

## RESEARCH ARTICLE

# National HPV Immunisation Programme: Knowledge and Acceptance of Mothers Attending an Obstetrics Clinic at a Teaching Hospital, Kuala Lumpur

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### Abstract

**Background:** Introduction of the HPV vaccine is a forefront primary prevention method in reducing the incidence of carcinogenic human papillomavirus (HPV) and cervical cancer. The Malaysia government has implemented the National HPV immunisation programme since 2010, supplying HPV vaccine free to targeted 13 year olds. This study aimed to explore the level of knowledge among mothers on cervical cancer, HPV, HPV vaccine and National HPV (NHPV) immunisation programme since its' implementation. It also assessed acceptance of mothers towards HPV vaccine being administered to their daughter, son or themselves. **Materials and Methods:** A cross sectional study was conducted on 155 respondents using self-administered questionnaires; conducted in December 2012 at the Obstetrics and Gynaecology Clinic in a teaching hospital in Kuala Lumpur. Respondents were selected using a multistage sampling technique. **Results:** A response rate of 100% was obtained. Overall, 51.0% of mothers had good knowledge, with 55% having good knowledge of cervical cancer, 54.2% for both HPV and the National HPV immunisation programme and 51.0% for the HPV vaccine. Regression analyses showed that ethnicity was associated with knowledge on cervical cancer ( $p=0.003$ ) while education was associated with knowledge on HPV ( $p=0.049$ ). Three factors are associated with knowledge of the National HPV immunisation programme; ethnicity ( $p=0.017$ ), mothers' education ( $p=0.0005$ ) and number of children ( $p=0.020$ ). The acceptance of HPV vaccine to be administered among daughter was the highest at 87.1%, followed by for mothers themselves at 73.5%, and the least is for sons 62.6%. **Conclusions:** This study found that the overall level of knowledge was moderate. Adequate information on cervical cancer, HPV, HPV vaccination and the National HPV immunisation programme should be provided to mothers in order to increase acceptance of the HPV vaccine which can reduce the disease burden in the future.

**Keywords:** Knowledge - cervical cancer - HPV - HPV vaccine - national HPV immunisation programme

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### Introduction

According to summary report by World Health Organization (WHO, 2010), indicated women population at age 15 years and older who are at risk of developing cervical cancer was 2337 million. Apart from that, WHO (2010), stated that Human papillomavirus (HPV) can cause cervical cancer (CC) which is the second most common cancer in women worldwide. In 2008, there were an estimated 529,409 new cases and 274,883 deaths due to cervical cancer worldwide. In addition, more than 86% of the cases happened in developing countries, where it accounts for 13% of all female cancer (WHO, 2010). While in Malaysia scenario reported that CC was the third most common gynaecological cancer at which about 2126

new cases every year and 631 deaths due to CC (WHO, 2010).

Many studies revealed the causative association between HPV and CC. Dobson et al. (2007), claimed that all cervical cancers are traced to infection with HPV types including types 16 and 18 which have been revealed by studies conducted in the past 15 years. In addition, Delphine et al. (2008) revealed the substantial correlation between the population prevalence of high-risk HPV infection and cervical cancer incidence. Consequently, the discovery of the past studies lead to the immunisation afford to protect against high risk of HPV which can cause CC. There are two types of HPV vaccines approved by the U.S. Food and Drug Administration which are Cervarix and Gardasil (Markowitz et al., 2010). According to

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Marc and Montreal (2007), vaccination may represent the best primary prevention method. Besides that, if the vaccine is successfully introduced, it would dramatically give potential to reduce the burden of cervical cancer in future even though it will not become obviously for years to come (CCA Report, 2012). People can obtain the vaccine from private sector or through government vaccination programmes. In many countries, HPV vaccine has become accessible to mass public starting year 2006 and in Malaysia, the public sector full implementation was done in year 2011 among adolescent girls 13 years old in schools. According to Annual Report of Malaysia Ministry of Health (2012), the immunisation coverage for complete 3 dosage of HPV vaccine was achieved 87.12% in year 2011 among girls aged 13 years old. Meanwhile, vaccination among boys are not in the near future, however men at risk are obtaining the HPV vaccines in the private sector health market and paying for it on their own merits. This prophylactic HPV vaccine with proven effectiveness in clinical trials has given hope of reducing the incidence of HPV and CC worldwide (Moraros et al., 2006).

There are several reasons why the evaluation on mothers' level of knowledge must be done. According to Hoai et al. (2009), one of the drawback of acceptance towards HPV vaccination is due to limited information about vaccine in conjunction with their concern on safety, effectiveness and financial cost of the vaccine. Meanwhile, in a study done by Hesham et al. (2011), found the poor acceptance of HPV vaccination among secondary school students in Sarawak which is only 22.3% and there is an association between acceptance of HPV vaccination with knowledge on cervical cancer and race. The increasing knowledge on CC, HPV Diseases, HPV Vaccine and National HPV (NHPV) immunisation programme could enhance the acceptance of the vaccination as well. However, it is a challenge to introduce new services such HPV vaccines when the communities may not be aware that cervical cancer can be prevented. Parents might not accept these vaccines and are not able to provide written consent for HPV vaccinations for their daughters at the school level. Therefore, this study aimed to explore the current level of knowledge on cervical cancer, HPV, HPV vaccine and NHPV immunisation programme among mothers as well as its associated factors in a teaching hospital in Kuala Lumpur. In addition, this study also intended to explore the acceptance of HPV vaccine among mothers towards their own selves (the mothers themselves), daughters or sons. This is preparation of HPV vaccination against boys that have been implemented on other countries like Australia. The quadrivalent HPV vaccine also provide protection against genital warts that are commonly seen among men at risk. However since this data is not routinely collected at the national level, the disability, impairment of men quality of lives and sexual functions have not been explored in Malaysia.

## Materials and Methods

This is a cross sectional study at a referral O&G clinic in a teaching hospital. The clinic had been purposely selected due to high attendance of mothers and as a tertiary

referral centre in Malaysia. Respondents targeted were mothers who attended the O&G clinics.

Data was collected from November to December 2012 using multistage random sampling technique. The inclusion criterias were mothers who attended O&G clinic, willing to participate, have at least one living child, able to read and understand either Malay (the national language)/ English language and are local Malaysian.

Study's sample size was calculated using the Pocock formula for two sample proportions and the calculated minimum sample size was 129 mothers. Adding an additional 20% was done to reduce attrition and non-response. Pre-test and face validation was conducted at a nearby primary health clinic, among 10% of total sample ie. 15 respondents. Data was collected by using self-administered questionnaire in both English and Bahasa Malaysia using a novel questionnaire that have been expertly validated. These novel questionnaires consist of eight domains (a total of 81 questions). First on demographic characteristic and socioeconomic status (5 questions), then children characteristic (2 questions), personal/family history of CC or HPV-related diseases (4 questions), knowledge on CC (27 questions), knowledge on HPV disease (16 questions), knowledge on HPV vaccine (9 questions) and lastly on the knowledge towards the National HPV (NHPV) Immunisation Programme (12 questions).

Data was analysed descriptively and as normality was not proven through Kolmorov-Smirnov; inferential analyses using non parametric analysis such as Chi-square, Fisher's Exact test and logistic regression was used with Statistical Package for Social Science (SPSS) programme version 20.0 to determine significant predictors towards knowledge and acceptance towards HPV vaccinations.

## Results

### *Respondents overall distributions*

The total number of respondents in this study was 155 with the response rate of 100%. Majority of respondents were of Malay ethnicity (82.6%), older age group (52.3%), had high education level (63.2%), higher income (50.3%), are currently employed (85.1%) and have more than one children (61.9%). The demographic, number of children, socioeconomic data of respondents is depicted in Table 1. The division of mother's age into younger and older was based on the median age of mothers at 32 years old. The division of mothers income level into lower and higher was based on the median income distribution of MYR 2269. The Cronbach's Alpha values for internal reliability of the four knowledge domains ranged from 0.634 to 0.924 as tabulated below.

### *History of cervical cancer (CC) or HPV related disease amongst respondents or their families*

Majority of respondents did not have any history of CC (either themselves or in the first degree relatives) or HPV-related disease for both themselves 136 (87.7%) and their families 144 (92.9%) (refer Table 1). These could be because the majority of the respondents were women of the younger age group who are at less at risk of CC and

not HPV high risk. HPV are not routinely tested in the clinics unless the patients have certain genital dysplasia or at higher risk than the general population.

#### Source of knowledge

Among respondent who had heard about CC, their main sources of information was from mass media (television and radio). These were also similar among respondents who have heard about HPV, HPV vaccine and National HPV immunisation programme. At which their main source of these informations are from mass media. Below table showed the sources of knowledge for 4 main domain of knowledge.

#### Knowledge of mothers towards CC, HPV diseases, HPV Vaccines and NHPV immunisation programme

Knowledge on the four domains were divided to good and poor categories based on median scores of knowledge distributions. Based on the total knowledge, half of mothers had good knowledge (51.0%), and another half

(49.0%) of mothers had poor knowledge. As seen in the following table, the percentage of mother scoring good knowledge and poor knowledge are almost proportionate. More than half of mothers scored good knowledge on cervical cancer (55.5%), HPV diseases (54.2%), HPV vaccines (51.0%) and NHPV immunisation programme (54.2%). As tabulated below in Table 5, is the distribution on knowledge percentages for four main domains.

#### Acceptance towards HPV vaccinations (Towards Mothers, Daughters and Sons)

The mothers' acceptance of HPV vaccine varies widely between acceptance of vaccinations for daughter, son and among the mothers themselves. The highest acceptance was showed by mothers towards their daughter being vaccinated (87.1%); followed by vaccination for themselves (73.5%). Only 62.6% of mothers showed acceptance of vaccination for their son. Below is the table showing HPV vaccine acceptability. (refer Table 1)

#### Willingness to pay for HPV vaccination

Majority of mothers indicated the willingness to bring their children to private clinic to be HPV vaccinated (76.8%). This was asked as the public schools are currently providing free HPV vaccinations to the school children age 13 years but girls only. Missing any of the three recommended dose would require them to get it from the nearest public health clinics or paying out-of-pocket on their own. Majority of mothers are willing to pay MYR10 per dose of vaccination (21.9%), followed by MYR50 (16.8%), MYR20 and MYR30 (15.5% each respectively). Meanwhile a quite high percentage of mothers at 20.6% had implied that they would not want to pay at any price (MYR0) (refer Table 1). This is a far cry from the usual

**Table 1. Distribution of Mothers' Profile on Socio-demographic, Personal and Family History of CC or HPV-Related Disease, Acceptance towards HPV Vaccine and Willingness to Bring Their Children to Private Sectors and Paying Out-of-Pocket**

Variables	Frequency	%
Socio-demographic Characteristic (n=155)		
Age (Years)	Younger (24-32)	74 47.7
	Older (33 and above)	81 52.3
Ethnicity+	Malay	128 82.6
	Chinese	18 11.6
	Indian	7 4.5
	Others	2 1.3
Level of Education ++	PMR	5 3.2
	SPM	52 33.5
	Diploma	53 34.2
	Degree/Master Degree	45 29.0
Household Income	Lower (MYR 0-RM2269)	77 49.7
	Higher (MYR 2270 and above)	78 50.3
Type of Occupation+++	Professional	47 30.3
	Semi Professional	85 54.8
	Housewife	20 12.9
	Unemployed	3 2.0
Number of Children	1 (less)	59 38.1
	2 (more)	96 61.9
History of CC/HPV-Related Disease		
Personal	Yes	19 12.3
	No	136 87.7
Family	Yes	11 7.1
	No	144 92.9
Acceptance of HPV Vaccine		
Daughter	Yes	135 87.1
	No	20 12.9
Son	Yes	97 62.6
	No	58 37.4
Themselves	Yes	114 73.5
	No	41 26.5
Mothers' willingness		
Bring children to private clinic	Yes	119 76.8
	No	36 23.2
Pay out-of-pocket	Yes	123 79.4
	No	32 20.6

**Table 2. Distribution of Mothers' Knowledge Source on CC, HPV, HPV Vaccine and NHPV Immunisation Programme**

Sources of Knowledge (n=155)	Frequency (%)			
	CC	HPV	HPV Vaccine	NHPV Immunisation Program
Mass Media	120 (35%)	79 (40%)	73 (39%)	70 (41%)
Printed Media	99 (29%)	62 (31%)	56 (30%)	52 (31%)
General Practitioner	40 (12%)	24 (12%)	21 (11%)	19 (11%)
Gynaecologist	24 (7%)	12 (6%)	12 (6%)	9 (5%)
Peers	54 (16%)	19 (10%)	24 (13%)	16 (9%)
Others	9 (3%)	1 (1%)	1 (1%)	3 (2%)

**Table 3. Distribution of Mothers' Knowledge Score on CC, HPV, HPV Vaccine and NHPV Immunisation Program**

Knowledge Score (n=155)	Frequency		Median Score	IQR	Min-Max
	Good	Poor			
CC	86 (55.5%)	69 (44.5%)	10	7	0-19
HPV	84 (54.2%)	71 (45.8%)	6	7	0-13
HPV Vaccine	79 (51.0%)	76 (49.0%)	2	2	0- 6
NHPV Immunisation Programme	84 (54.2%)	71 (45.8%)	7	4	0- 9
Total Knowledge	79 (51.0%)	76 (49.0%)	24	17	0-44

**Table 4. Bivariate Chi Square Analysis on Association between Knowledge and Influencing Factors and Acceptance of HPV Vaccines and its Significant Knowledge Domains**

<i>Influencing Factors for Knowledge</i>																
	CC				NHPV Immunisation Program				Total Knowledge							
	Good f (%)	Poor f (%)	$\chi^2$	p value	Good f (%)	Poor f (%)	$\chi^2$	p value	Good f (%)	Poor f (%)	$\chi^2$	p value				
Ethnicity	Malay	78(60.9)	50(39.1)	8.848	0.003*	75(58.6)	53(41.4)	5.731	0.017*	71(55.5)	57(44.5)	5.957	0.015*			
	Non Malay	8(29.6)	19(70.4)			9(33.3)	18(66.7)			8(29.6)	19(70.4)					
	HPV Disease				NHPV Immunisation Program											
	Good f (%)	Poor f (%)	$\chi^2$	p value	Good f (%)	Poor f (%)	$\chi^2$	p value								
Level of Education	Lower Level	25(43.9)	32(56.1)	3.878	0.049*	17(29.8)	40(70.2)									
	Higher Level	59(60.2)	39(39.8)			67(68.4)	31(31.6)	21.567	0.0005*							
No. of Children	Less Children					39(66.1)	20(33.9)	5.442	0.020*							
	More Children					45(46.9)	51(53.1)									
<i>Acceptance of HPV Vaccine</i>																
	CC				HPV Vaccine				NHPV Immunisation Program				Total Knowledge			
	Good f (%)	Poor f (%)	$\chi^2$	p value	Good f (%)	Poor f (%)	$\chi^2$	p value	Good f (%)	Poor f (%)	$\chi^2$	p value	Good f (%)	Poor f (%)	$\chi^2$	p value
<i>For Daughter</i>																
Yes	79(91.9)	56(81.2)	3.901	0.048*	75(94.9)	60(78.9)	8.812	0.003*	79(94.0)	56(78.9)	7.884	0.005*	73(92.4)	62(81.6)	4.040	0.044*
No	7(8.1)	13(18.8)			4(5.1)	16(21.1)			5(6.0)	15(21.1)			6(7.6)	14(18.4)		
<i>For Mother</i>																
Yes	69(80.2)	45(65.2)	4.437	0.035*									66(83.5)	48(63.2)	8.275	0.004*
No	17(19.8)	24(34.8)											13(16.5)	28(36.8)		

\*significant at p<0.05; acceptance of HPV vaccine for sons not shown as not significant for all factors

**Table 5. Multivariate Analysis on Factors Predicting Knowledge towards CC, NHPV Immunisation Programme and Acceptance of HPV Vaccination**

	B	S.E	Wald	p	Exp (β)	95% CI	
						Lower	Upper
<i>Predictor for knowledge on CC</i>							
Ethnicity	1.285	0.495	6.74	0.009*	3.613	1.37	9.528
Number of Children	0.839	0.419	4.01	0.045*	2.315	1.018	5.264
Constant	-1.667	0.681	5.989	0.14	0.189		
<i>Predictor for knowledge on NHPV immunisation programme</i>							
Education Level	1.609	0.455	12.531	<0.001*	4.997	2.05	12.179
Constant	-0.442	0.701	0.397	0.528	0.643		
<i>Predictor for HPV vaccine acceptance for daughter</i>							
Knowledge on HPV vaccine	1.548	0.714	4.695	0.030*	4.701	1.159	19.064
Knowledge on NHPV immunisation programme	1.363	0.684	3.968	0.046*	3.907	1.022	14.932
Constant	0.86	0.355	5.858	0.016	2.364		
<i>Predictor for total knowledge</i>							
Ethnicity	1.238	0.5	6.122	0.013*	3.449	1.293	9.199
Constant	-0.442	0.701	0.397	0.528	0.643		

\*Significant at p<0.05

RM90-150 per dose obtained from the private health care market. As much as 7.1% are willing to pay other prices if need to.

**Bivariate analysis**

In bivariate analysis, the findings showed that one factor that has significant association with knowledge on cervical cancer which was ethnicity (p=0.003). One factor which had significant association with knowledge on HPV which is the level of education (p=0.049). Meanwhile, three factors showed significant association with knowledge on National HPV immunisation programme which are ethnicity (p=0.017), level of education (p=0.0005) and number of children (p=0.020). Only ethnicity was found to be significant associated with total knowledge with p=0.015.

Apart from that, level of knowledge on cervical cancer (p=0.048), level of knowledge on HPV vaccine (p=0.003), level of knowledge on National HPV immunisation programme (p=0.005) and level of total knowledge

(p=0.044) are found to have significant association with the acceptance of HPV vaccine among mothers towards their daughters. Meanwhile, level of knowledge on cervical cancer (p=0.035) and level of total knowledge (p=0.004) indicated significant association with the acceptance of HPV vaccine among mothers towards themselves. However, all of the above factors had no significant relationships with acceptance of HPV vaccines and vaccinations of sons. These are summarised in Table 4.

Apart from that, level of knowledge on cervical cancer (p=0.048), level of knowledge on HPV vaccine (p=0.003), level of knowledge on National HPV immunisation programme (p=0.005) and level of total knowledge (p=0.044) are found to have significant association with the acceptance of HPV vaccine among mothers towards their daughters. Meanwhile, level of knowledge on cervical cancer (p=0.035) and level of total knowledge (p=0.004) indicated significant association with the acceptance of HPV vaccine among mothers towards

themselves. However, all of the above factors had no significant relationships with acceptance of HPV vaccines and vaccinations of sons.

### *Multivariate analysis*

In multivariate analysis, logistic regression analysis showed that ethnicity and number of children are significant predictors on CC knowledge. Whilst education is a significant predictor towards knowledge on existing National HPV immunisation programme. In addition, level of knowledge on HPV vaccine and on National HPV immunisation programme are the significant predictors for the acceptance of HPV vaccine among mothers on their daughters. These are summarised in Table 7.

## **Discussion**

The final result of this study showed that overall, mothers were having good knowledge. In this study, there are 79 mothers or 51.0% possessed good knowledge as overall while 76 mothers or 49.0% were possessed poor knowledge as overall. It is slightly different between good knowledge and poor knowledge among mothers.

In this study, nearly 100 percent of the mothers had heard about cervical cancer. Their main source of knowledge was mass media which represent one quarter. This was followed by printed media, peer, general practitioner, gynaecologist and other. This finding is in line with Chung et al. (2011) at which 88.8% of total 103 respondents had heard of cervical cancer and television was the main source of information. Besides that, the finding of this study also similar to the study done by Awodele et al. (2011) in which the main sources of cervical cancer information is gained through electronic media (43.9%) as compared to other sources.

This study also demonstrated more than half of respondents obtained good knowledge on cervical cancer. Nearly 50 percent of respondent knew the main cause of cervical cancer is due to virus. More than three quarter of respondent knew that there is treatment for early stage of cervical cancer patient. However, contrast in finding by Caiyan et al. (2011) revealed that women had low knowledge on cervical cancer at which 52.5% of them knew that early detection could be done towards cervical cancer diseases. In addition, only 26.9% of respondents knew the risk factor for cervical cancer development was HPV infections

This study further revealed that majority of the respondents score good knowledge on HPV and more than half of respondents managed to defined HPV are the virus that causes cervical cancer. As compared to the study conducted in Belgium by Gilbert et al. (2008) in gynaecology and obstetrics clinic to evaluate the women knowledge found that 29.3% of the women can recognize HPV is a virus correctly. Nevertheless, 60% of respondents could not answer what HPV stands for.

However, the finding in this study is inconsistent with study done by Moraros et al. (2006) who found that there is lack of knowledge on HPV among 60 participants. Only 2 of the participants know very much about HPV and 29 of the participants know little about HPV and the

other 29 participants showed very little or nothing at all. Furthermore, only 15 % from the participants stated that HPV causes cervical cancer and 7 % knew that HPV was a virus or a sexually transmitted disease which can be transmitted during sexual intercourse with a man. The finding of this study also not incongruent with a study done by Hanisch et al. (2007) who demonstrated that majority of the respondents (79.3%) were categorized into low knowledge on HPV. Only 7.8% of the respondents possessed high knowledge on HPV and 12.9% possessed medium knowledge on HPV.

Majority of the respondent managed to score good knowledge on HPV vaccine even though there was slightly difference with score of poor knowledge. According to the result found in this study stated that the mass media provided major knowledge input on HPV vaccine to the respondents as compared to other medium. This result is parallel to the study done by Gilbert et al. (2008), stating that the main sources of information on vaccine was mass media such newspapers, television and radio which encompasses as main source for 69% of women. These were followed by peer (4.3%), gynaecologist (3.8%) and general practitioner (1.3%). The study done by Haesebaert et al. (2012) also indicated the mass media as main source of HPV vaccination related information at which 54.7% of respondents had heard of the vaccine via television and only 16% informed that physician was the source of HPV vaccination related information.

However, this finding contradicts with another study in Argentina that found the level of knowledge regarding HPV vaccination among the women was low to moderate, which reported less than 40% of respondents knew the vaccine and its use to prevent HPV infection or cervical cancer (Arrossi et al., 2012). Besides that, Das et al. (2010) found that 57.1% (n=248) respondents did not know about the HPV vaccine that does not protect against all types of the virus which causes cervical cancer. Furthermore, 53.3% (n=237) respondent did not know that post vaccination, the individual still need routine Pap smear screening. 40.6% of respondent did not know that the HPV vaccine does not protect against other sexually transmitted diseases.

The finding on the knowledge on National HPV immunisation programme showed that majority of respondent possessed good knowledge on the stated programme. However, the study done by Chung et al. (2011) stated that the uptake of the vaccine was lower in Asian countries. This can due to lack of budget approved for mass vaccinations among adolescent girls.

This study also showed that age group was found to have no significant association towards level of knowledge on cervical cancer, HPV, HPV vaccine, National HPV immunisation programme. The result indicates elderly age group was more likely to have better knowledge on cervical cancer as compared to younger age group. In addition, elderly age group was found to score better knowledge on HPV rather than younger age group. It also similar to knowledge on HPV vaccine, at which older age group have better knowledge compared to younger age group. Better exposures and higher awareness were assumed two contributing factors among older women.

Our finding was consistent with the study finding by Gilbert et al. (2008) which indicates younger age group more prone to have a lesser knowledge on cervical cancer, HPV and HPV vaccine although 79% of them were possessed significantly higher education. Gilbert et al. (2008) stated the reason for older women to have better knowledge because they practised Pap smear as compared to youngsters. Besides that, it was found that 20.9% of young age group had perception that Pap smear is not necessary. Our finding was also parallel with the study finding by Gilbert et al. (2008) which indicates younger age group more prone to have a lesser knowledge on cervical cancer, HPV and HPV vaccine although 79% of them were possessed significantly higher education. Gilbert et al. stated the reason of for older women to have better knowledge was because they were practicing Pap smear more diligently as compared to youngsters. Besides that, it was found that 20.9% of young age group perceived that Pap smear is not necessary. However, the study done by Holcomb et al. (2004) showed an inverse correlation between age and knowledge scores on HPV. This was being supported by Woodhall (2007) who also found significant inverse correlation between age and their knowledge score on HPV.

The bivariate analysis showed that ethnicity had significant association with level of knowledge on cervical cancer and National HPV immunisation. The result indicated that majority of Malay respondents were more likely to have better knowledge on cervical cancer. This is also in congruence with knowledge on National HPV immunisation programme, HPV disease and HPV vaccine at which majority of Malay respondents had better knowledge on these areas. This finding is consistent with a study by Cates et al. (2009) concerning areas of ethnicity and knowledge. Blacks respondents were less knowledgeable compared to White respondents (Cates et al., 2009). However, this finding is inconsistent with the previous study by Marlow et al. (2007) to assess the public awareness on HPV as a risk factor for cervical cancer and found that there was no association between races either the respondents were White, Black, Hispanic, Asian or other race.

This study also revealed that level of education had demonstrated to be a predictor to knowledge on National HPV immunisation programme. In addition, majority of respondents who possessed higher level of education had better knowledge score on cervical cancer, HPV disease, HPV vaccine and National HPV immunisation programme. In which the finding is in parallel with the study done by Caiyan et al. (2011) which found that women who had higher education showed greater knowledge at  $p < 0.0001$ . Other study supported the lower education background reflect the lower knowledge on HPV. The result showed those who had elementary school education or less were 3.18 times higher for having lower knowledge on HPV (95% CI 1.82-5.57) (Hanisch et al., 2007).

In term of household income, this study reveal that majority of respondents who had higher income would have better knowledge on cervical cancer, HPV, HPV vaccine and National HPV immunisation programme. In the study done by Tiro et al. (2007) was parallel with this

study result; which showed that the household income was significantly associated with knowledge on HPV where respondents who have higher income had better knowledge on HPV compared to low income (Tiro et al., 2007).

In general, types of occupation either 'employed' or 'unemployed' were not significantly associated with knowledge of the four knowledge domains. However, it was found that majority of respondents who are 'employed' had better knowledge scores, compared to the 'unemployed'. This study is consistent with the finding by Emre et al. (2012). He demonstrated that women who were employed had better awareness against cervical cancer. Perhaps the status of employed opened areas of better utilisation of health care services and better access to areas of health educations and health promotion. They are usually better off financially and obtain informations more readily.

Even though there is no significant association between history of cervical cancer or any HPV-related infection with knowledge score, majority of respondents who had health history on this disease would having better knowledge score. In the Ferris et al. (2010) study on parental acceptance of a mandatory human papillomavirus vaccination programme found that parents with a personal history of HPV infection or genital warts and greater familiarity with the adverse consequences of HPV infection were positive to the school-based vaccination.

The finding of this study found that majority of respondents who had more children had good knowledge as compared to mothers with less number of children. This result is contradicting with study conducted by Susana (2009), women with no children possess good knowledge on cervical cancer compare to those who have children. However, in the other study revealed that, the level of knowledge on cervical cancer is better among women who have children (Gilbert et al., 2008).

This study revealed that majority of respondents who had good knowledge, had supported the HPV vaccine to be administered to their children. This study is supported with other studies which demonstrated the better knowledge had positive association with vaccine acceptance (Hsu et al., 2009; Oh et al., 2010; Wong and Sam, 2010). Besides that, in the study by Gilbert et al. (2008) found that women were more willing to accept the HPV vaccination for their daughters compared to their son. Mothers perceived daughters are more likely to contract the diseases and develop cervical cancer later on in life. However, they could not imagine the concept that the infection are being transmitted by the boys/men that act as a vector. This could act as a deterrent for vaccination against boys if it were to be implemented among boys later on in Malaysia. In addition, a study done by Bendik et al. (2011) stated that respondents who had scored higher in HPV-related knowledge had prompted the respondents to have already received all doses of the vaccine

However, finding of this study was contradict with Poole et al. (2012) at which found that even though the level of knowledge on HPV were very low, but population at Mali willing to participate in HPV vaccine trial was high about 98% from 51 subject (Poole et al., 2012).

Whilst, in Malaysia, before the inception of National HPV Immunisation programme the study conducted by Wong (2008), found that HPV vaccine's acceptability was not influenced by knowledge. However, the participants were more concerned on matters related to the vaccines' safety, the status of 'halal' vaccines, worries that the daughter to be perceived as promiscuous and become a sexually active person if they obtained the vaccine. Haesebaert et al. (2012) found that mothers are more favour towards HPV vaccine since they have already vaccinated their child against pneumococcus as compared to those mothers who were not.

Majority of respondents who scored good knowledge (regardless on any domain of knowledge), indicated the willingness to do so as well. Respondents who scored poor knowledge; also indicated their willingness to bring their children to private clinics to be administered the HPV vaccine. Since the group asked were probably more affluent, they are more willing to do so and pay user charges for it.

The introduction of HPV immunisation programme in Malaysia which given the vaccination freely to Malaysian girls 13 years old either school or clinic based had started since 2010 (Chung et al., 2011). However Tay et al. (2008) demonstrated the low uptake of vaccine when the programme is individually funded and voluntary basis.

Majority of the respondents showed willingness to pay out of pocket if the vaccination is not given freely. The finding of this study is consistent with study by Gilbert et al. (2008) stated that, half of women would accept the vaccination for themselves even though if the vaccination is not given freely. Besides that, they would pay the full price of the vaccination at 450 Euro. However, when the vaccination is refunded, the other 40% of respondents would accept.

This study demonstrated that majority of respondents (21.9%) were willing to pay RM10 and the highest price was RM100. However, this is followed by 20.6% that would not want to pay a single cent for it. It is not similar to a study done by Chung et al. (2012) stated that the price per dosage of HPV vaccine is RM400 and the full course of vaccine is RM1200. Comparing to the study done by Chung et al., (2011), stated that the price that respondents willing to pay ranged from RM5.00 to RM600, however, the average price for full course of vaccination is RM96.7 (USD \$27.7) instead of market price of this vaccine is RM1200 (USD \$342.85).

Recommendations, in ensuring the National HPV immunisation programme achieve the target as well as to ensure the proactive action of implementing vaccination as primary prevention method, the appropriate educational programme should be strengthen among parents of targeted group. It could be done through public health campaigns or health talk held in their children's school. As result in this study showed that majority of respondents rely on mass media as their source of knowledge, the Ministry of Health should joint cooperate with mass media to fully utilize the mass media as a medium to deliver the information on the programme as well as the important of vaccination in preventing the development of cervical cancer or other HPV-related diseases.

The finding showed all respondents had moderate level of knowledge score as well as the knowledge on cervical cancer and National HPV immunisation programme are the predictor to the acceptance of HPV vaccine among mothers for their daughter, our public should be educated in order to clear up the myths or misunderstanding about the risk of getting the disease as well as the preventive action that they could take. This is because the general public are not clear yet about how individuals could be infected with this disease in the first place and who are at higher risk of getting the disease. If a gender neutral society is later assumed for boys immunisation proposal; then parents need to be aware that the boys/men are behaving as 'vectors' to HPV disease spread. It could be done by having one day at the national level as day to remember on cervical cancer day such "breast cancer day". Besides that, the appropriate educational intervention should be included in this day to remember the objectives of cancer screening and preventions. Role of male community leaders are justified to promote immunisation among male participants to increase the herd immunity in the public HPV pool.

Here come the role of doctor, gynaecologist and paediatrician to provide information about the HPV vaccine without upon request by the parents. They as the person who have contact with the parents should take the opportunity to advise the parents on the usage of vaccine for their children. Therefore, they should take the responsibility to educated the public especially parents on the proper action to ensure the health of future generation who will lead the country.

In addition, Ministry of Education should collaborate with Ministry of Health in developing the new curricular in school that include the early teaching on cervical cancer among the teenager as well as young adults since they are the group who would benefit more from the use of HPV vaccine as preventive action because most of them at this age are not sexually debut yet. In addition, learning from young age would help them to increase understanding about the disease since they would become parents as well in the future. By doing so, we can ensure the good health status in population as general in primary cancer prevention.

In conclusion, with regards to all domain of knowledge, there is a slightly difference between good knowledge (51.0%) and poor knowledge (49.0%) scores among all respondents which indicates the moderate level of knowledge score. The factors that demonstrated to be predictors to level of knowledge on HPV are ethnicity, number of children and level of education. The educational programme should be targeted at multi-racial as well as all level of educational background in addressing the poor knowledge on the cervical cancer, HPV, HPV vaccine and National HPV immunisation programme. In addition, majority of mothers demonstrated the acceptance of HPV vaccine to be administered to their daughters compared to sons. On top of that, knowledge on HPV vaccine and National HPV immunisation programme are predictor to the acceptance of HPV vaccine on daughters. With that, appropriate education such as running tv time should be given to parents especially mothers, in regards to HPV

vaccine and the Vaccination programme. This would help to increase the acceptability of HPV vaccine as preventive method to reduce the burden of cervical cancer. Apart from that, the willingness to pay out of pocket (if had the vaccination is not provided free) was higher compared to those who refused. Majority of respondents were willing to pay RM10 per dosage of vaccination. As for now, the government has subsidised HPV vaccinations among school girls 13 years of age for three recommended doses. This is very important for the government to plan the health programme ensuring sustainability, as well as ensuring the enough budget advocated to the health of nation without leaving the financial burden on the public.

Limitation, mothers were choosing as respondents instead of fathers or parents. However, this selection is due to the culture of any decision regarding on children health usually was made by mother instead of fathers even though fathers are the leader in the family. Second limitation was the selection of respondents which made only at O&G clinic. While the other limitation was the small sample size which only 155 respondents due to time and monetary constrains. Besides that, the systematic random sampling used had resulted in low number of other ethnicity which make it a fairly homogeneous group that may not be represented the population as whole. The chosen of mothers are not all from those who had children at eligible age for receiving National HPV immunisation programme due to time constrain. However, the selection is compulsory for mothers to have at least one child regardless of gender. The other limitation was the response of question which asking about past history of any genital infection rely solely on the respondents honesty in answering the question without having them to show any approval for the diseases for respecting confidentiality of individual. Since all the variables were not normal distributed, median was being used to be as cut-off point instead of using from literature review which may affect the findings. For examples like level of income, age group, knowledge score and others. Lastly, selection bias in which only mothers that are able to read and understand Malay Language or English Language only included in this study. This may affect the findings. Questionnaire should be writing up in Mandarin and Tamil in future so that it more representative of the population in Malaysia.

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