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# Assessment of Medical and Public Assistance Expenditures and Employment Among US Adults With Cancer Diagnoses

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## Abstract

**IMPORTANCE** Prior research suggests significant social value associated with increased longevity due to preventing and treating cancer. Other social costs associated with cancer, such as unemployment, public medical spending, and public assistance, may also be sizable.

**OBJECTIVE** To examine whether a cancer history is associated with receipt of disability insurance, income, employment, and medical spending.

**DESIGN, SETTING, AND PARTICIPANTS** This cross-sectional study used data from the Medical Expenditure Panel Study (MEPS) (2010-2016) for a nationally representative sample of US adults aged 50 to 79 years. Data were analyzed from December 2021 to March 2023.

**EXPOSURE** Cancer history.

**MAIN OUTCOMES AND MEASURES** The main outcomes were employment, public assistance receipt, disability, and medical expenditures. Variables for race, ethnicity, and age were used as controls. A series of multivariate regression models were used to assess the immediate and 2-year association of a cancer history with disability, income, employment, and medical spending.

**RESULTS** Of 39 439 unique MEPS respondents included in the study, 52% were female, and the mean (SD) age was 61.44 (8.32) years; 12% of respondents had a history of cancer. Individuals with a cancer history who were aged 50 to 64 years were 9.80 (95% CI, 7.35-12.25) percentage points more likely to have a work-limiting disability and were 9.08 (95% CI, 6.22-11.94) percentage points less likely to be employed compared with individuals in the same age group without a history of cancer. Nationally, cancer accounted for 505 768 fewer employed individuals in the population aged 50 to 64 years. A cancer history was also associated with an increase of $2722 (95% CI, $2131-$3313) in medical spending, $6460 (95% CI, $5254-$7667) in public medical spending, and $515 (95% CI, $337-$692) in other public assistance spending.

**CONCLUSIONS AND RELEVANCE** In this cross-sectional study, a history of cancer was associated with increased likelihood of disability, higher medical spending, and decreased likelihood of employment. These findings suggest there may be gains beyond increased longevity if cancer can be detected and treated earlier.


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## Key Points

**Question** Is a cancer history associated with the receipt of disability insurance, income, employment, and medical spending in the US?

**Findings** In this cross-sectional study of 39 439 respondents to the Medical Expenditure Panel Study, cancer survivors had a lower likelihood of employment and a greater likelihood of a work-limiting disability compared with respondents without a history of cancer. Cancer accounted for 505 768 fewer employed individuals in the population aged 50 to 64 years and was associated with significantly higher medical and public assistance expenditures.

**Meaning** In this study, cancer history was associated with increased likelihood of disability and decreased likelihood of employment.

+ Supplemental content

Author affiliations and article information are listed at the end of this article.

## Introduction

In 1971, President Richard Nixon signed the National Cancer Act, signifying the beginning of the war on cancer. At that time, cancer was the second leading cause of death in the US. It remains so today with an estimated 606 520 US individuals dying of cancer in 2020.[1] As a result, President Joseph Biden launched the Cancer Moonshot with the mission of reducing cancer mortality by at least one-half and improving the experience of individuals living with and surviving cancer.[2]

Over the past 50 years, various innovations have been developed to treat a range of different cancers. A key policy issue is whether these cancer treatments offer value given their high cost. Some critics have argued that certain cancer treatments have not been cost-effective. That is, some of these treatments marginally prolong life at a high cost.[3] However, other studies have pointed to the increase in cancer survival over the past 2 decades, particularly for breast cancer, colon cancer, and non-Hodgkin lymphoma.[4-6] Some of this increase has been associated with earlier cancer screening, while some has been associated with innovations in treatment.[7]

The prior cancer literature has predominantly focused on the gains associated with increased longevity due to preventing and treating cancer.[8] However, there may be other gains beyond longevity if cancer can be detected and treated earlier. For example, if earlier detection or more effective treatment improves a patient's eventual health outcome, economic outcomes like income or employment might improve too.[9-11] There remains an unmet need for improved economic outcomes among patients with cancer. Studies[12] have found that cancer survivors are less likely to be employed and more likely to be receiving sick leave or disability assistance. A 2009 meta-analysis of 36 studies found that cancer survivors had roughly double the probability of being unemployed compared with those without a history of cancer.[12] Earnings may also decrease, with one estimate indicating that cancer survivors had 10% lower earnings in the 3 years following their cancer diagnosis.[13] A US study found that a cancer diagnosis was associated with reductions in the probability of work by 10%, in individual earnings by 40% after 2 years, and in family earnings by 20%, although family earnings recovered more over time.[14] Similarly, a US study found that severe health shocks, including incident cancer, had negative downstream consequences for household income and wealth.[10]

Medical costs are another large social cost associated with cancer. In 2020, the national cancer-attributed medical care costs in the US were estimated at $208.9 billion.[15] In the year after cancer diagnosis, individuals (and their insurers) faced costs of nearly $16 000, including both medical spending and estimated lost wages from a reduced likelihood of working and increased days of work missed.[16] Importantly, the largest source of expenditures for patients with cancer is Medicare, with spending of $8000 to $10 000 per patient with cancer aged 65 years or older.[17] Thus, cancer is associated with an especially large burden on government budgets relative to other funding sources.

Cancer can lead to increased spending on disability insurance that typically occurs during later stage cancers. As of 2019, roughly 300 000 US individuals were receiving benefits through the Social Security Disability Insurance or Supplemental Security Income programs because of a neoplasm.[18] Although the specific cost of the program for these recipients is unclear, they make up roughly 3% of all recipients, and total spending in 2019 on these programs was $200 billion dollars, suggesting that annual disability costs associated with cancer are in the billions.[18,19] In this study, we sought to examine whether a history of cancer is associated with income, employment, medical spending, and the receipt of disability insurance.

## Methods

This cross-sectional study used Integrated Public Use Microdata Series (IPUMS) data from the Medical Expenditure Panel Study (MEPS), focusing on 2010 to 2016. The sample was restricted to adults aged 50 to 79 years. MEPS is a panel study conducted over a 2-year period, in which each respondent participates in 2 waves. It collects basic demographic, economic, and health information,

with the survey instruments designed to gather information on annual medical expenditures in each of the respondent's 2 years of participation. This study was deemed to be exempt from review by the Harvard Medical School institutional review board; informed consent was not obtained because the study involved the secondary analysis of existing data. We followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guideline for cross-sectional studies.

Our main analysis used a MEPS question asked of each respondent in 2 waves for respondents beginning before 2016, roughly a year apart, about whether they had ever been diagnosed with cancer. For those who had been diagnosed with cancer, the MEPS also collected data on the type of cancer, breaking it into 12 categories. Our primary measure of reported cancer history was defined as listing any type of past cancer diagnosis other than nonmelanoma skin cancers. We examined several outcome measures, including employment and income, public assistance and Supplemental Nutrition Assistance Program (SNAP) receipt, disability, and medical expenditures.

Employment was defined as having been employed during the reference period for the current survey wave. People who did not work were then asked why; the reason was used to define our disability measure, including those who reported that they did not work during the reference period due to illness or disability. MEPS asked about annual income in each year that the person was in the survey. We used this question to define our measures of earnings and public assistance income. Individual earnings were collected directly as a category for wage and salary income, while public assistance income was defined as the sum of unemployment benefits, supplemental security income, income from other welfare programs (eg, Temporary Assistance for Needy Families), and Social Security income (which was collected as a combined measure for disability and older-age benefits) for those younger than 62 years (or <65 years if they listed having a disability that prevented work). Individuals were also asked whether they received SNAP benefits during the reference period.

Lastly, we used aggregated annual medical expenditure variables from IPUMS MEPS. The measures of annual expenditures for different payer groups (eg, out of pocket, private insurance, and Medicare) are a mix of self-reported and validated responses. People are asked about their medical care use and spending across a broad suite of procedures and medications. Then MEPS follows up with insurers and health care practitioners to get information on expenditures. In terms of accuracy, MEPS has been found to underestimate total medical spending compared with aggregate national health accounts data.[20] However, after adjusting for the population and services included, the underestimate is smaller. Compared with health expenditure measures from the Bureau of Labor Statistics consumer expenditure survey, the MEPS captures more spending.[21] We created both total medical spending and public medical spending variables. The public medical spending measure included Medicare, Medicaid, Veterans Health Administration, Tricare, and 3 other public variables (for other federal, state, and unidentified public expenditures).

We also used variables for race, ethnicity, and age as controls because gradients in cancer prevalence exist across all 3 measures. The race and ethnicity measures were self-reported, with categories reported as in IPUMS MEPS data with 3 exceptions: we reported Hispanic ethnicity separately from non-Hispanic racial groups, combined the Asian and Pacific Islander categories, and combined all multiracial groups into 1 category. These categorizations were primarily made for simplifying the presentation and because several groups had small sample sizes. The resulting categories were Asian or Pacific Islander, Black, Hispanic, Native American or Alaska Native, White, and multiracial.

## Statistical Analysis

Data were analyzed from December 2021 to March 2023. To estimate the association between cancer history and the aforementioned outcomes, we ran a set of regressions with the calculation

$$Y_i = \alpha + (\beta \times EverCancer_i) + (\delta \times X_i) + \epsilon_i,$$

where $Y_i$ is the outcome; $\alpha$ is the intercept; $\beta$ is the coefficient of interest; $EverCancer_i$ is the variable for whether the respondent had ever been diagnosed with cancer; $\delta \times X_i$ is the vector of race,

ethnicity, age, and age-squared controls; and $\epsilon_i$ is the error term. As suggested when using the MEPS, we used the svyset command in Stata, version 15 (StataCorp LLC) to estimate our regression models. This allowed us to incorporate the survey weights, multiple waves, and sampling structure. Using the weights constructed by MEPS, we were able to generate national estimates of the number of people with a reported cancer history by adding together their weights. We then estimated the national costs associated with reported cancer history by multiplying the coefficients on cancer report by the sum for the corresponding sample age range (50-64 years, 50-79 years).

For binary outcomes, we estimated a linear probability model to facilitate interpretation of the coefficient estimates. These results were robust to those generated from a logistic regression model. For the expenditure outcomes, we estimated 2-part models to account for the skewed nature of health care spending using the twopm command in Stata.[22] The first stage was estimated using a probit model, whereas the second stage was estimated using ordinary least squares. We combined the 2 stages and presented the overall marginal effects and SEs generated using the delta method.

Additionally, the longitudinal nature of the MEPS allowed us to separate the immediate and longer-term associations of cancer history with the outcomes. Because some individuals who entered the survey before 2016 were diagnosed between the first and second time that they were asked about their cancer status, we examined the association of cancer with the outcomes within individuals over time. In this model, we demeaned all variables by calculating the person-level mean and then subtracting the round-specific values from that mean. We then estimated the aforementioned model without the race and ethnicity controls, as these were only collected once and were thus time invariant. All variables except employment and disability were collected as annual measures (income and expenditures) or were collected only once per year (cancer, SNAP). The employment outcomes were collected in each round, so these were mapped to the year in which the first report of cancer occurred. Our estimation approach was mathematically equivalent to including individual fixed effects in the regression model. That is, the model estimated the mean 1-year difference in outcomes before and after a person's cancer diagnosis compared with the 1-year difference in outcomes for other individuals who had not been diagnosed with cancer within that past year. Finally, we estimated models that relied only on data from each respondent's second year in the survey; this allowed us to separately analyze the incidence of cancers that were diagnosed within the past year and cancers that were diagnosed more than a year earlier. Two-sided $P < .05$ was considered significant.

## Results

Of 39 439 unique MEPS respondents included in the study, 52% were female and 48% were male; the mean (SD) age was 61.44 (8.32) years (**Table 1**). A total of 5% of individuals were Asian or Pacific Islander; 11%, Black; 10%, Hispanic; 1% Native American or Alaska Native; 73%, White; and 1%, multiracial. A total of 12% of respondents had a prior cancer diagnosis excluding nonmelanoma skin cancers. National estimates of the number of people with a reported cancer history were 5.7 million people aged 50 to 64 years and 13.1 million people aged 50 to 79 years in 2016. Because of the MEPS panel structure, each individual had numerous observations (typically 6; individuals were surveyed 5 times but were given a sixth observation for the combined, annual measures in their second year). However, most variables used in our analysis were constant within each person-year. The most common cancers in the sample were breast, prostate, melanoma, and other. As reported in Table 1, cancer survivors were more likely to be White, to not be working, to be older, and to have lower earnings and higher medical expenditures.

Based on multivariate regression analyses (**Table 2**), a history of cancer was associated with a statistically significant 9.08 (95% CI, 6.22-11.94) percentage point reduction in the probability of employment, a 9.80 (95% CI, 7.35-12.25) percentage point increase in the probability of having a work-limiting disability, and a 1.45 (95% CI, 0.39-2.51) percentage point increase in SNAP receipt. Nationally, these results indicated that cancer accounted for 505 768 fewer employed individuals in

the population aged 50 to 64 years, 545 873 more individuals with a work-preventing disability in the population aged 50 to 64 years, and 189 876 more SNAP recipients in the population aged 50 to 79 years. Based on 2-part regression models (**Table 3**), a cancer history was associated with $2722 (95% CI, $2131-$3313) greater medical spending, $6460 (95% CI, $5254-$7667) greater public medical spending, and $515 (95% CI, $337-$692) greater other public assistance spending.

When we examined the within-person association of reporting a new cancer for the first time with the outcomes (**Table 4**), we found that an initial cancer diagnosis was associated with a statistically significant $15 398 (95% CI, $7235-$23 561) increase in total medical expenditures and a $9087 (95% CI, $2151-$16 023) increase in public medical expenditures. When we examined the timing of a cancer diagnosis (**Table 5**), the estimates were generally larger for cancers first reported more recently, although the smaller number of people receiving a recent initial report added some noise to these estimates. Nonetheless, we found a significant association between a cancer report and the outcome variables after more than 1 year.

Table 1. Descriptive Statistics of Variables Used in Analysis

| | Mean (SD)[a] | | |
|---|---|---|---|
| | All | Cancer history | No cancer history |
| Reported cancer history[b] | | | |
| Any | 12 (32) | 100 (0) | 0 (0) |
| Bladder | 3 (18) | 3 (18) | 0 (0) |
| Breast | 26 (44) | 26 (44) | 0 (0) |
| Colon | 7 (25) | 7 (25) | 0 (0) |
| Lung | 3 (18) | 3 (18) | 0 (0) |
| Lymphoma | 4 (19) | 4 (19) | 0 (0) |
| Melanoma | 12 (32) | 12 (32) | 0 (0) |
| Other | 22 (42) | 22 (42) | 0 (0) |
| Prostate | 18 (38) | 18 (38) | 0 (0) |
| Uterine | 5 (22) | 5 (22) | 0 (0) |
| Cervical | 5 (22) | 5 (22) | 0 (0) |
| Individual earnings, $[c] | 42 159.24 (46 085.73) | 38 240.27 (47 610.72) | 42 506.51 (45 932.03) |
| Employed[c] | 72 (45) | 60 (49) | 73 (44) |
| Work-limiting disability[c] | 9 (29) | 18 (39) | 8 (28) |
| Public assistance income | 1183.98 (4207.64) | 1438.83 (4732.17) | 1150.27 (4132.10) |
| Received supplemental nutrition assistance program | 8 (28) | 9 (28) | 8 (28) |
| Public medical expenditures, $ | 3839.84 (13 112.04) | 8016.66 (21 315.06) | 3287.33 (11 487.19) |
| Total medical expenditures, $ | 8448.45 (19 136.49) | 15 099.58 (30 527.46) | 7568.63 (16 874.38) |
| Age, y | 61.44 (8.32) | 65.43 (8.22) | 60.91 (8.19) |
| Race and ethnicity[d] | | | |
| Asian or Pacific Islander | 5 (21) | 2 (14) | 5 (22) |
| Black | 11 (31) | 9 (28) | 11 (31) |
| Hispanic | 10 (30) | 6 (24) | 11 (31) |
| Native American or Alaska Native | 1 (7) | 1 (7) | 1 (7) |
| White | 73 (45) | 81 (39) | 72 (45) |
| Multiracial | 1 (12) | 1 (12) | 1 (12) |
| Sex | | | |
| Female | 52 (50) | 57 (49) | 52 (50) |
| Male | 48 (50) | 43 (49) | 48 (50) |
| Observations, No. | 195 360 | 20 289 | 175 071 |

[a] Data are presented as mean (SD) percentage of patients unless otherwise indicated.

[b] Cancer history was defined as reporting a past cancer diagnosis but excluded those whose only reported diagnosis was a nonmelanoma skin cancer. Cancer type categories do not sum to 1 because of individuals who had been diagnosed with multiple types.

[c] Employment-related outcomes were restricted to individuals younger than 65 years.

[d] Race and ethnicity groups were defined to be mutually exclusive, so multiracial and Hispanic individuals are not included in other categories.

## Discussion

In this study, we found that a history of cancer was associated with significant social costs, including increased likelihood of disability, higher medical care spending, and decreased likelihood of employment. These costs are typically not considered when evaluating the high societal burden of cancer. Given current disparities in cancer rates by geography, income, education, and race,[23] these costs may be particularly high for more disadvantaged groups.

Prior research in the US,[10] UK,[11] and Germany[9] found that health shocks were associated with significant increases in the likelihood of leaving the labor force. Moreover, the burdens of health shocks were typically greater for individuals with the least earning potential. This result suggests that future research may help in understanding of the equity implications of the employment and medical expenditure associations with cancer history. Cong et al[24] found that reductions in employment in

**Table 2. Association of Cancer History With Employment, Disability, and Receipt of SNAP[a]**

| Variable | Employed | Work-limiting disability | Received SNAP |
|---|---|---|---|
| Reported cancer history, regression coefficient (SE), percentage points | −9.08 (1.46)[b] | 9.80 (1.25)[b] | 1.45 (0.54)[b] |
| Population estimate, No. | 505 768 | 545 873 | 189 876 |
| Observations, No. | 113 550 | 113 550 | 168 090 |
| $R^2$ | 0.064 | 0.018 | 0.031 |

Abbreviation: SNAP, Supplemental Nutrition Assistance Program.

[a] Regression estimates are based on linear probability models. Nonmelanoma skin cancers were removed from the cancer variable. Age, age-squared, sex, and race and ethnicity were included as controls in the regression model. Population estimates are derived from multiplying the coefficient on cancer history by Medical Expenditure Panel Study estimates of the population aged 50 to 64 years who reported ever having cancer (employed and work-limiting disability) or aged 50 to 79 years who reported ever having cancer (received SNAP).

[b] $P < .01$.

**Table 3. Association of Cancer History With Earnings, Public Assistance, and Medical Expenditures[a]**

| Variable | Individual earnings[b] | Public assistance income[c] | Public medical expenditures[c] | Total medical expenditures[c] |
|---|---|---|---|---|
| Reported cancer history, coefficient estimate (SE), $ | −270 (1748) | 515 (90)[d] | 6460 (616)[d] | 2722 (302)[d] |
| Observations, No. | 113 550 | 168 090 | 168 090 | 168 090 |

[a] The 2-part models are from a probit regression for having a nonzero value for each outcome and an ordinary least squares regression for the continuous outcome conditional on having a nonzero value. The models were combined into a single marginal effect using the margins, dydx Stata option. Nonmelanoma skin cancers were removed from the cancer variable. Age, age-squared, sex, and race and ethnicity were included as controls.

[b] Sample restricted to people aged 50 to 64 years.

[c] Sample restricted to people aged 50 to 79 years.

[d] $P < .01$.

**Table 4. Association of New Cancer Report With Outcomes[a]**

| Variable | Employed, percentage points[b] | Work-limiting disability, percentage points[b] | Public assistance income, $[c] | Individual earnings, $[b] | Received SNAP, percentage points[c] | Total medical expenditures, $[c] | Public medical expenditures, $[c] |
|---|---|---|---|---|---|---|---|
| New cancer report, coefficient estimate (SE) | −2.05 (1.41) | 0.79 (0.74) | 112.0 (269.7) | −656.7 (3851) | 1.81 (1.12) | 15 398 (4165)[d] | 9087 (3539)[e] |
| Observations, No. | 113 550 | 113 550 | 168 090 | 113 550 | 168 090 | 168 090 | 168 090 |

Abbreviation: SNAP, Supplemental Nutrition Assistance Program.

[a] The coefficients are from regressions of the demeaned outcome on the demeaned cancer report variable. Coefficients can be interpreted as the association between a new cancer report and the outcomes of interest. Nonmelanoma skin cancers were removed from the cancer variable. Age and age-squared were included as controls.

[b] Sample restricted to people aged 50 to 64 years.

[c] Sample restricted to people aged 50 to 79 years.

[d] $P < .01$.

[e] $P < .05$.

the US market were greater for individuals diagnosed with metastatic cancer compared with those diagnosed with nonmetastatic cancer. This finding suggests that further study of how reducing the incidence or the burden of late stage cancer either through earlier detection or more effective treatment may impact the associations found in our study and potentially ameliorate some of the disparities found in prior studies.[25-28]

A large body of research literature has examined the underlying reasons for health care disparities. Potential explanations include differences in insurance coverage,[29] income,[30] environment,[31] and access to high-quality health care.[32] Policy efforts to address these underlying factors would help to address variation in the outcomes for cancer survivors found in this study. Some of the observed disparities may also be related to differential access to early detection[26] and treatment,[33] especially during the COVID-19 pandemic.[34] Efforts to increase screening and treatment for historically disadvantaged groups have the potential to mitigate disparities connected to the social costs found in our study.

Our research builds on earlier studies[12] that found that cancer history was associated with lower employment and less earnings. A 2009 meta-analysis of 36 studies concluded that cancer survivors had roughly double the probability of being unemployed compared with those without a cancer history.[12] Using more recent data, our study found that cancer survivors were roughly one-third more likely to be unemployed than those without a cancer history. Although the gap remains sizeable, our study suggests that more recent data show progress in reducing it. In terms of earnings, prior studies have found a short-term decline in earnings ranging from 10% to 40%.[13,14] However, we did not observe a statistically significant association between cancer history and earnings in the short term (<1 year) or long term. Finally, a number of studies have documented the financial toxicity associated with cancer treatment.[35] Our study extends this result by showing that this financial burden may persist for years after cancer diagnosis. For example, we found that a cancer history was associated with an increase in annual total medical spending of almost one-third.

## Limitations

This analysis was limited in several ways. First, MEPS does not ask about cancer stage or metastasis. Late-stage cancers may have an association with worse employment and income-related outcomes analyzed in this study.[24] Second, our results do not account for survivor's bias, in which cancer survivors will inevitably differ from the full set of individuals diagnosed with cancer. For example, our estimates on earlier screening for cancer would lead not only to downstaging among existing cancer survivors but also to increasing the number and types of individuals surviving cancer. However, although patients with cancer experience diminished well-being in the short term across a variety of

Table 5. Cancer Outcomes by Timing[a]

| Variable | Employed, percentage points[b,c] | Work-limiting disability, percentage points[b,c] | Public assistance income, $[d,e] | Individual earnings, $[c,d] | Received SNAP, percentage points[b,e] | Total medical expenditures, $[d,e] | Public medical expenditures, $[d,e] |
|---|---|---|---|---|---|---|---|
| New cancer report, coefficient estimate (SE) | −11.0 (4.62)[f] | 4.32 (3.10) | 500.3 (244.8)[f] | −552.9 (4524) | 4.37 (2.04)[f] | 18 046 (4033)[g] | 8206 (2543)[g] |
| Old cancer report, coefficient estimate (SE) | −8.85 (1.71)[g] | 10.30 (1.47)[g] | 543.9 (103.2)[g] | −1394 (1892) | 0.92 (0.57) | 5912 (794.0)[g] | 2344 (330.1)[g] |
| Observations, No. | 55 011 | 55 011 | 83 484 | 55 011 | 83 484 | 83 484 | 83 484 |

Abbreviation: SNAP, Supplemental Nutrition Assistance Program.

[a] Regressions included only the second year of Medical Expenditure Panel Study respondents' time in the survey so that we could distinguish between the first time a past cancer was reported and the second time. Nonmelanoma skin cancers were removed from the cancer variable. Age, age-squared, sex, and race and ethnicity were included as controls. A new cancer report was one within the past year and old, longer than 1 year ago.

[b] Regression estimates are based on linear probability models.

[c] Sample restricted to people aged 50 to 64 years.

[d] The 2-part model results are from a probit regression for having a nonzero value for each outcome and an ordinary least squares regression for the continuous outcome conditional on having a nonzero value. The models were combined into a single marginal effect using the margins, dydx Stata option.

[e] Sample restricted to people aged 50 to 79 years.

[f] $P < .05$.

[g] $P < .01$.

measures, cancer survivors do as well as or better than US residents of similar age and demographic characteristics in the long term.[36] Third, there may be some measurement error associated with self-reported cancer diagnosis. For example, cervical cancer has been found to be misclassified in self-reported data.[37]

Fourth, although we controlled for the available covariates in our models, other unobserved factors may be correlated with cancer risk and our outcomes of interest. Our model that controlled for person-level fixed effects could address those unobserved person-level factors, but that model only examined the short-term outcomes associated with new cancers.

## Conclusion

In this cross-sectional study of US data, cancer survivors were found to have a lower likelihood of employment and a greater likelihood of a work-limiting disability compared with individuals without a history of cancer. Nationally, our results indicated that cancer accounted for 505 768 fewer employed individuals in the population aged 50 to 64 years and was associated with significantly higher medical and public assistance expenditures.

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**Author Contributions:** Dr Grabowski had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

*Concept and design:* All authors.

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**Conflict of Interest Disclosures:** Dr Grabowski reported receiving personal fees from GRAIL, LLC during the conduct of the study; receiving personal fees from AARP, the Analysis Group, the Medicare Payment Advisory Commission, Bluestone Physician Services, and Health Care Lawyer PLC outside the submitted work; and receiving research support from AARP, the Agency for Healthcare Research and Quality, the Commonwealth Fund, the Donaghue Foundation, GRAIL, the John and Laura Arnold Foundation, the National Institutes of Health, the Robert Wood Johnson Foundation, and the Warren Alpert Foundation. Dr Goldman reported receiving personal fees for serving on the scientific advisory board from GRAIL during the conduct of the study; receiving grants from Amgen, The Aspen Institute, GRAIL, Blue Cross Blue Shield of Arizona, Bristol Myers Squibb, Cedars-Sinai Health System, Edwards Lifesciences, Gates Ventures, Genentech, Gilead Sciences, Johnson & Johnson, Kaiser Family Foundation, Novartis, Pfizer, Roche, and Walgreens Boots Alliance; receiving personal fees from the National Railway Labor Conference, Precision Medicine Group, and Biogen; and being a cofounder with equity of EntityRisk outside the submitted work. Dr Lakdawalla reported receiving personal fees for consulting services from Amgen, Genentech, Gilead, GRAIL, Mylan, Novartis, Otsuka, Perrigo, Pfizer, and Sorrento Therapeutics; owning equity and serving as a

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**SUPPLEMENT.**

**Data Sharing Statement**