

## RESEARCH ARTICLE

# Knowledge and Views of Secondary School Students in Kuala Lumpur on Cervical Cancer and its Prevention

Hesham Rashwan<sup>1\*</sup>, Ismarulyusda Ishak<sup>2</sup>, Nurhidayah Sawalludin<sup>3</sup>

## Abstract

Cervical cancer is one of the most frequent cancers in women worldwide. Persistent infection with a human papillomavirus (HPV) is the main cause for cervical cancer. Vaccination and Pap smear screening are the best methods for prevention of the disease. The objective of this cross-sectional study was to assess the knowledge and views of upper secondary school female students in Kuala Lumpur, Malaysia, toward prevention of cervical cancer. This study was conducted from April 2009 to September 2009 in 8 schools in Kuala Lumpur area using pre-tested and validated questionnaires. Results indicated that the respondents had low knowledge of cervical cancer and its prevention although the majority of students (80.4%) had heard about the disease. The level of knowledge of cervical cancer and its prevention was significantly higher among students from the science stream ( $p < 0.001$ ) compared to students from the art stream. Most students (69.3%) agreed to take the vaccination if the service was available in schools. A high percentage of students (82.2%) agreed that the vaccination should be compulsory to the students. In conclusion, most students had low knowledge of cervical cancer and its prevention but they had positive attitude toward vaccination and agreed that vaccination should be compulsory. Therefore, suitable educational programmes should be developed to improve the knowledge of secondary school students on the prevention of cervical cancer.

**Keywords:** Cervical cancer - prevention - HPV vaccination - adolescents - school students

*Asian Pacific J Cancer Prev*, **14** (4), 2545-2549

## Introduction

Cervical cancer is the third most common cancer in women worldwide and the leading cause of cancer deaths in women of developing countries (Ferlay et al., 2010). In Peninsular Malaysia, according to the report of the National Cancer Registry for 2007, cervical cancer is the third most common cancer, contributing 8.4% of all cancers in Malaysian women. Indian woman have the highest rate, followed by Chinese and Malays (Zainal Ariffin and Nor Saleha, 2011).

Persistent infection with human papillomavirus (HPV) is the essential cause of cervical cancer with HPV types 16 and 18 causing around 70% of the cancers (Munoz et al., 2004; Catellsague et al., 2006). Some of the factors that may increase the risk to get cervical cancer are sexual behavior (Herrero et al., 2004) and smoking (Appleby et al., 2006).

The incidence and problems associated with sexually transmitted diseases (STDs) are of great concern, especially among adolescents and young adults. In America, 48% of STDs occur in people aged 15-24 years old and the three most common ones are HPV infection, Chlamydia and Herpes (Weinstock et al., 2004). However, because most of the HPV infections do not show any

symptoms, most adolescents would not realize it until they become pre-cancerous (Moscicki, 2005).

Studies have shown that adolescents lack knowledge about cervical cancer and HPV. In a study done in China, only 7.8% of women under 20 years old had heard about HPV (Li et al., 2009) while in Canada, only 13% of high school adolescents had heard about HPV, sexually transmitted diseases and pap test (Dell et al., 2000).

For adolescent girls aged 15-20 years old, the most effective preventive method against cervical cancer would be the primary prevention by the HPV vaccination (Villa et al., 2005). The vaccines are highly effective in preventing cervical cancer caused by high risk oncogenic HPV types 16 and 18 when used before exposure to these types. Many countries including Malaysia have already started a cervical cancer vaccination program for school students (The Star Online, 2009).

It is important to assess the knowledge and views of the students on the prevention of cervical cancer in order to develop appropriate educational and awareness programs targeting young Malaysian girls. The objectives of this study were to assess the level of knowledge and views of upper secondary school students in Kuala Lumpur towards cervical cancer and its preventive measures and to determine their acceptance of HPV vaccination.

<sup>1</sup>Faculty of Pharmacy, University Technology Mara (UiTM), Puncak Alam, <sup>2</sup>Faculty of Allied Health Sciences, Universiti Kebangsaan Malaysia, Kuala Lumpur, <sup>3</sup>Hospital Sultanah Aminah, Johor Bharu, Malaysia \*For correspondence: heshrash@hotmail.com

## Materials and Methods

### Study design

This cross-sectional survey was carried out in 8 government schools in Kuala Lumpur. Participating schools were recruited from a list of all government secondary schools in Kuala Lumpur. The sample frame consisted of 94 secondary schools. Only female students from form 4 and lower form 6 participated in this study, with age range from 15-20 years old. This study was approved by the Education Planning and Research Division of Ministry of Education and Education Department of Kuala Lumpur. The 8 schools which participated in the study were SMK (P) Jalan Ipoh, SMK Puteri Titiwangsa, SMK Wangsa Melawati, SMK Seri Sentosa, SMK Raja Abdullah, SMK Puteri Wilayah, SMK Desa Tun Hussein Onn and SMK Setapak Indah. The study was carried out from April to September 2009 using pre-tested and validated self-administered questionnaire. The sample size was calculated according to Krejcie et al. (1970).

### Questionnaire

The questionnaire was divided into 4 parts. Part A: demographic data of respondents, part B: knowledge of cervical cancer, part C: knowledge of prevention of cervical cancer and part D were the questions about vaccination. After the questionnaires were completed and given back, each student was given a pamphlet about cervical cancer and its preventive measures. All pamphlets were provided by Glaxosmithklein pharmaceutical company (GSK SDN BHD).

### Data analysis

Data was analyzed using Statistical Package for Social Sciences (SPSS) version 12.0. The analysis results of respondent's demographics variables were summarized

**Table 1. Score for General knowledge of Cervical Cancer**

Category	Score of correct answer	Category
Knowledge of cervical cancer	11-15	High
	8-10	Intermediate
	0-7	Low
Knowledge of prevention of cervical cancer	7-9	High
	5-6	Intermediate
	0-4	Low

using descriptive summary measures; expressed as percent for categorical variables. The chi-square test was used to find association between categorical variables. All statistical tests were performed using 0.05 level of significance.

The level of knowledge about cervical cancer and the knowledge about the prevention of cervical cancer were classified into three different levels; low, intermediate and high. Every question that was correctly answered by students was given one mark. Table 1 shows the score for level of knowledge of cervical cancer and knowledge of prevention of cervical cancer (Razaei et al., 2004).

## Results

### Demographic data

A total of 550 completed questionnaires, out of 610 that were distributed, were returned by the students with a 90% response rate. The average age of respondents was 16.6. Most of the respondents were Malay (54.0%), followed by Chinese (33.8%) and Indian and others (12.2%). More form 4 students (74.9%) participated in the study compared to lower form 6 students (25.1%). More than

**Table 2. Demographic Data of Respondents**

	Demographic data	Total (n)	Percentage (%)
Race	Malay	297	54.0
	Chinese	186	33.8
	Indian and others	67	12.2
Age	15 years old	6	1.1
	16 years old	376	68.4
	17 years old	35	6.4
	18 years old	82	14.9
	19 years old	50	9.1
	20 years old	1	0.2
School	SMK (P) Jalan Ipoh	42	7.6
	SMK Puteri Titiwangsa	104	18.9
	SMK Wangsa Melawati	24	4.4
	SMK Seri Sentosa	67	12.2
	SMK Raja Abdullah	69	12.5
	SMK Puteri Wilayah	40	7.3
	SMK Setapak Indah	127	23.1
	SMK Desa Tun Hussein Onn	77	14.0
Form	4	412	74.9
	Lower 6	138	25.1
Stream	Science	220	40.0
	Art	330	60.0

**Table 3. Level of Knowledge of Cervical Cancer and its Prevention According to Race, form and Stream**

	All	Race			$\chi^2$	Form		$\chi^2$	Stream		$\chi^2$
		Malay	Chinese	Indian		4	6		Science	Art	
Heard about cervical cancer:											
Yes	442 (80.4)	258 (86.9)	130 (69.9)	54 (80.6)	$\chi^2=20.890$	314 (76.2)	128 (92.8)	$\chi^2=17.920$	178 (80.9)	264 (80.0)	$\chi^2=0.070$
No	108 (9.6)	39 (13.1)	56 (30.1)	13 (19.4)	$p<0.001$	98 (23.8)	10 (7.2)	$p<0.001$	42 (19.1)	66 (20.0)	$p=0.793$
Knowledge of cervical cancer:											
High	26 (4.7)	17 (5.7)	7 (3.8)	2 (3.0)	$\chi^2=5.284$	21 (5.1)	5 (3.6)	$\chi^2=0.967$	17 (7.7)	9 (2.7)	$\chi^2=15.723$
Intermediate	115 (20.9)	54 (18.2)	48 (25.8)	13 (19.4)	$p=0.259$	83 (20.1)	32 (23.2)	$p=0.617$	58 (26.4)	57 (17.3)	$p<0.001$
Low	409 (74.4)	226 (76.1)	131 (70.4)	52 (77.6)		308 (74.8)	101 (75.3)		145 (65.9)	264 (74.4)	
Knowledge of prevention of cervical cancer:											
High	77 (14.0)	33 (11.1)	32 (17.2)	12 (17.9)	$\chi^2=8.160$	52 (12.6)	25 (18.1)	$\chi^2=3.048$	46 (20.9)	31 (9.4)	$\chi^2=20.898$
Intermediate	86 (15.6)	40 (13.5)	34 (18.3)	12 (17.9)	$p=0.860$	63 (15.3)	23 (16.7)	$p=0.218$	42 (19.1)	44 (13.3)	$p<0.001$
Low	387 (70.4)	224 (75.4)	120 (64.5)	43 (64.2)		297 (72.1)	90 (65.2)		132 (60.0)	255 (77.3)	

half of the respondents were art students (60.0%) (Table 2.)

#### Knowledge of cervical cancer and its prevention

Most respondents (80.4%) had heard about cervical cancer with a strong significant relationship ( $p < 0.001$ ) with form and race. For race, more Malay students (86.9%) had heard about cervical cancer, followed by Indian (80.6%) and Chinese students (69.9%). More students of lower Form 6 (92.8%) had heard about cervical cancer compared to form 4 students (76.2%).

Most of the respondents (74.4%) had low knowledge about cervical cancer while (70.4%) had a low knowledge about the preventive measures of cervical cancer. The level of knowledge about cervical cancer and its prevention was significantly higher among students from science stream ( $p < 0.001$ ) compared to students from art stream.

However, the differences were not significant among different races ( $p = 0.259$ ) or different forms ( $p = 0.617$ ). Details of the data are shown in Table 3.

#### Views on vaccination

Most of the students (68.9%) were interested to find out more information about vaccines to prevent cervical cancer if such vaccines existed. Their first choice for a

source of information was the internet (64.4%) followed by books and magazines (54.0%) and also healthcare professionals (52.9%).

On the question of whether they would take the vaccine if it is available in schools, 69.3% of respondents accepted to take the vaccine. There were significant differences ( $p < 0.05$ ) between races and forms. More Malay students (75.1%) would take the vaccine, followed by Indian students (67.2%) and Chinese students (60.8%). More lower Form 6 students (77.5%) would accept vaccination compared to Form 4 (66.5%) students.

The main reason to take the vaccine was because they were aware about the risk of getting the cancer (51.1%). For students who refused to take the vaccine, the main reason was because they believed that they were not prone to get cervical cancer (12.4%). Other reasons were fear of adverse events (11.1%) and did not know the importance of vaccination (8.7%).

Also the majority of respondents (82.2%) agreed that vaccination should be compulsory for school students in Malaysia. There was significant difference between races ( $p < 0.05$ ). More Malay students (87.5%) agreed to make the vaccination compulsory, followed by Indian students (76.1%) and Chinese students (75.8%). Details of the data are shown in Tables 4 and 5.

**Table 4. Views on Vaccination among Students**

	N	%
If new vaccine becomes available, you would:		
Find out more information	379	68.9
Get the vaccine as soon as possible	124	22.5
Wait for other people to have it first	33	6.0
Tell parents about the vaccine and ask opinion	290	52.7
No action taken	80	14.5
Source of information for vaccine:		
Family	184	33.5
Friends	129	23.5
Teacher	163	29.6
Health professionals	291	52.9
Television	173	31.5
Internet	354	64.4
Magazines or books	297	54.0
Would you get vaccinated against cervical cancer if the service is available in the school? Why?		
Yes		
Aware about risk of getting cervical cancer	281	51.1
Afraid of being infected	237	43.1
Suggestion from family/friends/health care providers	68	12.4
Feel prone to get cervical cancer	65	11.8
No		
Feel not prone to get cervical cancer	68	12.4
Do not see the importance to get vaccination	48	8.7
No time to get vaccination	18	3.3
Not cost effective	15	2.7
Fear of the adverse event	61	11.1

#### Discussion

Knowledge of cervical cancer and its prevention, most students (80.4%) had heard about cervical cancer. This is similar to results of a study done In Trinidad where 71% of students aged 14-19 years old had heard about cervical cancer or cervical smear testing (Orett et al., 1996) and another study among Malaysian University students (Tan et al., 2010). The awareness among our respondents from Kuala Lumpur was higher than that among East Malaysian students from Sarawak (Hesham et al., 2011). This is because of the less publicity about cervical cancer and its prevention in rural states such as Sarawak compared to Kuala Lumpur. Higher percentage of Malay students had heard about cervical cancer followed by Indian and Chinese students although Chinese Malaysian women have the highest incidence rate of cervical cancer compared to other races (Lim et al., 2008). The main source of information for the respondents about cervical cancer was mass media such as television, movies and magazines. Public media was also the main source of information of cervical cancer among adolescents in other studies (L'Engle et al., 2006). Therefore mass media can play an important role in educating adolescents about the effective methods to prevent cervical cancer if

**Table 5. Views on Vaccination according to Race, Form and Stream**

	All	Race			$\chi^2$	Form		$\chi^2$	Stream		$\chi^2$
		Malay	Chinese	Indian		4	6		Science	Art	
Would you get vaccinated against cervical cancer if the service is available in the school?											
Yes	381(69.3)	223(75.1)	113(60.8)	45(67.2)	$\chi^2=11.196$	274(66.5)	107(77.5)	$\chi^2=5.910$	158(71.8)	223(67.6)	$\chi^2=1.116$
No	169(30.7)	74(24.9)	73(39.2)	22(32.8)	$p < 0.05$	138(33.5)	31(22.5)	$p < 0.05$	62(28.2)	107(32.4)	$p = 0.291$
Do you agree if this vaccination is made compulsory for school students?											
Yes	452(82.2)	260(87.5)	141(75.8)	51(76.1)	$\chi^2=12.672$	336(81.6)	116(84.1)	$\chi^2=0.443$	181(82.3)	271(82.1)	$\chi^2=0.002$
No	98(17.8)	37(12.5)	45(24.2)	16(23.9)	$p < 0.05$	116(84.1)	22(15.9)	$p = 0.506$	39(17.7)	59(17.9)	$p = 0.964$

they provide them with accurate and simple information. Government health authorities in collaboration with non-government organizations and/or pharmaceutical companies should make use of popular mass media to raise the awareness of adolescents about cervical cancer and its prevention.

Another important source of information for students was education. It was shown earlier that there was a significant increase of respondents' knowledge after one-hour curriculum about cervical cancer (Tejeda et al., 2006). Hence, introduction of a cervical cancer curriculum into the school syllabus and during awareness programs at schools as well as community centers can effectively increase the knowledge of students toward prevention of the disease. Only 15.2% of students got the information from healthcare providers. An earlier study concluded that although 61% of adolescents wanted to discuss about sexually transmitted diseases with the health care provider, as many as two-thirds of them have not had the opportunity to do so (Klein and Wilson, 2002). It is important to encourage students to seek information about the prevention of cervical cancer from healthcare providers perhaps through the involvement of these professionals in regular awareness programs at schools.

Most students had low knowledge of cervical cancer and its prevention. This result was expected as an earlier study had shown that Malaysian women lacked knowledge of cervical cancer and pap smear (Wong et al., 2009). Students from science stream had significantly higher knowledge compared to students from art stream. This finding suggests that the difference in curriculum content that they learn at school might affect the students' knowledge about cervical cancer. Science students might also find it easier to search for information about diseases.

Almost half of respondents knew that the main cause of cervical cancer is virus infection. However, only 24% knew that HPV is the main cause of cervical cancer. These findings were different from a survey done among students of Mangosuthu University where almost half of the undergraduate female students knew that HPV is the main cause of cervical cancer (Hoque and Hoque, 2009). However students in our study were younger and only in secondary schools.

The majority of the students (88.2%) did not know that there was a vaccine to prevent cervical cancer. This is similar to an earlier report where only 10% of Malaysian females aged thirteen to twenty-seven years old had ever heard about the cervical cancer vaccines (Wong, 2008). The vaccines for cervical cancer prevention received regulatory approval in Malaysia only in recent years that is the reason not many females knew about them. Besides, not many campaigns were done by the government or non-governmental organizations to promote cervical cancer vaccination among teenagers at schools or in community centers.

There were no significant differences between different races and forms on the knowledge of methods to prevent cervical cancer. Only 30% of students correctly answered questions about pap smear. Even after vaccination, females still need to do pap smear screening because the HPV vaccines do not protect against all types of HPV (Bosch

and Harper, 2006). Thus, it is important for the students to be aware of the pap smear test and information should be provided to encourage them to practice pap smear test even after they get vaccinated.

Views on vaccination, most of the respondents were very interested to find information about the vaccines to prevent cervical. Their source of choice for information was the internet. This is because internet is a convenient tool to find information and most teenagers nowadays are familiar with the use of internet as a source of information and it is widely available. However, students must be guided to find the correct information from reliable internet sources. This can be provided to students by simple brochures and during health talks.

The respondents also showed positive attitude toward taking the vaccination if it were available in schools and they agreed that the vaccination should be compulsory to school students. Malaysian University students had also shown positive attitude toward HPV vaccination (Tan et al., 2010; Hesham et al., 2012). Vaccination was significantly more accepted by Malay students compared to Chinese students. This is interesting as we expected Chinese students to show more interest in vaccination because they are more susceptible to get cervical cancer than Malay (Zainal and Nor, 2011). It is not clear why less Chinese students accepted the HPV vaccination and this should be investigated in future studies. Most students did not have a problem with the vaccine being compulsory at schools because they are used to the practice of taking different vaccines at schools.

The main reason for refusal of vaccination was not prone to get cervical cancer, which was similar to Malaysian University students (Hesham et al., 2012). This might be due to the low knowledge of students on cervical cancer. In addition, the belief in Malaysia was that school students were not sexually active due to the religious and cultural guidance. Similarly a study done among Malaysian women showed that for those who were not sexually active, they thought they did not need the vaccine and preferred to wait before they were vaccinated (Wong, 2008). However, earlier studies carried out abroad showed that the cumulative prevalence for HPV infection among adolescents is as high as 82% (Brown et al., 2005). Thus, vaccination in younger age would provide the effective protection against cervical cancer before the adolescents are exposed to HPV infection. Another reason for refusal of the vaccine was being afraid of the adverse events that they might get from the vaccine. However, the adverse effects of cervical cancer vaccines are transient and minor such as fever, redness, swelling and fatigue (Einstein et al., 2009). Therefore, providing the students and their parents with accurate and simple information about the reasons for the need to vaccinate adolescents with the effective and safe HPV vaccines can increase the acceptance of HPV vaccination among the students.

In conclusion, the respondents had low knowledge about cervical cancer and its prevention but showed positive attitude toward vaccination and agreed that the vaccine should be compulsory for school students. They were also willing to search for information about the vaccines to prevent cervical cancer with the internet

being their first choice. It is important to educate the students about the effective methods to prevent cervical cancer through educational and awareness programs at schools as well as using the internet and mass media to raise awareness of adolescents and their families about the disease.

## Acknowledgements

The authors would like to thank the Ministry of Education, Malaysia and the Kuala Lumpur Department of Education for the approval to carry out this study. We are also grateful to the teachers who helped to distribute the questionnaires and to all students who participated in this study. The results of this study were partially presented at the 5<sup>th</sup> International APOCP (Asian Pacific Organization for Cancer Prevention) Conference, Istanbul, Turkey, April 3-7, 2010. This project was partially supported by an educational grant from GSK/BHD.

## References

- Appleby P, Beral V, De Gonzalez BA, et al (2006). Carcinoma of the cervix and tobacco smoking: collaborative reanalysis of individual data on 13,541 women with carcinoma cervix and 23,017 women without carcinoma of the cervix from 24 epidemiological studies. *Int J Cancer*, **118**, 1481-95.
- Brown DR, Shew ML, Qadadri B, et al (2005). A longitudinal study of genital human papillomavirus infection in a cohort of closely followed adolescent women. *J Infect Dis*, **191**, 182-92.
- Bosch X, Harper D (2006). Prevention strategies of cervical cancer in the HPV vaccine era. *Gynecol Oncol*, **103**, 21-4.
- Catellsague X, Diaz M, De Sanjose S, et al (2006). Worldwide human papilloma etiology of cervical adenocarcinoma and its cofactors: implications for screening and prevention. *J Natl Cancer Inst*, **98**, 303-15.
- Dell DL, Chen H, Ahmad F, Stewart DE (2000). Knowledge about human papillomavirus among adolescents. *Obstet Gynecol*, **96**, 653-6.
- Einstein MH, Baron M, Levin MJ, et al (2009). Comparison of the immunogenicity and safety of Cervarix<sup>TM</sup> and Gardasil<sup>®</sup> human papillomavirus (HPV) cervical cancer vaccines in healthy women aged 18-45 years. *Human Vaccines*, **5**, 1-15
- Ferlay J, Shin HR, Bray F, et al (2010). Estimates of worldwide burden of cancer in 2008: GLOBOCAN 2008. *Int J Cancer*, **127**, 2893-917.
- Herrero R, Castle PE, Schiffman M, et al (2004). Epidemiologic profile of type-specific human papillomavirus infection and cervical neoplasia in Guanacaste, Costa Rica. *J Infect Dis*, **191**, 1796-807.
- Hesham R, Syarif HL, Kiat AN (2011). Knowledge of cervical cancer and acceptance of HPV vaccination among secondary school students in Sarawak, Malaysia. *Asian Pac J Cancer Prev*, **12**, 1837-41.
- Hesham R, Nur ZN, Dahlia NM (2012). Knowledge, attitude and practice of Malaysian medical and pharmacy students toward human papillomavirus vaccination. *Asian Pac J Cancer Prev*, **13**, 2279-83.
- Hoque E, Hoque M (2009). Knowledge of and attitudes towards cervical cancer among female university students in South Africa. *South Afr J Epidemiol Infect*, **24**, 21-4.
- Klein JD, Wilson KM (2002). Delivering quality care: adolescents' discussion of health risks with their providers. *J Addesc Health*, **30**, 190-5.
- Krejcie RV, Morgan DW (1970). Determining for sample size for research activities. *Educational and Physiological Measurement*, **30**, 607-10.
- L'Engle KL, Brown JD, Nenneavy K (2006). The mass media are an important context for adolescent' sexual behavior. *J Addesc Health*, **38**, 186-92
- Li J, Li L-K, Ma J-F, et al (2009). Knowledge and attitudes about human papillomavirus (HPV) and HPV vaccines among women living in metropolitan and rural regions of China. *Vaccine*, **27**, 1210-15.
- Moscicki AB (2005). Impact of HPV infection in adolescent populations. *J Addesc Health*, **37**, 3-9.
- Munoz N, Bosch FX, Castellsague X, et al (2004). Against which human papillomavirus types shall we vaccinate and screen? The International perspective. *Int J Cancer*, **111**, 278-85.
- Orrett FA, Balbirsing M, Pinto-Pereira LM (1996). Knowledge of cervical cancer in teenage school children in Trinidad. *East Afr Med J*, **73**, 400-3.
- Razaei MB, Seydi S, Alizadeh SM (2004). Effects of 2 educational methods on the knowledge, attitude and practice of women high school teachers in prevention of cervical cancer. *Cancer Nurs*, **27**, 364-9.
- Tan Y-Y, Hesham R, Qodriyah HMS (2010). Knowledge and attitude of university students in health sciences on the prevention of cervical cancer. *Med J Malaysia*, **65**, 53-7.
- Tejeda S, Thompson B, Coronado GD, Rees GM (2006). A cervical cancer curriculum for Hispanic adolescents in rural high schools: a pilot study. *J Health Care Poor Underserved*, **17**, 734-44
- The Star online (2009). Electronic sources: Cervical cancer vaccination: up to parent. <http://thestar.com.my/news/story.asp?file=/2009/10/8/nation/20091008103513&sec=nation> [8 October 2009].
- Villa LL, Costa RLR, Petta CA, et al (2005). Prophylactic quadrivalent human papillomavirus (types 6, 11, 16, and 18) L1 virus-like particle vaccine in young women: a randomized double-blind placebo-controlled multicentre Phase II efficacy trial. *Lancet Oncol*, **6**, 271-8.
- Weinstock H, Berman S, Cates W (2000). Sexually transmitted disease among American youth: incidence and prevalence estimates, 2000. *Perspectives on Sexual and Reproductive Health*, **36**, 6-10.
- Wong LP (2008). Young multiethnic women's attitudes toward the HPV vaccine and HPV vaccination. *Int J Gynecol Obstet*, **103**, 131-5.
- Wong LP, Wong YL, Low WY, Shuib R (2009). Knowledge and awareness of cervical cancer and screening among Malaysian women who have never had a Pap smear: a qualitative study. *Singapore Med J*, **50**, 49-53.
- Zainal AO, Nor Saleha IT (2011). NCR Report 2007, Ministry of Health, Malaysia.