



The use of Pap smear and its influencing factors among women with disabilities in Taiwan

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ABSTRACT

Cervical cancer is a prevalent cancer among Taiwanese women, and can be effectively cured if diagnosed early. Therefore, cervical cancer is worthy of preventive health screening. Due to physical and psychological barriers, patients with disability may be unable to express their physical complaints accurately, thus reducing their access to health care; some may not even receive proper preventive health care or medical treatment. This study investigates the utilization of Pap smear among women with disability in Taiwan and its influencing factors. With women aged 30 and over as the study subjects, this retrospective cohort study is conducted based on the database of the Ministry of the Interior, Taiwan, 2008, combined with information gathered between 2006 and 2008 regarding preventive health care and health insurance medical claims data from the Bureau of Health Promotion and the National Health Research Institutes, respectively. The frequency of Pap smears and the percentage differences of each variable are examined using the $2 \times$ tests to check for statistical significance. Finally, logistic regression analysis is used to examine the factors influencing the use of Pap smears. The results revealed that among disabled women aged 30 and over, the use of Pap smears was 7.71% in 2008. Disabled women with the following characteristics had lower use levels regarding Pap smears: greater age, residing in areas of higher urbanization, lower income, lower education levels, unmarried, not diagnosed with cancer, diagnosed with diabetes, and with severe disability levels. Disabled women with hearing impairments or mental retardation were possessed of the highest and lowest probabilities of using Pap smear, respectively. The recommendations of this study include: (1) provide physicians with a varying pricing scheme and incentives for Pap smear based on the type or severity of disability; (2) proactively encourage gynecologist and obstetricians to conduct regular and convenient Pap smear on disabled women; and (3) target disabled women in low usage groups, and improve their knowledge of Pap smear.

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1. Introduction

Cervical cancer is a prevalent type of cancer among Taiwanese women, and can be effectively cured if diagnosed early. From 1995, the National Health Insurance (NHI) in Taiwan has offered one free Pap smear annually for women aged 30 or

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older, effectively promoting screening rates (Huang, Chi, Chang, & Chou, 1999; Wang & Lin, 1996). However, the public's use of preventive health services remains far less than ideal. In 2009, the screening rate of Pap smear was as low as 29.7% (Bureau of Health Promotion, 2010).

To promote health, prevent secondary conditions, and reduce differences of medical care utilization between the patients with and without disability, Healthy People 2010 of the United States included disabled people in national health objectives (US Department of Health and Human Services, 1997). In 2008, a study using the Behavioral Risk Factor Surveillance System (BRFSS) discovered that the use of Pap smear among disabled women (78.9%) was significantly lower than those women without disability (83.4%) (Armour, Thierry, & Wolf, 2009). However, a British study indicated that wheelchair-dependent women with injured spinal cords had higher Pap smear screening rates compared to non-disabled women (Graham, Savic, & Gardner, 1998). This is due to different populations or other factors remains to be clarified. Nevertheless, disability indeed can affect the use of Pap smear.

Due to physical and psychological barriers, patients with disability may be unable to express their physical complaints accurately, thus reducing their access to health care. The longer time required and other obstacles encountered frequently hinder them from receiving timely and appropriate treatments and health care. Studies indicated that when we would develop a population-based cancer screening intervention plan, populations with the lowest testing rate should be first identified, and appropriate cancer screening information should be provided to these populations (Selvin & Brett, 2003). Subsequently, through a public health information system, the disparities in prevalence of cancer can be further understood and eliminated (Koh, Judge, Ferrer, & Gershman, 2005). This study uses the nationwide datasets to investigate the utilization of Pap smear among women with disability in Taiwan and its influencing factors. The results can hopefully serve as a reference for the health authorities when establishing preventive health care service policies targeting disabled people, with eliminating health inequalities as the ultimate goal.

2. Materials and methods

2.1. Data source and processing

Selecting disabled women aged 30 and older as the subjects, this retrospective cohort study was conducted based on the database of Ministry of the Interior, Taiwan, 2008, and combined with information gathered between 2006 and 2008 on preventive health care and health insurance medical claims data from the Bureau of Health Promotion and the National Health Research Institutes, respectively. The variables recorded include: (1) demographic characteristics: age, marital status, education level, urbanization level of resident area, premium-based monthly salary, and aboriginal status; (2) health status: catastrophic illness/injury, relevant chronic illnesses (including cancer and diabetes); (3) classification of disability: type of disability, severity of disability; and (4) use of Pap smears as a preventive health service.

2.2. Subjects

According to the "Disability Rights Protection Act" of Taiwan, disability can be 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 is classified into 4 categories: very severe, severe, moderate, and mild.

Table 1 provides an example of the selection criteria. A total of 396,194 women (≥ 30 years old) with disabilities met the requirement for Pap smear services. Participants with the disability of a persistent vegetative state (1955 individuals), all of whom did not undergo Pap smear testing, were deemed unsuitable to be subjects and, thus, were excluded from this study. Because the categories of autism (22 individuals) and congenital metabolic disorders (43 individuals) had small sample sizes, this study groups them into the category of "others."

2.3. Statistical analysis

All data were analyzed using SAS version 9.1. This study first conducts a descriptive analysis of the identified variables. The frequency of Pap smear testing and differences in the percentage of each variable are examined using the χ^2 tests to check for statistical significance. Finally, multivariate logistic regression analysis is used to examine the factors influencing the use of Pap smear.

3. Results

A total of 394,329 disabled women were qualified to receive a free Pap smear, and those aged between 70 and 79 years constitute the largest group (20.42%). Nearly half of the participants were residing in areas of level 1–3 urbanization form the largest group (47.49%). A majority of premium-based monthly salary are dependent population (39.22%). Approximately 1.57% of disabled women had an aboriginal status. In terms of educational levels, elementary or lower education levels made

Table 1
Study subjects selection criteria.

Age	Birth date	Observed period for using Pap smear
30 years old (once per year)	1978/01/01	2008/01/01–2008/12/31
	1977/12/31	2007/12/31–2008/12/30
	⋮	⋮
31 years old (once per year)	1977/01/02	2007/01/02–2008/01/01
	1977/01/01	2008/01/01–2008/12/31
	1976/12/31	2007/12/31–2008/12/30
32 years old (once per year)	⋮	⋮
	1976/01/02	2007/01/02–2008/01/01
	1976/01/01	2008/01/01–2008/12/31
⋮	1975/12/31	2007/12/31–2008/12/30
	⋮	⋮
	1975/01/02	2007/01/02–2008/01/01
⋮	⋮	⋮

up the largest group (56.77%). Among the participants, 32.15% had catastrophic illness/injury, and those suffering from cancer or diabetes mellitus (DM) constituted 5.87% and 22.93%, respectively. As for the type of disability, the majority of the participants had physical disabilities (37.89%), followed by major organ malfunction (12.55%). Regarding the severity of disability, most of the participants were categorized in the mild group (32.21%) (see Table 2).

The Pap smear usage rate among disabled women was 7.71%, which is significantly lower than the 28.8% usage rate of women aged 30 and over in 2008 (Bureau of Health Promotion, 2010). The usage rate of Pap smear was the highest among disabled women aged 40–49 years (11.64%) and the usage rate decreased as the participant's age increased. Individuals residing in areas with urbanization levels of 8 had the highest screening rates (8.27%), while those residing in areas with urbanization of level one had the lowest usage (6.87%).

Participants with a premium-based monthly salary of NT\$38,200–45,800 (New Taiwan Dollars) had the highest usage rate (13.45%) instead of subjects with the highest premium-based monthly salary of NT\$48,200–57,800 (11.72%). Aboriginal participants had a usage rate of 9.05%, which is slightly higher than the rate of non-aboriginals (7.72%). When categorized by educational level, disabled women with senior high (or vocational) school diplomas had the highest testing rates, whereas those with education levels of elementary school or less had the lowest testing rates (6.47%). As for marital status, married disabled women had a higher usage rate (8.59%) compared to the single women with disability (5.0%). Participants with catastrophic illnesses had a usage rate of 8.47%, which is slightly higher than the rate of those without catastrophic illness (7.40%). Similarly, those with cancer had a usage rate of 9.45%, which is higher than that of those without cancer (7.63%). However, the sufferers of diabetes had a usage rate of 6.46%, which is less than those without diabetes (8.12%). Among the different categories of impairment, disabled women with facial injuries had the highest usage (12.73%), followed by those with refractory epilepsy (12.31%), while dementia had the lowest usage rate (3.50%). Those with mild disabilities show a greater usage (10.19%) compared to those with higher severity of disability. A negative relationship between severity of disability and usage was observed (Table 2).

In Table 3, odds ratios (ORs) and 95% confidence interval (CI) were estimated using logistic regression models to examine the influencing factors on the usage of Pap smear. Age, urbanization level, premium-based salary, education level, marital status, existence of cancer, existence of diabetes, type of disability, and severity of disability all significantly influenced Pap smear use ($p < 0.05$).

The probability of using Pap smear decreased with age. The probability of Pap smear usage among aged 80 or older displayed 0.15 times less than that of those aged 30–39 years (95%CI: 0.14–0.16). Disabled women residing in areas with urbanization levels of 8 had the higher probability of use compared to those residing in area with level 1 (OR = 1.14; 95%CI: 1.07–1.21). Furthermore, those with premium-based monthly salary of NT\$38,200–45,800 had the highest probability of use, with 1.56 times greater than that of those with monthly salary of <NT\$15,840 (95%CI: 1.46–1.67). For those with a premium-based monthly salary less than NT\$45,800, the probability of use rose as salary increased, whereas subjects in the category of NT\$48,200–57,800 had slightly lower probability of use. In addition, disabled women with senior high (or vocational) school education significantly had the highest probability of use compared to those who had an elementary school education or less (OR = 1.13; 95%CI: 1.09–1.18). Married participants displayed a 2.33-times higher probability of use than single subjects did (95%CI: 2.22–2.45).

The probability of use for those with catastrophic illness/injury did not significantly differ from those without catastrophic illness/injury ($p > 0.05$). Participants with cancer had a higher probability of use (OR = 1.20; 95%CI: 1.13–1.27), whereas participants with diabetes displayed a lower probability (OR = 0.95; 95%CI: 0.92–0.98).

The likelihood of using Pap smear varied with the types of disability. Participants with mental retardation or balance impairment displayed the lowest probabilities of use compared to those with physical disabilities (OR = 0.64; 95%CI: 0.60–0.69; OR = 0.78; 95%CI: 0.62–0.98, respectively). The probability of use among subjects with hearing impairments or major organ malfunction was 1.38 and 1.31 times higher than that among those with physical disabilities, respectively. On the

Table 2
Chi-square analysis of Pap smear use among women with disabilities during 2007–2008.

Variables	Total		Use		Non-use		χ ² p-Value
	N = 394,239	%	n ₁ = 30,518	%	n ₂ = 363,721	%	
Gender							–
Female	394,239	100.00	30,518	7.74	363,721	92.26	
Age							<.001 ⁺
30–39 years	37,247	9.45	3434	9.22	33,813	90.78	
40–49 years	65,625	16.65	7636	11.64	57,989	88.36	
50–59 years	76,307	19.36	8285	10.86	68,022	89.14	
60–69 years	68,758	17.44	6320	9.19	62,438	90.81	
70–79 years	80,505	20.42	3672	4.56	76,833	95.44	
≥80 years	65,797	16.69	1171	1.78	64,626	98.22	
Urbanization level							<.001 ⁺
Level 1	46,812	11.87	3218	6.87	43,594	93.13	
Level 2	81,819	20.75	6600	8.07	75,219	91.93	
Level 3	58,616	14.87	4658	7.95	53,958	92.05	
Level 4	33,589	8.52	2627	7.82	30,962	92.18	
Level 5	58,634	14.87	4620	7.88	54,014	92.12	
Level 6	43,723	11.09	3272	7.48	40,451	92.52	
Level 7	46,718	11.85	3512	7.52	43,206	92.48	
Level 8	24,328	6.17	2011	8.27	22,317	91.73	
Premium-based monthly salary (NT\$)							<.001 ⁺
Dependent population	154,613	39.22	9188	5.94	145,425	94.06	
<15,840	80,064	20.31	5337	6.67	74,727	93.33	
16,500– 22,800	118,703	30.11	10,653	8.97	108,050	91.03	
24,000–28,800	15,123	3.84	1950	12.89	13,173	87.11	
30,300–36,300	12,436	3.15	1669	13.42	10,767	86.58	
38,200–45,800	9367	2.38	1260	13.45	8107	86.55	
48,200–57,800	3933	1.00	461	11.72	3472	88.28	
Aboriginal status							<.001 ⁺
Yes	6186	1.57	560	9.05	5626	90.95	
No	388,053	98.43	29,958	7.72	358,095	92.28	
Education level							<.001 ⁺
Elementary school and under	223,821	56.77	14,475	6.47	209,346	93.53	
Junior high school	45,308	11.49	4657	10.28	40,651	89.72	
Senior high/vocational school	50,793	12.88	5535	10.90	45,258	89.10	
Junior college/university and above	22,352	5.67	2202	9.85	20,150	90.15	
Unknown	51,965	13.18	3649	7.02	48,316	92.98	
Marital status							<.001 ⁺
Married	216,540	54.93	18,610	8.59	197,930	91.41	
Unmarried	42,902	10.88	2146	5.00	40,756	95.00	
Divorced and widowed	23,510	5.96	1762	7.49	21,748	92.51	
Unknown	111,287	28.23	8000	7.19	103,287	92.81	
Catastrophic illness/injury							<.001 ⁺
Yes	126,754	32.15	10,735	8.47	116,019	91.53	
No	267,485	67.85	19,783	7.40	247,702	92.60	
Relevant chronic illnesses							<.001 ⁺
Cancer							<.001 ⁺
Yes	23,134	5.87	2187	9.45	20,947	90.55	
No	371,105	94.13	28,331	7.63	342,774	92.37	
Diabetes mellitus							<.001 ⁺
Yes	90,650	22.99	5853	6.46	84,797	93.54	
No	303,589	77.01	24,665	8.12	278,924	91.88	
Type of disability							<.001 ⁺
Physical disability	149,373	37.89	11,501	7.70	137,872	92.30	
Major organ malfunction	49,493	12.55	4038	8.16	45,455	91.84	
Chronic mental illness	48,333	12.26	5339	11.05	42,994	88.95	
Hearing impairment	43,217	10.96	3841	8.89	39,376	91.11	
Multiple disabilities	36,051	9.14	1738	4.82	34,313	95.18	
Visual impairment	25,112	6.37	1887	7.51	23,225	92.49	
Mental retardation	18,204	4.62	880	4.83	17,324	95.17	
Dementia	17,633	4.47	618	3.50	17,015	96.50	
Sound or speech impairment	2939	0.75	279	9.49	2660	90.51	
Balance impairment	1245	0.32	80	6.43	1165	93.57	
Refractory epilepsy	1243	0.32	153	12.31	1090	87.69	
Facial injury	888	0.23	113	12.73	775	87.27	
Rare diseases	244	0.06	29	11.89	215	88.11	
Congenital defects	106	0.03	9	8.49	97	91.51	
Chromosomal abnormalities	93	0.02	7	7.53	86	92.47	
Others	65	0.02	6	9.23	59	90.77	
Severity of disability							<.001 ⁺

Table 2 (Continued)

Variables	Total		Use		Non-use		χ^2 p-Value
	N = 394,239	%	n ₁ = 30,518	%	n ₂ = 363,721	%	
Mild	138,830	35.21	14,147	10.19	124,683	89.81	
Moderate	130,112	33.00	10,056	7.73	120,056	92.27	
Severe	74,526	18.90	3537	4.75	70,989	95.25	
Very severe	50,771	12.88	2778	5.47	47,993	94.53	

$p < 0.05$.

Table 3

Logistic regression models for Pap smear use among women with disabilities during 2007–2008.

Variables	Unadjusted OR	95%CI	p-Value	Adjusted OR	95%CI	p-Value		
Age								
30–39 years	–	–	–	–	–	–		
40–49 years	1.30	1.24	1.35	<.001*	1.04	1.00	1.09	0.082
50–59 years	1.20	1.15	1.25	<.001*	0.92	0.87	0.96	0.000*
60–69 years	1.00	0.95	1.04	0.881	0.79	0.75	0.83	<.001*
70–79 years	0.47	0.45	0.49	<.001*	0.38	0.35	0.40	<.001*
≥80 years	0.18	0.17	0.19	<.001*	0.15	0.14	0.16	<.001*
Urbanization level								
Level 1	–	–	–	–	–	–	–	–
Level 2	1.19	1.14	1.24	<.001*	1.00	0.95	1.04	0.881
Level 3	1.17	1.12	1.23	<.001*	1.00	0.96	1.05	0.906
Level 4	1.15	1.09	1.21	<.001*	0.97	0.92	1.03	0.347
Level 5	1.16	1.11	1.21	<.001*	1.01	0.96	1.06	0.694
Level 6	1.10	1.04	1.15	0.000*	1.00	0.94	1.05	0.877
Level 7	1.10	1.05	1.16	0.000*	1.03	0.98	1.09	0.218
Level 8	1.22	1.15	1.29	<.001*	1.14	1.07	1.21	<.001*
Premium-based monthly salary (NT\$)								
<15,840	–	–	–	–	–	–	–	–
Dependent population	0.89	0.85	0.92	<.001*	1.07	1.03	1.12	0.001*
16,500–22,800	1.38	1.33	1.43	<.001*	1.35	1.30	1.41	<.001*
24,000–28,800	2.07	1.96	2.19	<.001*	1.43	1.34	1.51	<.001*
30,300–36,300	2.17	2.05	2.30	<.001*	1.50	1.41	1.60	<.001*
38,200–45,800	2.18	2.04	2.32	<.001*	1.56	1.46	1.67	<.001*
48,200–57,800	1.86	1.68	2.06	<.001*	1.33	1.20	1.48	<.001*
Aboriginal status								
No	–	–	–	–	–	–	–	–
Yes	1.19	1.09	1.30	0.000*	1.03	0.94	1.13	0.522
Education level								
Elementary school and under	–	–	–	–	–	–	–	–
Junior high school	1.66	1.60	1.72	<.001*	1.10	1.06	1.15	<.001*
Senior high/vocational school	1.77	1.71	1.83	<.001*	1.13	1.09	1.18	<.001*
Junior college/university and above	1.58	1.51	1.66	<.001*	1.08	1.03	1.14	0.004*
Unknown	1.09	1.05	1.13	<.001*	1.03	0.99	1.07	0.153
Marital status								
Unmarried	–	–	–	–	–	–	–	–
Married	1.79	1.71	1.87	<.001*	2.33	2.22	2.45	<.001*
Divorced and widowed	1.54	1.44	1.64	<.001*	2.21	2.07	2.37	<.001*
Unknown	1.47	1.40	1.55	<.001*	1.90	1.80	2.00	<.001*
Catastrophic illness/injury								
Yes	–	–	–	–	–	–	–	–
No	1.16	1.13	1.19	<.001*	1.02	0.98	1.06	0.301
Relevant chronic illnesses								
Cancer								
No	–	–	–	–	–	–	–	–
Yes	1.26	1.21	1.32	<.001*	1.20	1.13	1.27	<.001*
Diabetes Mellitus								
No	–	–	–	–	–	–	–	–
Yes	0.78	0.76	0.80	<.001*	0.95	0.92	0.98	0.003*
Type of disability								
Physical disability								
Visual impairment	0.97	0.93	1.03	0.308	1.24	1.18	1.31	<.001*
Hearing impairment	1.17	1.13	1.22	<.001*	1.38	1.32	1.43	<.001*
Sound or speech impairment	1.26	1.11	1.42	0.000*	1.04	0.92	1.18	0.542
Mental retardation	0.61	0.57	0.65	<.001*	0.64	0.60	0.69	<.001*
Multiple disabilities	0.61	0.58	0.64	<.001*	1.07	1.01	1.13	0.024*
Major organ malfunction	1.07	1.03	1.11	0.001*	1.31	1.25	1.37	<.001*
Facial injury	1.75	1.43	2.13	<.001*	1.17	0.96	1.43	0.126
Dementia	0.44	0.40	0.47	<.001*	1.08	0.99	1.17	0.092

Table 3 (Continued)

Variables	Unadjusted OR	95%CI		p-Value	Adjusted OR	95%CI		p-Value
Chromosomal abnormalities	0.98	0.45	2.11	0.950	0.97	0.44	2.10	0.931
Congenital defects	1.11	0.56	2.20	0.760	0.87	0.44	1.74	0.697
Chronic mental illness	1.49	1.44	1.54	<.001*	1.26	1.20	1.32	<.001*
Balance impairment	0.82	0.66	1.03	0.094	0.78	0.62	0.98	0.036*
Refractory epilepsy	1.68	1.42	2.00	<.001*	1.00	0.84	1.19	0.987
Rare diseases	1.62	1.10	2.38	0.015*	1.19	0.80	1.76	0.390
Others	1.22	0.53	2.82	0.644	1.16	0.50	2.72	0.727
Severity of disability								
Mild	–	–	–	–	–	–	–	–
Moderate	0.74	0.72	0.76	<.001*	0.79	0.76	0.81	<.001*
Severe	0.44	0.42	0.46	<.001*	0.56	0.54	0.59	<.001*
Very severe	0.51	0.49	0.53	<.001*	0.51	0.48	0.54	<.001*

* $p < 0.05$.

contrary, the probability of use was lowest among those with mental retardation, 0.64 times lower than that of those with physical disabilities (95%CI: 0.60–0.69). When categorized according to severity of disability, subjects with higher severity significantly displayed lower usage rates. Thus, disabled women with very severe disabilities had the lowest probability of use in comparison to those with mild disabilities (OR = 0.51; 95%CI: 0.48–0.54) (see Table 3).

4. Discussion

This study discovered that the use of Pap smears in health prevention decreased as the participant's age increased. These results are consistent with many previous studies (Chang, Hsiung, Chen, Yen, & Chen, 2007; Huang et al., 1999; Rodríguez, Ward, & Pérez-Stable, 2005; Wang & Lin, 1996). Regarding residing area, the usage probability of subjects residing in areas of lower urbanization was significantly higher than those residing in areas with higher urbanization. This result is identical to another study conducted in Taiwan (Chen et al., 2009). Generally, urbanization reflects the accessibility of medical resources. After implementation of the National Health Insurance in Taiwan, the accessibility of medical care has effectively improved. Therefore, the usages of Pap smear have increased among the female population (Huang et al., 1999; Lin, Chen, Liu, & Lin, 2008). This effect is especially evident in areas of low urbanization. Because the accessibility of medical resources is enhanced, Pap smear usage rates are improved on a larger scale. In addition, the lifestyle of rural townships and remote areas allows the effective spread of health policies and health promotion activities by the health authorities. Public health offices and stations in rural townships across Taiwan are actively involved in promoting cancer screening activities, and frequently cooperate with district hospitals and clinics to launch mobile medical care, subsequently contributing to higher usage.

Besides, since the implementation of "the Program of Improving Medical Service Utilization in Mountainous Regions and Outlying Islands" in 1999, the accessibility of medical care in remote areas has been proactively improved through the Integrative Delivery System (IDS) program in Taiwan. In this program, Pap smear was a significant indicator of program effectiveness (Chen et al., 2007; Tan, Tseng, Chang, Lin, & Hsiao, 2005). In order to achieve the program goals, mobile Pap smear screening vehicles visited remote areas to service entire villages, increasing the usage of Pap smear in low-urbanization regions to higher than that of other areas. These results indicate that National Health Insurance, mobile medical services, and IDS programs are highly effective for improving health care and preventive service, and balancing inter-regional medical resource distribution.

Disabled women with a premium-based monthly salary over NT\$15,840 (including dependent populations) showed higher Pap smear usage rates than those in the NT\$15,840 category did. This is consistent with previous study results indicating that the usage rates and frequency of preventive health care was direct proportional to income (Hewitt, Devesa, & Breen, 2004; Rodríguez et al., 2005). Pap smear usage rates in aboriginal subjects were significantly higher than those in non-aboriginal subjects. This proved that financial barriers to healthcare were effectively overcome after implementation of the National Health Insurance. Among people with a lower socioeconomic status, such as aboriginals, the effects on the utilization of preventive health care was even more significant. However, Lantz, Weigers and House (1997) believed that income did not directly determine Pap smear screening behaviors, but together with other factors exerted an indirect influence. Therefore, in addition to overcoming financial barriers, other influencing barriers should also be eliminated to improve Pap smear screening.

This study revealed that the lower the subject's educational level, the lower the usage of Pap smear was. This result is consistent with those from previous studies (Chang et al., 2007; Huang et al., 1999; Lin et al., 2008; Wang & Lin, 1996). Since education often correlates with socioeconomic status, lower socioeconomic groups may have inadequate knowledge on preventive health care, contributing to limited use of Pap smear.

Single disabled women had lower Pap smear usage rates, which is in accordance with numerous previous studies (Chang et al., 2007; Hewitt et al., 2004; Lantz et al., 1997; Rodríguez et al., 2005). It is likely that Taiwanese and Asian people possess relatively conservative attitudes toward sex and knowledge of sexual organs compared to the public in Western countries, resulting in the unmarried disabled women to be reluctant to receive such preventive health services.

Disabled women with catastrophic illness/injury and cancer had significantly higher usage rates of Pap smear. There is a likelihood that disabled people with catastrophic illness/injury and cancer must receive medical services regularly. Previous

studies indicated that patients with regular medical attention had relatively higher usage of preventive healthcare (Hewitt et al., 2004; Lantz et al., 1997). This is probably because those disabled women receiving regular medical services have more opportunities to be reminded or suggested to receive preventive healthcare services.

On the side, disabled women had lower usage rates of Pap smear. This was probably because patients must lie on examination tables to undergo Pap smears, which can be extremely difficult for certain disabled women (Welner, 1998). Moreover, the public and physicians may also consider disabled women to be less prone to cervical cancer as a result of a lack of or scarce sexual intercourse (Diab & Johnston, 2004; Welner, 1998). These misconceptions were possibly a major cause of lower usage of Pap smear in disabled women. Among the 16 types of disabilities, patients with hearing impairment, major organ malfunction, chronic mental illness, and visual impairment exhibited higher usage of Pap smear, whereas disabled women with mental retardation and balance impairment had lower usage. It seems most likely that the types of disabilities described in the former have less impact on an individual marriage and sex life, which possibly leads to such results. Furthermore, these results may also be associated with the severity of disability; however, this requires further verification.

Subjects with higher disability severity demonstrated lower Pap smear usage rates, which is consistent with numerous previous studies (Armour et al., 2009; Cheng et al., 2001; Chevarley, Thierry, Gill, Ryerson, & Nosek, 2006; Diab & Johnston, 2004; Iezzoni, McCarthy, Davis, Harris-David, & O'Day, 2001; Ramirez, Farmer, Grant, & Papachristou, 2005; Reynolds, Stanistreet, & Elton, 2008; Wei, Findley, & Sambamoorthi, 2006). Those with higher disability severity also had a lower accessibility to medical care, inevitably resulting in extremely low usage of Pap smear among those with very severe disability.

5. Conclusions

This study determined that the Pap smear usage rate among disabled women is 7.71%, which is significantly lower than the 28.8% usage rate among Taiwanese women aged 30 and older in 2008. Among the factors influencing Pap smear usage rates, subjects with the following characteristics have lower usage rates: greater age, residing in areas of higher urbanization, lower income, lower education levels, unmarried, not suffering from cancer, diagnosed with diabetes, and with severe disability levels. Among the 16 types of disabilities, patients with a hearing impairment, major organ malfunction, chronic mental illness, multiple disabilities, and visual impairment demonstrated higher usage of Pap smear, whereas disabled women with mental retardation and balance impairment had the lower usage.

In brief, the results indicate that disabled women who are among the minority population regarding social status display low Pap smear usage rates. The recommendations of this study include: (1) Provide physicians with a varying pricing scheme and incentives for Pap smear based on the type or severity of women with disability; (2) proactively encourage gynecologist and obstetricians to conduct regular and convenient Pap smear on disabled women, especially targeting the relevant influencing factors of utilization of preventive health care; and (3) target disabled women in low usage groups, and improve their knowledge of Pap smear. These suggestions will hopefully help eliminate the obstacles and disparities of Pap smear usage among disabled women.

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