

Knowledge and Attitudes of Human Papillomavirus (HPV) Vaccination among Secondary School Students in Selangor, Malaysia

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ABSTRAK

Kanser serviks merupakan penyebab yang signifikan terhadap kematian wanita di Malaysia dan berkait dengan jangkitan Human Papilloma virus (HPV). Dalam menangani isu ini, kerajaan Malaysia telah melancarkan program vaksinasi HPV yang menasaskan pelajar sekolah menengah. Kajian ini bertujuan untuk mengkaji tahap pengetahuan dan sikap terhadap vaksinasi HPV and kaitannya terhadap demografik sebagai penentu dalam kalangan pelajar sekolah menengah di Malaysia. Kajian tinjauan yang menggunakan persampelan rawak telah dijalankan terhadap 182 orang pelajar sekolah menengah di Selangor berumur di antara 13-17 tahun. Borang soal-selidik yang telah disahkan digunakan untuk mengutip data demografik, tahap pengetahuan, dan sikap terhadap vaksinasi HPV. Pelajar mempamerkan tahap pengetahuan yang memuaskan ($M=3.75$, $SD=.85$) dan sikap yang positif ($M=3.48$, $SD=3.57$) terhadap vaksinasi HPV. Ujian χ^2 menunjukkan jantina ($\chi^2=6.39$, $p=.011$), etnik ($\chi^2=6.57$, $p=.037$), agama ($\chi^2=15.51$, $p=.004$), dan umur ($\chi^2=12.61$, $p=.013$) merupakan faktor yang signifikan dalam mempengaruhi tahap pengetahuan manakala jantina ($\chi^2=8.44$, $p=.004$) dan pendapatan keluarga ($\chi^2=11.63$, $p=.040$) mempengaruhi sikap secara signifikan. Program imunisasi kebangsaan HPV adalah efektif, namun penambahbaikan diperlukan. Ini termasuk mengadaptasi pendekatan secara gender-neutral, mendidik ibubapa dan mempromosikan penerimaan vaksinasi HPV. Strategi seperti memperkenalkan pendidikan seksual dan kerjasama di antara Unit Kesihatan Sekolah Kementerian Kesihatan (UKS) adalah penting dalam meningkatkan kesedaran dan pemahaman terhadap vaksinasi HPV dalam kalangan masyarakat.

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Kata kunci: HPV; human papilloma virus; pengetahuan; pelajar sekolah; sikap

ABSTRACT

Cervical cancer is a significant cause of female mortality in Malaysia, primarily linked to Human Papillomavirus (HPV) infection. To address this, the Malaysian government launched a HPV vaccination program targeting secondary school students. This study aimed to investigate the level of knowledge and attitude toward HPV vaccination and its association with demographics as a determinant among Malaysian secondary school students. A survey study using random sampling was conducted for 182 secondary school students in Selangor between the aged 13-17 years old. A validated questionnaire was used to collect data on demographics, knowledge, and attitudes toward HPV vaccination. The students demonstrated moderate knowledge ($M=3.75$, $SD=.85$) and generally positive attitudes ($M=3.48$, $SD=3.57$) towards HPV vaccination. Gender ($\chi^2=6.39$, $p=.011$), ethnicity ($\chi^2=6.57$, $p=.037$), religion ($\chi^2=15.51$, $p=.004$), and age ($\chi^2=12.61$, $p=.013$) were statistically significant factors affecting knowledge. Gender ($\chi^2=8.44$, $p=.004$) and family income ($\chi^2=11.63$, $p=.040$) significantly influenced attitudes. The Malaysian national HPV immunisation program has been effective, but improvements are needed. These include adopting a gender-neutral approach, educating parents to foster positive attitudes, and promoting acceptance of HPV vaccination. Strategies like introducing sexual education and collaboration with the Ministry of Health School Health Unit (UKS) are vital for enhancing public awareness and understanding of HPV vaccination.

Keywords: Attitude; Human Papillomavirus; HPV; knowledge; school student

INTRODUCTION

Human Papillomavirus (HPV) is the most widespread sexually transmitted infection (STI), with 43 million cases in 2018, primarily affecting late teens and early 20s (Darraj et al. 2022). While HPV has various forms, vaccines can prevent health complications like genital warts and cancer. Unlike human immunodeficiency virus (HIV) or herpes simplex virus (HSV), HPV spreads through vaginal or anal intercourse and direct skin-to-skin

contact (Workowski & Bolan 2015). Asymptomatic carriers can still transmit it, and even with one partner, sexual activity increases risk. Symptoms may emerge years after exposure, making the timing of infection hard to determine. This underscores the need for awareness and prevention. In the majority of cases (9 out of 10), HPV naturally clears within two years without causing health issues (Darraj et al. 2022). However, untreated HPV can lead to cancer and other problems like genital warts, which

appear as small, clustered, or distinct bumps in the genital area, with varying sizes and shapes (Darraj et al. 2022). Diagnosis is typically through a doctor's examination of the vaginal region. HPV is the primary cause of cervical cancer, potentially affecting any sexually active person, even those with a single partner. Symptoms may emerge years after exposure, and cancer development following HPV acquisition can span years to decades (Fowler & Jack 2020).

An established method for detecting HPV in the mouth or throat has yet to be approved. However, HPV tests find utility in screening for cervical cancer (Workowski & Bolan 2015). Typically, these tests are recommended for women aged 30 and above. HPV testing is generally not recommended for men, adolescents, and women under 30, except in cases of sexual activity, where it should be encouraged. Unexpected Pap test results in women undergoing cervical cancer screening may reveal an HPV presence (Workowski & Bolan 2015). Some individuals might remain unaware until more serious HPV-related complications, including cancer manifests. Cervical cancer stands as the second most prevalent cancer among Malaysian women aged 15 to 44, despite being preventable (Keane et al. 2021). The main culprit behind the majority of these cases is HPV infection, particularly specific strains associated with cervical cancer. What adds to the concern is that cervical cancer often lacks initial discernible symptoms. It emerges when the cells lining the cervix, composed of glandular and squamous cells,

behave abnormally. The convergence point of these cell types, known as the transformation zone, holds vital diagnostic significance. Evaluating this region and cell behavior is crucial for identifying cervical cancer or gauging susceptibility to it. Beyond cervical cancer, HPV's implications extend to other cancers like those of the anus, vulva, penis, and oropharynx, which includes the tonsils, back of the tongue, throat's sides, and back walls, as well as the soft palate (Keane et al. 2021).

HPV vaccinations, endorsed by the National Cancer Institute offer robust protection against over 40 of the 200 HPV-related viruses transmitted through sexual contact. These vaccines are highly effective, preventing more than 90% of HPV-caused cancers (Bogani et al. 2023). Operating like conventional vaccines, they stimulate the immune system to produce antibodies targeting HPV, enabling the body to recognise and neutralise the virus before it harms healthy cells. Utilising virus-like particles from HPV's surface, modern vaccines trigger immunity without containing the virus's DNA, ensuring no illness is caused or viral spread occurs (Yousefi et al. 2022). While the HPV vaccine prevents cell invasion, it doesn't cure existing infections or address other STDs. In Malaysia, three approved HPV vaccines are available: the 9-valent HPV vaccination, the bivalent HPV vaccine, and the quadrivalent HPV vaccine. All three vaccines safeguard against HPV types 16 and 18, jointly accountable for 70% of cervical cancers (Keane et al. 2021). The 9-valent HPV vaccine

extends its protection to five additional HPV types, encompassing HPV 52 and 58, prominent culprits behind 20% of cervical cancer cases among Malaysian women. Nonetheless, specific conditions warrant caution with HPV vaccinations. Individuals who have experienced severe adverse effects after initial doses, a history of life-threatening allergic reactions, recent hospitalisation, or are pregnant should avoid certain HPV vaccines.

Girls are vulnerable to HPV infection (Vinodhini et al. 2012), which makes vaccination a crucial measure for future cervical cancer prevention. In Malaysia, the Ministry of Health extends free immunisation eligibility to all Form 1 girls and those currently aged 13. School-enrolled girls receive immunisation through their schools, while those not in school can obtain it at government health centers. Additionally, private clinics and hospitals offer the vaccination for a fee, catering to those outside the mentioned groups. Parental consent is advised, and ensuring timely completion of all 3 vaccine doses is essential. By adhering to the recommended dosage schedule, girls attain optimal protection against HPV infection, bolstering their defense. Administered by licensed and skilled medical personnel at schools, the vaccinations come with a well-organised process. In cases of illness or absenteeism on the designated immunisation day, health staff will arrange alternative appointments for students. Reassuringly, the vaccine's production avoids hazardous materials, alleviating parental safety concerns. The vaccine has been demonstrated as

unquestionably safe for use and does not induce infertility. While soreness at the injection site represents the most prevalent side effect, any post-injection issues can be addressed by seeking further care at local hospitals or clinics (Buang 2013).

Globally, cervical cancer contributes to around 500,000 cases and 275,000 deaths annually. Within Malaysia, Ministry of Health cancer statistics from 2007 revealed approximately 2,145 diagnosed cases of cervical cancer, resulting in 621 fatalities. Notably, Malaysia's cervical cancer mortality rate surpasses that of countries like the United Kingdom, Finland, and the Netherlands, exceeding twofold (Jalani et al. 2016). Cervical cancer ranks as the third leading cause of female mortality among Malaysian women. The primary instigator of most cervical cancer cases is HPV infection (Ulasan et al. 2020). To address this concern, the Malaysian government introduced an HPV vaccination program targeting secondary school females aged 13 and above. Despite this effort, research conducted in Miri, Sarawak, highlighted the persistently low knowledge levels among students about HPV vaccination and cervical cancer (61.8%), underscoring the need for increased awareness (Rashwan et al. 2011). Attitudes toward HPV vaccination among Malaysian students exhibit a diverse spectrum, with varying degrees of acceptance and opposition.

The study encompassed secondary students from six schools in Melaka, revealing that 77.0% expressed willingness to receive vaccinations

at school, while 21.9% declined the opportunity (Al-Naggar et al. 2012). Notably, a key factor motivating students to embrace vaccination is their awareness of cancer risk (Rashwan et al. 2013). Conversely, factors deterring vaccination encompass anxiety and discomfort, identified by 27.3% of students, alongside concerns about vaccine safety (7.2%) and perceived inadequacy in preventing HPV infection (15.8%) (Wong et al. 2016). Extensive studies have been conducted to assess the knowledge and attitude toward HPV vaccine however there are limited investigations among secondary school students in which most of the studies in Malaysia took place either in rural areas or with limited access to the knowledge of HPV and its vaccine. Therefore this study aimed to investigate the level of knowledge and attitude toward HPV vaccination and its association with demographics as a determinant among Malaysian secondary school students.

MATERIALS AND METHODS

Study Design & Population

This survey research study was conducted in a school among secondary school students in the Selangor state of Malaysia from August to November 2022 with a total population of 293 students ranging from 13-17 years old.

Sample Size

The sample size proportion was calculated using Krejcie and Morgan's

(1970) sample size estimation formula with an estimate of 165 school students. Considering the 10% attrition effect, a total of 182 school students were selected as respondents. A random sampling technique was used to select the students aged 13-17 years old as the inclusion criteria. School administrators, parents, and students who did not consent to the study were excluded.

Instrumentations

A questionnaire consisting of 3 sections was adapted to measure respondents' sociodemographic information, knowledge, and attitudes toward HPV vaccination (Chiang et al. 2016). The questionnaire collected the participants' (a) demographic (7 items) (b) knowledge of HPV vaccination (6 single-choice items) and (c) attitude toward HPV vaccination (7 items using the Likert Scale). As for section (b), each item had two answer options which were 'yes' and 'no', and one score was given to a correct answer and a zero score for an incorrect answer. Section (c) used a scale of 1 = strongly disagree to 5 = strongly agree. To analyse the result, the score of (≥ 4) and the scale of (≥ 3) were grouped as good for knowledge and attitude respectively. The entire questionnaire was developed in English. Content validity was performed using public health physicians and health educationists. As for reliability, the questionnaire was tested on 30 secondary school students who were not included as study participants. The internal consistency was estimated using Cronbach's alpha

with a value of 0.54.

Data Collection Procedures

Ethical approval was obtained from the Research Ethics Committee of UiTM with referral number ED/REC/F/10224. A confirmation letter was sent to the principals of the respective school for permission to conduct the research. The questionnaire was distributed and collected from the students using the Google Form link. A brief explanation of the study was provided on the front page of the questionnaire together with the consent form to ensure voluntary involvement in the present study. An introductory statement was incorporated at the beginning of the questionnaire, underlining the necessity for respondents to answer truthfully, without the need to consult any external sources. A period of 2 weeks was given for the data collection. A reminder was sent during the final week to ensure all the respondents completed the form. All the information collected was then kept anonymous and stored confidentially by the researcher.

Data Analysis

Collected data were then constructed in a spreadsheet and statistical analysis was performed using Statistical Package for Social Science for Windows (SPSS version 27). Each data set was then statistically described as frequencies and mean. The data were examined to ensure all of its underlying assumptions were met. The chi-square test of contingencies was

employed to analyse the association between the categorical data and demographic profiles. Significance was predetermined at a probability value of 0.05 or less.

RESULTS

A total of 182 secondary school students were involved in this research with 182 disseminated questionnaires returned to the researcher with a 100% response rate. Female students predominate males in terms of frequency (60.6% vs 39.4%). The majority of the students claimed to be 14 years old (32.7%) followed by 15 years old (26.7%). Ethnicity profile revealed Malay to be the major ethnic group (92.7%) with a majority of them being Muslim (90.9%). More than half of the students resided in the urban area (80.6%) with a majority of family income range less than RM 2.5K (56.3%). Lastly, 83.6% of the research population had a history of receiving a vaccination (Table 1). A Pearson's chi-square test of contingencies (with $\alpha = .05$) was used to evaluate whether the demographic profiles of the students (gender, ethnicity, religion, age, region, history of vaccination, and family income) were associated with the level (good or bad) of knowledge and attitude towards HPV vaccination. The chi-square test was statistically significant with gender $\chi^2 = 6.39$ ($p = .011$), ethnic, $\chi^2 = 6.57$ ($p = .037$), religion $\chi^2 = 15.51$ ($p = .004$), and age $\chi^2 = 12.61$ ($p = .013$) towards knowledge whilst gender $\chi^2 = 8.44$ ($p = .004$) and family income $\chi^2 = 11.63$ ($p = .040$) was significant towards attitude (Table

TABLE 1: The association between demographic profiles and the level of knowledge and attitude toward HPV vaccination

Demographics	N(%)	Level of Knowledge (N%)		Chi-Square (Sig)	Level of Attitude (N%)		Chi-Square (Sig)
		Bad	Good		Bad	Good	
Gender							
Male	65(39.4)	30(52.6)	35(32.4)	6.39(.011)*	37(52.1)	28(29.8)	8.44(.004)*
Female	100(60.6)	27(47.4)	73(67.6)		34(47.9)	66(70.2)	
Ethnicity							
Malay	153(92.7)	49(86)	104(96.3)	6.57(.037)*	66(93)	87(92.6)	1.185(.553)
Chinese	7(4.2)	4(7)	3(2.8)		2(2.8)	5(5.3)	
Indian	5(3.0)	4(7)	1(0.9)		3(4.2)	2(2.1)	
Religion							
Islam	150(90.9)	45(78.9)	105(97.2)	15.51(.004)*	64(90.1)	86(91.5)	1.58(.812)
Buddhist	1(0.6)	1(1.8)	0(0)		0(0)	1(1.1)	
Christian	6(3.6)	5(8.8)	1(0.9)		3(4.2)	3(3.2)	
Hindu	5(3.0)	4(7)	1(0.9)		3(4.2)	2(2.1)	
Others	3(1.8)	2(3.5)	1(0.9)		1(1.4)	2(2.1)	
Age							
13	18(10.9)	8(14)	10(9.3)	12.61(.013)*	6(8.51)	12(12.8)	6.16(.187)
14	54(32.7)	21(36.8)	33(30.6)		28(39.4)	26(27.7)	
15	44(26.7)	20(35.1)	24(22.2)		14(19.7)	30(31.9)	
16	12(7.33)	0(0)	12(11.1)		4(5.6)	8(8.5)	
17	37(22.4)	8(14)	29(26.9)		19(26.8)	18(19.1)	
History of vaccination							
With a history of vaccination	138(83.6)	47(82.5)	91(84.3)	.719(.698)	56(78.9)	82(87.2)	3.37(.185)
No history of vaccination	27(16.4)	10(17.5)	16(14.8)		15(21.1)	11(11.7)	
Region							
Urban	133(80.6)	47(82.5)	86(79.6)	.636(.727)	59(83.1)	74(78.7)	1.087(.581)
Sub-Urban	32(19.4)	10(17.5)	21(19.4)		12(16.9)	19(20.2)	
Parental Income							
< RM 1.5K	37(22.4)	12(21.1)	25(23.1)	8.64(.124)	16(22.5)	21(22.3)	11.63(.040)*
RM 1.5K - 2.5K	56(33.9)	23(40.4)	33(30.6)		17(23.9)	39(41.5)	
RM 2.5K - 3.5K	29(17.6)	13(22.8)	16(14.8)		18(25.4)	11(11.7)	
RM 3.5K - 4.5K	16(9.7)	1(1.8)	15(13.9)		8(11.3)	8(8.5)	
RM 4.5K - 5.5K	12(7.3)	3(5.3)	9(8.3)		3(4.2)	9(9.6)	
> RM 5.5K	15(9.1)	5(8.8)	10(9.3)		9(12.7)	6(6.4)	

*Significant at the level of p < .05

1).

This study identified that a majority (90.9%) of students were aware that the HPV vaccination was offered freely to secondary school girls. However, most of the students were unaware that the vaccine was also accessible to men (81.2%). Despite most students

receiving the vaccine shots in a school setting, (71.5%) of the students were unaware that it had to be taken in a series of 3-shot injections over 6-month schedule. In terms of prevention, most students (80.6%) were aware that the vaccine prevented the development of genital warts and cervical cancer. The

students also agreed that the vaccine was the most effective on a person who was not sexually active (63%) and all religions including Islam allowed the intake of HPV vaccines (93.3%). Overall, the highest total score range

was 5 (18.2%) with a total mean of (M = 3.75, SD = .85) (Table 2).

In terms of the attitude toward HPV vaccination (Table 3), this study showed that the school students agreed to take the vaccine if it was offered for free (M

TABLE 2: Level of knowledge towards HPV vaccination

No	Item	N(%)	
		Correct	Incorrect
1	HPV vaccination is currently offered freely to secondary school girl	150(90.9)	15(9.1)
2	HPV vaccine is currently accessible to men	31(18.8)	134(81.2)
3	HPV vaccine is delivered in a series of 3 shots injections over 6 month's schedule	47(28.5)	118(71.5)
4	HPV vaccine can prevent the development of genital warts and cervical cancer	133(80.6)	32(19.4)
5	HPV vaccine is most effective on someone who is not sexually active	104(63.0)	61(37.0)
6	Vaccination is allowed in Islam and other religion	154(93.3)	11(6.7)
Range			
		2	
Total Score			14(8.5)
			43(26.1)
			78(47.3)
			30(18.2)
Mean (SD)		3.75(.85)	

= 3.90). However, the students felt that the parents may not allow them to get the vaccine (M = 3.71) together with the necessities of getting vaccinated (M = 3.59). Nevertheless, students agreed that the HPV vaccination was safe (M = 3.58) and can save their life (M = 3.37).

The students tended to disagree if the HPV vaccination can cause serious side effects (M = 3.21) or not to receive HPV vaccination if they had performed a regular PAP test (M = 3.06). Overall, the total mean scores of the attitude toward HPV vaccination were good (M

TABLE 3: Level of attitude towards HPV vaccination

No	Item	Mean(SD)
1	I would get the vaccine if it were for free	3.90(1.17)
2	It is not necessary for me to get the vaccination	3.59(1.10)
3	My parents would not allow me to get the vaccine	3.71(1.21)
4	HPV vaccination is safe	3.58(.88)
5	HPV vaccination can cause serious side effects	3.21(.78)
6	HPV vaccination is not necessary if I get a regular PAP test	3.06(.79)
7	HPV vaccination can save my life	3.37(1.06)
Total		3.48(3.57)

= 3.48, SD = 3.57).

DISCUSSION

Malaysia introduced the free HPV vaccination program in 2010 (Ezat et al. 2013). Before the implementation of national scale-free vaccination for school students, majority of the secondary school students had insufficient knowledge of HPV and cervical cancer (Rashwan et al. 2011). During the pandemic of COVID-19, the school shifted to online learning which caused the absence of students from school for some time. With the focus on COVID-19 vaccination, the school HPV vaccination program was slightly behind (Pillai 2022; Rao et al. 2022). This study examined the current knowledge and attitude toward HPV vaccination among secondary school students in the Selangor state of Malaysia. In general, the majority of the students were aware that the HPV vaccination was offered freely to female students at school. Ever since the national HPV program for school was introduced, numerous campaign, health talk, and exposure by the school administrative has been conducted to alarm the school students regarding the HPV vaccination which eventually informed them regarding the vaccine (Khoo et al. 2022). On the other note, since most of the students reside in urban areas, the urban lifestyle equipped with the internet and social media seemed to be the source of information in obtaining HPV-related information (Widjaja 2019).

Nevertheless, the majority of the students were unaware that this

vaccine had to be taken in several shots within a year and was accessible to both male and female students. This can be attributed to the involvement of male students with the HPV program in school. Most of the exposure is skewed to female students rather than male. In the school setting, before the administration of HPV shots, talk, campaign, and consent forms were given to female students only (Shaikh et al. 2019; Tusimin et al. 2019). Therefore, through this fact, male ignorance towards HPV and its vaccine overcame the mindset as they assume HPV affects females exclusively and males will not be affected by the virus (Jalani et al. 2016). As for the deliveries of shots, some of the schools did not conduct a campaign involving health professionals in delivering the information with regards to the vaccine which resulted in a lack of resources and information about the clinical aspects because ethical conduct requires health professionals to explain about the objective of the vaccination before it takes place (Chin et al. 2022; Mathur et al. 2010; Widjaja 2019).

This study also identified that the majority of the students were aware that the vaccine helped to prevent cervical cancer and the formation of genital warts together with its effectiveness if they were not sexually active. This finding is in line with a study in a rural area of Negeri Sembilan which demonstrated better knowledge of the association between HPV and genital warts. A study conducted in Sarawak, Kuala Lumpur, and Melaka also demonstrated a good knowledge of HPV and cervical cancer (Rashwan et

al. 2011; Rashwan et al. 2013; Al-Naggar et al. 2012). A possible explanation may be the exposure of HPV-related information through social media as a platform for health education among school students (Choi et al. 2023; Feng et al. 2023; Ortiz et al. 2019). As this study was conducted in an area with Malay ethnicity as a major population, most of the respondents were Muslim. The majority of them were aware that vaccination was allowed in Islam as explained by the Imams and Islamic figures who had made their bold statement and fatwas outlining how vaccinations were in line with Islamic ethics. This is also in line with Catholicism that it is lawful to use these vaccines if there is danger to the health of children or the health of the population as a whole (Iannelli 2012; Mohd Noor 2019)

In the context of attitude toward HPV vaccination, the school students agreed to take the vaccine if it were for free. This is in line with the government HPV program which offers free HPV vaccine to secondary female school students at the age of 13 years old. According to the former Minister of Health, Malaysia is slightly behind in the school HPV vaccine program due to the pandemic that has struck and the focus has been shifted towards herd immunity for COVID-19 (Vethasalam 2023). Due to this delay, most students who did not receive their vaccination shots during the period of the pandemic would have assumed that the immunisation program has been stopped or is no longer for free (Rao et al. 2022). Students' acceptance of the HPV vaccine would be higher if the

payment is lower or if it is given for free (Alsanafi et al. 2023). This suggested that the increased rate of vaccination among female students is influenced by the cost. However, starting in 2023, the program has been resumed and all female students aged 13 are given the shots accordingly (Vethasalam 2023). However, the students felt that they did not need to obtain the vaccine as it was also supported by the refusal of the parents.

This was due to the parental perceptions which directed the students to agree to take the vaccine following their guardians' consent. As most of the parents' income range fell within the range of B40, this suggested that educated or low-income parents may influence supporting or opposing the vaccination for their children (Newman et al. 2018; Rajiah et al. 2015; Widjaja 2019). The parents also perceived that protection derived from the vaccine would induce their children to be sexually active hence the hesitancy (Pillai 2022). It is crucial to comprehend parents' decision-making processes about their daughter's vaccination to achieve high coverage of the vaccine. Barriers include low-risk perception, parents' conviction that their daughters do not require vaccinations since they are not sexually active, worries about security and effectiveness, ignorance of the necessity for vaccination, and a lack of information (Wijayanti et al. 2021a; Wijayanti et al. 2021b). This suggested the need to educate the public about cervical cancer and the necessity for vaccinations since the HPV vaccination is crucial for preventing cervical cancer.

The students also possessed a good level of awareness of the HPV vaccine in terms of its safety and side effects. This was also supported by the past studies which showed an increased awareness among the school girls in Melaka (Al-Naggar et al. 2012). It was also indicated that merely 80% of the school students in rural Negeri Sembilan are aware of the HPV vaccine effects (Jalani et al. 2016). This may be due to the effects of general exposure to the vaccine during the pandemic of COVID-19. Numerous campaigns via social media and platforms with regards to the general information of virus, strain, immunity, immunisation, development, and content of vaccine, effects of the vaccine, post-vaccination effects, and acute effects following immunisation (AEFI) are some of the key concerns which have been highlighted for the past years during the national immunisation program (Chan et al. 2022). These concepts eventually provided fundamental knowledge to most students which subsequently prompted them to learn more about different types of vaccination available including HPV. However, the students perceived that vaccines were not necessary if the Pap smear test had been conducted regularly. Similar findings were also indicated in a study in Kuala Lumpur with merely 30% of students understanding the role of pap smear in rural areas of Negeri Sembilan (Rashwan et al. 2013, Jalani et al. 2016). It is important to note that the Pap smear test and vaccine serve different purposes. This may be attributed to the misunderstanding of Pap smear screening and vaccine necessities

for the prevention of cervical cancer (Siseho et al. 2022). It is important to note that even after vaccination, women still need to undergo Pap smear screening since the vaccine is not protective against all types of HPV (Rashwan et al. 2013). Thus, it is important to extend the information regarding screening procedures aside from the knowledge of HPV and the role of vaccines.

To determine the demographic profiles as determinants of good knowledge and attitude towards HPV vaccination, it was found that the female students scored higher in comparison with males. As discussed earlier, it is possible that most of the school's HPV national immunisation campaign was designed to educate female students rather than males. Thus, the involvement of female students alone would create ignorance among male students towards HPV and its vaccine (Jalani et al. 2016; Sopian et al. 2018). Men need to be fully informed and made aware of HPV's relation with cervical cancer and its prevention so they can support their family members to vaccinate against HPV. This would also encourage male students to take precautionary measures against HPV infections. Though the national program is not extended to males, they can get the vaccine from private health care. Therefore it would be advantageous to educate both males and females about HPV infection, prevention, and vaccination (Buang et al. 2018; Jalani et al. 2016). In the context of students' age, this study implied that extensive exposure to health-related subjects

such as Biology, Health Education, or Science in a school setting may equip them with the knowledge of HPV and its vaccine and thus reflected in the knowledge scores. In addition, past studies suggested that educational years affect the knowledge level among students as higher knowledge was achieved by students in higher secondary as compared to lower secondary (Jalani et al. 2016; Rajiah et al. 2015; Shafei et al. 2014).

As for the parental income differences among the students, there was a slight discrepancy between the good and bad attitudes toward HPV vaccination among the students. As most of the students' parental income fell under the range of RM 3.5K and below, this created the parental perceptions which influence the students' attitude towards HPV vaccination such as the necessity of obtaining the vaccine since previous studies suggested that non-vaccinated or low income or uneducated parents had low tendency to accept the vaccine and consent for their children (Awadh et al. 2014; Rajiah et al. 2015; Newman et al. 2018). It is also attributed to the lack of parental or family support to receive vaccination since most of the students are under the care of parents, hence decision relies on their parents. The parents also believe that their children will have a minimal chance of contracting HPV, thus frequently putting off their children towards HPV vaccination. Therefore, an appropriate strategy needs to be planned to increase public awareness about HPV, cancer, and its prevention, especially for the target population.

Overall, the studies outline several

suggestions which can further improve the knowledge and attitude toward HPV vaccination. To start with, the National Immunisation Program for HPV for female school students across all of Malaysia should be resumed soonest with the improvement on several elements. Since the programs were stopped in 2021 due to the pandemic of COVID-19, the government should increase the allocation of HPV vaccines for the usage of students who are affected by the period of pandemic starting from the year 2021 onwards (Vethasalam 2023). A more effective delivery strategy is necessary since it is unlikely for the female students who missed vaccination to acquire the vaccine in a public clinic due to its high pricing which can be a burden and subsequently increases the chances of hesitancy among the parents (Muhamad et al. 2018). The coverage of the HPV immunisation program in Malaysia should also be extended to male students rather than females alone. Male vaccination was thought to be beneficial in the prevention of virus transmission from male to female and male to male. Furthermore, a gender-neutral approach to HPV vaccination will help to improve the attitude and reduce the assumption that the HPV vaccine was meant to protect the female alone (Buang et al. 2018; Sopian et al. 2018).

In improving the knowledge of HPV and vaccines, the introduction of sexual education subjects as part of the national curriculum is the need of the hour as these subjects are meant specifically to educate the students rather than integrating parts of the

HPV and vaccine-related (if any) in any school subjects (Sham et al. 2020). On this aspect of clinical, the involvement of the UKS (School Health Unit) from the Ministry of Health is crucial in providing relevant information about sexual education matters of HPV including the etiology of the virus, signs and symptoms, prevention, role of vaccine and extending it to the role of routine screening for long term prevention and care for the students. The role of healthcare professionals' would assist in explaining the objective of the vaccination in more detail and concise manner before the vaccination takes place. The presence of healthcare professionals such as public health doctors, nurses, or paramedics together with the involvement of parents could help to increase the awareness and attitude towards HPV vaccination and subsequently change the parents' perception, especially with low income, knowledge, and access to HPV vaccination (Chin et al. 2022).

This study is not without limitations. For example, the two-week duration allowed for the students to complete the questionnaire did not preclude that they may seek answers for the knowledge section through other resources, such as from reference books or online resources. In the future, it is suggested that more diverse recruitment can be considered by expanding the research area to other urban schools in Selangor. Due to many of the students being Malay, the findings should be interpreted cautiously, and future findings should be more reliable with the involvement of other ethnic groups. It is also

suggested that the involvement of parents in the study will enable more justification for the output of the study.

CONCLUSION

This study revealed that the secondary school students in Selangor acquired a moderate knowledge and attitude towards HPV vaccination. Gender, religion, ethnicity, and age play significant roles in good knowledge whereas gender and parental income influence the attitude towards HPV vaccination. The vaccination practice through the national HPV immunisation for school students was effective nevertheless more efforts should be implemented such as promoting a gender-neutral approach and educating parents in promoting positive attitudes and acceptance towards HPV vaccination. Strategies include introducing the sexual education subject and the cooperation from the Ministry of Health School Health Unit (UKS) is crucial in empowering the students and public knowledge and the importance of HPV vaccination.

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