Cross-Sectional Analysis of the Associations Between Four Common Cancers and Disability

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ABSTRACT

Background: Approximately 61 million Americans have a disability. Little research has explored whether disability is associated with subsequent diagnosis of cancer, the second-leading cause of death in the United States. The objective of this study was to explore associations between cancer and disability, focusing on 4 cancers that may present with nonspecific symptoms that could be conflated with aspects of disability, thus delaying cancer diagnoses. An analysis of a nationally representative survey using sampling weights to produce national estimates was performed. **Methods:** Civilian, noninstitutionalized US residents responding to the 2010–2017 National Health Interview Surveys totaling 259,392 Sample Adult Core survey respondents were included. We used self-reported functional status limitations to identify persons with movement difficulties (MD), complex activity limitations (CAL), and no disability. Multivariable regressions predicting cancer diagnosis included socio-demographic characteristics, tobacco use, body mass index, access to care indicators, and disability status. **Results:** Persons with preexisting disability had significantly higher rates of cancer (ranging from 0.40 [SE, 0.05] for ovarian to 3.38 [0.14] for prostate) than did those without disability (0.20 [0.02] and 1.26 [0.04] for the same cancers; all $P < .0001$). Multivariable analyses found strong associations of preexisting MD and CAL with colorectal cancer, with adjusted odds ratios (aORs) of 1.5 (95% CI, 1.2–1.9) and 1.9 (1.5–2.4), respectively. For non-Hodgkin's lymphoma, the aOR for CAL was 1.5 (1.1–2.1). For prostate cancer, aORs for MD were 1.2 (1.0–1.3) and 1.1 (1.0–1.3) for CAL. Using cross-sectional survey data, we could only identify statistical associations, not causality. **Conclusions:** Our population-based analyses suggest that persons with disability may constitute a high-risk population, with higher cancer incidence. Optimizing appropriate screening and fully investigating new signs and symptoms are therefore critical for patients with disability.

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Background

Approximately 61 million Americans, 26% of the US population, have some type of disability, and this population is increasing.¹ According to 2017 National Health Interview Survey (NHIS) data, 8.5% of Americans aged ≥ 18 years have—or have had—cancer,² the second leading cause of death in the United States.³ Although these disability and cancer prevalence estimates are independent, clinicians have recognized increasingly that cancer and its treatment can be profoundly disabling, often causing neurologic or musculoskeletal impairments requiring rehabilitation therapy.^{4–6} In 2017, 2.8% of beneficiaries receiving Social Security Disability Insurance qualified because of cancer-related disability.⁷ The Social Security Administration's Compassionate Allowances offers fast-track approval of disability benefits for person with progressive cancer.⁸

However, whether persons who already have disability are more likely than nondisabled persons to develop cancer has received little study. Several factors suggest that preexisting disability and cancer could be associated. Persons with disability have higher rates of tobacco use⁹ and obesity,¹⁰ potential cancer risk factors.^{11,12} Persons with disability have higher rates of poverty,^{13,14} which is associated with increased cancer mortality risks. Additionally, persons with disability can experience disparities in cancer screening,^{15–17} which may result in failures to detect precancerous lesions. For older individuals with early-onset disability, prior patterns of care (eg, frequent radiographs and thus radiation exposure during childhood) could also increase cancer risks. Persons with disability, either congenital or acquired by midlife, show physiologic signs of more rapid aging compared with nondisabled persons, although reasons for this are unknown.^{18–20} Might this heighten risks of developing cancer?

One separate but related question is whether, when persons with disability do develop cancer, they receive timely diagnoses. Some groups that experience healthcare

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disparities also face delayed cancer diagnoses.^{21,22} Diagnostic overshadowing—when clinicians erroneously attribute cancer signs and symptoms to the patient's underlying disability—can potentially delay cancer diagnoses.²³

This research explored associations between cancer and disability, focusing on 4 cancers that may present with nonspecific symptoms that could be conflated with aspects of disability. Few datasets contain information on both cancer and disability (eg, the SEER cancer registry does not report functional status information). We therefore analyzed data from the NHIS, a nationally representative survey of civilian, noninstitutionalized Americans, which asks about common health conditions, including cancer and functional status. Our major analytic goals were to examine (1) population prevalence among adults with 4 cancer diagnoses and disability, (2) associations between cancer diagnoses and preexisting disability, (3) age at cancer diagnosis for persons with versus without preexisting disability, and (4) associations between cancer diagnosis and preexisting disability after adjusting for sociodemographic characteristics and selected risk factors.

Methods

Data

We downloaded 2010–2017 NHIS Public Release data from the National Center for Health Statistics (NCHS) website. The NHIS Basic Module contains 3 questionnaires: Family Core, Sample Adult Core, and Sample Child Core. The Family Core collects information on all family members. One randomly selected person aged ≥ 18 years within each family receives the Sample Adult Core questionnaire, which gathers more detailed health history and functional status information. If the randomly sampled adult is physically or cognitively unable to respond or is unavailable, a knowledgeable adult family member provides proxy responses. In 2017, for example, the NHIS interview sample included 32,617 households, and the Sample Adult Core included 26,742 individuals, 423 with proxy responses. The household response rate was 66.5%; the conditional response rate for the Sample Adult Core was 80.7%.²⁴

NHIS oversamples black, Hispanic, and Asian populations, and minorities aged ≥ 65 years. NHIS's associated sampling weights, based on its complex sample design, support nationally representative estimates for civilian, noninstitutionalized populations. All analyses used these sampling weights.

Chronic Disability Indicators

To identify chronic disability, we began with NCHS algorithms capturing limitations in body functions and activity and participation difficulties.²² These algorithms

use responses from the Adult Health Status and Limitations module in the Sample Adult Core questionnaire. Supplemental eAppendix 1 (available with this article at JNCCN.org) presents the question stems and description of response categories.

After NCHS's approach, we combined responses from various functional and activity limitation questions to create 2 broad categories of disability—basic action difficulties (BADs) and complex activity limitations (CALs)—with 7 subcategories, which include movement, sensory, emotional, or cognitive difficulties, and self-care, social, or work limitations (see supplemental eAppendices 1 and 2). The 7 categories are not conceptually mutually exclusive: individual BADs can contribute to CALs.

To identify persons with chronic disability, we refined the NCHS algorithms. When participants indicate functional status difficulties, NHIS asks how long the difficulties have lasted. We considered difficulties present for at least a year to be chronic. We combined participants who reported nonchronic (< 1 year duration) conditions with those without the particular disability.

Identifying Cancer, Time Frames, and Other Variables

Sample Adult Core respondents were asked “if they have ever been told by a doctor that they had cancer,” and if so, the type of cancer. We considered 4 cancer types: colorectal cancer (CRC), non-Hodgkin's lymphoma (NHL), ovarian cancer, and prostate cancer. We also obtained age at diagnosis reported by participants and computed time since cancer diagnosis. We then compared durations for the reported disability and time since cancer diagnosis in order to determine whether disability was preexisting or occurred subsequent to the cancer. For respondents reporting > 1 disability type, we used the earliest disability in comparing disability with time from cancer diagnosis. We categorized respondents into those with disability occurring before cancer, simultaneously with cancer, and after the cancer diagnosis.

We used Sample Adult Core questions to identify basic sociodemographic characteristics that could be important risk factors¹⁴ (age, race, ethnicity, education, health insurance status, usual source of care, body mass index [BMI], and smoking status), except for income, which came from Family Core responses linked to the Sample Adult participant. We grouped age into 4 categories (< 45 , 45–64, 65–79, ≥ 80 years). For prostate cancer analyses, we combined the 2 younger categories (age < 65) because of small numbers in the age < 45 group.

Analysis

We conducted all analyses using SAS 9.4 (SAS Institute Inc.) and SUDAAN 11.0.3 (RTI International). To account for NHIS's complex sampling design, we included weights,

cluster, and strata variables in all analyses. We combined the data across years (2010–2017). We obtained summary statistics (proportions, means, SEs) for all variables. We used 2-sided chi-square tests to evaluate the association of having cancer with the different disability types. We focus our presentation here on 2 common disability types with an adequate sample size for rigorous analysis: movement difficulty (MD) and any CAL. In our analyses, persons with no disability had none of the 7 disability types.

We obtained odds ratios (ORs) and 95% CIs from separate multivariable logistic regressions assessing the relationship of MD and CAL with each of the cancer diagnosis, adjusting for age (<45, 45–64, ≥65 for prostate cancer, 65–79, and ≥80 years), race (white, black, Asian, other/multiple races), Hispanic ethnicity (yes/no), education (less than high school, high school, some college/associate's degree, college/advanced degree), BMI (<25, 25–29, 30–34, 35–39, and ≥40 kg/m²), smoking status (current, former, never), family income <200% of the poverty threshold (yes, no), health insurance (covered, not covered), and usual source of care (yes, no). Models to assess the relationship of disability with CRC and NHL also included sex (male, female) in the models. All tests were 2-sided, and we considered *P* values <.05 to be statistically significant.

Results

From 2010 to 2017, the NHIS Sample Adult Core involved 259,392 participants. Table 1 shows the distribution, overall and by sex, of the sociodemographic characteristics of these participants and risk factors (BMI and smoking status) and rates of each of the 4 cancers and different disability types. Across men and women, 0.6% (SE, 0.02%) had ever been told they had CRC and 0.3% (SE, 0.01%) reported NHL; among men, 2.2% (SE, 0.05%) reported having been told they had prostate cancer; and 0.4% (SE, 0.02%) of women reported ovarian cancer. MD was the most common disability type, reported by 20.9% (SE, 0.1%) of men and women.

Identifying Preexisting Disability

Our major research questions focused on patients who had disability before their cancers. We concentrate here on 2 disability types: MD and any CAL. For each of the 4 cancer types, Figure 1 shows the percent of cases reporting the timing of their disability relative to their cancer diagnosis: before, simultaneously with, or after the cancer diagnosis. For CRC, prostate cancer, and NHL, >60% of persons reported their MD or CAL occurred before their cancer; for ovarian cancer, approximately 50% reported preexisting MD or CAL. Results presented herein focus only on persons who had MD or CAL disability before being diagnosed with cancer.

Cancer Rates and Age at Cancer Diagnosis by Preexisting Disability Status

The top half of Table 2 shows the percent (SE) of participants reporting cancer by preexisting disability status (MD or CAL). Persons with preexisting disability had significantly higher rates of cancer (ranging from 0.40% [0.05%] for ovarian to 3.38% [0.14%] for prostate) than did those without disability (0.20% [0.02%] and 1.26% [0.04%] for the same cancers, all *P*<.0001). For example, among men who already had MD, 3.38% (0.14%) reported a prostate cancer diagnosis compared with 1.26% (0.04%) of men without disability.

The bottom half of Table 2 shows the mean age (SE) in years at cancer diagnosis for persons without disability versus those with preexisting MD or CAL. In all comparisons, persons with preexisting disability were significantly older (by 3–15 years) when diagnosed with cancer than those without disability (most *P*<.0001). For example, persons with preexisting MD were on average aged 62.6 (0.8) years when diagnosed with CRC, compared with 55.9 (0.7) years for persons without disability (*P*<.0001).

Accounting for Sociodemographic and Other Characteristics

For each cancer, Table 3 shows bivariable associations for sociodemographic characteristics, risk factors, and time from cancer diagnosis for persons with and without preexisting MD or CAL disability. For all 4 cancers, compared with persons without disability, those with MD or CAL disability were older, had lower education levels (CAL disability only for ovarian cancer), and were more likely to have incomes <200% of the federal poverty level. Health insurance status and having a usual source of care patterns vary by cancer: for CRC, NHL, and ovarian cancer, persons with disability are substantially more likely to have insurance coverage than those without disability. Compared with persons without disability, those with MD and CAL disability have substantially higher BMIs for CRC, prostate cancer, and ovarian cancer. Compared with persons without disability, persons with MD or CAL disability were substantially more likely to have positive smoking histories (current or former smoker) for all 4 cancers. Persons with MD or CAL disability had significantly shorter time from cancer diagnosis than individuals without disability for CRC and NHL.

We produced ORs and 95% CIs from multivariable models assessing the relation of cancer diagnoses with preexisting disability status accounting for sociodemographic and risk factor characteristics. The question was whether accounting for these other characteristics would attenuate or eliminate the association of disability with cancer diagnosis. We performed 8 regressions: for each of the 4 cancers and for each of the 2 preexisting disability types, MD and CAL.

Table 1. Distribution of Sociodemographic Characteristics, Disability, and Cancer by Sex^a

Variable	Male % (SE)	Female % (SE)	Total % (SE)
Total, N	116,066	143,326	259,392
Sociodemographic characteristics			
Mean age (SE), y	46.1 (0.1)	47.6 (0.1)	46.9 (0.1)
Age			
<45 y	48.3 (0.3)	45.8 (0.2)	47.0 (0.2)
45–64 y	34.7 (0.2)	34.3 (0.2)	34.5 (0.2)
65–79 y	13.3 (0.1)	14.6 (0.1)	14.0 (0.1)
≥80 y	3.7 (0.1)	5.3 (0.1)	4.5 (0.1)
Race			
White	80.5 (0.3)	78.5 (0.3)	79.5 (0.2)
Black	11.3 (0.2)	12.9 (0.2)	12.2 (0.2)
Asian	5.5 (0.1)	5.7 (0.1)	5.6 (0.1)
Other/Mixed	2.7 (0.1)	2.8 (0.1)	2.8 (0.1)
Hispanic ethnicity	15.7 (0.3)	14.5 (0.3)	15.1 (0.3)
Education			
Less than high school	13.7 (0.2)	12.9 (0.2)	13.3 (0.2)
High school	26.6 (0.2)	24.9 (0.2)	25.7 (0.2)
Some college/associate's degree	29.5 (0.2)	32.1 (0.2)	30.9 (0.2)
College/Advanced degree	30.1 (0.3)	30.1 (0.3)	30.1 (0.3)
Body mass index			
<25 kg/m ²	29.7 (0.2)	42.7 (0.2)	36.3 (0.2)
25–29 kg/m ²	40.9 (0.2)	28.3 (0.2)	34.5 (0.1)
30–34 kg/m ²	19.2 (0.2)	16.2 (0.1)	17.7 (0.1)
35–39 kg/m ²	6.8 (0.1)	7.2 (0.1)	7.0 (0.1)
≥40 kg/m ²	3.4 (0.1)	5.6 (0.1)	4.5 (0.1)
Smoking status			
Current smoker	19.1 (0.2)	14.9 (0.2)	16.9 (0.1)
Former smoker	25.4 (0.2)	18.9 (0.2)	22.0 (0.1)
Never-smoker	55.5 (0.2)	66.3 (0.2)	61.1 (0.2)
Smoker, current status unknown	0.03 (0.01)	0.03 (0.01)	0.03 (0.01)
Family income below FPT	11.7 (0.2)	15.2 (0.2)	13.6 (0.2)
Has health insurance	84.3 (0.2)	87.7 (0.2)	86.1 (0.2)
Has a usual source of care	81.3 (0.2)	89.4 (0.1)	85.5 (0.1)
Cancer history			
Ever told had colorectal cancer	0.6 (0.03)	0.5 (0.02)	0.6 (0.02)
Mean age at diagnosis, y	57.9 (0.6)	58.3 (0.7)	58.1 (0.5)
Ever told had non-Hodgkin's lymphoma	0.3 (0.02)	0.2 (0.02)	0.3 (0.01)
Mean age at diagnosis, y	49.0 (1.2)	50.7 (1.3)	49.7 (0.9)
Ever told had prostate cancer	2.2 (0.05)		
Mean age at diagnosis, y	62.9 (0.3)		
Ever told had ovarian cancer		0.4 (0.02)	
Mean age at diagnosis, y		41.6 (0.9)	

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Table 1. Distribution of Sociodemographic Characteristics, Disability, and Cancer by Sex^a (cont.)

Variable	Male % (SE)	Female % (SE)	Total % (SE)
Disability			
Movement difficulty	17.5 (0.2)	24.0 (0.2)	20.9 (0.1)
Level 1 (least severe difficulty)	5.4 (0.1)	5.9 (0.1)	5.6 (0.1)
Level 2	4.4 (0.1)	6.2 (0.1)	5.3 (0.1)
Level 3	4.1 (0.1)	5.9 (0.1)	5.1 (0.1)
Level 4	2.2 (0.1)	3.6 (0.1)	2.9 (0.05)
Level 5 (most severe difficulty)	1.4 (0.04)	2.5 (0.1)	2.0 (0.04)
Sensory disability (vision and/or hearing)	5.8 (0.1)	7.8 (0.1)	6.8 (0.1)
Emotional disability (mental health)	2.0 (0.1)	2.9 (0.1)	2.4 (0.05)
Cognitive disability (including intellectual)	2.6 (0.1)	3.1 (0.1)	2.9 (0.05)
Self-care limitations	3.1 (0.1)	5.1 (0.1)	4.1 (0.1)
Social limitations	6.0 (0.1)	8.8 (0.1)	7.4 (0.1)
Work limitations	9.4 (0.1)	11.1 (0.1)	10.3 (0.1)
Any basic action difficult	19.5 (0.2)	26.3 (0.2)	23.0 (0.2)
Any complex activity limitation	11.4 (0.1)	14.3 (0.2)	12.9 (0.1)

Abbreviation: FPT, federal poverty threshold.

^aAll analyses accounted for the complex sampling design and used National Health Interview Survey sampling weights to produce nationally representative estimates for civilian, noninstitutionalized US residents.

Table 4 shows results from these 8 multivariable regressions, presenting adjusted odds ratios (aORs) with 95% CIs; reference groups have aORs of 1.0. Even after adjusting for other covariates, preexisting MD and CAL

were strongly associated with CRC, with aORs (95% CI) of 1.5 (1.2–1.9) and 1.9 (1.5–2.4), respectively. For NHL, the aORs for MD and CAL were 1.2 (0.9–1.6) and 1.5 (1.1–2.1), respectively. In contrast, for prostate cancer, the aOR

Figure 1. Time between disability and cancer.

Abbreviations: CAL, complex activity limitations; MD, movement difficulty; NHL, non-Hodgkin's lymphoma.

Table 2. Cancer Rates and Age at Cancer Diagnosis by Disability Status^a

	No Disability	MD	P Value ^b	Any CAL	P Value ^b
Total, N	183,106	61,291		38,862	
Cancer rate, % (SE)					
Colorectal cancer	0.24 (0.01)	0.85 (0.05)	<.0001	1.02 (0.07)	<.0001
Non-Hodgkin's lymphoma	0.17 (0.01)	0.32 (0.03)	<.0001	0.39 (0.04)	<.0001
Prostate cancer	1.26 (0.04)	3.38 (0.14)	<.0001	3.13 (0.18)	<.0001
Ovarian cancer	0.20 (0.02)	0.40 (0.05)	<.0001	0.47 (0.07)	<.0001
Age at cancer diagnosis, mean (SE), y					
Colorectal cancer	55.9 (0.7)	62.6 (0.8)	<.0001	61.3 (0.9)	<.0001
Non-Hodgkin's lymphoma	44.8 (1.3)	61.0 (1.3)	<.0001	59.3 (1.6)	<.0001
Prostate cancer	62.2 (0.4)	66.0 (0.5)	<.0001	64.9 (0.7)	<.001
Ovarian cancer	40.2 (1.4)	45.5 (2.2)	.04	45.8 (2.6)	.05

Abbreviations: CAL, complex activity limitation; MD, movement difficulty; NHIS, National Health Interview Survey.

^aAll analyses accounted for the complex sampling design and used NHIS sampling weights to produce nationally representative estimates for civilian, noninstitutionalized US residents.

^bComparing persons with no disability versus those with MD or CAL disability.

for MD was 1.2 (1.0–1.3) and 1.1 (1.0–1.3) for CAL. For ovarian cancer, the aOR for MD was 1.4 (0.9–2.1) and 1.5 (0.9–2.4) for CAL.

Discussion

Disability rates increase with aging,²⁵ as do rates of cancer.²⁶ Therefore, it was not surprising to find that persons with preexisting disability had significantly higher rates of cancer than those without disability, and that persons with preexisting disability generally had their cancers diagnosed at later ages than those without disability. Other factors often associated with cancer, such as obesity,¹² tobacco use,¹¹ and poverty,²⁷ are also associated with disability, again suggesting possible links between preexisting disability and cancer. Notably, however, even after adjusting for these various confounding factors, we found associations between at least 1 preexisting disability type—MD or CAL—and cancers. These findings have important implications for clinicians, especially those providing routine longitudinal care for persons with disability. In particular, these findings support greater vigilance in screening persons with disability for cancers using established screening tests, and investigating new symptoms that arise.

The NHIS data provide no insight into the reasons for these findings. Other research suggests possibilities that merit further exploration. For instance, the later age at diagnosis for persons with disability may relate to delays in cancer diagnosis for this population, as other disadvantaged groups have experienced.²¹ Disparities in provision of screening and preventive services could also contribute to these observations. The US Preventive Services Task Force (USPSTF) strongly recommends

screening for CRC in specified populations.²⁸ Analysis of 2013 NHIS data suggest that people with mobility disability experience reduced rates of CRC screening, with an inverse relationship between severity of mobility disability and odds of CRC screening.²⁹ However, analysis of NHIS data from 1998 through 2010 does not suggest a disparity in rates of CRC screening between people with and without disability.³⁰ Screening for the other 3 cancers studied here is not recommended by the USPSTF. Evidence does indicate disability disparities for cervical and breast cancer screening, which are both recommended by USPSTF.^{31,32} These observations could raise broader questions about how physicians approach care of patients with disability.

One possible contributor to our findings is diagnostic overshadowing; that is, misattributing new signs and symptoms to a patients' underlying disability rather than a comorbid health condition, and thus delaying diagnosis. Diagnostic overshadowing has been explored in individuals with developmental^{33–35} and mental health disabilities,^{36–39} albeit primarily addressing new or acute problems, not cancer. Among members of the disability community, anecdotal reports suggest that diagnostic overshadowing might also delay cancer diagnoses among persons with physical disability,²³ but this possibility requires more investigation.

NHIS data unfortunately do not include stage at diagnosis, which would have allowed us to look explicitly at delayed diagnosis. Furthermore, NHIS relies on self-report, without confirmation of cancer diagnoses. To explore whether NHIS cancer self-reports are credible, we compared our NHIS cancer prevalence rates with those generated from the 2016 SEER cancer registry.⁴⁰

Table 3. Sociodemographic Characteristics and Cancer Duration by Cancer Type and Disability Status^a

Cancer	Disability Status				
	No Disability % (SE)	MD % (SE)	P Value ^b	CAL % (SE)	P Value ^b
Colorectal					
Total, N	515	549		410	
Mean age (SE), y	64.6 (0.7)	69.6 (0.7)	<.0001	68.5 (0.9)	<.0001
Age			<.0001		.001
<45 y	7.4 (1.6)	3.3 (1.3)		4.4 (1.8)	
45–64 y	39.0 (2.9)	31.5 (2.6)		34.8 (3.2)	
65–79 y	39.3 (2.7)	37.7 (2.7)		34.3 (2.9)	
≥80 y	14.3 (1.6)	27.5 (2.4)		26.4 (2.6)	
Sex			.14		.26
Male	54.2 (2.8)	48.4 (2.7)		49.4 (3.2)	
Female	45.8 (2.8)	51.6 (2.7)		50.6 (3.2)	
Race			.14		.56
White	83.3 (1.9)	84.3 (1.9)		82.8 (2.2)	
Black	10.3 (1.5)	9.4 (1.3)		11.0 (1.6)	
Asian	4.7 (1.1)	2.4 (0.9)		3.2 (1.2)	
Other/Mixed	1.7 (0.8)	4.0 (1.2)		3.1 (1.0)	
Ethnicity			.72		.79
Hispanic	5.4 (1.1)	6.0 (1.2)		5.9 (1.4)	
Education			<.0001		<.0001
Less than high school	10.0 (1.5)	20.6 (2.0)		20.7 (2.4)	
High school	27.3 (2.3)	30.1 (2.6)		31.8 (3.0)	
Some college/associate's degree	28.6 (2.5)	30.4 (2.7)		28.2 (3.0)	
College/Advanced degree	34.1 (2.7)	18.9 (2.2)		19.3 (2.7)	
Body mass index			<.01		.03
<25 kg/m ²	31.9 (2.5)	26.8 (2.4)		27.1 (2.9)	
25–29 kg/m ²	40.4 (2.9)	32.8 (2.8)		33.2 (3.2)	
30–34 kg/m ²	17.4 (2.2)	21.2 (2.2)		18.4 (2.5)	
35–39 kg/m ²	5.1 (1.2)	10.0 (1.6)		9.5 (1.9)	
≥40 kg/m ²	5.1 (2.1)	9.2 (1.5)		11.7 (2.1)	
Smoking status			.02		.01
Current smoker	6.9 (1.2)	12.4 (1.6)		14.2 (2.1)	
Former smoker	43.6 (2.9)	46.2 (2.8)		44.8 (3.3)	
Never-smoker	49.6 (2.9)	41.4 (2.8)		41.0 (3.2)	
Family income below FPT	5.1 (1.2)	15.4 (1.7)	<.0001	18.9 (2.2)	<.0001
Has health insurance	96.5 (0.9)	98.9 (0.5)	.03	98.9 (0.6)	.04
Has a usual source of care	97.3 (0.7)	98.6 (0.5)	.11	98.3 (0.6)	.27
Cancer duration, mean (SE), y	8.6 (0.5)	7.0 (0.4)	<.01	7.3 (0.5)	.05

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Table 3. Sociodemographic Characteristics and Cancer Duration by Cancer Type and Disability Status^a (cont.)

Cancer	Disability Status				
	No Disability % (SE)	MD % (SE)	P Value ^b	CAL % (SE)	P Value ^b
Non-Hodgkin's Lymphoma					
Total, N	308	210		148	
Mean age (SE), y	54.8 (1.1)	68.1 (1.1)	<.0001	66.7 (1.5)	<.0001
Age category			<.0001		<.0001
<45 y	25.5 (3.0)	6.9 (2.1)		6.8 (2.6)	
45–64 y	45.0 (3.6)	29.0 (3.9)		34.4 (4.9)	
65–79 y	21.5 (2.8)	42.1 (4.2)		36.8 (4.6)	
≥80 y	8.1 (2.0)	21.9 (3.4)		22.0 (4.1)	
Sex			.07		.20
Male	59.6 (3.5)	49.6 (4.3)		51.6 (5.1)	
Female	40.4 (3.5)	50.4 (4.3)		48.4 (5.1)	
Race			.23		.41
White	88.3 (2.4)	87.7 (2.8)		87.5 (3.4)	
Black	6.4 (1.7)	10.1 (2.6)		9.5 (3.1)	
Asian	4.1 (1.6)	1.0 (0.8)		1.4 (1.1)	
Other/Mixed	1.1 (0.6)	1.2 (1.0)		1.7 (1.3)	
Ethnicity			.89		.77
Hispanic	8.6 (2.6)	9.1 (2.6)		9.8 (3.1)	
Education			<.01		<.001
Less than high school	8.7 (2.1)	15.1 (3.0)		17.2 (3.8)	
High school	23.1 (3.3)	31.7 (4.0)		35.2 (5.0)	
Some college/associate's degree	28.5 (3.4)	33.6 (4.0)		31.8 (4.7)	
College/Advanced degree	39.8 (3.9)	19.7 (3.5)		15.9 (4.1)	
Body mass index			.85		.94
<25 kg/m ²	35.8 (3.5)	31.0 (4.0)		34.0 (5.1)	
25–29 kg/m ²	34.2 (3.4)	35.2 (4.4)		31.8 (4.7)	
30–34 kg/m ²	21.4 (3.1)	23.4 (3.7)		25.1 (4.7)	
35–39 kg/m ²	5.2 (1.6)	5.0 (1.8)		4.3 (2.1)	
≥40 kg/m ²	3.4 (1.1)	5.4 (2.4)		4.9 (2.9)	
Smoking status			<.001		<.001
Current smoker	9.8 (2.0)	16.1 (3.1)		22.5 (4.5)	
Former smoker	26.3 (3.1)	39.7 (4.0)		37.6 (4.8)	
Never-smoker	63.9 (3.4)	44.2 (4.0)		39.9 (4.9)	
Family income below FPT	4.4 (1.4)	9.4 (2.0)	.04	13.9 (3.5)	.01
Has health insurance	92.8 (2.1)	99.2 (0.6)	<.01	98.9 (0.8)	<.01
Has a usual source of care	93.1 (1.9)	97.7 (1.5)	.06	98.6 (0.9)	.01
Cancer duration, mean (SE)	10.0 (0.6)	7.1 (0.7)	<.01	7.4 (0.8)	0.01

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Table 3. Sociodemographic Characteristics and Cancer Duration by Cancer Type and Disability Status^a (cont.)

Cancer	Disability Status				
	No Disability % (SE)	MD % (SE)	P Value ^b	CAL % (SE)	P Value ^b
Prostate					
Total, N	1,233	855		540	
Mean age (SE), y	69.6 (0.3)	73.5 (0.4)	<.0001	72.3 (0.6)	<.0001
Age			<.0001		<.0001
<45 y	0.3 (0.1)	0.2 (0.1)		0.3 (0.2)	
45–64 y	27.3 (1.6)	17.0 (1.6)		23.1 (2.3)	
65–79 y	58.4 (1.9)	52.5 (2.2)		47.9 (2.8)	
≥80 y	14.1 (1.2)	30.2 (2.0)		28.6 (2.6)	
Race			.05		<.01
White	84.6 (1.2)	81.1 (1.6)		76.6 (2.2)	
Black	12.2 (1.1)	15.9 (1.5)		19.1 (2.0)	
Asian	2.0 (0.6)	1.1 (0.3)		1.3 (0.5)	
Other/Mixed	1.1 (0.4)	2.0 (0.6)		2.9 (1.0)	
Ethnicity			.43		.62
Hispanic	5.3 (0.7)	6.4 (1.1)		6.1 (1.2)	
Education			<.0001		<.0001
Less than high school	9.6 (1.0)	20.1 (1.7)		25.3 (2.3)	
High school	21.8 (1.4)	27.0 (2.0)		28.1 (2.4)	
Some college/associate's degree	24.0 (1.5)	25.8 (2.0)		23.5 (2.4)	
College/Advanced degree	44.6 (1.8)	27.2 (2.1)		23.1 (2.4)	
Body mass index			<.0001		<.0001
<25 kg/m ²	32.5 (1.8)	24.6 (1.9)		27.2 (2.5)	
25–29 kg/m ²	46.1 (1.8)	38.4 (2.1)		34.8 (2.6)	
30–34 kg/m ²	16.4 (1.3)	25.9 (2.0)		25.5 (2.5)	
35–39 kg/m ²	4.6 (0.9)	7.1 (1.1)		7.5 (1.3)	
≥40 kg/m ²	0.4 (0.2)	4.0 (1.0)		5.0 (1.3)	
Smoking status			<.001		<.01
Current smoker	8.3 (1.0)	11.3 (1.4)		13.9 (2.0)	
Former smoker	45.5 (1.7)	53.7 (2.2)		49.6 (2.8)	
Never-smoker	46.1 (1.7)	35.0 (2.1)		36.5 (2.6)	
Family income below FPT	3.1 (0.5)	8.2 (1.0)	<.0001	12.5 (1.7)	<.0001
Has health insurance	99.0 (0.4)	98.9 (0.5)	.97	98.7 (0.7)	.72
Has a usual source of care	97.6 (0.7)	98.8 (0.5)	.16	97.7 (1.0)	.97
Cancer duration, mean (SE)	7.3 (0.3)	7.4 (0.4)	.92	7.3 (0.6)	.95

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Table 3. Sociodemographic Characteristics and Cancer Duration by Cancer Type and Disability Status^a (cont.)

Cancer	Disability Status				
	No Disability % (SE)	MD % (SE)	P Value ^b	CAL % (SE)	P Value ^b
Ovarian					
Total, N	207	149		112	
Mean age (SE), y	53.3 (1.5)	57.4 (2.3)	<.0001	59.2 (2.3)	<.0001
Age			.14		.08
<45 y	33.6 (4.4)	23.3 (5.6)		19.9 (5.8)	
45–64 y	39.0 (4.6)	34.1 (5.3)		31.9 (6.5)	
65–79 y	23.2 (4.1)	31.8 (5.7)		34.5 (7.2)	
≥80 y	4.2 (1.6)	10.9 (3.8)		13.7 (5.2)	
Race			.12		.28
White	79.7 (3.9)	89.7 (2.7)		87.3 (3.3)	
Black	11.1 (3.0)	8.3 (2.5)		9.8 (3.0)	
Asian	4.9 (2.5)	0.7 (0.5)		0.7 (0.5)	
Other/Mixed	4.3 (1.8)	1.3 (0.7)		2.2 (1.1)	
Ethnicity			.04		<.01
Hispanic	14.2 (3.6)	5.2 (2.4)		3.2 (1.4)	
Education			.18		.08
Less than high school	10.9 (3.4)	20.0 (3.7)		26.3 (5.7)	
High school	26.5 (3.6)	31.4 (5.4)		27.0 (5.9)	
Some college/associate's degree	35.2 (4.5)	30.4 (5.4)		27.2 (5.3)	
College/Advanced degree	27.5 (4.2)	18.2 (6.1)		19.4 (8.0)	
Body mass index			<.01		.17
<25 kg/m ²	43.0 (5.2)	27.3 (5.9)		32.7 (8.1)	
25–29 kg/m ²	27.9 (4.9)	26.5 (5.7)		23.8 (5.8)	
30–34 kg/m ²	21.1 (4.2)	19.3 (4.3)		22.1 (5.2)	
35–39 kg/m ²	5.1 (1.8)	11.3 (3.6)		9.9 (3.3)	
≥40 kg/m ²	2.8 (1.3)	15.6 (4.1)		11.5 (4.2)	
Smoking status			.20		.15
Current smoker	21.6 (3.6)	20.5 (3.9)		25.4 (5.6)	
Former smoker	18.9 (3.6)	30.9 (5.8)		31.2 (7.4)	
Never-smoker	59.4 (4.5)	48.6 (6.2)		43.4 (7.0)	
Family income below FPT	7.7 (2.4)	30.6 (5.1)	<.0001	32.7 (6.0)	<.0001
Has health insurance	88.4 (3.2)	94.2 (2.2)	.13	93.3 (3.3)	.30
Has a usual source of care	92.1 (2.7)	97.6 (1.3)	.06	95.9 (2.9)	.33
Cancer duration, mean (SE)	13.1 (1.3)	11.0 (1.5)	.29	12.2 (1.8)	.69

Abbreviations: CAL, complex activity limitation; FPT, federal poverty threshold; MD, movement difficulty; NHIS, National Health Interview Survey.

^aAll analyses accounted for the complex sampling design and used NHIS sampling weights to produce nationally representative estimates for civilian, noninstitutionalized US residents.

^bComparing persons with no disability versus those with MD or CAL disability.

We found similar CRC and prostate cancer prevalence estimates across the 2 data sources, whereas the NHIS estimates higher rates for NHL and ovarian cancer (although the absolute differences are small). These findings suggest that NHIS participants are not underreporting

cancer diagnoses, although—especially for ovarian cancer—overreporting could occur.

In addition to concerns about the accuracy of cancer reports, our findings share the limitations of other cross-sectional survey data analyses. We identify statistical

Table 4. Multivariable Logistic Regression Analyses of Relationship Between Cancer and Disability Status^a

Variable	Colorectal aOR (95% CI)			Non-Hodgkin's Lymphoma aOR (95% CI)			Prostate aOR (95% CI)			Ovarian aOR (95% CI)		
	MD	CAL	MD	MD	CAL	MD	MD	CAL	MD	CAL	MD	CAL
Disability (P value)	<.001	<.0001	.14	<.0001	<.01	.03	.11	.15	.10			
Disability	1.5 (1.2–1.9)	1.9 (1.5–2.4)	1.2 (0.9–1.6)	1.5 (1.1–2.1)	1.2 (1.0–1.3)	1.2 (1.0–1.3)	1.1 (1.0–1.3)	1.4 (0.9–2.1)	1.5 (0.9–2.4)			
No disability	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Age (P value)	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	.08	<.01			
<45 y	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
45–64 y	6.4 (4.1–10.0)	6.2 (3.9–9.9)	2.7 (1.9–3.8)	2.8 (2.0–4.0)	–	–	–	1.5 (1.0–2.3)	1.6 (1.1–2.5)			
65–79 y	14.3 (9.0–22.7)	14.0 (8.8–22.4)	4.3 (3.0–6.3)	4.2 (2.9–6.2)	–	–	–	2.0 (1.1–3.4)	2.6 (1.5–4.4)			
≥80 y	22.7 (14.1–36.6)	21.2 (13.0–34.8)	6.4 (3.9–10.4)	6.6 (3.9–11.1)	–	–	–	1.2 (0.6–2.6)	1.4 (0.6–3.3)			
<65 y	–	–	–	–	–	Ref	Ref	–	–			
65–79 y	–	–	–	–	–	11.6 (9.8–13.6)	11.6 (9.7–13.8)	–	–			
≥80 y	–	–	–	–	–	16.3 (13.2–20.2)	15.7 (12.4–19.8)	–	–			
Sex (P value)	<.01	.01	<.01	<.01	<.01	–	–	–	–			
Male	Ref	Ref	Ref	Ref	Ref	–	–	–	–			
Female	0.8 (0.6–0.9)	0.8 (0.6–0.9)	0.7 (0.6–0.9)	0.7 (0.5–0.9)	–	–	–	–	–			
Race (P value)	.22	.84	.19	.16	.16	<.0001	<.0001	.36	.53			
White	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref			
Black	0.9 (0.7–1.2)	0.9 (0.7–1.2)	0.8 (0.5–1.2)	0.7 (0.4–1.1)	1.8 (1.5–2.2)	1.8 (1.6–2.2)	1.8 (1.5–2.2)	0.7 (0.4–1.1)	0.8 (0.5–1.3)			
Asian	0.9 (0.6–1.4)	1.0 (0.7–1.6)	0.5 (0.2–1.2)	0.6 (0.2–1.2)	0.4 (0.2–0.6)	0.3 (0.2–0.6)	0.4 (0.2–0.6)	0.7 (0.3–2.0)	0.8 (0.3–2.2)			
Other/Mixed	1.7 (1.0–2.8)	1.2 (0.7–2.2)	0.5 (0.2–1.4)	0.6 (0.2–1.4)	1.0 (0.6–1.7)	1.0 (0.6–1.7)	1.0 (0.6–1.8)	1.2 (0.5–2.5)	1.4 (0.7–3.0)			
Ethnicity (P value)	<.01	<.01	.44	.47	.47	<.01	<.01	.29	.35			
Non-Hispanic	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref			
Hispanic	0.6 (0.4–0.8)	0.6 (0.4–0.8)	0.8 (0.5–1.4)	0.8 (0.5–1.4)	0.6 (0.5–0.8)	0.7 (0.5–0.9)	0.6 (0.5–0.8)	0.8 (0.5–1.3)	0.8 (0.5–1.3)			
Education (P value)	.42	.73	.71	.70	.70	<.01	<.01	.93	.86			
Less than high school	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref			
High school	1.0 (0.8–1.2)	1.1 (0.9–1.5)	1.1 (0.7–1.7)	1.2 (0.7–1.9)	1.0 (0.8–1.3)	1.1 (0.9–1.3)	1.0 (0.8–1.3)	0.9 (0.6–1.5)	0.8 (0.5–1.4)			
Some college/associate's degree	1.0 (0.8–1.3)	1.1 (0.8–1.5)	1.2 (0.8–1.9)	1.3 (0.8–2.0)	1.0 (0.8–1.2)	1.1 (0.9–1.3)	1.0 (0.8–1.2)	0.9 (0.6–1.5)	0.8 (0.5–1.4)			

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Table 4. Multivariable Logistic Regression Analyses of Relationship Between Cancer and Disability Status^a (cont.)

Variable	Colorectal aOR (95% CI)		Non-Hodgkin's Lymphoma aOR (95% CI)		Prostate aOR (95% CI)		Ovarian aOR (95% CI)	
	MD	CAL	MD	CAL	MD	CAL	MD	CAL
College/Advanced degree	0.8 (0.6–1.1)	1.0 (0.7–1.4)	1.2 (0.8–2.0)	1.3 (0.8–2.1)	1.4 (1.1–1.7)	1.3 (1.1–1.7)	0.8 (0.5–1.5)	0.8 (0.4–1.5)
Body mass index (P value)	.21	.06	.44	.43	.21	.23	.69	.82
<25 kg/m ²	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
25–29 kg/m ²	1.1 (0.9–1.3)	1.1 (0.9–1.4)	0.8 (0.6–1.1)	0.8 (0.6–1.1)	0.9 (0.8–1.1)	0.9 (0.8–1.1)	1.1 (0.7–1.7)	1.0 (0.6–1.6)
30–34 kg/m ²	1.1 (0.8–1.4)	1.1 (0.8–1.4)	1.0 (0.7–1.5)	1.1 (0.8–1.6)	1.0 (0.8–1.2)	1.0 (0.8–1.2)	1.2 (0.8–1.9)	1.3 (0.8–2.0)
35–39 kg/m ²	1.1 (0.8–1.6)	1.1 (0.8–1.6)	0.7 (0.4–1.2)	0.7 (0.4–1.3)	0.8 (0.6–1.1)	0.9 (0.7–1.3)	1.2 (0.7–2.1)	1.0 (0.6–1.8)
≥40 kg/m ²	1.7 (1.1–2.7)	2.0 (1.3–3.2)	0.8 (0.4–1.6)	0.9 (0.4–1.7)	0.6 (0.4–1.0)	0.6 (0.4–0.9)	1.5 (0.8–2.6)	1.1 (0.5–2.2)
Smoking status (P value)	<.0001	<.0001	.72	.93	<.01	<.01	.03	<.01
Current smoker	0.8 (0.6–1.1)	0.8 (0.7–1.1)	0.9 (0.6–1.2)	0.9 (0.6–1.4)	0.9 (0.7–1.1)	0.9 (0.7–1.1)	1.7 (1.2–2.5)	2.0 (1.3–3.0)
Former smoker	1.5 (1.3–1.8)	1.5 (1.2–1.8)	1.0 (0.8–1.3)	1.0 (0.7–1.3)	1.2 (1.1–1.4)	1.2 (1.0–1.4)	1.3 (0.8–1.9)	1.3 (0.8–2.0)
Never-smoker	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Family income below FPT (P value)	.74	.88	.06	.14	<.001	<.01	.46	.64
Yes	1.0 (0.8–1.4)	1.0 (0.7–1.3)	0.7 (0.5–1.0)	0.7 (0.5–1.1)	0.7 (0.5–0.9)	0.7 (0.6–0.9)	1.2 (0.8–1.7)	0.9 (0.6–1.4)
No	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Has health insurance (P value)	.01	.04	.09	.13	<.001	<.0001	.99	.70
Yes	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
No	0.6 (0.4–.9)	0.6 (0.4–1.0)	0.5 (0.3–1.1)	0.6 (0.3–1.2)	0.3 (0.2–0.6)	0.3 (0.1–0.5)	1.0 (0.6–1.8)	1.1 (0.6–2.1)
Has usual source of care (P value)	<.0001	<.001	.02	<.01	<.0001	<.0001	.28	.52
Yes	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
No	0.4 (0.2–0.6)	0.4 (0.2–0.6)	0.5 (0.3–0.9)	0.4 (0.2–0.8)	0.3 (0.2–0.5)	0.3 (0.2–0.6)	0.7 (0.4–1.3)	0.8 (0.4–1.6)

Abbreviations: CAL, complex activity limitation; FPT, federal poverty threshold; MD, movement difficulty; NHIS, National Health Interview Survey.

^aObtained from multivariable logistic regression models that included all the variables in the table and accounted for the complex sampling design using NHIS sampling weights to produce nationally representative estimates for civilian, noninstitutionalized US residents.

associations, not causality. We cannot precisely assess whether disability occurred because of cancer or before the cancer, although by looking at different time frames we attempted to explore this timing. Given concerns about potential stigmatization of disability, response bias or sociocultural factors could affect self-reports of functional status. Although we examined 8 years of NHIS data, too few cases reported sensory, mental health, or cognitive disability for us to perform rigorous analyses for these disability groups. Nonetheless, because NHIS data are nationally representative, they allow us to produce population estimates; their detail about cancer diagnoses and functional status also offers the opportunity to explore associations between disability and cancer experiences, which have not been previously assessed.

Conclusions

Little research has explored cancer among persons with preexisting disability, and our findings raise further questions. Our population-based analyses suggest that persons with disability should perhaps be considered a high-risk population, with higher cancer incidence. Optimizing appropriate screening and fully investigating

new signs and symptoms are therefore critical. Given older ages at diagnosis among persons with disability, further investigation into the possibility of diagnostic overshadowing is important. Erroneously attributing new signs and symptoms to a patient's underlying disability could delay cancer diagnoses and reduce the likelihood of a good outcome.

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See [JNCCN.org](https://www.jnccn.org) for supplemental online content.

Supplemental online content for:

Cross-Sectional Analysis of the Associations Between Four Common Cancers and Disability

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eAppendix 1: Question Stems and Response Categories for the Adult Health Status and Limitations Module

eAppendix 2: Definitions of Disability Measures Using National Health Interview Survey Responses

eAppendix 1. Question Stems and Response Categories for the Adult Health Status and Limitations Module in the Sample Adult Core Questionnaire of the National Health Interview Survey

“The next questions ask about difficulties you may have doing certain activities because of a HEALTH PROBLEM. By ‘health problem’ we mean any physical, mental, or emotional problem or illness (not including pregnancy). By yourself, and without using any special equipment, how difficult is it for you to...”

Response categories are: “not at all difficult,” “only a little difficult,” “somewhat difficult,” “very difficult,” “can’t do at all,” “do not do this activity” (“refused” and “don’t know”).

Categories of disability created by combining responses from functional and activity limitation questions:

Basic Action Difficulties (BADs)

- **Movement difficulty (MD):** at least somewhat difficult to walk, stand, climb stairs, sit, stoop, reach, grasp, or carry
- **Sensory difficulty:** trouble seeing even when wearing glasses/contact lenses; or deaf or trouble hearing without a hearing aid
- **Emotional difficulty:** sad, nervous, restless, hopeless, “everything was an effort,” and worthless feelings in the past 30 days
- **Cognitive difficulty:** limited in any way because of difficulty remembering or because of periods of confusion

Complex Activity Limitations (CALs)

- **Self-care limitation:** difficulty with any component of activities of daily living (ADLs) or instrumental ADLs (IADLs)
- **Social limitation:** going out, participating in social activities or relaxing at least somewhat difficult
- **Work limitation:** cannot work or has work limitations because of physical, mental or emotional problem

eAppendix 2. Definitions of Disability Measures Using National Health Interview Survey Responses

Basic Action Difficulties	
Movement Disability	<p>A response of “only somewhat difficult,” “very difficult,” or “can’t do at all” on any of the following questions: “By yourself, and without using any special equipment, how difficult is it for you to . . . Walk a quarter of a mile—about 3 city blocks? . . . Walk up 10 steps without resting? . . . Stand or be on your feet for about 2 hours? . . . Sit for about 2 hours? . . . Stoop, bend, or kneel? . . . Reach up over your head? . . . Use your fingers to grasp or handle small objects? . . . Lift or carry something as heavy as 10 pounds such as a full bag of groceries?”</p>
Sensory Disability	<p>A “yes” response to either of the following questions: “Do you have any trouble seeing, even when wearing glasses or contact lenses?” If the response is yes: “Are you blind or unable to see at all?” “Have you ever worn a hearing aid?” OR a response of “a lot of trouble” or “deaf” to the following: “Which statement best describes your hearing without a hearing aid: Good, a little trouble, a lot of trouble, deaf?”</p>
Emotional Disability	<p>A score of 13 or more based on the following questions which comprise the K6 serious psychological distress scale: “During the past 30 days, how often did you feel . . . So sad that nothing could cheer you up? . . . Nervous? . . . Restless or fidgety? . . . Hopeless? . . . That everything was an effort? . . . Worthless? Possible answers are “all of the time” (4 points) “most of the time” (3 points) “some of the time” (2 points) “a little of the time” (1 point) “none of the time” (0 points).</p> <p>To score the K6, the points are added together yielding a possible total of 0 to 24 points</p>
Cognitive Disability	<p>A “yes” response to the following: {Are/Is} {person} LIMITED IN ANY WAY because of difficulty remembering or because {you/they} e experience periods of confusion?”</p>
Complex Activity Limitations	
Self Care Limitation	<p>Require help with any daily living activities: bathing or showering dressing getting in or out of bed or a chair using the toilet eating and getting around inside the home OR Require help with any instrumental daily living activities: household chores doing necessary business shopping getting around for other purposes</p>
Social Limitation	<p>A response of “only somewhat difficult,” “very difficult,” or “can’t do at all” on any of the following questions: “By yourself and without using any special equipment, how difficult is it for you to . . . Go out to things like shopping, movies, or sporting events? . . . Participate in social activities such as visiting friends, attending clubs and meetings, going to parties? . . . Do things to relax at home or for leisure (reading, watching TV, sewing, listening to music)?”</p>
Work Limitation	<p>A “yes” response to either of the following: “Does a physical, mental, or emotional problem NOW keep {you/anyone in the family (age ≥18 years)} from working at a job or business?” “{Are you/any of these family members} limited in the kind OR amount of work {you/they} can do because of a physical, mental or emotional problem?”</p>