**339.4**	**189.6**	**263.5**	**582.4**	**326.4**	**452.7**	**670.1**	**440.3**	**553.7**
Cervix (180)		33.8			63.1			92.3	
Uterus (182)		86.0			154.2			208.8	
Ovaries (183)		54.1			82.9			102.6	
Prostate (185)	316.8			540.6			614.9		
Urinary organs (188-189)	**180.0**	**77.1**	**127.9**	**292.2**	**127.0**	**208.5**	**362.9**	**163.0**	**261.6**
Bladder (188)	127.6	42.5		210.1	71.4		261.3	91.4	
Kidney (189)	52.4	34.6		82.1	55.6		101.6	71.6	
Brain and central nervous system (191-192)	**20.7**	**16.7**	**18.7**	**30.7**	**25.6**	**28.1**	**38.1**	**32.3**	**35.2**
Endocrine glands (193-194)	**14.2**	**38.1**	**26.3**	**23.3**	**63.6**	**43.7**	**29.5**	**80.2**	**55.2**
Other haematopoietic and lymphatic tissues (200 to 203)	**90.9**	**78.6**	**84.7**	**139.0**	**122.0**	**130.4**	**172.7**	**153.5**	**162.9**
Leukaemia (204 to 208)	**37.4**	**29.8**	**33.6**	**54.2**	**44.3**	**49.2**	**66.2**	**54.9**	**60.5**
All sites (140 to 208)*	**1,278.3**	**1,378.2**	**1,328.9**	**1,978.9**	**2,202.6**	**2,092.2**	**2,382.9**	**2,790.0**	**2,589.1**

* Excluding skin cancer other than melanoma (ICD-9 173) and undefined sites (ICD-9 196 to 199).

4.3. Five-year prevalence of cancer by area

The 5-year prevalence of cancer by area of residence for the primary cancer sites is presented in Table 4, that is, for the cases diagnosed between 1995 and 1999. It is not surprising to see that the number of prevalent cases is proportional to the size of the population in the regions. For example, among the 97,615 5-year prevalent cases of cancer listed in 1999, 26,068 or close to 27%, are from the Montréal-Centre region, when this region accounts for about 26% of the Quebec population.

However, it is possible from the adjusted relative prevalence, shown in Figure 2, to directly compare cancer sites and regions. Thus, the Côte-Nord region stands out with the highest rates of lung cancer prevalence in Quebec for both men and women. The same observation applies for colorectal cancer, although the numbers are closer to the Quebec average. In contrast, the Côte-Nord has the lowest prevalence of prostate cancer in Quebec. It is also worth mentioning the high prevalence of bladder cancer in the Saguenay—Lac St-Jean region, possibly linked to the aluminium industry (Tremblay et *al.* 2000).

Table 4: Number of 5-year prevalent cases of cancer by area and sex, Quebec, 1999

Area	5-year prevalent cases					
	Colorectal (153-154)	Lung (162)	Prostate (185)	Bladder (188)	Kidneys and other urinary organs (189)	All sites *
Men						
01- Bas-Saint-Laurent	229	242	350	111	57	1,441
02- Saguenay—Lac-Saint-Jean	317	318	397	199	73	1,851
03- Québec	652	597	887	430	167	3,992
04- Mauricie et Centre-du-Québec	527	499	962	323	133	3,403
05- Estrie	292	286	493	180	68	1,900
06- Montréal-Centre	1,841	1,434	2,942	1,252	469	11,672
07- Outaouais**	278	261	377	162	71	1,668
08- Abitibi-Témiscamingue	150	127	216	78	25	869
09- Côte-Nord	110	116	118	59	35	676
11- Gaspé—Îles-de-la-Madeleine	115	137	190	72	50	852
12- Chaudière-Appalaches	387	357	549	227	87	2,340
13- Laval	332	280	547	226	82	2,110
14- Lanaudière	294	372	528	232	110	2,283
15- Laurentides	434	420	783	291	129	2,887
16- Montérégie	1,222	1,003	1,971	736	314	7,659
Total	**7,266**	**6,532**	**11,482**	**4,626**	**1,898**	**46,333**

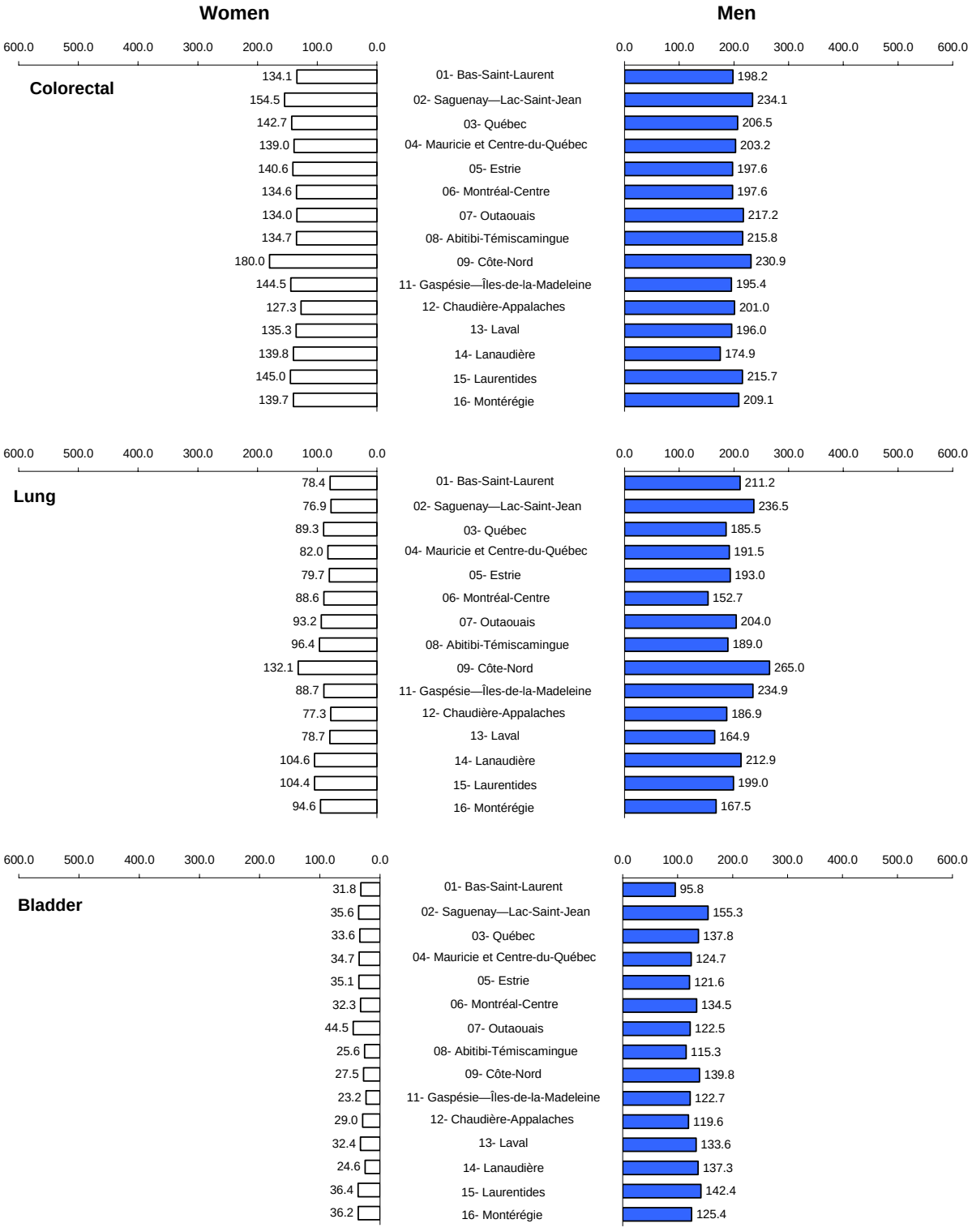
Area	5-year prevalent cases					
	Colorectal (153-154)	Lung (162)	Breast (174)	Uterus (182)	Bladder (188)	All sites*
Women						
01- Bas-Saint-Laurent	198	104	656	100	45	1,561
02- Saguenay—Lac-Saint-Jean	262	130	858	144	61	2,056
03- Québec	657	383	1,925	301	154	4,919
04- Mauricie et Centre-du-Québec	487	266	1,236	189	119	3,452
05- Estrie	288	148	660	140	66	1,934
06- Montréal-Centre	1,900	1,136	5,396	976	447	14,396
07- Outaouais**	215	152	656	81	73	1,650
08- Abitibi-Témiscamingue	108	78	345	48	21	892
09- Côte-Nord	88	62	221	28	13	629
11- Gaspé—Îles-de-la-Madeleine	103	59	287	48	16	778
12- Chaudière-Appalaches	315	180	1,015	155	71	2,473
13- Laval	294	172	935	149	70	2,339
14- Lanaudière	286	222	844	143	51	2,259
15- Laurentides	356	260	1,169	160	90	2,952
16- Montérégie	1,058	709	3,147	514	271	8,312
Total	**6,686**	**4,122**	**19,542**	**1,257**	**1,582**	**51,282**

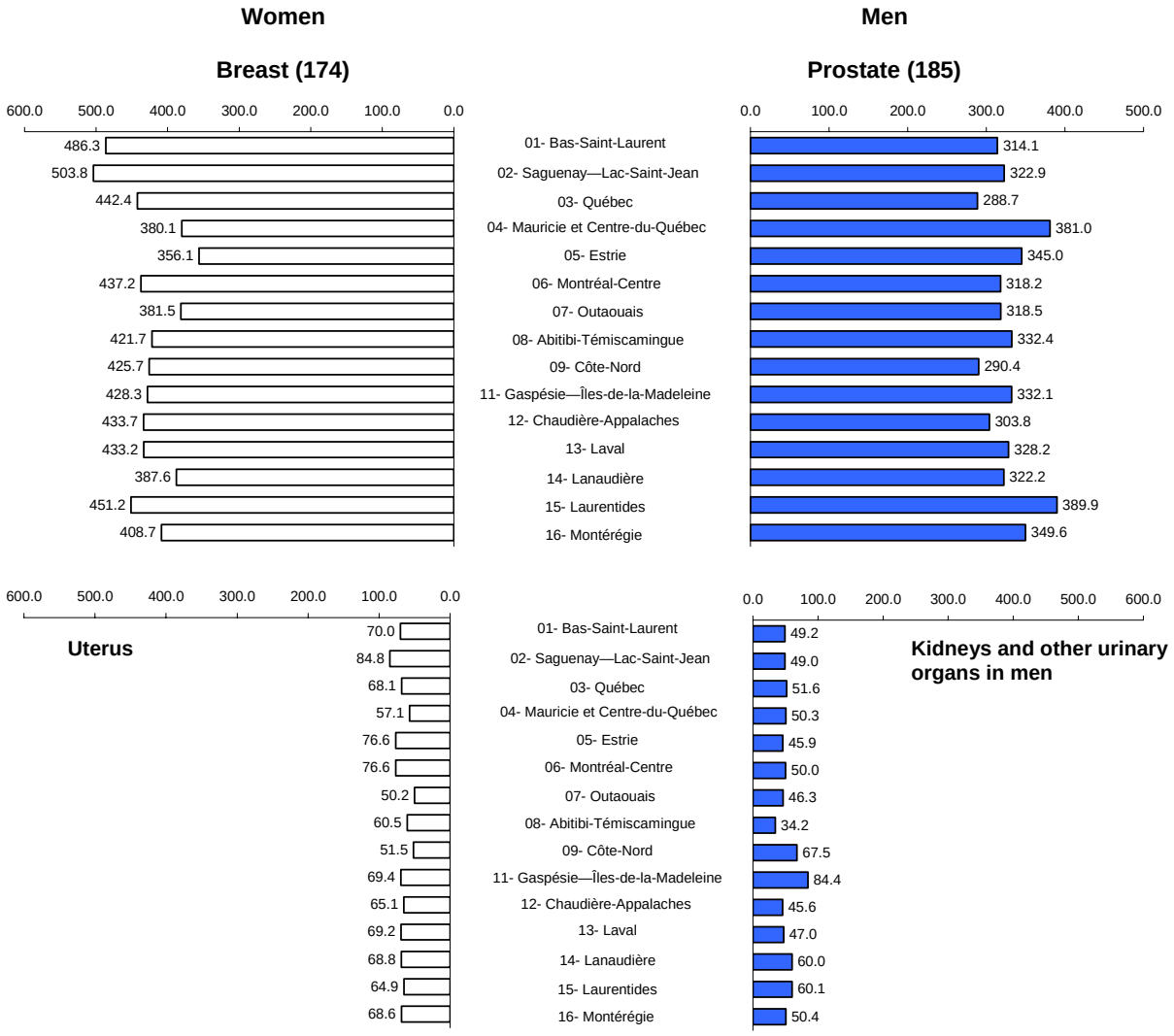
* Excluding skin cancer other than melanoma (ICD-9 173) and undefined sites (ICD-9 196 to 199).

** The under-count of the incidence of cancer in the Outaouais resulting from the incomplete integration of cases for residents of the Outaouais treated exclusively in Ontario for cancer was in the order of 30% during the 1987-1989 period. The degree of under-counting varies by cancer site. The total number of persons treated in Ontario has declined since the early 1990s, but it is estimated that the under-count of new cases of cancer in the Outaouais is still at least 20% today (Direction de la santé publique de l'Outaouais). It is plausible to assume that the prevalence of cancer in the Outaouais region will be affected to the same degree of magnitude.

Source: Quebec Cancer Registry.

Figure 2: Five-year adjusted relative prevalence of cancer per 100,000 people by area and by sex, Quebec, 1999





4.4. Five-year prevalence of cancer by age and sex

As is the case with incidence, a significant number of prevalent cases are found at relatively younger ages among women than among men because of breast cancer (Table 5 and Figure 3). In general, the relative rate of prevalence of cancer is at its maximum between 70 and 85 years (Figure 3). Prostate cancer is the exception because the rate continues to increase after 90 years.

For all sites, relative prevalence reaches about 5% between 75 and 89 years among women and 10% among men 75 years and older.

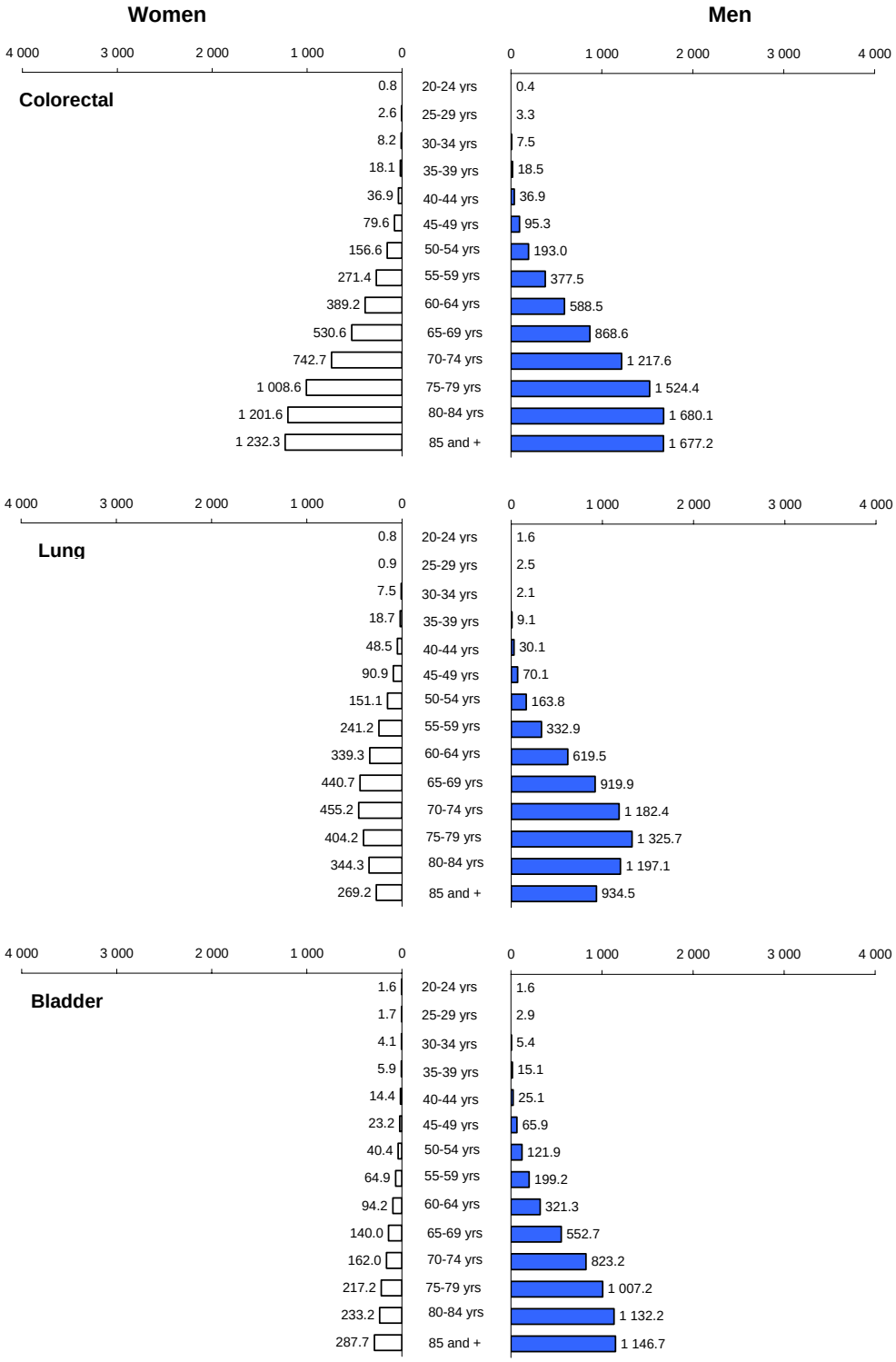
Table 5: Number of 5-year prevalent cases of cancer by age group and sex, Quebec, 1999

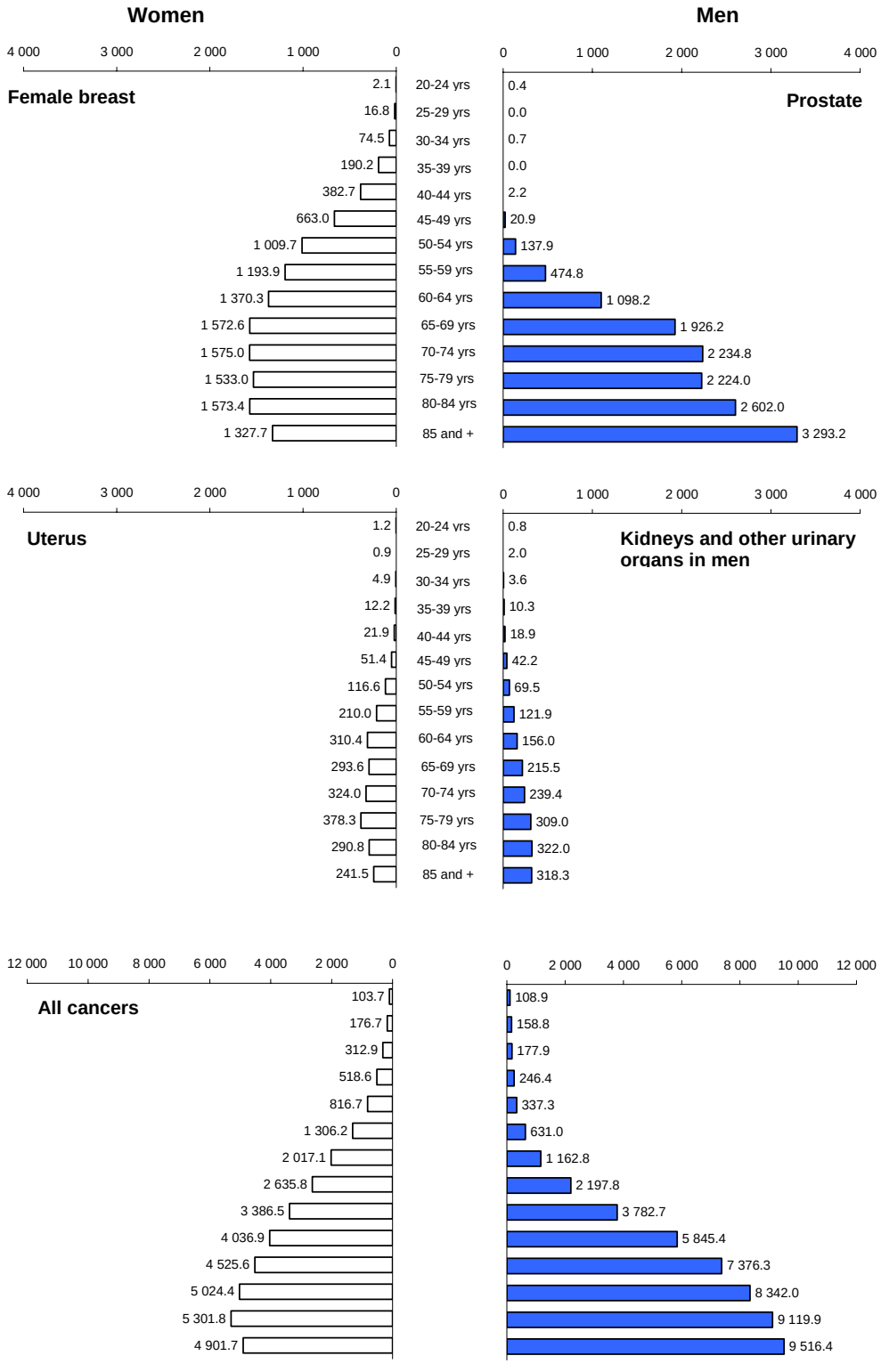
Age group	5-year prevalent cases					
	Colorectal (153-154)	Lung (162)	Prostate (185)	Bladder (188)	Kidneys and other urinary organs (189)	All sites*
Men						
20 to 24	1	4	1	4	2	278
25 to 29	8	6	--	7	5	388
30 to 34	21	6	2	15	10	497
35 to 39	61	30	--	50	34	814
40 to 44	119	97	7	81	61	1,088
45 to 49	269	198	59	186	119	1,781
50 to 54	483	410	345	305	174	2,910
55 to 59	737	650	927	389	238	4,291
60 to 64	890	937	1,661	486	236	5,721
65 to 69	1,185	1,255	2,628	754	294	7,975
70 to 74	1,312	1,274	2,408	887	258	7,948
75 to 79	1,120	974	1,634	740	227	6,129
80 to 84	647	461	1,002	436	124	3,512
85 or more	411	229	807	281	78	2,332
Total	**7,266**	**6,532**	**11,482**	**4,626**	**1,898**	**46,333**

Age group	5-year prevalent cases					
	Colorectal (153-154)	Lung (162)	Breast (174)	Uterus (182)	Bladder (188)	All sites *
Women						
20 to 24	2	2	5	3	4	252
25 to 29	6	2	39	2	4	411
30 to 34	22	20	199	13	11	836
35 to 39	58	60	609	39	19	1,661
40 to 44	118	155	1,223	70	46	2,610
45 to 49	226	258	1,882	146	66	3,708
50 to 54	399	385	2,572	297	103	5,138
55 to 59	548	487	2,411	424	131	5,323
60 to 64	632	551	2,225	504	153	5,499
65 to 69	826	686	2,448	457	218	6,284
70 to 74	1,036	635	2,197	452	226	6,313
75 to 79	1,133	454	1,722	425	244	5,644
80 to 84	876	251	1,147	212	170	3,865
85 or more	801	175	863	157	187	3,186
Total	**6,686**	**4,122**	**19,542**	**3,201**	**1,582**	**51,282**

* Excluding skin cancer other than melanoma (ICD-9 173) and undefined sites (ICD-9 196 to 199).

Figure 3: Five-year relative prevalence of cancer per 100,000 people by age group and sex, Quebec, 1999




Women
Men
Female breast
Prostate
Uterus
Kidneys and other urinary organs in men
All cancers
20-24 yrs
25-29 yrs
30-34 yrs
35-39 yrs
40-44 yrs
45-49 yrs
50-54 yrs
55-59 yrs
60-64 yrs
65-69 yrs
70-74 yrs
75-79 yrs
80-84 yrs
85 and +
2.1
16.8
74.5
190.2
382.7
663.0
1 009.7
1 193.9
1 370.3
1 572.6
1 575.0
1 533.0
1 573.4
1 327.7
0.4
0.0
0.7
0.0
2.2
20.9
137.9
474.8
1 098.2
1 926.2
2 234.8
2 224.0
2 602.0
3 293.2
1.2
0.9
4.9
12.2
21.9
51.4
116.6
210.0
310.4
293.6
324.0
378.3
290.8
241.5
0.8
2.0
3.6
10.3
18.9
42.2
69.5
121.9
156.0
215.5
239.4
309.0
322.0
318.3
103.7
176.7
312.9
518.6
816.7
1 306.2
2 017.1
2 635.8
3 386.5
4 036.9
4 525.6
5 024.4
5 301.8
4 901.7
108.9
158.8
177.9
246.4
337.3
631.0
1 162.8
2 197.8
3 782.7
5 845.4
7 376.3
8 342.0
9 119.9
9 516.4

5. DISCUSSION

The concept of prevalence assumes that cancer is an irreversible and permanent disease. People affected by it therefore require more health services than the population in general, whether for specialized treatments, detection of secondary sites or monitoring for recurrence. These people may also see their capacities diminished more or less permanently and require rehabilitation services or psychological assistance.

However, the intensity of services required may vary considerably depending on the nature of the cancer and the time since diagnosis. Unlike incidence, which refers to new cases only, prevalence is a very heterogeneous collection of people, some of whom have had a recent diagnosis and are still in treatment and others who may have been in remission for a long time and considered to be practically cured.

According to Micheli et al. (2002), the first two years after diagnosis consist of people who are undergoing their first treatments and who are often experiencing the secondary effects of these treatments. The period of two to five years is a period of high risk of recurrence and close monitoring. Between six and 10 years, the probability of recurrence is lesser and some people can be considered cured; however, regular monitoring is still recommended. From 11 to 15 years after diagnosis, the majority of people can be considered cured or at least should represent a low demand for health care for their disease.

Using 5 years as the basis for calculating prevalence, we were able to estimate that in 1999, almost 100,000 people[1] in Quebec required treatment for cancer or close monitoring after treatment. Calculated over a longer period (10 years), some 54,000 more people in remission or in the chronic phase of their cancer could be added to the number of people affected by a cancer (see Table 1).

Prostate cancer is the most prevalent cancer among men despite its under-reporting in the Quebec Cancer Registry (Brisson et *al.* 2003). In women, breast cancer survivors account for over one-third of prevalent cases (38%). For both of these sites, the 5-year survival rate is good, varying around 70% (Louchini et *al.* 2003). This is why prevalence calculated on a 15-year basis doubles for these cancers. In contrast, because of a low survival rate, prevalence calculated on a 15-year basis increases only 50% for lung cancer.

In addition to the time that has passed since the diagnosis, the age of the person afflicted, the stage of the cancer at the time of diagnosis, and the associated morbidity are all factors that can affect the demand for care. The analyses presented in this report take age into consideration, but cancer staging and co-morbidity data are not available from the Quebec Cancer Registry.

From another perspective, because the measure of prevalence is based on incidence and death, the completeness of prevalence depends closely on the completeness of incidence and the recording of deaths. A recent study of case ascertainment in the Quebec Cancer Registry showed that, overall, 92% of all cancers confirmed histopathologically are reported

[1] Excluding skin cancer other than melanoma (CIM-9 173) and undefined sites (CIM-9 196 to 199).

to the Quebec Cancer Registry (Brisson et *al.* 2003). However, reporting is significantly less reliable for three cancer sites, specifically, prostate (67%), bladder (86%) and melanoma (65%). Since the long-term survival associated with these cancer sites is relatively high, it is likely that the associated prevalence, both short and long term, could be significantly under-estimated.

The measure of the prevalence of cancer could also be affected by screening activities since the search for concealed or asymptomatic cancers, in addition to cancers detected clinically, will increase incidence. Theoretically, such an increase in incidence should be only temporary (Michel Beaupré, 2002; Canadian Cancer Statistics, 2004). For example, in the early 1990s, following the introduction of the test to measure Prostate Specific Antigen level (PSA test) to detect prostate cancer, the incidence curve for this cancer experienced a sharp increase and then stabilized before returning to its previous pattern when the recommendations for screening were clarified and restricted. In effect, according to a guide published in 1998 by the Collège des médecins du Québec, the quasi-systematic use of the screening test in asymptomatic individuals is not justifiable and should be replaced by more selective use, following counselling (Collège des médecins du Québec, 1998).

As for breast cancer screening, the impact on prevalence may be more gradual because, although a systematic screening program was introduced in 1998, the use of mammography was already widespread in Quebec, having been gradually introduced to the target population since the late 1980s (Institut de la statistique du Québec, 2000).

The purpose of cancer screening is to detect cancers at an earlier stage to improve the chances of cure. Prolonged survival of persons with cancers discovered at an early stage also increases prevalence. In some situations, screening for cancer is also intended to detect and remove or destroy precancerous lesions, which could contribute to reducing incidence and, consequently, the prevalence of these cancers. This is especially true in the case of cervix or colorectal cancer.

Thus, rising prevalence can be associated with an increase in incidence, improved survival and a decline in mortality. If the increase in prevalence is associated mainly with an increase in incidence outside the screening framework, then it would point to disquieting deficiencies in the battle against cancer. However, if the increase in prevalence is associated mainly with longer survival, our battle is making headway. Regardless of the cause, an increase in prevalence means an increase in the demand for health services and in needs that require resources. Since life expectancy is rising, the prevalence of cancer is also rising and is becoming a major socio-economic burden (Verdecchia et *al.* 2002; Stewart B. W. and Kleihues, 2003).

It should also be mentioned that excluding cancers for which the site or the nature is imprecise from the estimation of prevalence (ICD-9 196 to 199) represents a loss of almost 3% (Michel Beaupré, 2002) of the annual number of new cases (ICD-9 140 to 208 excluding 173). While these cases are often malignant tumors of secondary sites, they are included in the Quebec Cancer Registry because there is no more precise indication of the primary site of these cancers. This does not change the fact that these people require health care that has direct and indirect costs.

The same comment holds true for skin cancers other than melanoma (ICD-9 173), excluded from the study because they are so infrequently reported to the Quebec Cancer Registry owing to the fact that they usually do not require hospitalization or day surgery. However, these cancers still require care and they can be the source of significant morbidity. It is estimated that there are 76,000 new cases of these cancers annually in Canada (Canadian Cancer Statistics, 2004). Given that Quebec represents 24% of the Canadian population, we can extrapolate that there are about 18,250 such new cases annually in Quebec.

6. CONCLUSION

We are living in a society where life expectancy continues to lengthen and the number of seniors is growing. Since cancer is especially common after the age of 60, we can expect a steady increase in the number of cases in Quebec in the years ahead. In addition, early screening efforts for certain types of cancer where there are large numbers, such as breast, prostate and colorectal cancer, associated with more and more effective treatments, mean that persons with cancer are living longer. Thus, the demand for social and health care services linked to cancer is likely to increase at a faster pace. In this context, the prevalence of cancer is a crucial indicator in planning the resources required to fight this disease.

However, the results of prevalence need to be properly interpreted in terms of the length of monitoring. Five-year prevalence is especially relevant because it includes people who are receiving primary treatment, suffering significant secondary effects linked to the treatments and who are at high risk of recurrence. The burden for society in terms of the care required by these people is quite high.

Prevalence could be very informative when it comes to planning resources for the population that requires initial treatment, those who are considered cured, those who are in the recovery phase of the disease and those in the ongoing recovery phase. The only direct means of reducing the increase in incidence, and thus prevalence, is to prevent cancer. Doing so involves an intensification of the battle against smoking, the promotion of healthy life styles, and maximum use of effective screening measures. In the next few years, a vaccine against the human papillomavirus, the cause of cervical cancer and linked to other cancer sites, could also become part of the arsenal of means available to prevent cancer.

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