



## The acceptability of human papillomavirus (HPV) vaccination among women with physical disabilities

Chia-Feng Yen<sup>a</sup>, Si-Fan Chen<sup>b</sup>, Lan-Ping Lin<sup>b</sup>, Shang-Wei Hsu<sup>c</sup>, Mao-Jung Chang<sup>d</sup>,  
Chia-Ling Wu<sup>e</sup>, Jin-Ding Lin<sup>b,\*</sup>

<sup>a</sup> Department of Public Health, Tzu-Chi University, Hualien City, Taiwan

<sup>b</sup> School of Public Health, National Defense Medical Center, Taipei, Taiwan

<sup>c</sup> Graduate Institute of Healthcare Administration, Asia University, Taichung, Taiwan

<sup>d</sup> Department of Public Administration and Policy, National Taipei University, New Taipei City, Taiwan

<sup>e</sup> Chung-Hua Foundation for Persons with Intellectual Disabilities, New Taipei City, Taiwan

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### ABSTRACT

The present paper aims to explore awareness and acceptability of human papillomavirus (HPV) vaccination and to identify factors influencing HPV acceptability among women with physical disabilities in Taiwan. The study participants were 438 adult women with physical disabilities, aged 18–69 years. The participants were all officially registered as having physical disabilities in Taipei County, Taiwan, in March 2009. The major findings were that 54.5% of the participants had previously heard about the HPV vaccine and that vaccine acceptability was very low (3.2%) if the participants would have had to pay for the vaccine but would increase to 60% if the government were to provide the vaccine for free. We found that those participants who had had a Pap smear test within the past 1 year or 3 years were significantly more likely to be aware of and willing to receive the HPV vaccine than those who had not. To increase the HPV vaccination rate among women with physical disabilities, the study suggests that the current health care system in Taiwan should consider implementing free immunization for this group of women.

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## 1. Introduction

The human papillomaviruses (HPVs) are a group of more than 100 related viruses, a subset of which constitute the major cause of cervical cancer (National Cancer Institute, 2011). The Society for Adolescent Medicine in the US has also pointed out that HPV is the most common sexually transmitted infection worldwide, causing genital warts as well as nearly all cases of cervical cancer (Friedman, Kahn, Middleman, Rosenthal, & Zimet, 2006). Vaccines that could prevent HPV acquisition would have the potential to significantly reduce the incidence of the disease in both children and adults (Kahn, 2005). Vaccines for HPV are currently licensed for females ages 9 through 26 in the US, and for adult women up to 45 years in some countries, such as Australia (Black, Zimet, Shorta, Sturmd, & Rosenthala, 2009). In addition to the vaccines, adolescents should be given appropriate health education about HPV and the dangers associated with infection; they should also be encouraged to obtain appropriate gynecological care after commencing sexual activity (Moscicki, 2005).

The American Cancer Society has developed guidelines for recommending the prophylactic HPV vaccine for the prevention of cervical cancer and its precursors (Saslow et al., 2007); the Centers for Disease Control and Prevention (2011)

\* Corresponding author at: No. 161, Min-Chun E. Rd., Sect. 6, Nei-Hu, Taipei, Taiwan. Tel.: +886 2 87923100x18447; fax: +886 2 87923147.  
E-mail address: a530706@ndmctsgh.edu.tw (J.-D. Lin).

also recommend HPV vaccination for preventing most types of cervical cancer. Research has shown that an HPV vaccination program would significantly lower the incidence of cervical cancer, improve reproductive health promotion, reduce health-care costs, and reduce health-care disparities (Thomas, 2008).

Evidence has shown that preventive HPV vaccines have the potential to substantially reduce HPV-associated morbidity and mortality (Zimet, 2005). However, Kling and Zeichner (2010) predict that introducing vaccination programs will be a challenge because of high costs, uncertainties about the durability of the vaccine, and the potential that new oncogenic strains could emerge; these barriers could prevent its acceptance. Allen et al. (2010) have suggested that evidence-based interventions, such as literature on factors associated with vaccine intentions and the acceptability of the HPV vaccine, are needed. Therefore, the present paper aims to investigate the acceptability of HPV vaccination among women with physical disabilities in Taiwan and to identify factors influencing that acceptability.

## 2. Methods

The present research was conducted as a part of a larger study on reported history of Pap smear tests, health experiences, perceptions of cervical cancer and HPV vaccination among women with physical disabilities in Taiwan. A cross-sectional survey was employed, in which we mailed out a structured questionnaire to collect our data. The study participants included 438 adult women aged 18–69 years who were officially registered as having physical disabilities in Taipei County, Taiwan as of March 2009. We have described the characteristics of the study participants in a previous paper on their history of having Pap smears (Lin, Chen, Lin, & Sung, 2011).

The survey measured HPV vaccine awareness and acceptability, included information about whether they heard of the HPV vaccine, whether they would pay a fee for the vaccine, and whether they were willing to accept free vaccination against HPV. We analyzed the data in SPSS 18.0, using numbers, percentages and Chi-square tests to determine the relationship between participants' demographic characteristics and HPV vaccine acceptance in paid or free scenarios.

## 3. Results

### 3.1. Awareness of HPV vaccine

Fig. 1 presents the results of the survey question regarding awareness of HPV vaccine in women with physical disabilities. Among the study participants, 54.5% of participants who previously heard about the HPV vaccine, while 18.1% were unsure and 27.4% had never heard of it. Table 1 shows the relationship between HPV-vaccine awareness and participants' demographic characteristics. Using Chi-square tests, we found that differences in age, educational level, having a spinal cord impairment or other nervous system impairment, and household monthly income were significant factors. We found that the participants who were more likely to be aware of the HPV vaccine were those in the age group 45–69 years (50.4% aware), those with a university or higher education (65.8% aware), those without spinal cord impairments (53.4% aware) or other nervous system impairments (55.2% aware), and those with a higher household monthly income (62.1% aware). We also found that among the participants who had had a Pap smear test within 1 year or within 3 years, a significantly higher proportion were aware of the HPV (66.5% and 62.5% aware, respectively) than among their counterparts who had not had Pap smears in the last 3 years.

### 3.2. HPV vaccine acceptability

Table 2 shows the overall level of potential acceptance of the HPV vaccine among women with physical disabilities. Only 3.2% of the participants agreed with the statement "If I had to pay 12,000–15,000 NTD for three doses, I would

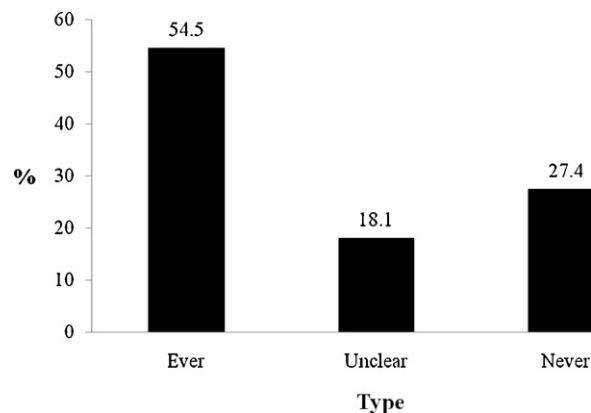


Fig. 1. Percentage of respondents who had heard of the HPV vaccine.

**Table 1**

HPV vaccine awareness by demographic characteristics and Pap smear history among women with physical impairments, with Chi-square significance indicated by <sup>\*</sup>.

Variable	N	Ever heard of HPV vaccine		
		Ever	Unsure	Never
Age <sup>*</sup>				
18–29 years	29	20 (69.0)	4 (13.8)	5 (17.2)
30–44 years	87	62 (71.3)	7 (8.0)	18 (20.7)
45–59 years	276	139 (50.4)	55 (19.9)	82 (29.7)
60–69 years	43	16 (37.2)	13 (30.2)	14 (32.6)
Marital status				
Unmarried	81	50 (61.7)	14 (17.3)	17 (21.0)
Married	352	186 (52.8)	65 (18.5)	101 (28.7)
Education level completed <sup>*</sup>				
High school diploma and lower	316	158 (50.0)	68 (21.5)	90 (28.5)
University and higher	117	77 (65.8)	11 (9.4)	29 (24.8)
Upper limb disability				
Yes	136	64 (47.1)	26 (19.1)	46 (33.8)
No	296	171 (57.8)	52 (17.5)	73 (24.7)
Lower limb disability				
Yes	315	177 (56.2)	51 (16.2)	87 (27.6)
No	116	57 (49.1)	27 (23.3)	32 (27.6)
Spinal cord impairment <sup>*</sup>				
Yes	36	23 (63.9)	11 (30.5)	2 (5.6)
No	395	211 (53.4)	67 (17.0)	117 (29.6)
Other nervous system impairments <sup>*</sup>				
Yes	25	10 (40.0)	10 (40.0)	5 (20.0)
No	406	224 (55.2)	68 (16.7)	114 (28.1)
Disability level				
Mild	242	133 (55.0)	42 (17.3)	67 (27.7)
Moderate	141	68 (48.2)	27 (19.2)	46 (32.6)
Severe and profound	50	35 (70.0)	9 (18.0)	6 (12.0)
Monthly household income <sup>*</sup>				
<39,999 NTD	247	121 (49.0)	46 (18.6)	80 (32.4)
≥40,000 NTD	145	90 (62.1)	26 (17.9)	29 (20.0)
Ever had a Pap smear test				
Yes	316	183 (57.9)	52 (16.5)	81 (25.6)
No	109	52 (47.7)	24 (22.0)	33 (30.3)
Had a Pap smear test within 1 year <sup>*</sup>				
Yes	176	117 (66.5)	20 (11.4)	39 (22.1)
No	236	112 (47.5)	53 (22.5)	71 (30.0)
Had a Pap smear test within 3 years <sup>*</sup>				
Yes	216	135 (62.5)	26 (12.0)	55 (25.5)
No	169	81 (47.9)	50 (29.6)	38 (22.5)

<sup>\*</sup>  $p < 0.05$ .

agree to receive the HPV vaccine,” compared to 35.2% who were undecided and 61.6% who disagreed. If the vaccines were available to the public free of charge, 60% of respondents said they would be willing to receive the vaccination, 33.4% were undecided and only 6.6% said they would decline it if it were a free service.

We also looked at the relationship between demographic and health care history factors and participants' willingness to receive the HPV vaccine if they had to pay vs. if it were free of charge (Tables 3 and 4). We found that participants who had completed lower levels of education, had lower monthly household incomes and had not had a Pap smear test within 1 or 3 years were less likely to agree that they would pay for HPV vaccinations. A Chi-square test showed that a significantly higher proportion of respondents with a mild or severe level of disability would agree to receive free vaccinations (64.5% and 66.7% agreeing, respectively) than those with a moderate level of disability (50.7% agreeing). There was also a higher rate of acceptability for a free vaccine among women who had had a Pap smear test within 1 year (70.1% agreeing) or 3 years (65.0% agreeing) than among those who had not.

### 3.3. Trade-offs in HPV vaccine acceptability

Table 5 shows that those participants who had never heard of the HPV vaccine were significantly less likely to agree that they would pay a fee for a vaccination ( $p = 0.037$  in the Chi-square test). Those who had heard of the HPV vaccine were significantly more likely to agree that they would accept a free-of-charge HPV vaccination (Table 6;  $p < 0.001$ ). However, if the HPV vaccination were free, a significant proportion of those who would not agree to pay a fee would accept a free, publicly available vaccination.

**Table 2**  
Acceptability of the HPV vaccine among women with physical disabilities.

Would agree to receive the vaccination if:	Would agree <i>N</i> (%)	Undecided <i>N</i> (%)	Would not agree <i>N</i> (%)
Had to pay 12,000–15,000 NTD for three doses ( <i>N</i> = 438)	14 (3.2)	154 (35.2)	270 (61.6)
Free of charge ( <i>N</i> = 437)	262 (60.0)	146 (33.4)	29 (6.6)

#### 4. Discussion

Cervical cancer is a preventable health problem. Wain (2010) has suggested that the most appropriate prevention system for HPV-related diseases, including cervical cancer, would be an individualized combination of vaccination, screening and early detection, depending on an individual's circumstances. Vaccinations should occur before people become sexually active, but females who are already sexually active can also benefit from vaccination. Even if they are already infected with one or more of the four HPV strains covered by the vaccine, the vaccine will help protect them from the remaining strains (Snow, 2007). Katz et al. (2009) emphasized the need for more comprehensive and consistent policies that maximize the accessibility of the HPV vaccine to women, especially those in underserved populations. For example, people with physical disabilities constitute one of the most vulnerable populations in society; their health issues should be a top priority in health policy.

Our study aimed to investigate the acceptability of the HPV vaccine among women with physical disabilities in Taiwan and to identify the factors that influence that acceptability. The main results were that HPV vaccine awareness was low (54.5% had heard about the vaccine) and that vaccine acceptability was very low (3.2%) if the participants would have had to pay for the vaccine, but that the acceptability increased to 60% if the government were to be providing a free vaccine.

**Table 3**  
Willingness to pay for an HPV vaccination by demographic characteristics and Pap smear history among women with physical impairments, with Chi-square significance indicated by \*.

Variable	<i>N</i>	Would agree	Undecided	Would not agree
Age				
18–29 years	29	1 (3.5)	13 (44.8)	15 (51.7)
30–44 years	87	4 (4.6)	23 (26.4)	60 (69.0)
45–59 years	278	8 (2.9)	104 (37.4)	166 (59.7)
60–69 years	44	1 (2.3)	14 (31.8)	29 (65.9)
Marital status				
Unmarried	82	4 (4.8)	29 (35.4)	49 (59.8)
Married	354	10 (2.8)	125 (35.3)	219 (61.9)
Education level completed*				
High school diploma and lower	318	6 (1.9)	115 (36.2)	197 (61.9)
University and higher	118	8 (6.8)	38 (32.2)	72 (61.0)
Upper limb disability				
Yes	136	3 (2.2)	43 (31.6)	90 (66.2)
No	299	11 (3.7)	109 (36.5)	179 (59.8)
Lower limb disability				
Yes	317	11 (3.5)	108 (34.1)	198 (62.5)
No	117	3 (2.6)	43 (36.8)	71 (60.6)
Spinal cord impairment				
Yes	38	1 (2.7)	17 (44.7)	20 (52.6)
No	396	13 (3.3)	134 (33.8)	249 (62.9)
Other nervous system impairment				
Yes	25	0 (0)	8 (30.8)	18 (69.2)
No	408	14 (3.5)	143 (35.0)	251 (61.5)
Disability level				
Mild	245	10 (4.1)	84 (34.3)	151 (61.6)
Moderate	141	2 (1.4)	46 (32.6)	93 (66.0)
Severe and profound	50	2 (4.0)	24 (48.0)	24 (48.0)
Monthly household income*				
<NT 39,999	247	4 (1.6)	77 (31.2)	166 (67.2)
≥NT 40,000	146	9 (6.2)	61 (41.8)	76 (52.0)
Ever had a Pap smear test				
Yes	319	13 (4.1)	115 (36.1)	191 (59.8)
No	109	1 (0.9)	35 (32.1)	73 (67.0)
Had a Pap smear test within 1 year*				
Yes	178	8 (4.5)	74 (41.6)	96 (53.9)
No	236	6 (2.5)	72 (30.5)	158 (67.0)
Had a Pap smear test within 3 years*				
Yes	218	8 (3.6)	81 (37.2)	129 (59.2)
No	170	5 (2.9)	54 (31.8)	111 (65.3)

\*  $p < 0.05$ .

**Table 4**

Willingness to accept a free HPV vaccination by demographic characteristics and Pap smear history among women with physical impairments, with Chi-square significance indicated by \*.

Variable	N	Would agree	Undecided	Would not agree
Age				
18–29 years	29	22 (75.9)	7 (24.1)	0 (0)
30–44 years	86	58 (67.4)	24 (27.9)	4 (4.7)
45–59 years	278	159 (57.2)	97 (34.9)	22 (7.9)
60–69 years	44	23 (52.3)	18 (40.9)	3 (6.8)
Marital status				
Unmarried	82	47 (57.3)	30 (36.6)	5 (6.1)
Married	353	215 (60.9)	116 (32.9)	22 (6.2)
Education level completed				
High school diploma and lower	318	199 (62.6)	100 (31.4)	19 (6.0)
University and higher	117	62 (53.0)	45 (38.5)	10 (8.5)
Upper limb disability				
Yes	137	76 (55.5)	52 (38.0)	9 (6.5)
No	297	184 (62.0)	93 (31.3)	20 (6.7)
Lower limb disability				
Yes	317	190 (60.1)	103 (32.6)	23 (7.3)
No	117	70 (59.8)	41 (35.0)	6 (5.2)
Spinal cord impairment				
Yes	38	26 (68.4)	10 (26.3)	2 (5.3)
No	395	234 (59.2)	134 (33.9)	27 (6.9)
Other nervous system impairment*				
Yes	26	9 (34.6)	15 (57.7)	2 (7.7)
No	407	251 (61.7)	129 (31.7)	27 (6.6)
Disability level†				
Mild	242	156 (64.5)	75 (31.0)	11 (4.5)
Moderate	142	72 (50.7)	55 (38.7)	15 (10.6)
Severe and profound	51	34 (66.7)	14 (27.5)	3 (5.8)
Monthly household income				
<NT 39,999	247	148 (59.9)	82 (33.2)	17 (6.9)
≥NT 40,000	146	83 (56.8)	53 (36.4)	10 (6.8)
Ever had a Pap smear test				
Yes	317	199 (62.8)	102 (32.2)	16 (5.0)
No	111	57 (51.4)	41 (36.9)	13 (11.7)
Had a Pap smear test within 1 year*				
Yes	177	124 (70.1)	47 (26.6)	6 (3.3)
No	238	124 (52.1)	92 (38.7)	22 (9.2)
Had a Pap smear test within 3 years*				
Yes	217	141 (65.0)	67 (30.9)	9 (4.1)
No	171	89 (52.0)	64 (37.5)	18 (10.5)

\*  $p < 0.05$ .

Studies conducted in different countries have had varied results with regard to HPV vaccine awareness and acceptability. In Canada, [Sauvageau, Duval, Gilca, Lavoie, and Ouakki \(2007\)](#) interviewed 500 adults in a telephone survey in the region of Quebec City and found that only 15% of respondents had ever heard of HPV. Eighty-seven percent agreed that HPV vaccines could prevent cervical cancer, and among the young respondents, 91% said they would agree to receive the vaccine if it were publicly funded, but only 72% would agree to pay \$100/dose. In the Midwestern US, [Hild-Mosley, Patel, Markwell, and Massad \(2009\)](#) surveyed gynecology patients and found that 65% had heard of the HPV vaccine and 11% recognized its effectiveness in preventing cervical cancer. Thirty-nine percent said they were likely to recommend it, but only 8% wanted to receive it. Knowledge about HPV and HPV vaccination was better among Caucasians, women under 45, current or previous smokers, and those with two or fewer children. [Hopenhayn, Christian, Christian, and Schoenberg \(2007\)](#) found that most women in an Appalachian county in Kentucky (82%) were interested in being vaccinated. Multivariate analysis showed that women were more likely to want to receive a vaccination themselves if they were younger than 50, had never married, had a lower income, or were current smokers. Women who had daughters were more likely to intend to have them vaccinated than

**Table 5**

Willingness to pay for an HPV vaccination by HPV vaccine awareness, with Chi-square significance ( $N = 434$ ).

	Willingness to pay for an HPV vaccination			$\chi^2$	p Value
	Would agree	Undecided	Would not agree		
Ever heard of the HPV vaccine				10.232	0.037
Ever, N (%)	12 (5.1)	91 (38.4)	134 (56.5)		
Unclear, N (%)	0 (0)	28 (35.4)	51 (64.6)		
Never, N (%)	2 (1.7)	34 (28.8)	82 (69.5)		

Table 6

Willingness to accept a free HPV vaccination by HPV vaccine awareness and trade-off acceptability with Chi-square significance.

	Willingness to accept a free HPV vaccination			$\chi^2$	p Value
	Would agree	Undecided	Would not agree		
Ever heard of the HPV vaccine (N = 433)				21.027	<0.001
Ever, N (%)	157 (60.4)	65 (44.8)	15 (53.6)		
Unclear, N (%)	31 (11.9)	43 (29.7)	4 (14.3)		
Never, N (%)	72 (27.7)	37 (25.5)	9 (32.1)		
Willingness to pay for an HPV vaccination (N = 435)				28.706	<0.001
Would agree, N (%)	14 (100)	0 (0)	0 (0)		
Undecided, N (%)	102 (66.2)	52 (33.8)	0 (0)		
Would not agree, N (%)	145 (54.3)	94 (35.2)	28 (10.5)		

to intend to be vaccinated themselves, and women younger than 40 were more likely to intend to vaccinate than older women (Sperber, Brewer, & Smith, 2008). Black et al. (2009) reviewed available articles on adults' opinions about and the acceptability of vaccinating women against HPV and found that the predictors of acceptability include barriers, awareness, risk factors, age and marital status. They concluded that acceptability rates were high when adequate information was given and the cost was affordable.

The major obstacle to acceptance of the HPV vaccine is lack of knowledge (Cheung, Chan, & Lo, 2006). Perceptions of the HPV vaccine's effectiveness were significantly higher among people who had previously heard of the vaccine and who knew that HPV is sexually transmitted (Chelimo, Wouldes, & Cameron, 2010). Brewer and Fazekas (2007) found that vaccination acceptability was higher when people believed that the vaccine was effective, that a physician would recommend it, and that HPV infection was likely. They suggested that HPV vaccine programs in the US should emphasize the vaccine's effectiveness, the high incidence of HPV infection, physicians' recommendations and barriers to vaccination. When Bigman, Cappella, and Hornik (2010) surveyed HPV-vaccine-related intentions and policy opinions, they found that information about the vaccine's effectiveness not only influences perceptions about effectiveness but also that it can, in some cases, influence support for policies mandating vaccine use. Friedman and Sheppard (2007) also highlighted the fact that limited knowledge of HPV was a barrier to acceptance of the vaccine. That study found that married women did not believe they needed vaccination. Cost and fear that others would consider them promiscuous were also barriers.

The present study also found that women who had previously had Pap smears had a significantly higher proportion of HPV vaccine awareness and potential acceptance. Moscicki (2005) has pointed out that, although cervical cancer screening has significantly reduced mortality rates in developed countries, detection and treatment remains costly and inefficient. Our previous study found that many factors affected the acceptability of Pap smear tests for women with disabilities, including marital status, health status, healthcare setting, and service program (Lin, Lin, et al., 2010; Lin, Sung, et al., 2010). Snow (2007) suggests that the health care system should teach women to continue getting Pap smears and other routine cervical cancer screening as recommended by their health care provider because the vaccine does not prevent all forms of cervical cancer.

The present study provides a general profile of HPV vaccine acceptability among women with physical disabilities. To increase the HPV vaccination rate, the health care system in Taiwan should examine the reasons for low HPV-vaccine awareness and consider implementing free immunizations for this group of women. Current health care policy could also incorporate Reiter et al.'s (2010) suggestions about increasing opportunities for HPV vaccination at preventive checkups and increasing the concomitant administration of the HPV vaccine with other adolescent vaccines. Furthermore, as Zimet (2005) emphasized, health care providers will need to be prepared to provide women with information about HPV and HPV vaccination and to respond appropriately to women who express opposition to the HPV vaccine.

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