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

Bosu Seo1*
Alain Demers2,3
Zoann Nugent4
Harinder Singh2,4,5

1Department of Economics, University of the Fraser Valley, Abbotsford, British Columbia, Canada
2Community Health Sciences, University of Manitoba, Winnipeg, Manitoba, Canada
3Cancer Care Manitoba, Department of Epidemiology and Cancer Registry, Winnipeg, Manitoba, Canada
4Cancer Care Manitoba, Department of Hematology and Oncology, Winnipeg, Manitoba, Canada
5Internal Medicine, University of Manitoba, Winnipeg, Manitoba, Canada

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-metastic 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 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...
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 into short-term (1 to 2 years following cancer diagnosis) and mid-term (2 to 3 years after 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 workforce 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 priority 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 that 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]. Bouknight [11] found 17% not returned to work 18 months.
Demographics and characteristics of invited people who returned and did not return the questionnaire

| Variables                      | 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          |
| 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 ± University   | 106 29                   | 41 26.3              | 39 21.3         | 84 29.9       | 32 25.6            | 33 23.4          |
| Graduated degree               | 89 24.4                  | 27 17.3              | 35 19.1         | 69 24.6       | 24 19.2            | 24 17            |
| Missing                         | 0 0                      | 0 0                  | 1 0.5           | 0 0           | 0 0                | 1 0.7            |
| Marital status at               |                           |                       |                 |               |                   |                  |
| In a relation                  | 283 77.5                 | 125 80.1             | 157 85.8        | 218 77.6      | 100 80             | 123 87.2         |
| 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           |
| Residence at diagnosis         |                           |                       |                 |               |                   |                  |
| 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 26.2        | 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 2.4             | 2 0.7            |
|                                    | Disabled                        | 21 7.5         | 3 12.8             | 1 1.4            |
|                                    | Retired                         | 27 9.6         | 11 8.8             | 17 12.1          |
|                                    | Student                         | 24 8.5         | 0 0.8              | 0 0              |
|                                    | Missing                         | 22 0.4         | 1 1.6              | 0 0              |
| Financial consequences             | 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    | Yes                             | 207 73.7       | 94 75.2            | 119 84.4         |
| maintain title / salary            | No                              | 63 22.4        | 21 16.8            | 10 7.1           |
|                                    | Missing                         | 11 3.9         | 10 8               | 12 8.5           |
| Able to work the same              | Yes                             | 173 61.6       | 79 63.2            | 120 85.1         |
| number of hours                    | 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            |

| Table 2: Economics and working status of survey respondents |

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

Variable categories are not exclusive
| 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 work¹ | 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
Table 4: Predictors of decline on employment and/or earnings

| Variable Description | Univariable Models | Multivariable Models |
|----------------------|--------------------|----------------------|
|                      | OR  | 95% CI  | OR  | 95% CI  |
| All                  | OR  | 95% CI  | OR  | 95% CI  |
| 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 | 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               | OR  | 95% CI  | OR  | 95% CI  |
| 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                  | OR  | 95% CI  | OR  | 95% CI  |
| 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             | OR  | 95% CI  | OR  | 95% CI  |
| 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

1 A 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.

2 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.

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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