Work Situation After Breast Cancer: Results From a Population-Based Study

Elizabeth Maunsell, Mélanie Drolet, Jacques Brisson, Chantal Brisson, Benoit Mâsse, Luc Deschênes

Background: **Breast cancer may adversely affect work experience. We assessed whether there was evidence of discrimination at work, defined as negative or involuntary changes in employment situation (including changes in position, wages, and other conditions), associated with a breast cancer diagnosis in a population-based retrospective cohort study conducted in Quebec, Canada.** ***Methods:*** **The study was based on the consecutive series of women aged less then 60 years when first treated for breast cancer (identified through the Quebec Tumor Registry) and a random sample of frequency-matched women living in Quebec (identified from provincial health care files) who had never been diagnosed with cancer. Eligibility for the study was restricted to women who were employed at the time of diagnosis (for breast cancer survivors) or the same calendar period (for women in the comparison group). We conducted telephone interviews of eligible women 3 years after diagnosis for 646 survivors or after the matched calendar period for 890 women in the comparison group. Binomial regression was used to evaluate the relationship between having breast cancer and work situation. All statistical tests were two-sided.** ***Results:*** **Working conditions were similar between the two groups at the beginning of follow-up. After 3 years, slightly more survivors (21%) than women in the comparison group (15%) were unemployed (adjusted relative risk for being unemployed = 1.29, 95% confidence interval = 1.05 to 1.59), although most women who were not working (84% of unemployed survivors and 76% of unemployed women in the comparison group) said that the decision to stop working was their own. Among women still employed, no deterioration in working conditions was observed in either group.** ***Conclusion:*** **We found little evidence that women diagnosed with breast cancer experience discrimination at work. This information may be helpful for working women concerned about employment after breast cancer. [J Natl Cancer Inst 2004;96:1813–22]**

Although breast cancer can affect many aspects of women's lives *(1),* the work experience of women who have had breast cancer is still an unexplored area of survivorship research. However, having information about breast cancer survivors' work experience is important for several reasons.

First, returning to or maintaining employment after cancer is important for survivors' quality of life, including physical and mental health *(2,3).* Earnings from employment are necessary to meet basic needs and facilitate a return to usual life activities *(4).* Moreover, for many women, returning to work after a cancer diagnosis is an important measure of recovery from and control of the disease and a positive step toward the future *(5–8).*

Second, although legislation in Canada *(9,10)* and in other countries *(11)* protects workers against discrimination on the basis of handicap or health state, cancer survivors in these countries have reported experiencing problems in the workplace after returning to work *(12–16).* Problems noted have included job loss and demotion, decreased wages, changes in working conditions, difficulty obtaining a new job, and problems with supervisors and colleagues.

Third, the number of women who are employed when they are diagnosed with breast cancer is growing *(17,18),* and a large proportion of these women will return to the workplace after diagnosis and treatments. Many women are diagnosed with breast cancer when they are still of working age (i.e., aged under 65 years), and many are diagnosed with early-stage disease, which often has a good prognosis. However, the majority of women diagnosed with breast cancer in recent years receive aggressive overall management of their disease involving multiple modalities, often in combination. Whether this approach to disease management contributes to problems in the workplace is unknown.

A few quantitative studies have assessed work experience after cancer *(13,14,19–27),* although design difficulties make it hard to determine whether the problems reported can be attributed to having had cancer. Only two studies, one of survivors of breast cancer *(19)* and one of survivors of other cancers *(27),* included comparison groups, which are essential for separating cancer-specific effects from those resulting from other life cycle or labor market changes. Also, some studies were cross-sectional in design *(13,14,19,24,25),* some included heterogeneous groups with regard to time since diagnosis and types of cancer *(13,14,20,24,27),* and some focused primarily on the percentage of patients at work after diagnosis but did not assess changes in work conditions among those still employed *(21,22,26).*

We undertook a population-based retrospective cohort study to compare the work experience of breast cancer survivors who

---

Affiliations of authors: Unité de recherche en santé des populations, Centre de recherche du Centre Hospitalier Affilié Universitaire de Québec, QC, Canada (EM, MD, JB, CB); Université Laval, Québec, QC, Canada (EM, MD, JB, CB); Fred Hutchinson Cancer Research Center, Seattle, WA (BM); Centre des maladies du sein Deschênes-Fabia, Hôpital du Saint-Sacrement, Québec, QC, Canada (LD).

Correspondence to: Elizabeth Maunsell, Unité de recherche en santé des populations, Hôpital du Saint-Sacrement, 1050 chemin Sainte-Foy, Québec, QC, Canada G1S 4L8 (e-mail: elizabeth.maunsell@uresp.ulaval.ca).

See "Notes" following "References."

DOI: 10.1093/jnci/djh335

were employed at the time they were diagnosed with the disease with the experience of similarly aged women who had never had cancer. We extended follow-up to the first 3 years after diagnosis to be sure that survivors had adequate time to recover from treatment and return to the workforce, if this were to happen. We compared indicators of discrimination at work—objective negative changes at work associated with cancer diagnosis *(5)*—among breast cancer survivors and women in the population-based comparison group.

SUBJECTS AND METHODS

Study Design and Subjects

In this population-based comparative retrospective cohort study *(28),* follow-up began in the month and year of diagnosis for breast cancer survivors and in a similar calendar period for women in the comparison group. Follow-up ended at the time of interview, 3 years after the survivors' diagnosis. Mean duration of follow-up was comparable in both groups (41 ± 2 months).

All identification, selection, and recruitment procedures were developed in consultation with and approved by the Commission d'Accès à l'information du Québec and the Ethics Committee of the Hôpital du Saint-Sacrement, Quebec. We used the Quebec Tumour Registry to identify 1504 consecutive women aged younger than 60 years who were newly diagnosed with breast cancer between November 1996 and August 1997. Information provided by the registry included the patient's name, age at diagnosis, hospital where diagnosed, date of diagnosis, and medical file number. We linked registry records with the provincial health care files managed by the Régie de l'Assurance maladie du Québec (RAMQ), which oversees Quebec's universal health insurance plan and is the most complete and up-to-date file of Quebec residents, to obtain the women's addresses and to identify women who had died before the start of data collection. Additional eligibility requirements for breast cancer survivors included being employed in the month of diagnosis and being able to respond to a telephone interview in either English or French.

To assemble a population-based comparison group, a random sample of women aged 18–59 years and living in the province of Quebec at the same period as the survivors' diagnoses were selected from the RAMQ file. Women in the comparison group were frequency-matched to breast cancer survivors on age and sampling time. Additional eligibility criteria for women in the comparison group included being employed during the period of survivors' diagnosis (same month as the diagnosis ± 1 month, i.e., within an overlapping 3-month period) and being able to respond to a telephone interview in either English or French. Women previously diagnosed with cancer (identified by record linkage with the Quebec Tumour Registry) or those who had died in the interval (linkage with the RAMQ files) were excluded. Neither the RAMQ nor the Quebec Tumour Registry contains information on individuals' employment status.

Recruitment Procedure

Potentially eligible study participants were sent a personalized letter, a leaflet providing study information, a reply form for indicating whether they agreed or refused to be contacted about the study, and a stamped, preaddressed return envelope. For women aged 40–59 years, we sought to recruit the same number of women in the comparison group and in the breast cancer survivor group. For women aged younger than 40 years, we sought to recruit twice as many women in the comparison group as in the breast cancer survivor group.

The letter briefly introduced the study and requested the woman's telephone number and signed permission to be contacted by a study team member, who would explain the study, verify work status at diagnosis (or similar period for women in the comparison group), and solicit the woman's consent to participate. For survivors from whom no response was received, we attempted to obtain a more recent address from the hospitals where the women were diagnosed. Before the study, we had contacted all directors of professional services in the 86 Quebec hospitals in which breast cancer is treated to inform them of the study, and we obtained permission to review the medical archives, if needed, for all but one hospital. After permission to explain the study to a potential participant was obtained, the interviewer first verified, on the telephone, whether the women had paid employment at the time she was diagnosed with breast cancer or during a similar 3-month period for women in the comparison group. After employment status was determined, the interviewer then described the study, answered any questions regarding the study, solicited verbal consent, and scheduled the telephone interview for those who gave consent.

Recruitment began in November 1999 and was temporarily halted in January 2000, after 148 survivors and 179 women in the comparison group had been recruited, because of the investigators' concerns about participation levels among potential study subjects. When we restarted recruitment in April 2000, we incorporated a three-arm randomized trial (A: no monetary incentive; B: $5 for returning the reply form, whatever the answer; C: $5 for returning the reply form, whatever the answer, plus an additional $10, or a 1 in 960 chance of winning $1000, for a completed interview) to compare methods of improving participation. Based on results for the 168 survivors and 227 women in the comparison group recruited from April to July 2000, we added an incentive of $5 plus an additional $10, or a 1 in 960 chance of winning $1000 (arm C) to all recruitment conducted subsequent to July 2000.

For women who did not respond to the first letter, with Commission d'Accès à l'information du Québec and the Ethics Committee permission, we attempted contact by telephone with those women for whom a valid telephone number could be found. If no valid telephone number was available, we were authorized to send up to two reminder letters.

Data Collection

All data for this study came from single telephone interviews conducted by trained interviewers, who each contacted both survivors and women in the comparison group. The interview questions had been extensively pretested among both groups.

The interview included of two sets of questions (on work history and sociodemographics) that both groups of women were asked and a third set (breast cancer disease and management) that was asked of breast cancer survivors only. The first part of the interview obtained information on work history during the 3-year period, starting chronologically with the most recent job and ending with the job held in the period up to and including diagnosis (or similar period for women in the comparison group). For each job, job title *(29),* whether self-employed or not

(30), type of industry, and length of employment (measured by month and year of beginning and ending employment) were recorded. Women reporting two simultaneous jobs were asked to respond in relation to the job for which they worked the greatest number of hours. This method of ascertaining work history was adapted from one that was previously validated among Quebec women *(31).* More detailed information on working conditions was obtained for two key jobs: the job held at diagnosis (or similar period for women in the comparison group) and the job held at interview [or the most recent job for women not working at interview and, for these women, reasons for not working at interview *(30)*]. Information obtained about these two jobs included the average number of hours worked per week, whether the woman was a union member *(30),* whether the job involved overseeing other employees, and whether there was access to an employee support program. We also obtained information about whether the women held a second job simultaneously to the main job and, if so, the number of hours per week worked at the second job.

During the second part of the interview, information was collected about sociodemographic and personal characteristics, and health problems. For each health problem reported, the year of diagnosis and whether the problem was associated with any current limitation in activities were assessed. For health problems occurring before the study period and not limiting activities at the time of the interview, only those health problems meeting the criteria of important comorbid conditions as defined by Elixhauser et al. *(32),* i.e., a clinically significant condition influencing mortality or resource use in hospital, nonacute and not a side-effect of another disease, were considered in the analysis.

During the third part of the interview, information was obtained from breast cancer survivors about their stage at diagnosis and initial disease management *(33).* To establish whether survivors had developed metastatic disease and the timing of any disease recurrence during the 3-year interval between diagnosis and the study interview, survivors were also asked about any new problems related to breast cancer that had occurred after they completed their initial treatment and about any subsequent treatments they received for these problems. Because only breast cancer survivors answered these additional questions, interviews averaged a mean (± standard deviation) of 56 (±16) minutes for breast cancer survivors and 43 (±11) minutes for women in the comparison group.

Statistical Analysis

Because multiple steps were involved in contacting and recruiting participants for this population-based study, we used several approaches to assess the extent to which we had been successful in reaching and obtaining a representative sample of the targeted population. First, we compared key sociodemographic and work characteristics of women recruited before and after the introduction of monetary incentives. We found no substantial differences in key characteristics among women recruited before and after the introduction of monetary incentives (data not shown). This comparison was the basis for our decision to combine the data from both groups of women. Second, on the basis of groupings of postal codes according to Quebec's 18 health districts, we compared the distributions of areas of residence of all participants with similarly aged women from the Quebec population. Third, by using data from Statistics Canada, we compared women in our comparison group with similarly aged women from the general Quebec population on key work characteristics (i.e., hours worked per week; years of experience in the job; self-employed or not; membership in a union; having a second job and, if so, number of hours worked per week; and personal income) common to both data sets.

Because information on employment status was not available from either the Quebec Tumor Registry or the RAMQ, we had to estimate participation among employed women using information from the 1996 Canadian Census on proportions (in 5-year strata) of women employed for the age groups we studied. The census was appropriate for this estimation because it was taken at about the same time as the year of diagnosis for a subgroup of our population. We had to estimate participation to correct for the underestimation in participation that would have resulted had we simply calculated participation as the number of women who completed the interview divided by the number of all letters sent. Some proportion of women who did not respond to our letter were not employed and were therefore ineligible for the study. Thus, we applied the census information to adjust the denominator (letters sent to both employed and unemployed women) to what it would have been had we been able to contact only employed women, and we calculated participation using this adjusted denominator. Specifically, this adjustment was made by multiplying the number of letters sent by the estimated proportion of working women obtained from the census.

We used descriptive statistics to compare breast cancer survivors and women in the comparison group on sociodemographic characteristics, comorbidities, and working situation at the start of follow-up (i.e., at the time of diagnosis). When we had sufficient numbers of participants, outcomes were assessed separately for breast cancer survivors who remained disease free during follow-up and for those who experienced any new breast cancer event (local, regional, or distant recurrence, or a new primary breast cancer in the contralateral breast) during the same period.

The relationships between having had breast cancer and the risk of being unemployed 3 years later, the risk of being employed at a different job, and the risk of being retired were assessed using binomial regression [generalized linear regression (GLM) with a log link and binomial distribution for the error *(34)*]—an analysis similar to logistic regression but that provides a true relative risk rather than an odds ratio and that can be used only in cohort studies. The modifying effect of age and belonging to a union on these relationships was assessed using a stratified analysis. The possible confounding effects of comorbid conditions, living with a partner, years of experience in the job held at the start of follow-up, personal income, number of hours worked per week, job type (white or blue collar), belonging to a union, and sampling time were also assessed by calculating both a crude and a fully adjusted estimate of effect—the latter including all characteristics considered to be potentially confounding. If the crude and fully adjusted estimates differed by more than 10%, the fully adjusted estimate was considered to be the more valid. We then assessed the change in the fully adjusted estimate associated with deleting potential confounders one by one (starting with those that were least confounding in univariate analyses). This process continued as long as the deletion did not materially change the estimate relative to the fully adjusted estimate *(28).* As a consequence, the matching factor (age) and whether a women belonged to a union appeared to be the main confounders and were included in all models assessing the effect of breast cancer on the risk of being unemployed, of being employed in a different job, and of being retired. Crude and adjusted relative risks (RRs; with 95% confidence intervals [CIs]) are presented. The RR represents the risk among survivors divided by the risk among comparison women.

To compare the pattern of change in time of working conditions of breast cancer survivors and women in the comparison group, we also used binomial regression. To account for possible correlations between working conditions at the beginning of follow-up and 3 years later, we also used a generalized estimating equation *(34)*. This model permitted the simultaneous assessment of the following elements: the effect of time on working conditions, independent of group; the effect of group on working conditions, independent of time; and the interaction between time and group, which represents the difference in the pattern of change in working conditions over time for the two groups of women. This same model also provided the data to compare the working conditions of breast cancer survivors and women in the comparison group, at both the start and the end of follow-up, and changes in working conditions over time within each group. A different model was run for each working condition, and the confounding effects of age and belonging to a union were also assessed but did not materially change results. Thus, crude results are presented. Disease-free survivors and those with a new breast cancer event who were still working at the end of follow-up (n = 53) were combined for these analyses because of the small number of women with a new breast cancer event. Results were not substantially different when only disease-free survivors were considered (data not shown). All analyses were performed using the SAS software system (version 8, SAS Institute, Cary, NC). All statistical tests were two-sided.

RESULTS

Participation and Representativeness

We initially contacted 1504 and 2921 age-eligible breast cancer survivors and women in the comparison group, respectively, by letter. Of the contacted women, 1300 (86%) survivors and 2174 (74%) women in the comparison group returned their response form. Among women whose eligibility would be verified when telephoned (974 survivors and 1388 women in the comparison group), 674 (69%) survivors and 939 (68%) women in the comparison group were eligible. The telephone interview was completed by 646 (96%) survivors and 890 (95%) women in the comparison group. We also calculated overall participation among eligible women (i.e., women employed at the beginning of follow-up), using denominators adjusted with information from the 1996 Canadian Census. Our calculations yielded estimates of participation of 73% (646 of 885) among survivors and 51% (890 of 1745) among women in the comparison group.

Distributions of women from different regions across Quebec of survivors and women in the comparison group closely resembled those of the general female population of Quebec (Fig. 1). Working conditions of the women in the comparison group were representative of those of similarly aged women living in the province of Quebec (Table 1).

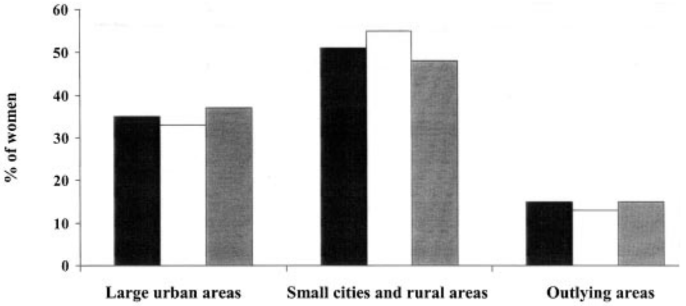

Fig. 1. Comparison of the distribution of breast cancer survivors and women in the population-based comparison group with that of the age-eligible female population of Québec, Canada, according to area of residence. **Black bars** = age-eligible women; **white bars** = participating survivors; **gray bars** = participating women in the comparison group. Large urban areas = Montréal and Québec; Small cities and rural areas = Mauricie, Estrie, Outaouais, Chaudière-Appalache, Laval, Lanaudière, Laurentides, Montérégie; Outlying areas = Bas St-Laurent, Saguenay, Abitibi, Côte-Nord, Nord du Québec, Gaspésie, Nunavik, Terres Cries.

Characteristics of Survivors and Women in the Comparison Group

Among the 646 breast cancer survivors, 79 women had a new breast cancer event during follow-up. Mean age at original diagnosis was 47 ± 7 years for disease-free survivors, 46 ± 7 years for survivors who had new breast cancer event, and 45 ± 8 years at the beginning of follow-up for women in the comparison group (Table 2). Among the survivors, all women had had surgery, with 83% reporting partial mastectomy. Most survivors (69%) had received two or more different types of adjuvant treatment.

Changes in Work Situation

At the start of follow-up, all women were employed. At the end of follow-up (i.e., 3 years after diagnosis for survivors or the same time period for women in the comparison group), 21% of survivors and 15% of women in the comparison group were not employed (adjusted RR of not being employed = 1.29; 95% CI = 1.05 to 1.59), 19% of survivors and 20% of women in the comparison group were still employed but at a job different than the one held 3 years earlier (adjusted RR of having a different job = 1.10; 95% CI = 0.90 to 1.35), and 11% of survivors and 8% of women in the comparison group had retired (adjusted RR of being retired = 1.14; 95% CI = 0.88 to 1.48) (Table 3). Age at retirement was similar for the two groups of women (mean age = 54 years). Findings were similar when we restricted the analysis to disease-free survivors only. However, among survivors who had new breast cancer events, 33% were unemployed (adjusted RR of not being employed = 2.11; 95% CI = 1.53 to 2.91), 13% were still employed but at a different job (adjusted RR of having a different job = 0.73; 95% CI = 0.40 to 1.31), and 11% were retired (adjusted RR of being retired = 1.16; 95% CI = 0.68 to 1.97).

In analyses stratified by age or by whether a woman belonged to a union, the only statistically significant difference between disease-free survivors and women in the comparison group was that a higher proportion of survivors aged 50–59 years were employed at the end of follow-up but at a different job (17% for survivors and 10% for comparison women, adjusted RR of having a different job = 1.79, 95% CI = 1.15 to 2.77). Among

Table 1. Working conditions of women in the comparison group and of women in the general population of Quebec, Canada, by age

	20–39 y		40–49 y		50–59 y	
Working conditions	Comparison group n = 217 %	Quebec women* n = 30 798 %	Comparison group n = 362 %	Quebec women n = 17 401 %	Comparison group n = 311 %	Quebec women n = 8 218 %
Hours worked/wk (mean ± SD)	35 ± 13	33 ± 11	34 ± 11	34 ± 11	33 ± 15	33 ± 12
Part-time job (<30 h/wk)	24	26	24	21	31	29
Years of experience, y						
<5	52	60	33	32	26	27
5–14	25	22	32	21	21	19
15–24	22	16	17	25	28	27
25–39	1	2	18	21	25	27
Self-employed	13	9	13	13	20	16
Belongs to a union	40	29	47	45	49	43
Second job	9	4	10	3	6	3
Hours at second job (mean ± SD)	12 ± 6	12 ± 9	15 ± 13	12 ± 7	10 ± 7	11 ± 7
Personal income						
< $20,000	35	48	32	34	39	44
$20,000–$29,999	27	28	33	30	23	27
$30,000–$39,999	22	15	16	18	17	14
$40,000–$49,999	9	6	13	11	10	7
≥ $50,000	7	3	7	7	11	7

*Derived from Statistics Canada data.

women not belonging to a union, a higher proportion of survivors than women in the comparison group were also employed at a different job, but this difference was not statistically significant (28% for survivors and 25% for comparison women, adjusted RR of having a different job = 1.27, 95% CI = 0.99 to 1.64).

Reasons for Stopping Work

By the end of follow-up, 131 women in the comparison group, 113 disease-free survivors, and 26 survivors with new cancer events were unemployed. Most women who stopped working said that the decision to do so was their own (86% of unemployed disease-free survivors, 79% of unemployed survivors who had new cancer events, and 76% of unemployed women in the comparison group). Survivors were more likely than women in the comparison group to report that they now valued work less than they did 3 years earlier (42% of survivors and 26% of comparison women, $P<.001$). Among women who were unemployed but not retired at the end of follow-up, reasons given for being unemployed were health-related (47% of disease-free survivors, 53% of survivors who had new cancer events, and 18% of women in the comparison group), personal non-health-related reasons (5%, 1%, and 16%, respectively), and work-related reasons (47%, 40%, and 54%, respectively). Among the work-related reasons, most women had been either laid off temporarily or quit because they found their jobs too difficult or unsatisfying.

Having been fired or quitting a job because of problems with colleagues or supervisors was a rare event among all participants, occurring among 10 (1.5%) survivors and 14 (1.6%) women in the comparison group. Four (0.6%) survivors reported having been fired and six (1%) survivors reported quitting their job because of problems with colleagues or supervisors. Six (0.6%) women in the comparison group reported having been fired and nine (1%) women reported quitting their job because of problems with colleagues or supervisors. In both groups, the majority of women reporting these situations had been able to find a new job (seven of 10 survivors and 11 of 14 women in the comparison group).

Changes in Working Conditions

Among women employed at interview, the working conditions of all survivors and women in the comparison group were mostly unchanged over time (Table 4). At start of follow-up, compared with women in the comparison group, survivors worked 1.7 more hours per week at their main job, earned more money (41% earned $30,000 or more per year, versus 34% among women in the comparison group), and fewer had a second job (5%, versus 10% among women in the comparison group). The number of hours worked per week decreased during follow-up by an average of 1.8 hours to 33.4 hours per week among survivors and increased by 0.8 hours to 34.3 hours per week for women in the comparison group. The proportion of survivors with a second job when interviewed had increased from 5% to 7%, whereas that among women in the comparison group had decreased from 10% to 7%. The proportion of survivors working part-time increased during follow-up from 21% to 25%, a statistically nonsignificant increase; there was no change in the proportion of part-time workers among women in the comparison group. The proportion of women earning more than $30,000 per year underwent similar statistically significant increases in both groups of women. At the end of follow-up, there were therefore no statistically significant differences in the overall working conditions between the two groups of women, even after adjusting for age and belonging to a union.

DISCUSSION

This population-based, retrospective cohort study compared the work experience of women during the 3 years after diagnosis of incident breast cancer with the work experience of similarly

Table 2. Sociodemographic and work characteristics of breast cancer survivors and women in the population-based comparison group at the start of follow-up, and survivor treatment and prognostic characteristics*

	Women in the comparison group n = 890		Disease-free survivors n = 567		Survivors with NBCE n = 79	
Characteristics	%	(n)	%	(n)	%	(n)
Sociodemographic characteristics						
Age, y						
18–39	24	(217)	14	(81)	15	(12)
40–49	41	(362)	44	(248)	49	(39)
50–59	35	(311)	42	(238)	35	(28)
Mean ± SD, y	45 ± 8		47 ± 7		46 ± 7	
Civil status						
Married	57	(510)	55	(310)	47	(37)
Separated, divorced, widowed	23	(204)	27	(151)	33	(26)
Single	20	(176)	19	(106)	20	(16)
Education level						
High school or less	44	(391)	43	(248)	39	(31)
Collegial level	28	(246)	27	(151)	30	(24)
Some university or more	28	(253)	30	(168)	30	(24)
Lives with a partner	77	(685)	71	(404)	67	(53)
Partner's education						
High school or less	52	(354)	50	(202)	51	(27)
Collegial level	23	(159)	20	(80)	25	(13)
Some university or more	25	(169)	29	(120)	23	(12)
Unknown	1	(3)	1	(2)	2	(1)
Personal income						
< $20,000	39	(352)	35	(198)	35	(28)
$20,000–$29,999	25	(224)	25	(139)	28	(22)
$30,000–$39,999	16	(139)	18	(103)	18	(14)
$40,000–$49,999	10	(85)	11	(61)	8	(6)
≥ $50,000	8	(68)	9	(52)	10	(8)
No answer	2	(22)	2	(14)	1	(1)
General health						
No. of medical problems that limit activities among arthritis, diabetes, high blood pressure, cardiovascular disease						
0	94	(833)	92	(519)	89	(70)
1	6	(49)	7	(42)	10	(8)
2–3	1	(8)	1	(6)	1	(1)
No. of any other condition diagnosed during the study period that limits activities						
0	92	(821)	92	(520)	90	(71)
1	7	(59)	6	(36)	5	(4)
2–3	1	(10)	2	(11)	5	(4)
Work characteristics						
Hours worked per week (mean ± SD)	34 ± 11		35 ± 11		35 ± 14	
Part-time job (< 30 h/wk)	27	(237)	24	(132)	20	(16)
Self-employed	16	(141)	15	(86)	21	(17)
White collar job	78	(691)	79	(450)	75	(59)
Belongs to a union	46	(346)	51	(247)	63	(39)
Seasonal job	7	(66)	5	(31)	4	(3)
Job involved employee supervision	21	(186)	24	(134)	23	(18)
Second job	9	(77)	4	(23)	6	(5)
Hours worked per week at second job (mean ± SD)	13 ± 10		15 ± 9		26 ± 13	
Years of experience in the job held at start of follow-up						
<5	35	(312)	31	(176)	30	(24)
5–14	40	(359)	38	(215)	29	(23)
15–39	25	(218)	31	(176)	41	(32)
Treatment and prognosis (survivors only)						
First treatment undergone						
Breast surgery and/or axillary dissection	—	—	95	(537)	94	(74)
Neo-adjuvant chemotherapy	—	—	5	(30)	6	(5)
Partial mastectomy	—	—	84	(476)	72	(57)
Axillary dissection	—	—	86	(487)	90	(71)

(Table continues)

Table 2. (continued).

Characteristics	Women in the comparison group n = 890 %	(n)	Disease-free survivors n = 567 %	(n)	Survivors with NBCE n = 79 %	(n)
No. invaded axillary nodes at diagnosis						
0	—	—	63	(308)	50	(35)
≥1	—	—	35	(169)	49	(34)
Unknown	—	—	2	(10)	1	(1)
Radiotherapy	—	—	82	(467)	72	(57)
Chemotherapy	—	—	56	(320)	59	(47)
Hormone therapy	—	—	50	(281)	37	(29)
No. types of different adjuvant treatments undergone among radiotherapy, chemotherapy, and hormone therapy						
0	—	—	4	(25)	9	(7)
1	—	—	25	(144)	34	(27)
2	—	—	47	(270)	37	(29)
3	—	—	23	(128)	20	(16)

*Percentages may not add to 100% because of rounding. NBCE = new breast cancer event; SD = standard deviation.

aged women who had never had cancer. The study was restricted to women younger than 60 years of age who were employed at the start of follow-up. We found that the majority of breast cancer survivors were still employed 3 years after diagnosis. In addition, we found that the working conditions and the proportions of women who had retired were similar among survivors and women in the population-based comparison group. Although the proportion of women who reduced work effort during follow-up was slightly higher for survivors than for women in the comparison group, the decision to do so appeared to be the woman's own. Negative events, such as being fired or leaving work because of problems with colleagues or supervisors, were rare among either group of women. Our findings that a high proportion of women were still employed after being diagnosed and treated for breast cancer and that a slightly higher proportion of breast cancer survivors were not employed after 3 years compared with similarly aged women without cancer *(19)* are in agreement with findings from other North American studies *(19,21–23,26)*.

This study makes several novel contributions. First, because we compared breast cancer survivors with similarly aged women without cancer (and without the social consequences of a cancer diagnosis) who worked during the same period as the survivors' diagnoses and who were subject to similar labor market forces, we isolated the effect of having breast cancer and could determine whether changes in work situation among survivors were specifically associated with their having had breast cancer. Second, in our analyses we considered a number of key work characteristics of both survivors and women in the comparison group in the period just before the survivors' diagnosis. With one exception *(22),* these prediagnosis work characteristics have not been accounted for in previous studies. Third, because this study is population-based rather than based on a small or selected sample, we contribute information about women from all socioeconomic strata and from urban, suburban, and rural areas in a province of approximately 7.4 million people, representing almost one quarter of the population of Canada. Fourth, this population-based study on work experience after cancer is the first, to our knowledge, to be conducted in a country in which health insurance coverage is not linked to labor force participation. As a consequence, our study provides valuable new understanding of the natural history of labor force participation in the initial years after a breast cancer diagnosis in the absence of having to keep a job simply to maintain health insurance coverage.

We also found no evidence to support the idea that women who had disease recurrence experienced discrimination in the workplace. Although women with a new breast cancer event were more likely than women in the comparison group to be unemployed 3 years later, they were not more likely to report involuntary changes in employment status. It may not be surprising that a proportion of women who experience new breast cancer events no longer work if they have to cope with new treatments and uncertainty about the future. However, the decision to stop working among these women, as among disease-free survivors, was, for the majority, the women's own decision.

Overall, older age did not negatively affect the work situation after breast cancer. Our results suggest that women with breast cancer did not retire because of their disease any earlier than women without breast cancer. This finding may reflect the fact that cancer occurred at a time in the woman's life when she was already thinking about retirement or about working less *(18).* The observation that, among women aged 50–59 years, a greater proportion of disease-free survivors than women in the comparison group had left the job they held at diagnosis could be interpreted as a poor labor market outcome. However, a closer look at the 41 survivors in that age group does not suggest such an outcome. The majority of the women in this group reported that the decision to change jobs was their own and was not imposed by the employer. Among women for whom the job change was imposed by the employer, the most frequently cited reason was a shortage of work, and with one exception, all these women maintained the same income level in their subsequent position. Thus, our results, obtained from women who were working when diagnosed and whose basic health insurance coverage was independent of employment, differ from previous studies *(8,12,14,16,35)* in that they provide little support for the

Table 3. Crude and adjusted relative risks (RRs) for work situation among breast cancer survivors and women in the comparison group, 3 years after the survivors' diagnosis or follow-up (or similar period for women in the comparison group).

	%	(n)	RR_{crude}	95% CI	$RR_{adjusted}$*	95% CI
Unemployed						
Women in the comparison group†	15	(131)	1.00	(Referent)	1.00	(Referent)
All survivors‡	21	(139)	1.46	(1.18 to 1.81)	1.29	(1.05 to 1.59)
Disease-free survivors§	20	(113)	1.35	(1.08 to 1.70)	1.19	(0.96 to 1.48)
Survivors with NBCE‖	33	(26)	2.24	(1.57 to 3.18)	2.11	(1.53 to 2.91)
Employed at a different job						
Women in the comparison group	20	(175)	1.00	(Referent)	1.00	(Referent)
All survivors	19	(125)	0.98	(0.80 to 1.21)	1.10	(0.90 to 1.35)
Disease-free survivors	20	(115)	1.03	(0.84 to 1.27)	1.15	(0.94 to 1.41)
Survivors with NBCE	13	(10)	0.64	(0.36 to 1.17)	0.73	(0.40 to 1.31)
Retired during study period¶						
Women in the comparison group	8	(67)	1.00	(Referent)	1.00	(Referent)
All survivors	11	(70)	1.44	(1.05 to 1.98)	1.14	(0.88 to 1.48)
Disease-free survivors	11	(61)	1.43	(1.03 to 1.99)	1.14	(0.87 to 1.49)
Survivors with NBCE	11	(9)	1.51	(0.78 to 2.92)	1.16	(0.68 to 1.97)

*Adjusted for age (<40, 40–49, ≥50 years) and being in a union (yes, no, self-employed worker). CI = confidence interval.

†n = 890 women in the comparison group.

‡n = 646 breast cancer survivors.

§n = 567 disease-free survivors.

‖n = 79 survivors with any new breast cancer event (NBCE)

¶Adjusted for age in two categories only (<50, ≥50 years) because no women aged <40 years had retired.

idea that breast cancer survivors who were in the labor market when diagnosed have more difficulty finding a new job.

Our findings also do not support the notion that survivors who return to work after breast cancer diagnosis and treatments experience poorer working conditions than they experienced before being diagnosed *(12,14,16)*. Survivors in our study earned more before and 3 years after their diagnosis than women in the comparison group. Greater earnings postdiagnosis have also been reported previously for American breast cancer survivors *(19)*. The increased proportion of survivors working part-time at the end of follow-up, combined with a possible tendency for more survivors to have a second job, could indicate deterioration in working conditions, and thus a negative work outcome. However, some additional observations lead us to believe this may not be the case. First, the mean personal income of survivors as a group was still higher than that of women in the comparison group. Second, most survivors who had changed to part-time work at the end of follow-up had kept the same job. Thus, their working part-time might reflect a personal decision to work fewer hours and supports the observation that a substantial proportion of survivors accorded less value to work than they had done 3 years earlier.

Our study could potentially be subject to selection bias. However, despite multiple steps involved in identifying, con-

Table 4. Working conditions of breast cancer survivors and women in the comparison group among those employed at the end of follow-up only: comparisons between groups and over time

	Survivors						Women in the comparison group						Difference in pattern of change over time*	
	Start of follow-up n = 507		3 years later n = 507		Change in time		Start of follow-up n = 759		3 years later n = 759		Change in time			
Working conditions	%	n	%	n	%	*P* value	%	n	%	n	%	*P* value	Absolute difference in change†	*P* value
Hours worked per week (mean ± SD)	35.2 ± 11		33.4 ± 12		−1.8	.001	33.5 ± 11		34.3 ± 12		+0.8	.04	2.6	<.001
Part-time job (<30 h/wk)	21	(107)	25	(128)	+4	.06	27	(202)	27	(207)	0	.71	4	.15
Self-employed	17	(85)	17	(84)	0	.83	17	(127)	17	(126)	0	.85	0	.95
White collar job	80	(408)	79	(403)	−1	.17	79	(596)	79	(599)	0	.63	1	.18
Belongs to a union‡	50	(211)	50	(211)	0	.86	45	(286)	46	(288)	+1	.74	1	.72
Seasonal job	5	(26)	5	(26)	0	1.00	7	(50)	6	(43)	−1	.16	1	.37
Job involves employee supervision	23	(116)	23	(118)	0	1.00	21	(159)	23	(173)	+2	.20	2	.42
Second job	5	(25)	7	(34)	+2	.14	10	(73)	7	(52)	−3	.01	5	.008
Hours worked per week at second job (mean ± SD)	17.7 ± 9		11.8 ± 10		−5.9	.01	12.4 ± 8		10.7 ± 7		−1.7	.20	4.2	.11
Personal annual income ≥$30,000	41	(202)	45	(222)	+4	.01	34	(250)	40	(299)	+6	<.001	2	.10

*Assessed using the interaction term representing the difference in the pattern of change in time between survivors and women in the comparison group.

†Absolute difference in the pattern of change between survivors and women in the comparison group.

‡Self-employed women excluded. Percentages were derived using 422 survivors and 632 women in the comparison group.

tacting, and recruiting participants for our population-based study, several observations provide reassurance that there seem to be no systematic differences between participants and those we intended to recruit. First, recruitment procedures appear to have been successful in netting participants theoretically targeted in all areas of Quebec. Second, the treatment and prognostic characteristics of the breast cancer survivors in this study were as expected for a group of newly diagnosed women in Quebec, suggesting that this group of survivors was not unusual. Third, although participation among women in the comparison group was modest, at 51%, key working conditions of the women in the comparison group were similar to those of working women in the province of Quebec. Fourth, although there is a possibility of selection bias if women who experienced problems at work were also more inclined to participate in this study, the small and similar numbers of women, regardless of group and disease status, who reported involuntary job termination suggest that this was not the case.

We also took several steps to limit the potential for information bias. The assessment of work experience was based on a method validated among Quebec women *(31)*. Questions were ordered so that women could establish a chronology of events—a technique that is known to aid recall *(36,37)*. Interviews were worded identically for both survivors and women in the comparison group, with the exception of the third and final interview section. Finally, our results could not be explained by the large variety of potential confounding characteristics (including working conditions at beginning of follow-up, comorbidities, and sociodemographics characteristics) assessed in the analyses.

We believe that our results on the working experience of women with breast cancer are likely to be representative of those among an unselected series of women with newly diagnosed breast cancer who are working when diagnosed, who receive current multimodal treatment (surgery and adjuvant therapies), who obtain health care and insurance as part of a universal plan independent of employment status, and among whom a small proportion would experience new events related to breast cancer in the first 3 years after diagnosis. At the societal level, our results are also likely relevant to other countries having laws, similar to those in Canada *(9,10)* and the United States *(11)*, that protect workers from unjustified job cessation and employment discrimination because of handicap or health state.

Finally, information from this study may help health professionals counsel working women about the type of changes that can occur after breast cancer. Although we found a greater proportion of survivors unemployed 3 years after diagnosis, particularly among survivors who experienced new breast cancer events, we also found that survivors themselves decided to stop working rather than reporting involuntary changes coming from the employer. Survivors also attached less value to work after diagnosis. These results are reasonable considering that confronting any important or life-threatening illness can result in a reordering of life priorities. Nonetheless, we recognize that individual women may find the return to work after breast cancer difficult and may attribute work problems or the personal decision to reduce work effort to the fact of having had breast cancer *(12)*. On a population basis, however, we found little evidence to support the idea of involuntary changes in work situation because of breast cancer in Quebec. Thus, we believe that these results should provide some reassurance for working women who have just been diagnosed with breast cancer, especially women who are part of health and social systems similar to those in Canada.

REFERENCES

(1) Batt S. Patient no more: the politics of breast cancer. Charlottetown: Gynergy Books; 1994.

(2) Anderson NB, Armstead CA. Toward understanding the association of socioeconomic status and health: a new challenge for the biopsychosocial approach. Psychosom Med 1995;57:213–25.

(3) Federal provincial and territorial advisory committee on population health. Strategies for population health: investing in the health of Canadians. Canada: Minister of Supply and Services; 1994.

(4) Van der Wouden J, Greaves-Otte J, Greaves J, Kruyt P, Van Leeuwen O, Van der Does E. Occupational reintegration of long-term cancer survivors. J Occup Med 1992;34:1084–9.

(5) Clark JC, Landis LL. Reintegration and maintenance of employees with breast cancer in the workplace. AAOHN J 1989;37:186–93.

(6) Holland J. Special problems of cancer patients returning to work. Trans Assoc Life Insur Med Dir Am 1986;69:87–94.

(7) Kagawa-Singer M. Redefining health: living with cancer. Soc Sci Med 1993;37:295–304.

(8) Mellette SJ. The cancer patient at work. CA Cancer J Clin 1985;35:360–73.

(9) Canadian Human Rights Commission. Canadian Human Rights Act. Available at: http://www.chrc-ccdp.ca. [Last accessed: August 2004.]

(10) Commission des droits de la personne et des droits de la jeunesse. Article 10 Charte des droits et libertés de la personne. Available at: http://www.cdpdj.qc.ca. Accessed: 2004.

(11) United States Department of Justice. American with Disabilities Act. Available at: http://www.usdoj.gov. [Last accessed: August 2004.]

(12) Maunsell E, Brisson C, Dubois L, Lauzier S, Fraser A. Work problems after breast cancer: an exploratory qualitative study. Psycho-Oncology 1999;8:467–73.

(13) Feldman F. Work and cancer health histories. A study of the experience of recovered patients. San Francisco: American Cancer Society, California Division; 1976.

(14) Feldman FL. Work and cancer health histories. A study of the experience of recovered blue-collar workers. San Francisco: American Cancer Society, California Division; 1978.

(15) Feldman FL. Female cancer patients and caregivers: experiences in the workplace. Women Health 1986;11:137–53.

(16) Feldman F. Inquiries into work experiences of recovered cancer patients: the California experience. In: Barofsky I, editor. Work and illness: the cancer patient. New York: Praeger; 1989. p. 25–47.

(17) Langlois S, Baillargeon JP, Caldwell G, Fréchet G, Gauthier M, Simard JP. La société québécoise en tendances 1960–1990. Québec: Diffusion Prologue, Institut québécois de la recherche sur la culture; 1991. p. 143–7.

(18) Chirikos TN. Economic impact of the growing population of breast cancer survivors. Cancer Control 2001;8:177–83.

(19) Bradley CJ, Bednarek HL, Neumark D. Breast cancer and women's labor supply. Health Serv Res 2002;37:1309–28.

(20) Bradley CJ, Bednarek HL. Employment patterns of long-term cancer survivors. Psycho-Oncology 2002;11:188–98.

(21) Satariano WA, DeLorenze GN. The likelihood of returning to work after breast cancer. Public Health Rep 1996;111:236–41.

(22) Bushunow PW, Sun Y, Raubertas RF, Rosenthal S. Adjuvant chemotherapy does not affect employment in patients with early-stage breast cancer. J Gen Intern Med 1995;10:73–6.

(23) Ganz PA, Coscarelli A, Fred C, Kahn B, Polinsky ML, Petersen L. Breast cancer survivors: psychosocial concerns and quality of life. Breast Cancer Res Treat 1996;38:183–99.

(24) Stewart DE, Cheung AM, Duff S, Wong F, McQuestion M, Cheng T, et al. Long-term breast cancer survivors: confidentiality, disclosure, effects on work and insurance. Psycho-Oncology 2001;10:259–63.

(25) Schultz PN, Beck ML, Stava C, Sellin RV. Cancer survivors. Work related issues. AAOHN J 2002;50:220–6.

(26) Bloom JR, Stewart SL, Chang S, Banks PJ. Then and now: quality of life of young breast cancer survivors. Psycho-Oncology 2004;13:147–60.

(27) Ehrmann-Feldmann D, Spitzer WO, Del Greco L, Desmeules L. Perceived discrimination against cured cancer patients in the work force. CMAJ 1987;136:719–23.

(28) Rothman KJ. Epidemiology: an introduction. New York: Oxford University Press; 2002.

(29) Ministère de la main-d'oeuvre et de l'immigration. Classification canadienne descriptive des professions: guide annuel. Ottawa: Information Canada; 1988.

(30) Dibbs R, Lutz D, Kaminsky B. "Questionnaire" de l'interview sur le travail—janvier 1997. Available at: http://www.statcan.ca. [Last accessed: September 2004.]

(31) Brisson C, Vezina M, Bernard PM, Gingras S. Validity of occupational histories obtained by interview with female workers. Am J Ind Med 1991;19:523–30.

(32) Elixhauser A, Steiner C, Harris DR, Coffey RM. Comorbidity measures for use with administrative data. Med Care 1998;36:8–27.

(33) Maunsell E, Drolet M, Ouhoummane N, Robert J. Breast cancer survivors accurately reported key treatment and prognostic characteristics. J Clin Epidemiol. In press.

(34) Skov T, Deddens J, Petersen MR, Endahl L. Prevalence proportion ratios: estimation and hypothesis testing. Int J Epidemiol 1998;27:91–5.

(35) Rothstein MA, Kennedy K, Ritchie KJ, Pyle K. Are cancer patients subject to employment discrimination? Oncology (Huntingt) 1995;9:1303–6.

(36) Foddy W. Constructing questions for interviews and questionnaires. Cambridge: Cambridge University Press; 1993.

(37) Sudman S, Bradburn N, Schwarz N. Thinking about answers: the application of cognitive processes to survey methodology. San Francisco: Jossey-Bass; 1996.

NOTES

Financial support for this study was provided by research grants from the Canadian Breast Cancer Research Alliance (CBCRA) and the Fondation Québécoise du Cancer. E. Maunsell and C. Brisson were National Health Research and Development Program (NHRDP) National Health Research Scholars at the time this work was originally planned and funded, and are (E. Maunsell) or were (C. Brisson) Investigators of the Canadian Institutes of Health Research (CIHR). M. Drolet holds a Ph.D. Fellowship Award from the Fonds de Recherche en Santé du Québec (FRSQ).

We recognize Ninon Bourque (deceased), B.A., Director General of Communications, Department of Fisheries and Oceans, Ottawa and founding member of the Canadian Breast Cancer Network, for her invaluable contribution as part of the investigator group that planned and obtained funding for this study. We thank the women who so generously gave their time to participate in the study. We are also grateful to Johanne Labbé for her work on study coordination, to interviewers France Blanchet, Manon Desgagné, Louise Gagné, Sylvie Pelletier, Nancy Perron, and Julie Turcotte and to Myrto Mondor and Eric Demers for contributions to data preparation, statistical analyses, and data presentation.

Manuscript received June 10, 2004; revised September 27, 2004; accepted October 11, 2004.