

ORIGINAL ARTICLE

The Knowledge, Attitude, and Practice on Human Papillomavirus (HPV) Vaccination and Pap Smear Screening is Low among Young Adult Women in Muar, Malaysia: a cross-sectional study.

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Abstract

Cervical cancer is the third most common cancer among women in Malaysia. However, there is still a lack of research and information regarding the women's knowledge, attitudes, and practices regarding the acceptance of Human papillomavirus (HPV) vaccination, and Papanicolaou (PAP) smear screening in the control program. The study was aimed to determine the knowledge of young adult women in Mukim Sungai Raya, Muar District, about the knowledge, attitudes and practices of HPV vaccination and Pap smear screening as a prevention of cervical cancer in Malaysia. The cross-sectional study was conducted using a self-filled questionnaire among young adult women aged 19-25 years old at Mukim Sungai Raya Muar. The participants were selected conveniently based on the list provided by Mukim's Head. The study showed that 67.3% of respondents had low knowledge on HPV vaccination and Pap smear screening, 50.9% had a negative attitude toward it, whilst 47.7% had completed two doses of HPV vaccine, but only 9.3% had been performed Pap smear screening. The lower level of education was significantly associated with a lower level of knowledge ($p= 0.025$). There was no association between levels of knowledge with attitude. The knowledge, attitude and practice on HPV vaccination and Pap smear screening were found to be low among young adult women at Mukim Sungai Raya, Muar. The intensive health promotion program should be instituted among young women in the rural and sub-urban setting.

Keywords: *Cervical cancer; HPV vaccine; KAP study; Muar; Malaysia; Pap smear.*

Introduction

One of the most significant threats to women in the world is cervical cancer. With an age-standardized incidence rate of 5.6 cases per 100,000 population in 2016 [1], it is classified as the third most common cancer among women in Malaysia. Since 2003, the incidence rate has decreased in general. In 2003, the age-standardized incidence rate was 19.7 per 100,000 population, but it fell to 8.3 per 100,000 population in 2007, and finally to 5.6 per 100,000 population in 2016 [2]. However, the mortality rate for cervical cancer in Malaysia is two times higher than in the Netherlands, Finland, and the United Kingdom [3]. The government spends around RM 312 million (USD 76 million) annually on managing cervical cancer, which is a significant economic burden [4].

The World Health Organization has passed a resolution in 2020 to speed up the elimination of cervical cancer due to its preventable and treatable nature. The target can be achieved in Malaysia by 2030 if the incidence rate of cervical cancer is less than 4 per 100,000 population. This can be accomplished through various efforts. The first step is to ensure that 90% of girls are completely vaccinated with the HPV vaccine by the age of 15. Secondly, by conducting a high-performance test on 70% of women by the age of 35, and lastly, by promptly treating 90% of women who are diagnosed with the early cervical disease [2].

The Ministry of Health has been implementing the national HPV vaccine program since 2010 [5]. From 2011 to 2020, the average vaccination rate was 85 percent, but then it fell to 14% in 2021 and 39% in 2022 due to the COVID-19 pandemic. Although the Papanicolaou smear test (PAP) has been utilized as an early cancer screening method for all women at all government health facilities since 1969. The test's acceptance rate remained low till now [2,7-8]. Even though awareness campaigns and advances in detection technology have been implemented throughout the country, cervical cancer screening coverage and uptake are still low, especially among young and high-risk

women [2]. The primary reason for the failure of Pap smear screening programs in middle- and low-income countries, as stated by Sankaranarayanan (2014), was the lack of awareness of cervical cancer among women [9]. The availability of information and research on women's knowledge, attitudes, and practices regarding cervical cancer, HPV vaccination, and Pap smear screening in Malaysia remains unsatisfactory [10]. The study on HPV vaccine was primarily focused on students attending college and university [11-12]. One of the studies conducted among students in one of the local universities showed that about half (54.7%) of the total respondents had a high level of knowledge towards HPV vaccine while 57.5% of the total respondents showed a negative attitude towards HPV vaccine [11]. The prevalence of women not being aware of Pap smear screening is also high in Malaysia. A qualitative study conducted among 20 Malaysian women living in Kuala Lumpur that had never had a Pap smear test showed that they were not well-informed about cervical cancer screening using a Pap smear test. The procedure was not done due to their lack of knowledge about its benefits, the risk of getting the disease, not feeling threatened, embarrassment, fear of pain, and other factors. Job commitment seemed to be the main reason for not getting the test among highly educated working women [13]. Several community studies also showed that women's knowledge of Pap smear screening was poor, and it was associated with poor acceptance and the practice of the procedure [14]. Due to lack of information on these issues, especially in the community, this study was conducted to determine the level of knowledge, the attitudes and practices of the HPV vaccination and Pap smear screening among young adult women in Mukim Sungai Raya, Muar District.

Materials and methods

The cross-sectional study was conducted from June 2022 to January 2023 among young adult

women aged 19 to 25 at Mukim Sungai Raya, Muar. The minimum sample size required for the study was 185. A total of 225 women from the list provided by the Mukim Head (PENGHULU) were approached. All women who were single, married or widowed from the age of 19 to 25 years old, the residents of Mukim Sungai Raya and willing to take part in the survey were included. Those women with a previous history of total hysterectomy, non-Malaysian citizens, unable to understand English or Malay and those who refused to take part in the survey were not selected.

They were given a questionnaire either in English or Malay to be filled independently. The questions were constructed based on literature review, pretested on 40 women and content validated by two of the senior lecturers of Public Health specialty in the Royal College of Medicine (RCMP). The questionnaire comprised of socioeconomic variables (age, ethnic groups, marital status and educational levels) and knowledge, attitude and practice (KAP) questions. The knowledge toward cervical cancer, HPV vaccine and Pap smear screening required a yes or no response whilst the attitude questions on HPV vaccination and Pap smear screening were using Likert's scale (strongly agree=5 to strongly disagree=1). The practice questions were in yes/no answer. For scoring and categorizing the score of knowledge, the correct answer would be assigned '1' mark and wrong answer '0' mark. The range was 0-10 mark and the score of 6 was used as a cutoff point (high knowledge if score \geq 6). For attitude the score range was between 8-40, the score of 29 was used as a cutoff point (good attitude if score \geq 29).

The data was collated, keyed in, cleaned and analyzed using Statistical Packages for Social Science (SPSS) version 26. The chi-square analysis was used to determine the association between variables. The $p < 0.05$ is considered significant.

Ethical approval was received from the Ethical Committee of UniKL RCMP. Permission to

conduct a survey in the Mukim (sub-district) was obtained from the Penghulu Mukim Sungai Raya.

Results

Profile of samples

Of the 225 young adult women approached, 221 agreed to participate in the study (98.2% response rate). However, seven (7) were ineligible as sample as their age exceeded 25 years old and 4 did not complete the questionnaire. The total eligible respondents in the study were 214 people. Table 1.0 showed the socioeconomic profiles of the respondent. The mean age was 22.3 (SD = 1.7) years. Most participants were aged 21 (23.4%) and 22 years old (21.0%), Malays (51.4%), unmarried (29.4%) and educational level up to upper secondary level (48.1%).

General knowledge of the respondents on cancer of cervix

Based on Table 2, more than half of respondents ever heard about the cervical cancer (65.0%), HPV vaccine (57.0%) and Pap smear screening (54.2%). The sources of information for most of them were social media (59.4%) such as Facebook and Twitter, and educational institution (55.1%). Knowledge on risk factors such as multiple sexual partners, HPV infection and smoking were poor among the respondents, with only about 25% of respondents knew all the risk factors. Additionally, understanding the sign and symptoms of cervical cancer, such as vaginal bleeding, contact bleeding and foul-smelling discharge, was limited among most women in the study, with only 20% being aware of all these signs and symptoms.

Specific knowledge on cervical cancer, HPV vaccine and Pap smear in population

Table 3 shows that most respondents were aware that Human Papilloma Virus (HPV) causes cervical cancer (65.4%) and could be prevented (56.1%). More than half of women in the study were knowledgeable about the purpose of taking the HPV vaccine (63.6%) and that the

recommended age for receiving the vaccine in Malaysia (60.3%) is 13 years old. Furthermore, 56.1% of respondents were aware that HPV infection cannot not be treated. In terms of vaccination, 58.9% knew that two doses of HPV vaccine were recommended in Malaysia. Additionally, 61.2% knew that women who have experienced the sexual intercourse are recommended to undergo Pap smear screening.

Attitude of respondent toward HPV vaccine taking and Pap smear screening

Table 4 shows the attitude of respondents toward HPV vaccine uptake and Pap smear screening. Almost 80% of respondents agreed that they would encourage their female family members to take the HPV vaccine. Additionally, the majority of respondents (60.3%) agreed that they should take the HPV vaccine even though they had no risk factors or were not exposed to sexual intercourse. Furthermore, 60.7% believed that women with hysterectomy did not require to take HPV vaccine. A significant portion (67.3% respondents, with almost 40% strongly believing) expressed the belief that getting HPV vaccine can protect them against the cervical cancer.

For Pap smear screening, 61.7% of respondents believed that a person who had a full hysterectomy did not need to undergo the screening. Single women (56.0%) believed that they did not need to undergo a Pap smear, as they have never been involved in sexual activity. The majority of respondents (66.3%) agreed that they should go for Pap smear screening, as they believed that early detection of cancer of cervix could save their lives. Slightly more than half of women in the study (51.9%) agreed that they still need to do the Pap smear screening even though they have completed their HPV vaccine.

Practice of HPV vaccination and Pap smear screening

According to Table 5, 47.7% respondents had completed the full dose of HPV vaccine. Among those who didn't receive the full dose of HPV vaccine (52.3%), they cited that their age already

exceeded the recommended ages for the vaccine. Almost 70% of respondents would ensure their female family members receive the HPV vaccine. In terms of Pap smear screening, only 9.3% had undergone the screening, while 56.1% did not do the screening, citing being unmarried as the primary reason.

The level of knowledge and attitude

The scores obtained from the knowledge and attitude questions were categorized as either high or low score, based on a cut-off point derived from the distribution of score data. It was found that 67.3% of the respondents had low knowledge about HPV vaccination and Pap smear screening as the methods for cervical cancer prevention. In terms of attitude 50.9% of women in the study had a negative attitude toward HPV vaccination and Pap smear screening.

Association between socioeconomic characteristics with knowledge, and attitude toward cervical cancer prevention

There was a significant association between ethnic groups and knowledge ($p=0.003$). Malays appeared to have higher knowledge (43.6%), in comparison with other ethnic groups (23.4% among Chinese and 17.9% among Indian). No association was found between marital status with the knowledge and attitude regarding HPV vaccine uptake and Pap smear screening. (Table 6). However, a significant association was found between educational level with knowledge of cervical cancer prevention ($p=0.025$). Poor knowledge was prevalent among women in primary education (100%) and those with a secondary level of education (75.7%).

Association between knowledge and attitude toward cervical cancer prevention

No association was found between knowledge and attitude in the prevention of cervical cancer ($p=0.111$).

Discussion

This study provides insights into the knowledge, attitude and practice about the HPV vaccination and Pap smear screening as cervical cancer prevention among young adult women in Mukim Sungai Raya, Muar, Johor. The findings indicate that, 67.3% of the respondents had poor knowledge of cervical cancer, HPV vaccination and Pap smear screening. Regarding attitudes, there was a balanced ratio of positive to negative responses at 50:50. It was found that 47.7% of the study participant had completed two doses of HPV vaccination, however only 9.3% underwent Pap smear screening. Malay ethnic seemed to have higher knowledge on these issues compared to other ethnic groups ($p < 0.05$), while lower level of education was significantly associated with a lower level of knowledge ($p = 0.025$). Surprisingly, no association existed between levels of knowledge with attitude toward prevention of this cancer.

While 65% of women were aware of cervical cancer preventive measures, only 25% were knowledgeable about the risk factors of the disease and 20% on its signs and symptoms. Overall, 67.3% had low knowledge of cervical cancer prevention, aligning with similar studies in Kuala Lumpur [15] and other Asian countries [16]. A study among the rural women in eastern China found that, despite the availability of a free cervical cancer screening program, the screening uptake was not high, and the women had poor knowledge of cervical cancer [17].

The primary source of information on cervical cancer and its prevention has been social media, such as Twitter, Facebook, Instagram, and TikTok. Currently, social media is the most popular way to communicate health information to the community. Similar results were observed in a Sarawak study, with social media being the most popular tool to promote awareness of cervical cancer and its prevention among teenagers [18]. According to Reiter et al. (2018)'s study, social media has been instrumental in increasing vaccine trust and immunization rates

[19]. However, some studies have found that engaging with HPV-related social media content is associated with improved awareness and knowledge of the disease, but not with increased vaccine uptake [20]. Wang et al. 2019 cautioned against the use of negative messages by irresponsible individuals of these platforms to deter people from getting vaccines for various reasons [21]. The progress of the elimination program is being held back by the main threat of vaccine hesitancy [22]. Consequently, the government and civil societies should maintain surveillance of the situation and utilize comparable platforms to educate the young adult population on health.

Despite regular exposure to social media and attending formal education, the study revealed a high rate (67.4%) of poor knowledge among women. Malays exhibited significantly higher levels of knowledge ($p < 0.05$), probably due to better accessibility to health messages and education. In terms of level of education, women who had post-secondary level of education had significantly better knowledge as compared to lower levels of education ($p < 0.05$). This result is consistent with a study in Xinjiang, China [23]. In contrast, a study in KwaZulu-Natal, South Africa, reported poor knowledge of cervical cancer-associated factors, symptoms, screening methods and treatment (28.0%) among their rural women. However, socio-demographic characteristics were not significantly associated with knowledge of cervical cancer and cervical cancer screening in this community [24].

Concerning attitude, an equal percentage of women displayed positive and negative attitudes with no association to knowledge level. This is contrary to the findings of a study by Burhan et al. (2021) [25], in which 52.8% of participants had average knowledge. His study demonstrated a highly significant, positive linear correlation between the respondents' total knowledge and attitude scores ($P < 0.001$) [25]. Jalani et al. (2016) reported that those who have a strong understanding of cervical cancer have a 1.66 times greater chance of being willing to get

vaccinated than those who do not. It reflects that the decision to get a vaccination depends on the person's perception of the knowledge about cancer [26]. Therefore, ongoing education about HPV and cancer is essential for the public.

In term of practice, 47.7% of the study participants had completed two doses of HPV vaccination, however only 9.3% had underwent Pap smear screening. In 2010, Malaysia approved the implementation of school-based HPV immunization programs for 13-year-old girls or first-year secondary students across the country [27]. After 13 years of implementation, only half of the women in this study have completed their two doses of HPV vaccine. The HPV vaccination rate in this study is very similar to the national rate of 51.5% [28], which is below the 90% target set by the World Health Organization (WHO) [29].

Canfell et al. (2021) suggests that screening for cervical cancer is necessary to lower the risk of cancer for both vaccinated and unvaccinated women [30]. Women aged 21 to 29 should undergo pap smear screening, regardless of whether they are sexually active or not. If the results are normal, the screening will be repeated every 3-5 years. In this study, less than 10% of women aged 19-25 were screened for this cancer, which is considered very low acceptance as compared to a national average of 36.6% in 2019 [31]. The cervical cancer screening program in Malaysia has consistently failed to meet its targets [32]. Similar situations have occurred in various parts of the world, particularly in developing countries [33]. The program's shortcomings were due to insufficient services, insufficient funds, and negative perceptions [34].

In a qualitative study conducted among Malaysian women who have never undergone a Pap smear, it was found that many of them are not knowledgeable about the benefits and indications of Pap smears [12]. The individual's decision to get screened is linked to their understanding and attitude of the causes and risk factors of cervical cancer [8]. This is supported by a trial using health education session and text message

reminders among women in Kedah. According to the study, these methods were effective in enhancing knowledge of cervical cancer and Pap smear, attitudes towards the test, and actual usage of the test [35]. The rate of uptake increased from 48.0% at baseline to 79.0% at the end of the study ($P < 0.001$). The uptake rate for health care personnel with more knowledge about these issues working in government hospitals was shockingly low at only 55.7% [36]. In this study, the prevalence was significantly lower among single individuals, younger age groups, doctors, individuals with higher educational levels, and those earning higher monthly incomes. The main reasons given for poor uptake were associated with a busy schedule, having no unusual symptoms, personal shyness, and fear of pain. Addressing obstacles and constraints should be addressed to improve the uptake among this group.

Apart from poor knowledge and attitude on the disease and its prevention, not much information regarding the accessibility and effectiveness of the health promotion program among women and people in rural and sub-urban areas has been published. A study in Xinjing China indicated that low acceptance of HPV vaccination is most likely due to the lack of public awareness about cervical cancer prevention. A study in Nepal indicated that low acceptance of Pap smear screening (15.9%) is also related to similar issues [37]. Saha et al. (2010) indicated a lack of understanding of cervical cancer among graduate and postgraduate students at some women's colleges in Kolkata, which is associated with poor acceptance of the program [38]. Furthermore, female healthcare professionals in King Fahad Medical City (KFMC), Saudi Arabia demonstrated a lack of knowledge about cervical cancer, HPV infection, and prevention [39]. The lack of knowledge on these issues by most parents in Malaysia may have an impact on their decision-making and uptake of HPV vaccination among their children. This highlights the need for better exposure to parents about HPV vaccination for their children [40].

The results of this study should be interpreted cautiously as the study is cross-sectional in nature, using a self-administered questionnaire and conveniently sampled. However, the results may reflect the pressing issues of women in the rural and sub-urban areas that require further study and attention by relevant authorities.

Conclusion

Overall knowledge, attitude and practice about HPV vaccine taking and Pap smear screening as a preventive measure of cervical cancer was low, in Mukim Sungai Raya. The young adult women at Mukim Sungai Raya and other similar areas need more information regarding the disease, HPV vaccination and Pap smear screening as cervical cancer prevention. Lack of awareness makes young women vulnerable to acquiring HPV infection and cervical cancer. Health authorities and civil societies must create accessible and effective programs meant for women, apart from implementing comprehensive

school and community-based health education programs. Larger sample sizes should be used to conduct more research to identify the main reason for the poor acceptance of HPV vaccination and Pap smear screening in Malaysia. Through this expanded research effort, it is possible to understand the specific factors that contribute to reluctance or hesitancy, which can lead to targeted interventions and the most effective public health strategies.

Table 1. Sociodemographic characteristics of respondents

Variable	Frequency <i>n</i>	Percentage (%)
Age		
19	13	6.1
20	15	7.0
21	50	23.4
22	45	21
23	36	16.8
24	24	11.2
25	31	14.5
Ethnic Group		
Malay	110	51.4
Chinese	64	29.9
Indian	39	18.2
Others	1	0.5
Educational Level		
PMR	2	0.9
SPM	103	48.1
Pre-degree	64	29.9
Degree	45	21.0
Marital Status		
Single	144	67.3
Married	63	29.4
Divorced	7	3.3
Hysterectomy experienced.		
Yes	0	0
No	214	100

Table 2. Knowledge on cervical cancer

Variables	Yes (n)	Percentage (%)
Have you ever heard about ...?		
Cervical cancer	139	65.0
HPV vaccine	122	57.0
Pap smear screening	116	54.2
Where do you get the information?		
Social media	127	59.4
Educational institution	118	55.1
Television/Radio	72	33.6
Book	48	22.4
The risk factor of cervical cancer.		
Multiple sexual partner	55	25.7
HPV infection	48	22.4
Cigarette smoking	31	14.5
All the above	53	24.8
None the above	27	12.6
The sign or symptom of cervical cancer.		
Vaginal bleeding	81	37.9
Foul smell vaginal discharge	43	20.1
Contact bleeding.	16	7.5
All the above	43	20.1
None the above	31	14.5

Table 3. Specific knowledge of respondent about cervical cancer, HPV vaccine and Pap smear screening.

Variable	Frequency (%)	
	Correct answer	Incorrect answer
The Human Papilloma virus (HPV) causes cervical cancer.	140 (65.4)	74(34.6)
Cervical cancer can be prevented.	120 (56.1)	94(43.9)
HPV infection cannot be treated.	120 (56.1)	94(43.9)
Cervical cancer usually doesn't cause any symptoms right away.	119(55.6)	95(44.4)
Pap smear test does not need to be done every year.	120 (56.1)	94(43.9)
Women who have experienced the sexual intercourse is recommended to do Pap smear screening.	131(61.2)	83(38.8)
If you had hysterectomy that totally remove your uterus and cervix, you can't get cervical cancer and don't need to be tested with Pap smear.	125(58.4)	89(41.6)
To prevent the cervical cancer is the purpose of HPV vaccine.	136(63.6)	78(36.4)
Age 13 years old is recommended age to get HPV vaccine in Malaysia.	129(60.3)	85(39.7)
The two doses of HPV vaccine are recommended doses in Malaysia.	126(58.9)	88(41.1)

Table 4. Attitude of respondent toward HPV vaccine taking and Pap smear screening.

Variable	Frequency (%)				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I will encourage my female family members to take vaccine	120(56.1)	51(23.8)	27(12.7)	8(3.7)	8(3.7)
I have no risk as I'm not exposed to sexual contact, but I do need to get the HPV vaccine	81(37.9)	48(22.3)	31(14.5)	32(15.0)	22(10.3)
I already had hysterectomy so I don't need to take the HPV vaccine	87(40.7)	33(15.4)	61(28.5)	24(11.2)	9(4.2)
Getting HPV vaccine can protect me against the cervical cancer	85(39.9)	59(27.7)	48(22.5)	14(6.5)	7(3.4)
I already fully remove my cervix and uterus, so I don't need to do the Pap smear screening	78(36.4)	54(25.2)	44(20.6)	25(11.7)	13(6.1)
It is unnecessary to do Pap smear as I am single and never involve with sexual intercourse	70(32.7)	50(23.4)	57(26.6)	21(9.8)	16(7.5)
I will go for Pap smear screening as early detection can save my life	82(38.3)	60(28.0)	37(17.3)	20(9.3)	15(7.1)
I have completed my HPV vaccine, but I still need to do the Pap smear screening	75(35.0)	36(16.8)	48(22.4)	37(17.4)	18(8.4)

Table 5. Practice of HPV vaccination and Pap smear screening.

Variable	Frequency (%)	
	Yes	No
I already get my HPV vaccine with completed doses	102 (47.7)	112 (52.3)
I don't get my HPV vaccine as my age already exceed the recommended age	112 (52.3)	102 (47.7)
I had made sure all my female family members get their HPV vaccine	147 (68.7)	67 (31.3)
I already done the Pap smear screening	20 (9.3)	194 (90.7)
I don't do the Pap smear screening as I am not yet married	120 (56.1)	94 (43.9)

Table 6. Association between ethnicity, educational level marital status with knowledge and attitude toward cervical cancer prevention

Variable	n	Knowledge			Attitude		
		Low %	High %	<i>p</i> value	Negative %	Positive %	<i>p</i> value
Ethnic Group							
Malay	110	56.4	43.6	0.003	56.4	43.6	0.205
Chinese	64	76.6	23.4		46.9	53.1	
Indian	39	82.1	17.9		41.0	59.0	
Others	1	100.0	0.0		100.0	0.0	
Educational Levels							
Primary	2	100.0	0.0	0.025	0.0	100.0	0.252
Secondary	103	75.7	24.3		46.6	53.4	
Pre-degree	64	54.7	45.3		57.8	42.2	
Degree	45	64.4	35.6		53.3	46.7	
Marital status							
Single	144	64.6	35.4	0.134	53.5	46.5	0.586
Married	63	69.8	30.2		46.0	54.0	
Divorced	7	100.0	0.0		42.9	57.1	

*P value < 0.05 is significant.

References

- [1] Azizah, A. M., Nor Saleha, I. T., Noor Hashimah, A., Asmah, Z. A., & Mastulu, W. (2016). Malaysian national cancer registry report 2007-2011. National Cancer Institute, 228.
- [2] Ministry of Health. 2021. Action plan towards the elimination of cervical cancer in Malaysia 2021- 2030. <https://moh.gov.my>.
- [3] Bruni L, Albero G, Serrano B, Mena M, Collado JJ, Gómez D, Muñoz J, Bosch FX, de Sanjosé S. ICO/IARC Information Centre on HPV and Cancer (HPV Information Centre). Human Papillomavirus and Related Diseases in Malaysia Summary Report 10 March 2023. [9th.July 2023].
- [4] Mustafa, W. A., Halim, A., Nasrudin, M. W., Shakir, K. (2022). Cervical cancer situation in Malaysia: A systematic literature review. BIOCELL, 46(2), 367–381.

- [5] Ulasan, S., Nahrawi, N., Mustafa, W. A., & Kanafiah, S. N. A. M. (2020). Knowledge of Human Papillomavirus (HPV) and cervical cancer among Malaysia Residents: A review. *Sains Malaysiana*, 49(7), 1687-1695.
- [6] Codeblue. 2023. Malaysia's HPV Vaccination Dropped To 39% For Girls Aged 15+ In 2022. <https://codeblue.galencentre.org/2023/09/12/malaysias-hpv-vaccination-rates-plunge-80-for-girls-15-and-above-in-2021>.
- [7] Chan YM, Ismail MZH, Khaw WF. Factors influencing the prevalence of cervical cancer screening in Malaysia: a nationwide survey. *BMC Womens Health*. 2023 Jul 25;23(1):389. doi: 10.1186/s12905-023-02553-3. PMID: 37491253; PMCID: PMC10369820.
- [8] Norkhafizah Saddki, M., & Norehan Mokhtar, M. (2019). Cervical cancer and pap smear screening: knowledge, attitude and practice among working women in northern state of Malaysia. *Med J Malaysia*, 74(1), 9.
- [9] Sankaranarayanan, R., Joshi, S., Muwonge, R., Esmay, P. O., Basu, P., Prabhu, P., ... & Indian HPV vaccine study group. (2018). Can a single dose of human papillomavirus (HPV) vaccine prevent cervical cancer? Early findings from an Indian study. *Vaccine*, 36(32), 4783-4791.
- [10] Seng, L. M., Rosman, A. N., Khan, A., Haris, N. M., Mustapha, N. A. S., Husaini, N. S. M., & Zahari, N. F. (2018). Awareness of cervical cancer among women in Malaysia. *International journal of health sciences*, 12(4), 42.
- [11] Tusimin M, Yee CL, Razak NZSA, Zainol MI, Minhat HS, Rejali Z. Sociodemographic determinants of knowledge and attitude in the primary prevention of cervical cancer among University Tunku Abdul Rahman (UTAR) students in Malaysia: preliminary study of HPV vaccination. *BMC Public Health*. 2019 Nov 5;19(1):1454. doi: 10.1186/s12889-019-7764-3. PMID: 31690296; PMCID: PMC6833199
- [12] Maharajan, M.K., Rajiah, K., Sze Fang, K.N. et al. Cervical Cancer Prevention in Malaysia: Knowledge and Attitude of Undergraduate Pharmacy Students Towards Human Papillomavirus Infection, Screening and Vaccination in Malaysia. *J Canc Educ* 32, 166–174 (2017). <https://doi.org/10.1007/s13187-015-0957-2>
- [13] Wong LP, Wong YL, Low WY, Khoo EM, Shuib R. Cervical cancer screening attitudes and beliefs of Malaysian women who have never had a pap smear: a qualitative study. *Int J Behav Med*. 2008;15(4):289-92. doi: 10.1080/10705500802365490. PMID: 19005928.
- [14] Sundraraj YA, Noor Shaqirah Abdul Murad, Nurul Azira Ismail, Noor Izzah Abdul Rahman. 2018. The prevalence of pap smear screening and association with knowledge, attitude and practice in Kota Kinabalu, Sabah, Malaysia. e – *Academia Special Issue GraCe*. 153-158.
- [15] Zaridah S. 2014. A review of cervical cancer research in Malaysia. *Med J Malaysia. Suppl A*:33-41. PMID: 25417949.

- [16] Mary, B., & D'Sa, J. L. (2014). Evaluation of an educational program on cervical cancer for rural women in Mangalore, Southern India. *Asian Pacific Journal of Cancer Prevention*, 15(16), 6603-6608.
- [17] Liu, T., Li, S., Ratcliffe, J., & Chen, G. (2017). Assessing Knowledge and Attitudes towards Cervical Cancer Screening among Rural Women in Eastern China. *International Journal of Environmental Research and Public Health*, 14(9), 967. <https://doi.org/10.3390/ijerph14090967>
- [18] Rashwan, H., Ishak, I., & Sawalludin, N. (2013). Knowledge and views of secondary school students in Kuala Lumpur on cervical cancer and its prevention. *Asian Pacific Journal of Cancer Prevention*, 14(4), 2545-2549.
- [19] Reiter, P. L., Gerend, M. A., Gilkey, M. B., Perkins, R. B., Saslow, D., Stokley, S., ... & Brewer, N. T. (2018). Advancing human papillomavirus vaccine delivery: 12 priority research gaps. *Academic pediatrics*, 18(2), S14-S16.
- [20] Ortiz, R. R., Smith, A., & Coyne-Beasley, T. (2019). A systematic literature review to examine the potential for social media to impact HPV vaccine uptake and awareness, knowledge, and attitudes about HPV and HPV vaccination. *Human vaccines & immunotherapeutic*, 15(7-8), 1465-1475.
- [21] Wang, Y., McKee, M., Torbica, A., & Stuckler, D. (2019). Systematic literature review on the spread of health-related misinformation on social media. *Social science & medicine*, 240, 112552.
- [22] World Health Organizations. (2019). Ten threats to global health in 2019. WHO, Retrieved March 20, 2022, from <https://www.who.int/vietnam/news/feature-stories/detail/ten-threats-to-global-health-in-2019>.
- [23] Abudukadeer, A., Azam, S., Mutailipu, A. Z., Qun, L., Guilin, G., & Mijiti, S. (2015). Knowledge and attitude of Uyghur women in Xinjiang province of China related to the prevention and early detection of cervical cancer. *World journal of surgical oncology*, 13(1), 1-7.
- [24] Omoyeni, O., & Tsoka-Gwegweni, J. (2022). Knowledge, attitudes and practices of cervical cancer screening among rural women in KwaZulu-Natal, South Africa. *The Pan African Medical Journal*, 42.
- [25] Burhan M, Rahman NAA, Haque M. Knowledge and attitude regarding cervical cancer and its prevention among young female adults in Kuantan (2021). Malaysia. *J Educ Health Promot*. Sep 30;10:332. doi: 10.4103/jehp.jehp_1454_20. PMID: 34761018; PMCID: PMC8552281.
- [26] Jalani, F. F. M., Rani, M. D. M., Isahak, I., Aris, M. S. M., & Roslan, N. (2016). Knowledge, attitude and practice of human papillomavirus (HPV) vaccination among secondary school students in rural areas of Negeri Sembilan, Malaysia. *International journal of collaborative research on internal medicine & public health*.

- [27] Muhamad, N. A., Buang, S. N., Jaafar, S., Jais, R., Tan, P. S., Mustapha, N., ... & Murad, S. (2018). Achieving high uptake of human papillomavirus vaccination in Malaysia through school-based vaccination programme. *BMC Public Health*, 18(1), 1-9.
- [28] Khoo CL, Teoh S, Rashid AK, Zakaria UU, Mansor S, Salleh FN, Nawi MN. Awareness of cervical cancer and HPV vaccination and its affordability among rural folks in Penang Malaysia. *Asian Pac J Cancer Prev*. 2011;12(6):1429-33. PMID: 22126476.
- [29] World Health Organization (WHO). 2023. Cervical-cancer-elimination-initiative. <https://www.who.int/initiatives/cervical-cancer-elimination-initiative>
- [30] Canfell, K., Smith, M. A., & Bateson, D. J. (2021). Self-collection for HPV screening: A game changer in the elimination of cervical cancer. doi:<http://dx.doi.org/10.5694/mja2.51262>
- [31] Institute of Public Health. 2021. National Health and Morbidity Survey 2019. https://iptk.moh.gov.my/images/technical_report/2020/FactSheet_BI_AUG2020.pdf.
- [32] Buang, S. N., Ja'afar, S., Pathmanathan, I., & Saint, V. (2018). Human papillomavirus immunisation of adolescent girls: improving coverage through multisectoral collaboration in Malaysia. *BMJ*, 363.
- [33] Kabalika C, Mulenga D, Mazaba ML, Siziya S. Acceptance of Cervical Cancer Screening and its Correlates Among Women of a Peri-Urban High-Density Residential Area in Ndola, Zambia. (2018). *Int J MCH AIDS*. 7(1):17-27. doi: 10.21106/ijma.223. PMID: 30305986; PMCID: PMC6168797.
- [34] Abdullah, N. N., Al-Kubaisy, W., & Mokhtar, M. M. (2013). Health behaviour regarding cervical cancer screening among urban women in Malaysia. *Procedia-Social and Behavioral Sciences*, 85, 110-117.
- [35] Romli, R., Sa'adiyah Shahabudin, N. S., & Mokhtar, N. (2020). Effectiveness of a health education program to improve knowledge and attitude towards cervical cancer and pap smear: a controlled community trial in Malaysia. *Asian Pacific journal of cancer prevention: APJCP*, 21(3), 853.
- [36] Saleh, E. E., Jamli, M. M., Shahbodin, D. M., Pau, E., Periyathamby, H., Gobu, K., ... & Elhariri, S. (2021). Prevalence of Pap Smear among Female Health Personnel in Hospital Tuanku Ja'afar Seremban, Malaysia. *Asian Pacific Journal of Cancer Care*, 6(2), 189-196
- [37] Ranabhat, S., Tiwari, M., Dhungana, G., & Shrestha, R. (2014). Association of knowledge, attitude and demographic variables with cervical Pap smear practice in Nepal. *Asian Pacific Journal of Cancer Prevention*, 15(20), 8905-8910.
- [38] Saha, A., Chaudhury, A. N., Bhowmik, P., & Chatterjee, R. (2010). Awareness of cervical cancer among female students of premier colleges in Kolkata, India. *Asian Pac J Cancer Prev*, 11(4), 1085-90.

- [39] Heena H, Durrani S, AlFayyad I, Riaz M, Tabasim R, Parvez G, Abu-Shaheen A. Knowledge, Attitudes, and Practices towards Cervical Cancer and Screening amongst Female Healthcare Professionals: A Cross-Sectional Study.(2019). *J Oncol.* Oct 17;2019:5423130. doi: 10.1155/2019/5423130. PMID: 31772579; PMCID: PMC6854973.
- [40] Sopian, M. M., Shaaban, J., Yusoff, S. S. M., & Mohamad, W. M. Z. W. (2018). Knowledge, decision-making and acceptance of human papilloma virus vaccination among parents of primary school students in Kota Bharu, Kelantan, Malaysia. *Asian Pacific journal of cancer prevention: APJCP*, 19(6), 1509.