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Utilization of General Health Checkups and Cancer Screening among Individuals with Disabilities Requiring Assistance: Insights from Japan's 2016 Comprehensive Survey of Living Conditions

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Abstract

Research addressing the uptake of preventive healthcare among people with disabilities in Japan is extremely limited. This study sought to (1) assess the link between disability and participation in general health examinations (GHE) as well as screenings for lung, gastric, colorectal, breast, and cervical cancers, and (2) investigate reasons why individuals with disabilities might skip GHE. Using data from the 2016 Comprehensive Survey of Living Conditions, responses from 15,294 adults aged 20–74 were analyzed. Associations between disability and non-attendance in preventive services were evaluated through binomial logistic regression, while descriptive analyses explored reported reasons for avoiding GHE. Results revealed that disability independently increased the likelihood of not undergoing GHE (OR: 1.73; 95%CI: 1.14–2.62) and screenings for colorectal (OR: 1.78; 95%CI: 1.08–2.94), gastric (OR: 2.27; 95%CI: 1.27–4.05), cervical (OR: 2.12; 95%CI: 1.04–4.32), and breast cancers (OR: 2.22; 95%CI: 1.04–4.72), after adjusting for potential confounders. The most cited explanation for non-participation was the perception that "I can see a doctor anytime if I am concerned" (25/54, 46.3%). These findings suggest that people with disabilities in Japan experience disparities in access to preventive healthcare services.

Keywords: General health examination, Cancer screening, Japan, Disability, Disparity

Introduction

Individuals with disabilities face greater vulnerability to health risks [1–4], chronic conditions [4], disability-associated illnesses [5, 6], and adverse health outcomes [7–9] compared with the general population. This elevated susceptibility, often termed the "narrow margin of health" [10, 11], highlights the critical importance of timely engagement in preventive healthcare such as GHE and cancer screenings [12, 13], which can facilitate early identification of coexisting or secondary conditions. Prior studies indicate that regular use of preventive services may positively influence health outcomes among people with disabilities [14, 15], suggesting that these services represent a key strategy for promoting health across both disabled and non-disabled populations.

Despite these benefits, multiple obstacles impede access to preventive healthcare for people with disabilities [13]. Evidence increasingly points to disability itself as a significant factor limiting participation in such services [16–19]. For example, a study in the United States found that women with major mobility limitations were less likely to receive Papanicolaou tests (OR: 0.6; 95%CI: 0.4–0.9) and mammograms (OR: 0.7; 95%CI: 0.5–0.9), even after accounting for other factors [16]. Similar trends have been reported in Taiwan, where disability predicted lower use of health examinations and influenza vaccination [17], and in the UK, where disability was linked to unmet healthcare needs [18]. The World Health Organization has recognized such disparities in

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preventive service access between people with and without disabilities as a global public health concern [13].

In Japan, preventive health measures including GHE and cancer screenings have been widely implemented since the 1970s. Workplace GHEs have been mandated under the Industrial Health and Safety Act since 1972, while municipal-level GHEs and cancer screenings were established through the Health and Medical Service Law for the Aged in 1983 [20]. These programs aim to detect conditions early and maintain population health. In 2000, the nationwide Health Japan 21 initiative was launched to extend healthy life expectancy and enhance quality of life [21, 22]. The program set participation targets for GHE and cancer screenings, promoting regular engagement with these services [21]. More recently, the Fourth edition of the Basic Plan to Promote Cancer Control Program (March 2023) has emphasized equal access to cancer screening for all individuals, including those with disabilities [23].

Despite these efforts, data on preventive healthcare utilization among Japanese people with disabilities remain limited. As of 2022, approximately 11.6 million Japanese citizens, or 9.2% of the population, were living with a disability [24]. Previous nationwide studies have explored factors influencing engagement with preventive services [25–31], but none explicitly included disability as a variable, leaving disability-related disparities largely unexamined. While some evidence suggests that preventive service use may be lower among people with disabilities [32–36], these studies often focused on specific services or small, institution-based samples. No comprehensive study has yet analyzed the association between disability and a broad range of preventive services using nationally representative data in Japan.

This study addresses that gap by examining how disability relates to participation in annual GHE and routine cancer screenings. It also explores reasons cited for skipping GHE. By doing so, it aims to provide insight for policymakers and healthcare providers seeking to reduce disparities and ensure equitable access to preventive healthcare for people with disabilities in Japan. We hypothesized that disability would be linked to lower engagement with preventive healthcare, while no specific predictions were made regarding reasons for non-participation due to the exploratory nature of this analysis.

Materials and Methods

Study design

This research employed a cross-sectional design, conducting a secondary analysis of anonymized, nationally representative data from the 2016 Comprehensive Survey of Living Conditions (CSLC) in Japan. The dataset was made available for academic research by the Ministry of Health, Labour and Welfare (MHLW) under Article 36 of the Statistical Act [37], and the authors received approval to access the data on 11 April 2023.

The 2016 CSLC dataset represented the most recent publicly accessible dataset at the time of this study. The survey was carried out between 2 June and 14 July 2016. Data from the Kumamoto prefecture (southern Japan, population 1,785,603 as of 1 January 2016, approximately 1.4% of the national population) were excluded due to disruptions caused by a major earthquake in that region, which affected survey procedures.

As this study involved only secondary analysis of de-identified data without any attempt to identify individuals, ethical approval and informed consent were not required.

Overview of preventive healthcare services in Japan

This study focused on two types of preventive healthcare services: general health examinations (GHE) and five categories of cancer screening.

In Japan, annual GHEs are offered either through workplaces (funded by employers) or at municipal health centers (primarily funded by local governments). Workplace GHEs typically cover employees and their non-employed dependents (e.g., spouses), whereas municipal GHEs are available for unemployed or self-employed adults aged 40–74 years and their dependents [38].

Cancer screening is similarly provided through workplace or municipal programs. Municipal screenings are nationally standardized population-based programs financed by local authorities. Employers are not mandated to provide cancer screenings, and availability and costs of workplace-based screenings may vary. Therefore, individuals generally access screenings through either municipal or workplace programs depending on their circumstances.

Following evidence-based guidelines, the Japanese government recommends five types of regular cancer screening based on age: gastric cancer screening every two years for individuals aged 50 and older; annual lung cancer screening for those 40 and above; annual

colorectal cancer screening for ages 40 and older; breast cancer screening every two years for women aged 40 and older; and cervical cancer screening every two years for women aged 20 and above [38]. Although the government does not set an upper age limit, some municipalities impose limits (e.g., 74 or 79 years) due to concerns about potential screening complications [39]. In alignment with these policies, this study defined 74 years as the upper age limit for all five cancer screenings. The World Health Organization recommends mammography for women aged 40–75, without guidance for those older than 75 [40].

Notably, in April 2016, the starting age for gastric cancer screening was raised from 40 to 50 years. Screening frequency also depends on the examination type: annual X-rays or endoscopic exams every two years.

Data source

The CSLC, conducted since 1986, is a nationwide self-administered survey assessing living conditions among the Japanese population [41]. It consists of large-scale surveys every three years and smaller annual surveys. The 2016 large-scale survey included questionnaires on household composition, income, health, savings, and long-term care.

In 2016, approximately 710,000 individuals from 290,000 households across 5,410 randomly selected census tracts received household and health questionnaires. Long-term care questionnaires were sent to around 8,000 registered long-term care users, and income/savings questionnaires reached 80,000 individuals from 30,000 households in 2,446 and 1,963 census tracts, respectively. Household members completed the surveys themselves, but proxies (e.g., family members or caregivers) could respond on behalf of participants who were unable. Response rates were 77.5% for household and health, 89.7% for long-term care, and 71.8% for income/savings questionnaires. Sample questionnaires (in Japanese) are publicly available on the MHLW website [42].

To protect anonymity and ensure representativeness, the MHLW resampled the data provided to researchers. Some records, such as those from large households (more than eight members), households with multiple members requiring support, or households with multiple long-term care users, were excluded. Consequently, the final resampled dataset used in this study included 15,294 individuals. Due to resampling and exclusions, statistics derived from this dataset may not exactly match official MHLW reports.

Inclusion and exclusion criteria

Participants included in this study were aged between 20 and 74 years. Individuals were excluded if they were temporarily absent from their household during the survey period or if they had missing responses for any variables relevant to the outcomes, explanatory factors, or potential confounders.

Outcome variables

The primary outcomes assessed were participation in, or non-participation in, general health examinations (GHE) and cancer screening. Specific survey items from the CSLC were used to determine each outcome:

- Receipt of a GHE within the past year (Yes/No).
- Receipt of gastric cancer screening (barium X-ray or endoscopy) within the past year (Yes/No). Although national guidelines recommend annual X-rays or biennial endoscopy, the 2016 CSLC questionnaire only captured screening within the previous year; thus, this variable was used as the outcome measure for gastric cancer screening.
- Receipt of lung cancer screening (chest X-ray or sputum test) in the past year (Yes/No).
- Receipt of colorectal cancer screening (fecal occult blood test) in the past year (Yes/No).
- Receipt of breast cancer screening (mammography or breast ultrasound) in the past two years (Yes/No).
- Receipt of cervical cancer screening (Pap smear) in the past two years (Yes/No).

Explanatory and confounding variables

The key explanatory variable was disability status, operationalized via a CSLC question on the need for support in daily life:

- "Do you require assistance or supervision from others due to disability or declining physical function?" (Yes/No). Participants answering "Yes" were classified as having a disability.

Preventive healthcare use may be influenced by multiple factors [13]; therefore, potential confounders were included in multivariate analyses to isolate the association between disability and service utilization. Candidate confounders were identified based on prior research indicating potential relationships with GHE or

cancer screening participation [16–18, 25, 26 ,31]. Twelve variables from the CSLC were selected and categorized into demographic, physiological, and psychosocial groups.

Demographic variables included:

- Sex (male, female)
- Age, categorized into three groups: (1) individuals ineligible for GHE or screening (ages 20–40 or 50, depending on the specific service), (2) eligible individuals younger than 65, and (3) eligible individuals aged 65 and older, reflecting the common Japanese policy threshold for elderly status.
- Marital status (married, single, divorced/widowed)
- Educational attainment (primary/junior high, high school, vocational/junior college/technical college/university/postgraduate)

Physiological variables included:

- Regular visits to medical facilities, including hospitals, clinics, dental offices, acupuncture, moxibustion, Japanese massage, or Judo therapy (Yes/No), with "regular visits" defined as ongoing use, though frequency was unspecified in the questionnaire.
- Self-reported health status (good, normal, poor)
- Alcohol consumption categorized as never/former drinker, low-risk (0–100 g/week), moderate-risk (101–350 g/week), and high-risk (>350 g/week) [31]
- Smoking status (never/ex-smoker, current smoker)

Psychosocial variables included:

- Perceived financial situation (wealthy, neither poor nor wealthy, poor)
- Psychological distress measured using the Kessler K6 scale (normal: ≤4, mild: 5–12, severe: ≥13) [31]
- Health insurance type (National Health Insurance, employee-based insurance, other)
- Employment status (employed, self-employed, other employed, unemployed)

Reasons for non-participation in GHE

Participants who reported not attending a GHE were asked to indicate reasons for non-participation through a multiple-choice question: "Why did you not participate in your GHE? Select all that apply." Twelve response options were provided: (1) unaware GHE was available, (2) too busy, (3) GHE location too far, (4) cost too high, (5) concerned about procedures (blood draw or endoscopy), (6) hospitalized when GHE offered, (7) did not perceive annual GHE as necessary, (8) felt healthy and did not need it, (9) can visit a doctor anytime if concerned, (10) worried about test results, (11) lacked motivation, and (12) other. These options have been included in the CSLC questionnaire since 1998. This study used these responses to examine reasons for non-participation in GHE. The CSLC did not include a comparable follow-up question regarding reasons for not participating in cancer screenings.

Statistical analysis

All variables in this study were categorical and are summarized as counts and percentages. The analysis followed a multi-step approach. First, chi-square tests were applied to compare explanatory and potential confounding variables between those who participated and those who did not participate in GHE and cancer screening. Second, unadjusted odds ratios (ORs) were computed for each variable to examine their association with non-participation. Third, a multivariable binomial logistic regression model was built using a forced-entry method to determine factors independently linked to non-participation. In this model, disability status was treated as the main explanatory factor, while all pre-selected candidate confounders were included as covariates. Assessment of multicollinearity revealed no strong correlations among covariates, with phi coefficients (for 2×2 tables) and Cramer's V (for tables with three or more categories) all below 0.5.

Finally, a descriptive analysis summarized the self-reported reasons for not attending GHE. All statistical procedures were carried out using IBM SPSS Statistics version 28.0.1.0, and p-values below 0.05 were considered statistically significant.

Results and Discussion

The flow of participant selection is illustrated in **Figure 1**. After applying exclusion criteria, the final samples for analysis were: GHE, ages 20–74 years (n = 8,438); gastric cancer screening, ages 50–74 years (n = 4,318); lung cancer screening, ages 40–74 years (n = 6,042); colorectal cancer screening, ages 40–74 years (n = 6,030); breast cancer screening, women aged 40–74 years (n = 3,098); and cervical cancer screening, women aged 20–74 years (n = 4,261).

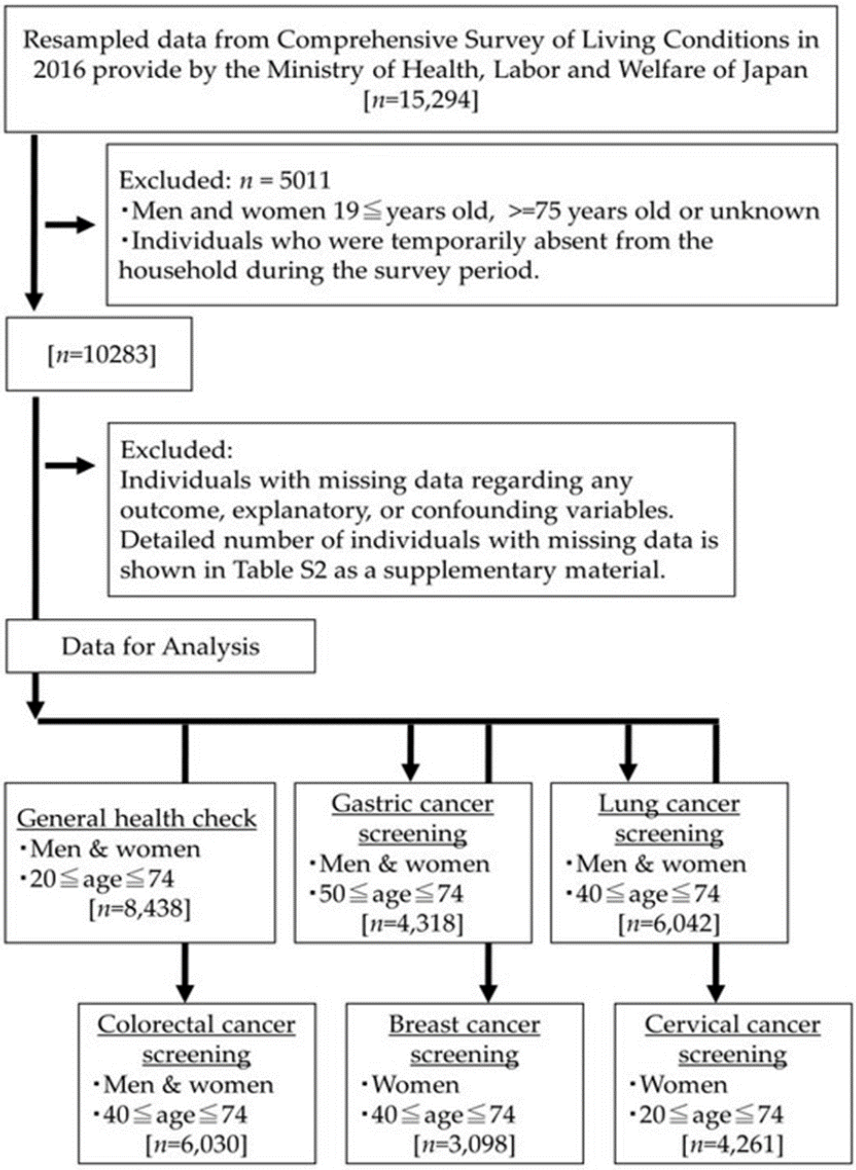

Figure 1. Participant selection process

Table 1 summarizes the characteristics of the study population and compares participants and non-participants across preventive healthcare services. Overall, the rates of participation were 73.4% for GHE (6,192/8,438), 52.4% for lung cancer screening (3,163/6,042), 46.8% for colorectal cancer screening (2,825/6,030), 47.1% for gastric cancer screening (2,033/4,318), 43.7% for cervical cancer screening (1,864/4,261), and 47.4% for breast cancer screening (1,469/3,098). Among individuals classified as having a disability, participation was notably lower, with rates of 50.0% (54/108) for GHE, 32.6% (28/86) for lung cancer, 28.2% (24/85) for colorectal cancer, 25.0% (17/68) for gastric cancer, 20.8% (11/53) for cervical cancer, and 25.0% (10/40) for breast cancer.

Statistical comparisons indicated that individuals with disabilities were significantly less likely to participate in GHE and all types of cancer screening than those without disabilities ($p < 0.001$ or $p = 0.004$). Among the 12 potential confounding variables, eight showed significant differences when comparing participants to non-participants across GHE and cancer screening.

Table 1. Participants' characteristics and their comparison between participants and non-participants in preventive healthcare services.

General Health Examination (*n* = 8438)	**Lung Cancer Screening (*n* = 6042)**					**Colorectal Cancer Screening (*n* = 6030)**					**General Health Examination (*n* = 8438)**				
	Participants (*n* = 6196)		**Non-Participants (*n* = 2242)**		***p*-Value**	**Participants (*n* = 3163)**		**Non-Participants (*n* = 2879)**		***p*-Value**	**Participants (*n* = 2825)**		**Non-Participants (*n* = 3205)**		***p*-Value**
	n	**(%)**	***n***	**(%)**		***n***	**(%)**	***n***	**(%)**		***n***	**(%)**	***n***	**(%)**	
Disability					<0.001					<0.001					<0.001
Do not need any support or supervision	6142	(99.13)	2188	(97.59)		3135	(99.11)	2821	(97.99)		2801	(99.15)	3144	(98.10)	
Need support or supervision	54	(0.87)	54	(2.41)		28	(0.89)	58	(2.01)		24	(0.85)	61	(1.90)	
Sex					<0.001					<0.001					<0.001
Male	3229	(52.11)	880	(39.25)		1720	(54.38)	1231	(42.76)		1510	(53.45)	1421	(44.34)	
Female	2967	(47.89)	1362	(60.75)		1443	(45.62)	1648	(57.24)		1315	(46.55)	1784	(55.66)	
Age (years)					<0.001					0.032					0.332
65–74	1264	(20.40)	576	(25.69)		914	(28.90)	905	(31.43)		834	(29.52)	983	(30.67)	
40–64	3325	(53.66)	982	(43.80)		2249	(71.10)	1974	(68.57)		1991	(70.48)	2222	(69.33)	

Wealthy	Subjective financial state	Primary/junior high school	High school	Vocational school/junior college/community (technical) college/university/post-graduate school	Educational qualification	Divorced/ widowed	Single	Married	Marital status	20–39
391		406	2512	3278		495	1306	4395		1607
(6.31)		(6.55)	(40.54)	(52.91)		(7.99)	(21.08)	(70.93)		(25.94)
85		306	1025	911		218	585	1439		684
(3.79)		(13.65)	(45.72)	(40.63)		(9.72)	(26.09)	(64.18)		(30.51)
	<0.001				<0.001				<0.001	
241		261	1369	1533		296	273	2594		-
(7.62)		(8.25)	(43.28)	(48.47)		(9.36)	(8.63)	(82.01)		(-)
117		358	1413	1108		344	346	2189		-
(4.06)		(12.43)	(49.08)	(38.49)		(11.95)	(12.02)	(76.03)		(-)
	<0.001				<0.001				<0.001	
227		207	1199	1419		249	221	2355		-
(8.04)		(7.33)	(42.44)	(50.23)		(8.81)	(7.82)	(83.36)		(-)
132		405	1576	1224		389	391	2425		-
(4.12)		(12.64)	(49.17)	(38.19)		(12.14)	(12.20)	(75.66)		(-)
	<0.001				<0.001				<0.001	

Unemployed	Employed (other)	Self-employed	Employed	Employment status	Other	National Health Insurance	Employee insurance	Health insurance	Poor	Nor poor, not wealthy
1405	400	333	4058		87	1590	4519		3313	2492
(22.68)	(6.46)	(5.37)	(65.49)		(1.40)	(25.66)	(72.93)		(53.47)	(40.22)
986	193	218	845		96	995	1151		1434	723
(43.98)	(8.61)	(9.72)	(37.69)		(4.28)	(44.38)	(51.34)		(63.96)	(32.25)
				<0.001				<0.001		
810	267	219	1867		46	985	2132		1599	1323
(25.61)	(8.44)	(6.92)	(59.03)		(1.45)	(31.14)	(67.40)		(50.55)	(41.83)
1137	246	268	1228		113	1249	1517		1744	1018
(39.49)	(8.54)	(9.31)	(42.65)		(3.92)	(43.38)	(52.69)		(60.58)	(35.36)
				<0.001				<0.001		
803	244	194	1584		42	917	1866		1395	1203
(28.42)	(8.64)	(6.87)	(56.07)		(1.49)	(32.46)	(66.05)		(49.38)	(42.58)
1140	270	291	1504		115	1310	1780		1935	1138
(35.57)	(8.42)	(9.08)	(46.93)		(3.59)	(40.87)	(55.54)		(60.37)	(35.51)
				<0.001				<0.001		

Bad	Normal	Good	Subjective health status	No (no visit)	Yes (visit)	Constant visits to hospitals †	Severe illness (13 ≤ total score)	Mild illness (5 ≤ total score ≤ 12)	Normal (total score ≤ 4)	Kessler Psychological Distress Scale
646	3262	2288		3528	2668		218	1468	4510	
(10.43)	(52.65)	(36.93)		(56.94)	(43.06)		(3.52)	(23.69)	(72.79)	
303	1158	781		1384	858		102	591	1549	
(13.51)	(51.65)	(34.83)		(61.73)	(38.27)		(4.55)	(26.36)	(69.09)	
			<0.001			<0.001				0.002
343	1731	1089		1510	1653		82	705	2376	
(10.84)	(54.73)	(34.43)		(47.74)	(52.26)		(2.59)	(22.29)	(75.12)	
396	1552	931		1538	1341		100	711	2068	
(13.75)	(53.91)	(32.34)		(53.42)	(46.58)		(3.47)	(24.70)	(71.83)	
			0.002			<0.001				0.007
314	1540	971		1298	1527		72	614	2139	
(11.12)	(54.51)	(34.37)		(45.95)	(54.05)		(2.55)	(21.73)	(75.72)	
427	1735	1043		1738	1467		109	801	2295	
(13.32)	(54.13)	(32.54)		(54.23)	(45.77)		(3.40)	(24.99)	(71.61)	
			0.024			<0.001				<0.001

			Current smoker	Never/ex-smoker	Smoking habit	High-risk drinking (>350 g/week)	Middle-risk drinking (>100 to ≤350 g/week)	Social drinker/low-risk group (>0 to ≤100 g/week)	Never or quit drinking	Alcohol consumption
n	**Participants (*n* = 2033)**	**Gastric Cancer Screening (*n* = 4318)**	1315	4881		187	1278	1534	3197	
(%)			(21.22)	(78.78)		(3.02)	(20.63)	(24.76)	(51.60)	
n	**Non-Participants (*n* = 2285)**		508	1734		66	322	444	1410	
(%)			(22.66)	(77.34)		(2.94)	(14.36)	(19.80)	(62.89)	
	***p*-Value**				0.157					<0.001
n	**Participants (*n* = 1864)**	**Cervical Cancer Screening (*n* = 4261)**	656	2507		93	765	776	1529	
(%)			(20.74)	(79.26)		(2.94)	(24.19)	(24.53)	(48.34)	
n	**Non-Participants (*n* = 2397)**		655	2224		91	520	564	1704	
(%)			(22.75)	(77.25)		(3.16)	(18.06)	(19.59)	(59.19)	
	***p*-Value**				0.058					<0.001
n	**Participants (*n* = 1469)**	**Breast Cancer Screening (*n* = 3098)**	524	2301		89	655	708	1373	
(%)			(18.55)	(81.45)		(3.15)	(23.19)	(25.06)	(48.60)	
n	**Non-Participants (*n* = 1629)**		776	2429		93	629	627	1856	
(%)			(24.21)	(75.79)		(2.90)	(19.63)	(19.56)	(57.91)	
	***p*-Value**				<0.001					<0.001

65–74	20–39	40–64	65–74	Age (years)	Female	Male	Sex	Need support or supervision	Do not need any support or supervision	Disability
821	-	-	-		927	1106		17	2016	
(40.38)	(-)	(-)	(-)		(45.60)	(54.40)		(0.84)	(99.16)	
996	-	-	-		1282	1003		51	2234	
(43.59)	(-)	(-)	(-)		(56.11)	(43.89)		(2.23)	(97.77)	
				0.033			<0.001			<0.001
-	484	1096	284		1864	-		11	1853	
(-)	(25.97)	(58.80)	(15.24)		(100.00)	(-)		(0.59)	(99.41)	
-	693	1075	629		2397	-		42	2355	
(-)	(28.91)	(44.85)	(26.24)		(100.00)	(-)		(1.75)	(98.25)	
				<0.001			-			<0.001
-	-	1144	325		1469	-		10	1459	
(-)	(-)	(77.88)	(22.12)		(100.00)	(-)		(0.68)	(99.32)	
-	-	1039	590		1629	-		30	1599	
(-)	(-)	(63.78)	(36.22)		(100.00)	(-)		(1.84)	(98.16)	
				<0.001			-			0.004

Subjective financial state	Primary/junior high school	High school	Vocational school/junior college/community (technical) college/university/post-graduate school	Educational qualification	Divorced/widowed	Single	Married	Marital status	50–64
	200	921	912		204	124	1705		1212
	(9.84)	(45.30)	(44.86)		(10.03)	(6.10)	(83.87)		(59.62)
	345	1173	767		321	207	1757		1289
	(15.10)	(51.33)	(33.57)		(14.05)	(9.06)	(76.89)		(56.41)
<0.001				<0.001				<0.001	
	84	765	1015		192	221	1451		-
	(4.51)	(41.04)	(54.45)		(10.30)	(11.86)	(77.84)		(-)
	256	1061	1080		318	588	1491		-
	(10.68)	(44.26)	(45.06)		(13.27)	(24.53)	(62.20)		(-)
<0.001				<0.001				<0.001	
	87	660	722		180	94	1195		-
	(5.92)	(44.93)	(49.15)		(12.25)	(6.40)	(81.35)		(-)
	214	842	573		282	125	1222		-
	(13.14)	(51.69)	(35.17)		(17.31)	(7.67)	(75.02)		(-)
<0.001				<0.001				<0.001	

Employed (other)	Self-employed	Employed	Employment status	Other	National Health Insurance	Employee insurance	Health insurance	Poor	Not poor, not wealthy	Wealthy
184	168	992		35	810	1188		990	868	175
(9.05)	(8.26)	(48.79)		(1.72)	(39.84)	(58.44)		(48.70)	(42.70)	(8.61)
218	231	822		99	1185	1001		1348	853	84
(9.54)	(10.11)	(35.97)		(4.33)	(51.86)	(43.81)		(58.99)	(37.33)	(3.68)
			<0.001				<0.001			
130	44	1070		13	452	1399		955	772	137
(6.97)	(2.36)	(57.40)		(0.70)	(24.25)	(75.05)		(51.23)	(41.42)	(7.35)
179	64	1195		70	862	1465		1466	838	93
(7.47)	(2.67)	(49.85)		(2.92)	(35.96)	(61.12)		(61.16)	(34.96)	(3.88)
			<0.001				<0.001			
122	40	777		11	455	1003		740	611	118
(8.30)	(2.72)	(52.89)		(0.75)	(30.97)	(68.28)		(50.37)	(41.59)	(8.03)
159	54	652		57	717	855		979	592	58
(9.76)	(3.31)	(40.02)		(3.50)	(44.01)	(52.49)		(60.10)	(36.34)	(3.56)
			<0.001				<0.001			

Normal	Good	Subjective health status	No (no visit)	Yes (visit)	Constant visits to hospitals †	Severe illness (13 ≤ total score)	Mild illness (5 ≤ total score ≤ 12)	Normal (total score ≤ 4)	Kessler Psychological Distress Scale	Unemployed
1134	651		784	1249		52	423	1558		689
(55.78)	(32.02)		(38.56)	(61.44)		(2.56)	(20.81)	(76.64)		(33.89)
1289	677		1060	1225		62	542	1681		1014
(56.41)	(29.63)		(46.39)	(53.61)		(2.71)	(23.72)	(73.57)		(44.38)
		0.099			<0.001				0.063	
940	713		1016	848		79	483	1302		620
(50.43)	(38.25)		(54.51)	(45.49)		(4.24)	(25.91)	(69.85)		(33.26)
1296	820		1412	985		103	609	1685		959
(54.07)	(34.21)		(58.91)	(41.09)		(4.30)	(25.41)	(70.30)		(40.01)
		0.023			0.004				0.931	
784	508		687	782		51	378	1040		530
(53.37)	(34.58)		(46.77)	(53.23)		(3.47)	(25.73)	(70.80)		(36.08)
892	531		858	771		56	395	1178		764
(54.76)	(32.60)		(52.67)	(47.33)		(3.44)	(24.25)	(72.31)		(46.90)
		0.495			0.001				0.627	

Bad	248	(12.20)	319	(13.96)		211	(11.32)	281	(11.72)		177	(12.05)	206	(12.65)	
Alcohol consumption					<0.001					0.008					0.004
Never or quit drinking	1001	(49.24)	1340	(58.64)		1230	(65.99)	1690	(70.50)		984	(66.98)	1178	(72.31)	
Social drinker/low-risk group (>0 to ≤100 g/week)	504	(24.79)	437	(19.12)		433	(23.23)	507	(21.15)		345	(23.49)	298	(18.29)	
Middle-risk drinking (>100 to ≤350 g/week)	478	(23.51)	448	(19.61)		178	(9.55)	176	(7.34)		125	(8.51)	137	(8.41)	
High-risk drinking (>350 g/week)	50	(2.46)	60	(2.63)		23	(1.23)	24	(1.00)		15	(1.02)	16	(0.98)	
Smoking habit					<0.001					0.003					<0.001
Never/ex-smoker	1692	(83.23)	1790	(78.34)		1708	(91.63)	2130	(88.86)		1368	(93.12)	1435	(88.09)	
Current smoker	341	(16.77)	495	(21.66)		156	(8.37)	267	(11.14)		101	(6.88)	194	(11.91)	

† No clear definition regarding the frequency of visit is provided in the questionnaire.

Findings from the multivariable binomial logistic regression are displayed in **Table 2**. Odds ratios were adjusted for all potential confounders. After adjustment, individuals with disabilities showed significantly higher odds of not attending several cancer screening programs, including general health examinations (adjusted OR: 1.73, 95% CI: 1.14–2.62), colorectal cancer screening (adjusted OR: 1.78, 95% CI: 1.08–2.94), gastric cancer screening (adjusted OR: 2.27, 95% CI: 1.27–4.05), cervical cancer screening (adjusted OR: 2.12, 95% CI: 1.04–4.32), and breast cancer screening (adjusted OR: 2.22, 95% CI: 1.04–4.72). In contrast, no significant relationship emerged between disability status and failure to participate in lung cancer screening (adjusted OR: 1.56, 95% CI: 0.96–2.51).

Table 2. Crude and adjusted odds ratios of disability associated with non-participation in general health check-ups and cancer screenings

Disability	General Health Examination	Lung Cancer Screening	Colorectal Cancer Screening	Gastric Cancer Screening	Cervical Cancer Screening	Breast Cancer Screening	Disability	General Health Examination	Lung Cancer Screening	Colorectal Cancer Screening	Gastric Cancer Screening	Cervical Cancer Screening
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)		Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)
Need support or supervision	2.81 (1.92, 4.11)	1.73 (1.14, 2.62)	2.30 (1.46, 3.62)	1.56 (0.96, 2.51)	2.26 (1.40, 3.64)	1.78 (1.08, 2.94)	Need support or supervision	2.81 (1.92, 4.11)	1.73 (1.14, 2.62)	2.30 (1.46, 3.62)	1.56 (0.96, 2.51)	2.26 (1.40, 3.64)
Do not need any support or supervision	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	Do not need any support or supervision	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)

Note: OR = odds ratio; CI = confidence interval; Ref = reference category.

Adjusted models controlled for the following potential confounders: sex, age, marital status, educational attainment, frequent hospital visits, self-rated health status, alcohol use, smoking status, perceived financial situation, Kessler Psychological Distress Scale score, health insurance coverage, and employment status.

Figure 2 illustrates the reasons for not participating in GHE, with the top three (excluding "other") being: the belief that medical consultation is available anytime if needed (25/54, 46.3%), being hospitalized during the GHE period (12/54, 22.2%), and lack of motivation to participate (8/54, 14.8 percent).

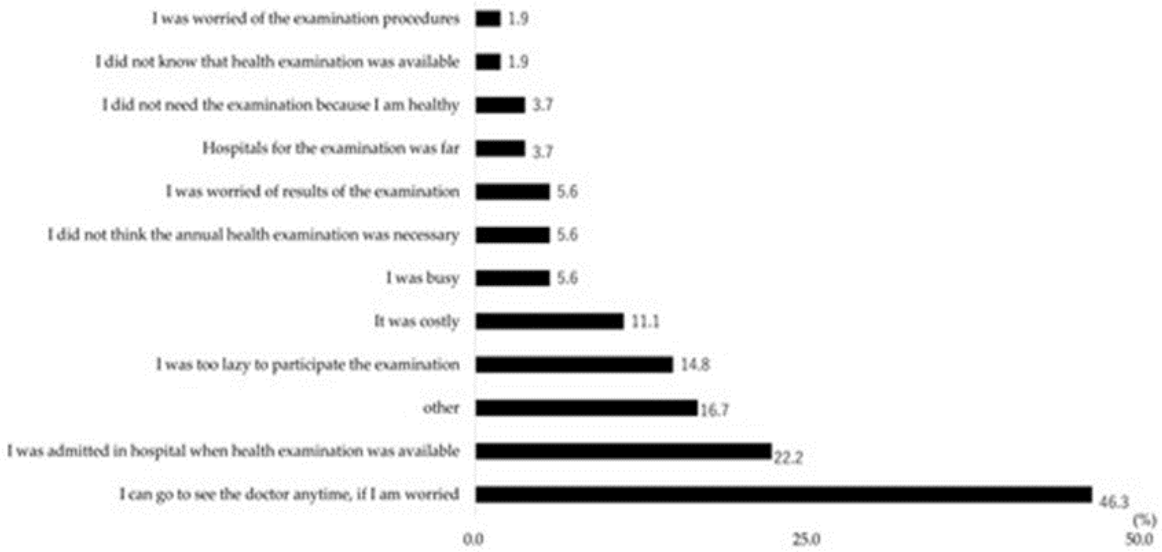

Figure 2. Reasons for non-participation in general health examination among people with disability who did not attend GHE (n = 54). Participants could select multiple reasons for non-participation.

Main findings

Using data from the 2016 Comprehensive Survey of Living Conditions (CSLC), which represents the entire Japanese population, we identified links between having a disability and lower rates of attendance at general health examinations (GHE) as well as screenings for gastric, colorectal, breast, and cervical cancers. These results suggest potential inequalities rooted in disability when accessing preventive medical services in Japan. As far as we are aware, this represents the initial research to address this important health concern through a broad, nationally representative dataset. Additionally, we uncovered specific obstacles encountered by individuals with disabilities in accessing GHE. Such insights help fill existing gaps in understanding this area of public health and underscore the importance of addressing it within Japan. The outcomes of this research offer valuable insights that could form the basis for subsequent efforts focused on reducing inequalities related to disability in the utilization of preventive health services in Japan.

Links between disability and utilization of preventive health services in Japan

After adjusting for twelve potential confounders, our analysis indicated that disability served as an independent predictor of reduced participation in GHE and in screenings for gastric, colorectal, breast, and cervical cancers. This observation points toward possible inequalities in preventive care access influenced by disability in Japan, marking it as the primary highlight of our work.

The results align with prior research exploring disability's role in preventive service uptake. A meta-analysis and systematic review by Andiwijaya *et al*. [19] determined that females with disabilities experienced reduced access to breast cancer screenings (adjusted pooled OR: 0.78; 95% CI: 0.72–0.85) and cervical cancer screenings (adjusted pooled OR: 0.67; 95% CI: 0.47–0.94) relative to those without disabilities. Furthermore, one investigation [43] utilizing cancer registry information (encompassing 93,545 cases from individuals diagnosed with various cancers) across major medical centers in northwestern Japan revealed notable variations in detection routes for early-stage (0 or 1) cancers among those with and without disabilities. In particular, early-stage cancers in disabled individuals were predominantly identified during routine outpatient appointments (44.9% for stage 0 and 54.5% for stage 1), rather than via screening programs (14.7% and 9.4%, respectively). In contrast, non-disabled individuals had early detections more often through screening (31.4% and 24.2%) or routine visits (34.3% and 39.6%, respectively). This provides supporting indirect indications that disability may disproportionately hinder cancer screening participation in Japan. Our results reinforce earlier hypotheses and bring attention to inequalities in preventive service engagement within the country.

Contrary to expectations, we observed no meaningful link between disability and avoidance of lung cancer

screening. It is worth noting that evidence regarding disability as an obstacle to lung cancer screening has been inconsistent. One scoping review [44] examining obstacles and enablers for lung cancer screening in the United States highlighted indications that comorbidities in patients could act as hindrances. On the other hand, a separate scoping review [45] investigating behavioral obstacles and enablers for such screening across high-income nations found no behavioral factors tied to disability. While the precise causes remain uncertain, we propose two potential reasons for the absence of a connection solely with lung cancer screening in our analysis. Firstly, the methods used for lung cancer screening in Japan—typically involving chest X-rays or sputum tests—may prove less challenging or more tolerable for those with disabilities compared to alternative cancer detection procedures. This could contribute to greater accessibility for disabled persons. Informal reports and qualitative insights [46, 47] have indicated that persons with physical impairments often encounter challenges during cervical screenings (via Papanicolaou smears) and breast screenings (via mammography), which necessitate specific postures or transfers onto elevated equipment. Procedures for gastric (such as barium ingestion or endoscopy) and colorectal (fecal blood testing) screenings might similarly present procedural hurdles for disabled individuals. In comparison, lung screenings generally require minimal actions, like positioning for an X-ray or submitting a sputum sample. Such straightforward steps may explain the non-significant association observed here. Secondly, inaccurate recall or over-reporting of lung cancer screening experiences could play a role in this finding. In Japan, lung cancer detection often incorporates chest X-rays or sputum analysis, with chest X-rays being routine for multiple non-screening purposes (e.g., diagnosing respiratory infections). Additionally, certain occupations in educational, medical, or caregiving settings mandate yearly chest X-rays for tuberculosis prevention and detection. Thus, workers in these fields undergoing X-rays unrelated to cancer screening might erroneously report having completed lung cancer screening within the past year. Since the CSLC relied on self-reported data, such misreporting could have affected the outcomes.

Factors contributing to avoidance of general health examinations

Identifying the underlying causes of non-attendance is essential for pinpointing the obstacles encountered by individuals with disabilities and for developing targeted interventions. Accordingly, we examined these factors using a dedicated question from the CSLC survey.

The predominant responses were: "I can visit a doctor whenever I feel concerned" (25/54, 46.3%) and "I was hospitalized during the period when the GHE was offered" (12/54, 22.2%). These suggest possible misunderstandings about the purpose and nature of GHE among people with disabilities. Primarily, regular GHE is recommended even in the absence of symptoms to facilitate early disease detection; relying on medical visits only after noticing issues or feeling worried could result in delayed diagnosis. Additionally, in Japan, GHE is typically accessible year-round through employer-sponsored or local government programs, meaning hospitalization periods generally do not restrict access opportunities. Should these inaccurate perceptions act as deterrents to GHE uptake, educational initiatives designed to disseminate correct information and enhance awareness about health checks could help boost participation rates among disabled individuals in Japan.

The next most frequent selection (excluding "other") was "I was too lazy to participate." This raises questions about why individuals with disabilities might show reluctance toward GHE. Likely contributors could involve challenges in locating disability-friendly facilities, extended waiting periods, complications with the examination process itself, or prior unfavorable encounters linked to disability accommodations. However, the vagueness of this response option limits our ability to identify precise obstacles or propose concrete countermeasures. This highlights the value of incorporating more detailed response choices in future CSLC surveys.

Notably, the top three reasons reported here did not involve concerns tied to geographic or physical access, nor to financial burdens. Such issues ranked lower: cost-related concerns ("It was costly," 5.6%) came fifth, while distance or physical access problems ("The examination facility was far away," 3.7%) ranked ninth. Nevertheless, barriers related to physical/geographic accessibility and affordability are frequently cited as major hurdles for disabled persons in utilizing healthcare, particularly in resource-limited settings [13, 48–51]. For example, Maart S. [48] studied healthcare access among 152 disabled individuals in a disadvantaged South African community and found that financial constraints (71%) and transportation issues (72%) were the primary challenges. Similarly, a systematic review [49] of 50

studies on general healthcare access for people with disabilities in low- and middle-income countries identified transportation barriers, financial constraints, and staff attitudes as the most prevalent obstacles. In contrast, data from a high-resource nation like Australia [50] showed that cost or physical access difficulties (ranging from 3.6% to 12%) were not the dominant complaints among disabled service users; instead, prolonged or unacceptable waiting times (24–31%) emerged as a more prominent concern. While direct comparisons with prior research are challenging due to differences in methodology and service focus, our results appear to align more closely with those from Australia [50], another affluent country. Thus, although geographic/physical and affordability barriers warrant attention, they may hold lesser priority compared to other factors in developed nations such as Japan.

Finally, the "other" category was also frequently selected. Predictably, this provided no actionable insights for interventions. It underscores potential limitations in the CSLC response options, which may not adequately capture the full spectrum of barriers faced by people with disabilities, pointing to the need for more inclusive and detailed choices in the questionnaire.

Implications for future research on reducing disability-related inequalities in preventive healthcare utilization

The results of this research suggest the potential presence of inequalities linked to disability in the uptake of preventive health services in Japan. This highlights the importance of addressing this public health concern. We consider that our insights can help establish a foundation for subsequent investigations focused on diminishing disability-related disparities in preventive care access within Japan.

Firstly, our classification of disability relied on self-reported requirements for assistance or oversight from others. This approach, based on self-reporting, carries a risk of misclassification that could affect the study's outcomes. In particular, it might primarily capture more severe forms, such as significant physical or intellectual impairments. However, individuals with other disability types that do not typically require external support—including hearing or visual impairments, or milder developmental or physical conditions—may not have been encompassed by this definition. Additionally, those requiring help but who decline it or fail to recognize the need were excluded from the disability category, potentially resulting in underestimation. On the other hand, healthy individuals experiencing temporary limitations (e.g., due to a leg fracture) might have been mistakenly classified as having a disability, causing overestimation. Similar misclassification concerns were noted in an earlier investigation [16] that also employed self-reported disability information. While our results indicate the value of broadening future research to include a more diverse spectrum of disabilities, ideally, disability data should be sourced from robust and validated systems, such as registries containing professionally diagnosed information.

Secondly, although the CSLC dataset offered valuable chances to explore relevant associations, our analysis revealed certain limitations in its ability to probe the causes of non-attendance. These shortcomings restricted our capacity to gather detailed insights into the obstacles preventing GHE participation among disabled individuals. Gaining a thorough and precise understanding of non-participation factors is vital for devising practical and impactful interventions. Consequently, additional research dedicated to deeply and fully investigating the motives behind avoiding preventive services is warranted. Established frameworks [52–54] outlining determinants of healthcare access could prove useful in elucidating the particular and multifaceted barriers faced by people with disabilities in accessing preventive services in Japan.

Limitations of the study

Several limitations should be acknowledged in this research. First, as previously discussed, potential misclassification in data on preventive service utilization and disability status—stemming from the self-reported format of the CSLC—may have impacted the findings. Second, the exclusion of individuals aged 75 and above, along with those having incomplete data, could have influenced the results. Third, the use of proxy respondents might have affected the outcomes. The CSLC permitted proxies to fill out the survey on behalf of participants unable to respond independently. Although the exact proportion of proxy completions remains unknown, it is probable that respondents with disabilities more frequently relied on proxies, and this involvement could have biased the results. Fourth, the substantial imbalance in sample sizes between participants with and without disabilities may have affected the statistical analyses. Fifth, the 2016 CSLC data represented the most recent available dataset at the time, but it is not current. Furthermore, the pre-COVID-

19 era of 2016 lacked the pandemic's significant effects on healthcare access [55]. To ensure relevance to contemporary conditions in Japan, future investigations should incorporate the latest available data.

Conclusion

Drawing on a nationally representative Japanese dataset, this research established links between disability and lower engagement in general health examinations as well as screenings for four cancer types. These observations point to possible disability-related inequalities in preventive healthcare utilization in Japan. The results help address gaps in knowledge regarding this public health matter and emphasize the urgency of confronting it within the country. Our insights can play a role in building a foundation for upcoming efforts to reduce disability-based disparities in preventive health service use in Japan.

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