



The assessment of the likelihood of mammography usage with relevant factors among women with disabilities

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ABSTRACT

Research that identifies the determinants of low mammography use among disabled people is scant. This study examines the determining factors related to the low usage of mammography among women with disabilities. To identify the barriers that prevent women with disabilities from participating in mammography screening can help authorities conceive feasibly useful strategies for avoiding worse suffering. With women aged between 50 and 69 as subjects, this study was conducted using the database of Ministry of the Interior, Taiwan, in 2008, coupled with information gathered between 2006 and 2008 on preventive health care and medical claim data from the Bureau of Health Promotion and the National Health Research Institutes, respectively. This study examined the factors determining the use of mammography with logistic regression analysis. Only 8.49% of the disabled women used mammographies. When women with disabilities were in higher income level, they were more likely to use mammography for breast cancer screening. Similar findings were found for education levels. Moreover, subjects with a more severe form of disability were less likely to use mammography with ORs of 0.84, 0.63, and 0.52. Disabled women with major organ malfunction, chronic mental illness, or mental retardation had a higher likelihood to use mammography services, whereas women with multiple disabilities had the lowest likelihood of usage. Those with experience using other preventive services showed 1.9 times to 7.54 times (95% CI: 1.82–1.98, 7.15–7.95, respectively) increased likelihood of mammography usage. In summary, mammography usage is relatively different for disabled and nondisabled populations. To mitigate the disparities, we can use community healthcare institutions or public health nurses and social workers to provide related preventive health services through community events to implement integrated cancer screening services.

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1. Introduction

Breast cancer is the most common type of cancer and a major threat for all women, including women with disabilities. Compared with other cancers, early detection of breast cancer is currently recognized as the most effective response to this threat and the optimal approach to provide a promising prognosis. According to Centers for Disease Control and Prevention (CDC), 76.2% of women in the U.S. aged 40 or older reported having a mammogram within the past two years in 2008, whereas women with disabilities have a lower rate (Armour, Thierry, & Wolf, 2009; CDC, 2008a) and tend to be screened for cancers significantly less frequently (Wei, Findley, & Sambamoorthi, 2006). Nonetheless, no data supports the hypothesis that disabled women are diagnosed at more advanced stages of diseases (Caban, Nosek, Graves, Esteva, & McNeese, 2002).

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Most importantly, women with disabilities suffer the same risk of being diagnosed with breast cancer (Hogg & Tuffrey-Wijne, 2008), but are in vulnerable situations in which they cannot always have access to adequate screening services.

In Taiwan, according to the Bureau of Health Promotion survey, there were 6593 breast cancer cases (incidence rate was 49/100,000) in 2005, and 1552 of these patients died (Chang, Kuo, & Wang, 2008). The usage of mammography in women between 50 and 69 years old within the previous two years in Taiwan and the U.S. were 12% and 70%, respectively (Breen et al., 2007; CDC, 2008b). The five-year survival rate of breast cancer patients in Taiwan is lower than that in the U.S. (80% vs. 89%, respectively) (Howlader et al., 2010), which is possibly due to the lower screening rate (Lin & Effken, 2010). For health authorities, the relevant factors of the barriers to mammography are fundamental to develop useful strategies for the promotion of preventive services in the near future.

Regarding mammography usage for certain populations, particularly in women with disabilities, a number of studies have indicated that low rates of breast cancer screening may be attributed to the various risk factors such as obesity (Kerlikowske et al., 2008), less physical activity (Irwin et al., 2007), or delayed diagnosis, which come with barriers to obtain preventive screening. Women with disabilities have reported barriers to obtain mammograms (Barr, Giannotti, Van Hoof, Mongoven, & Curry, 2008). The barriers can be divided into three major parts: environment; attitude; and communication.

Certain obstacles, for example, come from facilities, clinicians, health workers, and self-consensus (Llewellyn, Balandin, Poulos, & McCarthy, 2011). Some women with disabilities attribute obstacles to situations such as difficulty with positioning while obtaining a mammogram, difficulty to arrange appointments, or a lack of access (Schuur, Shah, Wu, Forman, & Gross, 2009). In addition, the providers' knowledge and attitudes also influence the breast cancer screening of disabled women. Furthermore, women with disabilities may not adequately express discomfort because of their physical or psychological restrictions. They take longer and have higher difficulty with explanations compared to the normal population. The CDC also found that health promotional messages and materials reflecting the unique needs of the disabled are lacking. Therefore, different types of disabilities such as mental retardation (Haverkamp, Scandlin, & Roth, 2004; Wilkinson, Deis, Bowen, & Bokhour, 2011) or physical limitations (Nosek & Howland, 1997) delay treatment or make it difficult to receive adequate services, placing the disabled person at greater risk. Consequently, women with disabilities are less likely to receive tests that can discover cancer and other health problems, and they often avoid routine health exams.

According to extant research (Diab & Johnston, 2004), increased severity of a disability lowers the prevention services used. Furthermore, disparities in screening rates among women with disabilities may contribute to larger tumors during breast cancer diagnosis. Although mammography screening is widely applied for breast cancer in Western countries, only a small proportion of the population has the experience in Asian countries. Research that identifies the determinants of low mammography use is scant among this population. This study examines the determining factors related to the usage of mammography among women with disabilities. Identifying the barriers that prevent women with disabilities from participating in mammography screening can help authorities conceive feasibly useful strategies for avoiding worse suffering.

2. Materials and methods

2.1. Data source and processing

With women aged between 50 and 69 as subjects, this study was conducted using the database of Ministry of the Interior, Executive Yuan, R.O.C., 2008, coupled with information gathered between 2007 and 2008 on preventive health care from the Bureau of Health Promotion and medical claim data from the National Health Insurance Research Dataset published by the National Health Research Institutes.

Previous studies have mostly adopted the survey method or randomized trials to investigate the relationship between women with disabilities and mammography usage. The respective roles of health status, comorbidity, and level of disability in the reception of mammography screening, or reasons for differences in the use of mammography according to disability status, are unclear. This study used a unique and high-quality database to determine the relevant factors associated with mammography among women with disabilities.

The recorded variables included the following: (1) demographic characteristics: age, urbanization level of resident area, premium-based monthly salary, low income status, education, marital status, and aboriginal status; (2) health status: catastrophic illness/injury, and relevant chronic illnesses such as cancer and diabetes; (3) classification of disability: type of disability and severity of disability; (4) utilization of other preventive health services: usage of pap smear and utilization of adult preventive health services; and (5) mammography status: usage of mammography.

2.2. Subjects

According to the 'Disability Rights Protection Acts' of Taiwan, disability was classified into 18 categories, namely visual impairment, hearing impairment, balance impairment, sound or speech impairment, physical disability, mental retardation, major organ malfunction, facial injury, persistent vegetative state, refractory epilepsy, dementia, autism, chromosomal abnormalities, congenital metabolic disorders, other congenital defects, multiple disabilities, chronic mental illness, and other disabilities caused by rare diseases recognized by central health authorities. Severity of disability was classified into four groups: very severe; severe; moderate; and mild. According to the regulation of the Bureau of Health Promotion, women whose age is between 50 and 69 could receive one free mammogram screening every two years. The study population with a

persistent vegetative state (627 individuals) was unsuitable for this study, and thus, was excluded. Based on the database of the Ministry of the Interior in 2008, 136,600 women aged between 50 and 69 with disabilities were included in this study to investigate their mammography use from 2007 to 2008.

2.3. Statistical analysis

All data were analyzed with SAS, version 9.1. This study first involved a descriptive analysis of the relative variables. According to the use of mammography, the difference in percentage of each variable would be examined using an χ^2 test to check for statistical significance. Multivariate logistic regression analysis was subsequently used to examine the influencing factors on the usage of mammography. The independent variables included demographic characteristics, health status, classification of disability, and the utilization of other preventive health services for the subjects.

3. Results

In this study, 136,600 cases followed the definition of disability, including the mammography usage group (8.49%, $n = 11,603$) and the non-usage group (91.51%, 124,997). Apparently, the majority of women with disabilities did not use

Table 1
Characteristics of Study Subjects in use of mammography during 2007–2008.

Variables	N = 136,600	%	Used		Non-use		χ^2 p-Value
			$n_1 = 11,603$	%	$n_2 = 124,997$	%	
Gender							–
Female	136,600	100.00	11,603	8.49	124,997	91.51	
Age							<.001*
50–59	67,859	49.68	6040	8.90	61,819	91.10	
60–69	68,741	50.32	5563	8.09	63,178	91.91	
Urbanization							<.001*
Level 1	15,395	11.27	1212	7.87	14,183	92.13	
Level 2	30,090	22.03	2140	7.11	27,950	92.89	
Level 3	20,992	15.37	1779	8.47	19,213	91.53	
Level 4	12,426	9.10	996	8.02	11,430	91.98	
Level 5	20,549	15.04	1861	9.06	18,688	90.94	
Level 6	14,546	10.65	1311	9.01	13,235	90.99	
Level 7	14,915	10.92	1472	9.87	13,443	90.13	
Level 8	7687	5.63	832	10.82	6855	89.18	
Premium-based monthly salary (NT\$)							<.001*
Dependent	53,942	39.49	3894	7.22	50,048	92.78	
<15,840	25,269	18.50	1438	5.69	23,831	94.31	
16,500–22,800	36,873	26.99	3797	10.30	33,076	89.70	
24,000–28,800	7325	5.36	851	11.62	6474	88.38	
30,300–36,300	6709	4.91	806	12.01	5903	87.99	
38,200–45,800	5384	3.94	699	12.98	4685	87.02	
48,200–57,800	1098	0.80	118	10.75	980	89.25	
Low-income							<.001*
Yes	4392	3.22	203	4.62	4189	95.38	
No	132,208	96.78	11,400	8.62	120,808	91.38	
Aboriginal							0.204
Yes	2275	1.67	210	9.23	2065	90.77	
No	134,325	98.33	11,393	8.48	122,932	91.52	
Education							<.001*
Elementary or under	86,429	63.27	6888	7.97	79,541	92.03	
Junior High	12,546	9.18	1220	9.72	11,326	90.28	
Senior High	13,298	9.73	1386	10.42	11,912	89.58	
College	6183	4.53	688	11.13	5495	88.87	
Unknown	18,144	13.28	1421	7.83	16,723	92.17	
Marriage							<.001*
Married	82,775	60.60	7692	9.29	75,083	90.71	
Single	8686	6.36	497	5.72	8189	94.28	
Divorce or widow	7931	5.81	584	7.36	7347	92.64	
Unknown	37,208	27.24	2830	7.61	34,378	92.39	
Other preventive health services							<.001*
Pap smear							<.001*
Yes	56,430	41.31	9848	17.45	46,582	82.55	
No	80,170	58.69	1755	2.19	78,415	97.81	
Adults' Preventive Care Service							<.001*
Yes	36,659	26.84	5605	15.29	31,054	84.71	
No	99,941	73.16	5998	6.00	93,943	94.00	

* $p < 0.05$.

mammography for breast cancer screening within the previous two years during 2007–2008. Table 1 displays the characteristics comparing the two groups. Regarding the age structure, the younger group has a higher proportion of mammography usage. Most subjects in both groups were dependent members, married, with elementary education or under, not of low income status, or aboriginal. Most predicators were significant between the usage group and non-usage group, except for those of aboriginal status. Furthermore, in the usage group, certain proportions of the cases had also used other preventive health services such as Pap smears and adult preventive care services (85% and 48%, respectively), while those figures in the non-used group dwindled significantly, to 37% and 25%, respectively.

In Table 2, we show the health status comparisons of the two groups. Over one-third suffered from catastrophic illness, and nearly 30% had diabetes, while the percentage of cancer population did not surpass 10%. Regarding the types of disabilities, approximately 40% comprised physical disabilities, and approximately 70% were catalogued as disabilities of moderate or mild severity. Most predicators, except for the relevant chronic disease in cancer, were significant between the usage group and the non-usage group, irrespective of cancer.

Finally, in the logistic regression model shown in Table 3, we display the likelihood of usage of mammography with the determining factors. Regarding urbanization (from 1 to 8), the lower number signified a higher urbanization. However, no significant difference was present among urbanization levels, except for the second level. For the monthly salary, except for the group with 48,200–57,800 New Taiwan dollars (NT\$), the likelihood of mammography usage increased with the income levels, with odds ratios (ORs) from 1.10 to 1.50, compared to those with monthly salaries of NT\$ < 15,840. This means that when women with disabilities were in the higher income level, they were more likely to use mammography for breast cancer screening. However, when their monthly incomes reached the highest level of NT\$ 48,200–57,800, the use of mammography was reduced. In addition, similar findings were found for their education level. Those who had a higher education level (junior high, senior high, and college) showed an increased likelihood of mammography usage compared to those with an elementary school or under level of education, with ORs of 1.27, 1.44, and 1.66, respectively.

Concerning comorbidity and the severity of disability, women in such situations showed a decreased likelihood of mammography usage. Disabled women suffering from any type of cancer or diabetes would have a lower likelihood of mammography usage. Moreover, subjects with a more severe form of disability were less likely to use mammography, with ORs of 0.84, 0.63, and 0.52, respectively, compared to the mild group of disabilities. However, different types of disabilities had mixed effects on the usage of mammography. Compared to physical disabilities, some, such as major organ malfunction, chronic mental illness, or mental retardation, had a higher likelihood to use mammography services, whereas others, such as those with multiple disabilities, had a decreased likelihood of mammography usage. Most importantly, those with more

Table 2

Chi-square analysis of the usage of mammography in women with disability during 2007–2008 (health status).

Variables	N = 136,600	%	Used		Non-used		χ^2 p-Value
			n ₁ = 11,603	%	n ₂ = 124,997	%	
Catastrophic illness							<.001*
Yes	47,995	35.14	3398	7.08	44,597	92.92	
No	88,605	64.86	8205	9.26	80,400	90.74	
Relevant chronic disease							0.544
Cancer							
Yes	9737	7.13	811	8.33	8926	91.67	
No	126,863	92.87	10,792	8.51	116,071	91.49	
Diabetes							<.001*
Yes	36,995	27.08	2697	7.29	34,298	92.71	
No	99,605	72.92	8906	8.94	90,699	91.06	
Type of disability							<.001*
Physical disability	53,294	39.01	4953	9.29	48,341	90.71	
Major organ malfunction	22,728	16.64	1494	6.57	21,234	93.43	
Chronic mental illness	17,243	12.62	1515	8.79	15,728	91.21	
Hearing impairment	14,761	10.81	1718	11.64	13,043	88.36	
Multiple disability	10,549	7.72	518	4.91	10,031	95.09	
Visual impairment	9058	6.63	845	9.33	8213	90.67	
Mental retardation	4370	3.20	189	4.32	4181	95.68	
Dementia	2282	1.67	153	6.70	2129	93.30	
Sound or speech impairment	1063	0.78	92	8.65	971	91.35	
Balance impairment	531	0.39	46	8.66	485	91.34	
Facial injury	298	0.22	38	12.75	260	87.25	
Refractory epilepsy	298	0.22	33	11.07	265	88.93	
Others	125	0.09	9	7.20	116	92.80	
Severity of disability							<.001*
Mild	51,800	37.92	6097	11.77	45,703	88.23	
Moderate	43,131	31.57	3604	8.36	39,527	91.64	
Severe	21,443	15.70	1109	5.17	20,334	94.83	
Very severe	20,226	14.81	793	3.92	19,433	96.08	

*p < 0.05.

Table 3

The results of logistic regression model for the mammography usage.

Variable	Unadjusted model			Adjusted model				
	OR	95% CI	p-Value	OR	95% CI	p-Value		
Age								
50–59	–	–	–	–	–	–		
60–69	0.90	0.87	0.94	<.001*	1.00	0.96	1.05	0.883
Urbanization								
Level 1	–	–	–	–	–	–	–	
Level 2	0.90	0.83	0.96	0.003*	0.87	0.80	0.94	<.001*
Level 3	1.08	1.00	1.17	0.039*	1.01	0.93	1.10	0.825
Level 4	1.02	0.93	1.11	0.662	0.96	0.87	1.06	0.397
Level 5	1.17	1.08	1.26	<.001*	1.01	0.93	1.10	0.755
Level 6	1.16	1.07	1.26	0.000*	0.96	0.88	1.06	0.421
Level 7	1.28	1.18	1.39	<.001*	0.99	0.90	1.08	0.792
Level 8	1.42	1.30	1.56	<.001*	0.98	0.88	1.09	0.732
Premium-based monthly salary (NT\$)								
<15,840	–	–	–	–	–	–	–	
Dependent	1.29	1.21	1.37	<.001*	1.10	1.02	1.18	0.011*
16,500–22,800	1.90	1.79	2.03	<.001*	1.27	1.18	1.37	<.001*
24,000–28,800	2.18	1.99	2.38	<.001*	1.40	1.27	1.55	<.001*
30,300–36,300	2.26	2.07	2.48	<.001*	1.36	1.23	1.51	<.001*
38,200–45,800	2.47	2.25	2.72	<.001*	1.50	1.35	1.67	<.001*
48,200–57,800	2.00	1.64	2.43	<.001*	1.17	0.95	1.46	0.143
Low-income household								
No	–	–	–	–	–	–	–	
Yes	0.51	0.45	0.59	<.001*	0.88	0.75	1.03	0.102
Aboriginal								
No	–	–	–	–	–	–	–	
Yes	1.10	0.95	1.27	0.204	0.92	0.79	1.07	0.291
Education								
Elementary or under	–	–	–	–	–	–	–	
Junior High	1.24	1.17	1.33	<.001*	1.27	1.18	1.36	<.001*
Senior High	1.34	1.27	1.43	<.001*	1.42	1.32	1.52	<.001*
College	1.45	1.33	1.57	<.001*	1.66	1.51	1.83	<.001*
Unknown	0.98	0.93	1.04	0.533	1.06	1.00	1.13	0.063
Marriage								
Married	–	–	–	–	–	–	–	
Single	1.69	1.54	1.85	<.001*	1.05	0.95	1.16	0.374
Divorce or widow	1.31	1.16	1.48	<.001*	1.00	0.88	1.15	0.961
Unknown	1.36	1.23	1.50	<.001*	0.99	0.89	1.10	0.882
Catastrophic illness								
Yes	–	–	–	–	–	–	–	
No	0.75	0.72	0.78	<.001*	0.97	0.91	1.04	0.429
Comorbidity								
Cancer	0.98	0.91	1.05	0.548	0.87	0.79	0.95	0.003*
Diabetes	0.80	0.77	0.84	<.001*	0.91	0.87	0.96	0.000*
Type of disability								
Physical disability	–	–	–	–	–	–	–	
Major organ malfunction	1.00	0.93	1.08	0.916	1.10	1.02	1.20	0.021*
Chronic mental illness	1.29	1.21	1.36	<.001*	1.13	1.06	1.20	0.000*
Hearing impairment	0.93	0.75	1.15	0.477	1.01	0.81	1.27	0.932
Multiple disability	0.44	0.38	0.51	<.001*	0.84	0.72	0.99	0.031*
Visual impairment	0.50	0.46	0.55	<.001*	1.00	0.90	1.11	0.981
Mental retardation	0.69	0.65	0.73	<.001*	1.08	1.00	1.17	0.043*
Dementia	1.43	1.01	2.01	0.042*	1.19	0.83	1.71	0.352
Sound or speech impairment	0.70	0.59	0.83	<.001*	0.85	0.72	1.02	0.076
Balance impairment	0.94	0.89	1.00	0.045*	1.06	0.98	1.15	0.169
Facial injury	0.93	0.68	1.25	0.618	1.01	0.73	1.39	0.974
Refractory epilepsy	1.22	0.85	1.75	0.292	0.87	0.60	1.27	0.474
Others	0.76	0.38	1.49	0.422	0.84	0.41	1.70	0.618
Severity of disability								
Mild	–	–	–	–	–	–	–	
Moderate	0.68	0.65	0.71	<.001*	0.84	0.80	0.88	<.001*
Severe	0.41	0.38	0.44	<.001*	0.63	0.58	0.68	<.001*
Very severe	0.31	0.28	0.33	<.001*	0.52	0.46	0.57	<.001*
Other preventive health services								
Pap smear								
No	–	–	–	–	–	–	–	
Yes	9.45	8.97	9.95	<.001*	7.54	7.15	7.95	<.001*
Adults' preventive health service								
No	–	–	–	–	–	–	–	
Yes	2.83	2.72	2.94	<.001*	1.90	1.82	1.98	<.001*

* $p < 0.05$.

experience using other preventive services, such as pap smears or adult preventive care services, showed 1.9 times to 7.54 times (95% CI: 7.15–7.95, 1.82–1.98, respectively) increased likelihood of mammography usage.

4. Discussion

Women with disabilities, according to previous studies, have higher breast cancer mortality rates (McCarthy et al., 2006), and there is an association between disability and screening (Schootman & Jeffe, 2003). The reasons why women with disabilities do not participate in breast cancer screening with mammography might not be surprising, and are revealed from a government report, such as access to information, communication, access to mammography machines, the mammography procedure, attitudes toward preventive health care, lack of physician referral, and so on (Barr et al., 2008; US Dept of Health & Human Services, 2009). To advocate the benefit of mammography for disabled women, some specific policies in public health could address this issue. Government or hospitals can offer training and educate healthcare providers on the sensitivity and awareness of disability issues (Schopp, Sanford, Hagglund, Gay, & Coatney, 2002; Truesdale-Kennedy, Taggart, & McIlfatrick, 2011).

In this study, the higher income group, the higher education level group, and those with experience using other preventive services showed an increased likelihood of mammography usage, whereas those with comorbidities such as cancer or diabetes and those in a severe state of disability showed decreased likelihood of mammography usage. The disabled women are in an especially vulnerable situation because they are significantly less likely to engage in routine mammography screening practices.

Generally, a higher number of women aged 65 years or older cited obstacles to using mammography compared to that of younger women (Yankaskas et al., 2010). However, in this study, age was not significant. This may be attributed to the national health insurance (NHI) in Taiwan, which reduces the financial barriers to use healthcare services. In addition, local health authorities provide mobile breast cancer screening services and integrated cancer screening services, thereby easing the barrier of access. Regarding urbanization, it does not seem to markedly influence the use of mammography. These services reduce the obstacles for populations in some remote areas, especially for women with disabilities.

From prior studies, the most important factor affecting usage of mammography is suggested by physicians (Lerman, Rimer, Trock, Balslem, & Engstrom, 1990), and Tsai and Kung (2010) also indicated that patients with higher education, higher household income, and regular physician counseling tend to have a better understanding of prevention services. Our findings were consistent with those of previous studies. Women with higher income, as well as a higher education level, showed an increased likelihood of using mammography services. One explanation is that women with higher income or education level have an increased sense of self-awareness. Another reason could be that they may be more likely to pay for the breast cancer screening on their own, compared with those in lower income level. A number of people with higher income conducted mammography screenings in their comprehensive physical examination, and paid for it on their own instead of by government. This is the reason why subjects with a higher monthly income of NT\$ 48,200–57,800 reduced the use of mammography screening offered by the government.

For the low socioeconomic group and the elder population who might have not received preventive services for a long time period, public health authorities should adopt more aggressive strategies to reach such populations because they may require more time to adjust or need more budget; these strategies may be required to provide information or to improve accessibility. In addition, to increase the knowledge, attitude, and perception (KAP) level, the government should invest more resources in health promotion and education for the disabled and their caregivers.

Women with multiple disabilities have been reported to experience all problems at a higher rate than women with a single disability or no disabilities (Clark et al., 2009; Yankaskas et al., 2010). Moreover, a higher severity level decreases the likelihood of mammography usage. Women with disabilities who had one type of cancer show a lower likelihood of using mammography because they might think that they already had one type of carcinoma, and they do not tend to think that they should bother to consider another. Apparently, when patients' situations do not improve or are worsening, their situations become an obstacle to obtain adequate preventive services.

Women with physical disabilities may have difficulties in accessing care sites (Poulos, Balandin, Llewellyn, McCarthy, & Dark, 2011); a lack of transportation, inadequate appointment times, nonadjustable equipment, communication issues, and fears of examination and of being touched by strangers all contribute to them opting to not seek help. Different types of disabilities might affect a woman's treatment options, preferences, and choices (Iezzoni et al., 2008). Physical disabilities are not easily accommodated by mammography scanners, reducing the likelihood of having a mammogram (Sullivan et al., 2003). This study reaches the same conclusion. However, we should acknowledge that women with disabilities stay in institutions for long time periods, and medical utilization, including mammography usage, may be misstated. Public health authorities must develop different strategies for different types of disabilities depending on the type and severity level. The intellectually disabled, for example, may require reading help when adequate literacy is necessary, or for requesting accommodations when scheduling appointments or during exams.

Not surprisingly, the group with experiences using other preventive services showed an increased likelihood of mammogram usage. For preventive services, more time and costs are required for disabled people (Tsai, Kung, Chiang, & Chang, 2007). Therefore, the reimbursement system should reflect these differences to provide more incentives for physicians and hospitals.

This study has several limitations. Because of using a secondary database, some information such as health behavior could not be obtained. Another important limitation is that this study used the NHI database instead of survey data. We were

unable to obtain information on the cognitive health situation. Information related to health beliefs or health knowledge, which may affect patients' usage of mammography, especially in women with disabilities, is not valid in this study.

5. Conclusions

Currently, Taiwan is implementing a pilot study of mammography for women aged between 40 and 49. However, there is less of a focus on mammography usage for women with disabilities. We should understand the relevant factors to provide the comprehensive strategies to promote mammography usage. Health authorities should regard the existing services system and consider the findings from this study to recognize those who are at risk. Therefore, we should improve clinical preventive services and provide more aggressive and comprehensive strategies to help the specific groups of women receive these important services. From previous studies, medical utilization is relatively different for the disabled and nondisabled populations. To mitigate the disparities, we can use community healthcare institutions, or public health nurses to call, interview, or provide related preventive health services through community events, to implement integrated cancer screening services. In addition, social workers may provide other opportunities to improve the usage of mammography for women with disabilities staying in institutions.

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