

Economic Impact of Cancer Diagnosis on Cancer Survivors: A survey of Colorectal, Breast and Prostate Cancer Survivors

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Abstract

Purpose: We investigated the economic impacts of breast, prostate and colorectal cancer (CRC) diagnosis on patients and compared them by cancer site.

Methods: A self-administered survey was mailed to all 18 to 62 years old Manitobans with a history of non-metastatic breast, prostate or CRC diagnosis within the prior one to three years. Cancer information was obtained from the provincial population-based Manitoba Cancer Registry. Fisher exact test was used to compare frequencies. Multivariate logistic regression models were used to determine independent predictors.

Results: 704 (56%) returned the questionnaire of which 547 met the analysis inclusion criteria (employment at time of cancer diagnosis). One to three years after cancer diagnosis, there was a 4 to 9% increase in the number of cancer survivors earning less than \$20,000 annually. There was a 13% (prostate), 23% (CRC) and 25% (breast) decrease in the number of survivors employed full-time. The most frequent financial consequence of a cancer diagnosis was using either registered retirement savings and/or other type of savings/investments (breast cancer: 38%, CRC: 35%, prostate cancer: 33%). Overall, 80% of survivors were able to return to the same number of hours worked pre cancer diagnosis.

Conclusions: This study suggests that although most recently diagnosed non-metastatic cancer survivors are able to return to work, one fifth to one fourth are impacted adversely, even long term. The one to three year economic impact of cancer diagnosis varies among the most common cancer types, with prostate cancer survivors being the least affected.

Implications: There is a need to identify and appraise effective strategies for restoring productive capabilities for cancer survivors currently unable to return to work but interested in doing so.

Keywords

Economic analysis; Cancer; Survivors

Introduction

Of all the Canadians diagnosed with a primary cancer in 1995-04, 776,313 were still alive in 2007 almost 2.5% of the national population [1]. Approximately 30% of these cancers were diagnosed in people 20 to 59 years of age, many of who could potentially return to work following their treatment. This return may be influenced by factors such as the cancer site, the tumor stage, the treatment, the education level and the type of work [2,3]. Most of these findings, however, are from countries with health care system and labor force practices different than Canada and are not necessarily generalizable.

In Canada, Maunsell et al. [4] reported that after three years of follow-up, 21% of breast cancer survivors and 15% of women in the comparison group (random sample of women never diagnosed with cancer) were not employed. During the three years of follow-up of this study, the number of hours worked per week decreased by an average of 1.8 hours and the proportion with a second job increased from 5% to 7%. At the end of follow-up, there were no differences in the overall working conditions between breast cancer cases and the comparison group [5]. Statistics Canada published a report on employment and earnings of cancer survivors with "strong attachment" to the labor market compared to people never diagnosed with cancer [6]. Cancer survivors earned 12% less (\$5,079) one year after diagnosis and 9.3% less (\$3,756) after three years. The effects on annual earnings were larger and longer lasting for survivors diagnosed with poor survival cancers. This study evaluated a limited number of economic outcomes and importantly did assess for

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predictors of economic outcomes.

Understanding the economic impacts of a cancer diagnosis on people is important for several reasons. Financial distress can contribute to decisions made regarding treatment and recovery. Work is a major aspect of life with deep socio-cultural ramifications that influences other life dimensions, even during a major crisis such as cancer. There are limited data on economic impact on prostate cancer and CRC survivors. The objectives of the present study were to investigate the economic impacts on persons with breast, prostate and colorectal cancer (CRC) diagnoses.

Methods

Using the Manitoba Cancer Registry, we identified Manitobans alive at the time of the survey (June 01, 2012) with a history of stage I to III (non-metastatic) breast, CRC and prostate cancer. The cases were diagnosed between January 01, 2009 and March 31, 2011, and were 18 to 62 years of age at diagnosis. We categorized the follow-up as short-term (1 to <2 years following cancer diagnosis) and mid-term (2 to 3 years after cancer diagnosis).

The questionnaire was mailed out with self-addressed return envelopes. A reminder was sent four weeks later. Information on employment status at the time of cancer diagnosis and the survey was obtained. We categorized the employment status into "employed" (employed full-time, employed part-time, and self-employed) and "unemployed" (unemployed, students, disability leave, retired).

Data on earnings, income from the employment at the time of cancer diagnosis and survey were collected. Working hours and the occupational categories were categorized based on the National Occupational Classification. The data collected included the time of retirement, time away from work, family support during treatment, financial consequences of cancer diagnosis, barriers to return to work, working conditions and employer's support. Barriers to return to work assessed included fatigue, workload, co-worker/employer attitude, anxiety/depression, pain/limited function, difficulty concentrating, body image, loss of skills, loss of revenue, confidence and, future health fears. We created a composite variable named "decline" that included change from full-time to part-time employment, continuous employment with decreased earnings, loss of employment due to cancer diagnosis, or loss of employment due to other reasons with loss of income.

Fisher exact test and logistic regression modeling were used to estimate the probability of economic condition change. Analyses were performed on the three cancer sites separately using SAS 9.2 (SAS Institute Inc.). The study was approved by the University of Manitoba's Health Research Ethics Board, and the Research and Resource Impact Committee at Cancer Care Manitoba.

Results

A total of 1,254 invitation questionnaires were sent to breast cancer (625 invitations), CRC (292) and prostate cancer survivors (337). Of these, 704 (56%) returned a questionnaire at least partially completed and two returned an empty questionnaire; 157 were not employed at diagnosis and were excluded from analyses. The final sample comprised 547 individuals. Prostate cancer respondents were more likely to have received treatment (80%) than non-respondents (58%) ($p < 0.001$). There were no other major differences in the characteristics of respondents and non-respondents (Table 1).

Among the survey respondents, the average age at diagnosis of breast cancer was 50, while it was 56 for prostate cancer cases and 53 for CRC cases (men: 54; women: 52). Sixty six percent (66%) of breast cancer cases had more than high school education compared to 50% for CRC and 56% for prostate cancer ($p = 0.018$) (Table 1). Almost all breast cancer and CRC cases had a surgery. Radiation was the next most frequent treatment for breast and prostate cancers, while for CRC chemotherapy was the second most frequent treatment.

The number of people earning less than \$20,000 annually increased by 4 to 9 percentage point between the time of diagnosis and the survey ($p < 0.001$ for breast; $p = 0.007$ for CRC; $p = 0.10$ for

prostate) (Table 2). There was a 13% (prostate) to 25% (breast; CRC: 23%) decrease in full time employment between diagnosis and the survey ($p < 0.001$). At the time of the survey, 30% of breast cancer cases, 24% of CRC cases and 14% of prostate cancer case were not part of the work force anymore. The percentage of people who retired varied from 9% to 12% depending of the cancer site ($p = 0.67$).

The most frequent financial consequence of a cancer diagnosis was using retirement savings and/or other type of savings/investments (breast cancer: 38%, CRC: 35%, prostate: 33%) (Table 2). Lower credit rating and loan/incurred debts were other common financial impacts. Approximately 77% of cancer survivors were able to return to work and to maintain their prior position (74% for breast, 75% for CRC, and 84% for prostate). A lower percentage of breast cancer (62%) and CRC cases (63%) than prostate patients (85%) were able to return to work the same number of hours. Fewer prostate cancer cases (4%) quit their job compared to breast (16%) and CRC (15%) cases.

Thirty-two percent (32%), 24% and 12% of breast, CRC and prostate cancer cases respectively experienced a decline in employment status and/or earnings. Thirty-eight percent (38%) of breast cancer cases needed a family member to take some time off from work to provide support as did 34% of CRC and 26% and prostate cancer cases.

The majority of respondents experienced some types of barriers to returning to work (Table 3). Fatigue, pain/limited functions, and future health fears were important barriers for returning to work for all the 3 cancer types survivors. Workload, anxiety/depression, difficulty concentrating and self-confidence were also often cited by breast cancer and CRC survivors. Arrangements made by employer to accommodate needs were more often reported for breast cancer cases (43%) than for CRC (32%) or prostate cancer cases (21%).

Logistic regression models were performed on all study variables individually (results not shown) and variables with a $P < 0.10$ were selected for the multivariate models (Table 4). Short-term (1 to 2 years) vs. mid-term (+2 to 3 years) follow-up after a cancer diagnosis did not impact the probability of having a decline. For all patients, a decline was associated with experiencing at least one barrier and having a later stage cancer. Women diagnosed with breast cancer had the highest probability of having a decline compared to the people diagnosed with CRC or prostate cancer. For breast cancer cases, being older age at diagnosis was associated with a decline while taking hormone therapy was associated with a reduced risk of decline. For CRC cases, a decline was associated with being older at diagnosis, experiencing of at least one barrier and having received a combination of surgery and chemotherapy (vs. surgery alone). For prostate cancer cases, having experienced at least one barrier was the only factor associated with a decline.

Discussion

In this population based study we evaluated and compared the economic impact of diagnosis of three of the most common cancer types at non-metastatic stage in the same general population. We report the type of cancer is an important factor determining the economic impact on cancer survivors. In our study, although they were the youngest at diagnosis and therefore more likely to return to work, breast cancer cases were the most affected. CRC cases, which were three years older on average than breast cancer cases were affected slightly less, and prostate cancer cases, which were 6 years older on average than breast cancer cases, were the least affected. Overall, approximately 75% of respondents were able to return to the work force. Older age at cancer diagnosis, one or more barriers to return to work and later tumor stage were associated with adverse economic impact.

The literature on the impact of breast cancer on employment and earning shows variability mainly due to evaluation of different time periods after diagnosis (e.g. six to 18 months, three years and more) and the cancer stages included. In general, the impact is more substantial in the first year after diagnosis and lessen afterward [5,7-10]. Bouknicht [11] found 17% not returned to work 18 months

Variables	Category	Returned the questionnaire						Returned the questionnaire and working at diagnosis					
		Breast (n=365)		Colorectal (n=156)		Prostate (n=183)		Breast (n=281)		Colorectal (n=125)		Prostate (n=141)	
		n	%	n	%	n	%	n	%	n	%	n	%
Age at diagnosis	<50	131	35.9	34	21.8	10	5.5	120	42.7	32	25.6	10	7.1
	50-54	94	25.8	25	16	39	21.3	81	28.8	22	17.6	38	27
	55-59	77	21.1	57	36.5	64	35	52	18.5	40	32	51	36.2
	60+	63	17.3	40	25.6	70	38.3	28	10	31	24.8	42	29.8
Sex	Male	--	--	98	62.8	183	100	--	--	78	62.4	141	100
	Female	365	100	58	37.2	--	--	281	100	47	37.6	--	--
Education	<High school	47	12.9	40	25.6	37	20.2	29	10.3	32	25.6	28	19.9
	High school	76	20.8	38	24.4	43	23.5	64	22.8	28	22.4	33	23.4
	College diploma [±]	106	29	41	26.3	39	21.3	84	29.9	32	25.6	33	23.4
	University	89	24.4	27	17.3	35	19.1	69	24.6	24	19.2	24	17
	Graduate degree	47	12.9	10	6.4	28	15.3	35	12.5	9	7.2	22	15.6
	Missing	0	0	0	0	1	0.5	0	0	0	0	1	0.7
Marital status at diagnosis	Single	81	22.2	31	19.9	26	14.2	62	22.1	25	20	18	12.8
	In a relation	283	77.5	125	80.1	157	85.8	218	77.6	100	80	123	87.2
	Missing	1	0.3	0	0	0	0	1	0.4	0	0	0	0
Marital status at survey	Single	86	23.6	29	18.6	27	14.8	66	23.5	23	18.4	19	13.5
	In a relation	279	76.4	127	81.4	155	84.7	215	76.5	102	81.6	121	85.8
	Missing	0	0	0	0	1	0.5	0	0	0	0	1	0.7
Employment at diagnosis	Full-time	206	56.4	95	60.9	91	49.7	206	73.3	95	76	91	64.5
	Part-time	51	14	11	7.1	13	7.1	51	18.1	11	8.8	13	9.2
	Self-employed	24	6.6	19	12.2	37	20.2	24	8.5	19	15.2	37	26.2
	Other	82	22.5	31	19.9	42	23	--	--	--	--	--	--
	Missing	2	0.5	0	0	0	0	--	--	--	--	--	--
Residence at diagnosis	Rural	126	34.5	64	41	88	48.1	110	39.1	61	48.8	72	51.1
	Urban	238	65.2	92	59	95	51.9	171	60.9	64	51.2	69	48.9
	Missing	1	0.3	0	0	0	0	0	0	0	0	0	0
Treatment	Surgery	363	99.5	155	99.4	135	73.8	280	99.6	125	100	108	76.6
	Radiation	292	80	48	30.8	36	19.7	228	81.1	38	30.4	27	19.1
	Chemotherapy	248	67.9	96	61.5	1	0.5	203	72.2	78	62.4	1	0.7
	Hormonal	230	63	1	0.6	15	8.2	177	63	1	0.8	10	7.1
	None recorded	1	0.3	0	0	36	19.7	0	0	0	0	26	18.4
Tumour stage	I	151	41.4	30	19.2	0	0	108	38.4	22	17.6	0	0
	II	149	40.8	53	34	145	79.2	120	42.7	44	35.2	110	78
	III	63	17.3	68	43.6	37	20.2	51	18.1	55	44	30	21.3
	Not reported	2	0.5	5	3.2	1	0.5	2	0.7	4	3.2	1	0.7

n: counts; %: percentage; ±: with and without.

Table 1: Demographics and characteristics of invited people who returned and did not return the questionnaire

Variables	Category	Breast (n=281)		Colorectal (n=125)		Prostate (n=141)	
		n	%	n	%	n	%
Annual salary at diagnosis	<\$20k	45	16	12	9.6	12	8.5
	\$20k - <\$40k	85	30.2	34	27.2	25	17.7
	\$40k - <\$60k	75	26.7	33	26.4	37	26.2
	\$60k - <\$80k	30	10.7	17	13.6	23	16.3
	\$80k - <\$100k	22	7.8	13	10.4	19	13.5
	≥ \$100k	17	6	11	8.8	22	15.6
	Missing	7	2.5	5	4	3	2.1
Annual salary at survey	< \$20k	69	24.6	21	16.8	17	12.1
	\$20k - <\$40k	73	26	30	24	28	19.9
	\$40k - <\$60k	64	22.8	27	21.6	29	20.6
	\$60k - <\$80k	21	7.5	14	11.2	23	16.3
	\$80k - <\$100k	19	6.8	7	5.6	14	9.9
	≥ \$100k	13	4.6	12	9.6	23	16.3
	Missing	22	7.8	14	11.2	7	5
Employment status at diagnosis	Employed full-time	206	73.3	95	76	91	64.5
	Employed part-time	51	18.1	11	8.8	13	9.2
	Self-employed	24	8.5	19	15.2	37	26.2
Employment status at survey	Employed full-time	136	48.4	66	52.8	73	51.8
	Employed part-time	43	15.3	8	6.4	11	7.8
	Self-employed	18	6.4	18	14.4	37	26.2
	Unemployed	11	3.9	16	12.8	2	0.7
	Disabled	21	7.5	3	2.4	1	0.7
	Retired	27	9.6	11	8.8	17	12.1
	Student	24	8.5	0	0	0	0
	Missing	22	0.4	1	0.8	0	0
Financial consequences ¹	Use retirement saving	28	10	7	5.6	11	7.8
	Use other savings	94	33.5	39	31.2	37	26.2
	Re-mortgaged house	16	5.7	3	2.4	1	0.7
	Lost house	1	0.4	0	0	0	0
	Forced to move	3	1.1	2	1.6	1	0.7
	Lower credit rating	30	10.7	7	5.6	7	5
	Incurred debts	41	14.6	9	7.2	6	4.3
	Child care difficulties	12	4.3	1	0.8	0	0
	Others	77	27.4	34	27.2	29	20.6
	Missing	2	0.7	0	0	3	2.1
Change in working hours	No change	127	45.2	62	49.6	86	61
	Less	31	11	15	12	9	6.4
	No longer employed	83	29.5	31	24.8	20	14.2
	Missing	40	14.2	17	13.6	26	18.4
Family members took time off	Yes	108	38.4	42	33.6	37	26.2
	No	172	61.2	80	64	102	72.3
	Missing	1	0.4	3	2.4	2	1.4
Forced to quit job	Yes	45	16	19	15.2	5	3.5
	No	233	82.9	99	79.2	135	95.7
	Missing	3	1.1	7	5.6	1	0.7
Able to return to prior job and maintain title / salary	Yes	207	73.7	94	75.2	119	84.4
	No	63	22.4	21	16.8	10	7.1
	Missing	11	3.9	10	8	12	8.5
Able to work the same number of hours	Yes	173	61.6	79	63.2	120	85.1
	No	91	32.4	40	32	12	8.5
	Missing	17	6	6	4.8	9	6.4
Decline	Yes	91	32.4	30	24	17	12.1
	No	186	66.2	90	72	119	84.4
	Missing	4	1.4	5	4	5	3.5

n: counts; %: percentage; <: less than

¹Variable categories are not exclusive**Table 2:** Economics and working status of survey respondents

Question	Category	Breast (n=281)		Colorectal (n=125)		Prostate (n=141)	
		n	%	n	%	n	%
Time off taken off after Diagnosis (weeks)	<4	32	11.4	19	15.2	35	24.8
	04-Aug	23	8.2	22	17.6	41	29.1
	09-Dec	14	5	13	10.4	29	20.6
	13-16	18	6.4	6	4.8	19	13.5
	>16	186	66.2	61	48.8	7	5
	Missing	8	2.8	4	3.2	10	7.1
Arrangement made by the employer to accommodate your needs when you return to work	Yes	122	43.4	40	32	30	21.3
	No	51	18.1	31	24.8	35	24.8
	Not necessary	93	33.1	44	35.2	67	47.5
	Missing	15	5.3	10	8	9	6.8
Barrier to return to work ¹	None	34	12.1	21	16.8	49	34.8
	Fatigue	205	73	74	59.2	53	37.6
	Workload	82	29.2	21	16.8	11	7.8
	Co-worker/employer attitude	39	13.9	9	7.2	6	4.3
	Anxiety/depression	84	29.9	30	24	12	8.5
	Pain/limited function	86	30.6	25	20	27	19.1
	Difficulty concentrating	104	37	32	25.6	6	4.3
	Body image	51	18.1	13	10.4	3	2.1
	Loss of skills	28	10	11	8.8	1	0.7
	Loss of revenue	27	9.6	10	8	11	7.8
	Confidence	55	19.6	15	12	4	2.8
	Future health fears	100	35.6	38	30.4	33	23.4
	Other	58	20.6	15	12	17	12.1
	Missing	2	0.7	0	0	0	0

n: counts; %: percentage

¹Variable categories are not exclusive**Table 3:** Time off work, work accommodations and barriers to return to work among respondents that were employed at cancer diagnosis

Cancer site	Variable	Unvariable models			Multivariable models	
		OR	95% CI		OR	95% CI
All	CRC vs Breast	0.68	0.42-1.10		0.73	0.41-1.30
	Prostate vs Breast	0.29	0.17-0.52		0.44	0.23-0.85
	Earning: \$40k+ vs. <\$40k	0.59	0.40-0.87		0.69	0.46-1.03
	Any barrier to return vs. none ²	3.33	1.89-5.85		2.47	1.38-4.43
	Stage III vs. I+II	1.66	1.08-2.55		1.61	1.00-2.57
	Radiation therapy: yes vs. no	2.12	1.41-3.18		1.3	0.79-2.14
Breast	Age: 55+ vs. <55	1.78	1.04-3.07		2.04	1.16-3.60
	Stage III vs. I+II	1.73	0.93-3.22		1.71	0.87-3.36
	Chemotherapy: yes vs. no	1.84	1.01-3.36		1.71	0.90-3.26
	Hormone therapy: yes vs. no	0.55	0.33-0.91		0.49	0.29-0.84
CRC	Age: 60+ vs. <60	3.54	1.44-8.72		5.51	1.90-15.97
	Any barrier to return vs. none	5.39	1.19-24.30		6.21	1.25-30.83
	Surgery + chemo/ radiotherapy vs. surgery alone	4.97	1.60-15.42		5.99	1.75-20.48
Prostate	Any barrier to return vs. none	4.91	1.34-17.97		4.23	1.12-16.44
	Stage III vs. I+II	2.55	0.85-7.65		1.62	0.51-5.15

OR: odds ratio; CI: confidence interval; CRC: colorectal cancer

¹A decline occurred when respondents reported negative employment or earning change: working from full-time to part-time, continuous employment with decreased earnings, loss of employment due to cancer diagnosis, or loss of employment due to other reasons with loss of income

²Fatigue, workload, co-worker/employer attitude, anxiety/depression, pain/limited function, difficulty concentrating, body image, loss of skills, loss of revenue, confidence and future health fears

Table 4: Predictors of decline¹ on employment and/or earnings

after diagnosis. A Canadian study found 21% of breast cancer cases were not employed 3 years after diagnosis in comparison to 15% of controls [4]. Another Canadian study reported a 27% loss of projected usual annual wages within 12 months of a diagnosis of early breast cancer [12]. A Finnish study reported no significant differences in employment rates of people with a history of breast and prostate cancers compared to their referents; colon cancer cases were more likely to be unemployed [13]. Bradley et al. [3], using a cohort of American women, reported that although women were 7 percentage point less likely to work after a breast cancer compared to referents, those who kept working had better salary and worked more hours, especially three years or more after the diagnosis.

Few studies have evaluated the impact of different cancer types. Sanchez et al. [14] reported 89% of CRC survivors returned to work after their diagnosis, with 80% still in employment 5 years later; Schultz et al. [15] reported 67% working 5 years post-diagnosis and Bednarek et al. [16] 25%. Carlsen et al. [8] found that men diagnosed with colon or prostate cancer had no increase in probability of unemployment on the long-term (up to 15 year follow-up) after diagnosis, while women diagnosed with colon cancer were at higher risk of unemployment. Bradley et al. [9] reported that the greatest employment difference between men with prostate cancer and a

control group was observed 6 months following diagnosis, when they were 10% less likely to be working; at 12 and 18 months, there were no differences anymore.

We found that barriers to return to work are important predictors of overall economic decline among all the 3 cancer types survivors evaluated in this study. Barriers to return to work are common among cancer cases. Mehnert [7] reported that younger age, the cancer site, higher levels of education, continuity of care, absence of surgery, less physical symptoms, the length of sick leave, being male and ethnicity have all been positively or negatively related to return to work. The authors mention that higher levels of fatigue, overall stress, sequels of the disease, cancer treatment and disease stage were independently and negatively associated with the ability to work. Our study results emphasize the need to assess and address the barriers to return to work.

The present study has some limitations. Respondents were sent a questionnaire one to three years after their diagnosis as we interested in the economic impact after completion of initial cancer therapy; however responses may have been influenced by recall biases. We focused on people that were working at diagnosis but the real impact of a cancer diagnosis extends beyond these people. For example, a death in a family may mean that pension income is lost, which could

greatly influence a household economy. Since we were not evaluating the immediate impact of cancer diagnosis, we did not measure out of pocket costs (e.g. health services, medications) of cancer therapy and the perceptions from respondents on these financial impacts. An Australian study reported that indirect costs following a breast cancer can represent more than 60% of the total costs [4]. Finally, we did not have a comparison group – our interest was to assess the difference among the most common type survivors.

Our findings suggest the majority of most common cancer sites survivors (stage I to III), who are working before their cancer diagnosis are able to return to the work force. The factors identified and associated with negative economic impact should receive attention after a diagnosis to allow cancer survivors to rapidly reintegrate in to the society and workforce. Prompt efforts to identify and appraise effective strategies for restoring productive capabilities could minimize the economic burden of cancer on the society as a whole and on the people affected by the disease.

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