

Knowledge, attitudes, and willingness of adolescents towards coronavirus disease 2019 vaccine in Bangkok, Thailand

Manassanun Wirunpan

Department of Science and Mathematics, Satit Prasarnmit International Programme, Watthana, Bangkok, Thailand


Correspondence to: Manassanun Wirunpan, E-mail: medkao@gmail.com

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ABSTRACT

Background: The outbreak of coronavirus disease 2019 (COVID-19) was declared by the World Health Organization (WHO) as a COVID-19 pandemic on March 11, 2020. Therefore, the availability of vaccines will help develop immunity and protect people from this pandemic. The present systematic study examined knowledge, attitudes, and willingness of adolescents towards COVID-19 vaccine in Bangkok, Thailand. **Objectives:** The objective of the study was to evaluate the knowledge, attitudes, and willingness toward COVID-19 vaccine of key stage 4–5 students at Satit Prasarnmit International Programme in Bangkok towards COVID-19 vaccine. **Materials and Methods:** The study was conducted using an online questionnaire. A total of 136 students participated. Knowledge, attitudes, and willingness of adolescents toward the COVID-19 vaccine were assessed. Differences between outcomes and socio-demographic characteristics of participants were analyzed through independent *t*-tests and the ANOVA. The level of willingness to vaccinate against COVID-19 was analyzed by a generalized linear model. **Results:** Students revealed moderate knowledge about COVID-19, correctly answering 11.08 out of 15 points (SD = 1.74), a low level of attitudes toward COVID-19 vaccine 8.49 out of 15 points (SD = 2.51), and low level of willingness to vaccinate against COVID-19 vaccine 2.29 out of 5 points (SD = 1.26), in total of 35 points (28 questions). There are statistically significant positive correlations shown between attitude towards COVID-19 vaccine and the level of willingness to vaccinate against COVID-19 vaccine ($\beta = 0.384$, $P < 0.01\%$). **Conclusion:** This study revealed students in Satit Prasarnmit International Programme had moderate knowledge towards COVID-19, negative attitudes toward COVID-19 vaccine and low willingness to vaccinate against COVID-19. Furthermore, it indicates that there is a casual relationship between attitudes toward COVID-19 vaccine and the willingness of individuals to be vaccinated against COVID-19 vaccine. Thus, attitude toward COVID-19 vaccine acts as a major predictive factor toward the willingness to vaccinate against COVID-19 vaccine. Therefore, to increase people's willingness to be vaccinated against COVID-19 vaccine, it is necessary to increase people's attitude toward COVID-19 vaccine.

KEY WORDS: Coronavirus Disease 2019 Vaccine; Attitude Toward Vaccination Against Coronavirus Disease 2019; Adolescents

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INTRODUCTION

The existence of the coronavirus disease 2019 (COVID-19), also known as the Coronavirus disease originating from Wuhan, China as of December 1, 2019, has turned our world upside down. This infectious, airborne disease has inevitably changed our way of life. As of July 2, 2021, there have been

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3,954,324 reported deaths and 182,319,261 confirmed cases worldwide with no permanent solution in sight.^[1] Most of the world's population continue to live the "new normal" lifestyle, with screens in the place of real people, face masks, alcohol sprays and social distancing. However, multiple countries' populations had tentatively returned to their normal lives after having been vaccinated, an alternative to living the 'new normal'.^[2]

COVID-19 is caused by severe acute respiratory syndrome coronavirus 2 virus. The first reported case of COVID-19 was from Wuhan, China on December 1, 2019, before spreading across the world. On March 11, 2020, the World Health Organization (WHO) announced that COVID-19 can be defined as a pandemic.^[3] Regarding the spread of COVID-19, it has turned the world upside down. Everything has been impacted. This pandemic has inevitably caused changes towards our life, for example social interaction, economics, education, and the healthcare system.

So far, there have been three waves of COVID-19 in Thailand. One in January 2020, rooted from a female Wuhan resident who traveled to Bangkok. By April 22, 2020, the total cases from COVID-19 are 2826 and total number recovered is 2352 (83.29%), this makes Thailand ranked as the second-best country that can handle COVID-19.^[4] The second wave of COVID-19 started in December 2020 originating from the central shrimp market in Samut Sakhon. It was believed to be from Burmese migrant workers who illegally crossed the Thai-Burma borders. The third wave, however, was lethal. Starting from April 1, 2021 one Thonglor bar cluster became 99 clusters nationally in one day when 240,350 new cases were reported.^[5] Totally up to 271,000 cases in Thailand with 90% from this wave alone. With the death toll of 992 deaths by June it can be said that 95% of the reported deaths are from this third wave.^[6]

There are several measurements used to cope with the spread of COVID-19 such as lockdown, contact tracing, work from home, and social distancing. Although in the year 2021, Thai people have started to cope with a new normal lifestyle better, it cannot be denied that the number of new cases have started to rise. Therefore, vaccination is an alternative answer to end this pandemic. Vaccines are designed to generate an immune response that will protect the individual from future exposures.^[7] According to the WHO, it is important to evaluate people's attitude towards COVID-19 vaccine, introducing vaccination campaigns and raise people's demands and acceptance towards vaccination.^[8] In order to end this pandemic, 70% of the world's population, or about 5.6 billion people, will need to be vaccinated and to achieve this, a continuous rate of vaccination should be present in every country.^[9,10]

Vaccines contain weakened or inactive parts of the virus or messenger RNA (mRNA) that triggers an immune response

within the body. These weakened or inactive parts of the virus will not cause harm to the person being vaccinated, but it will simulate the person's body to respond as if they were actually infected by the actual pathogen. Therefore, when the person is exposed to the pathogen in the future, their immune system will be able to respond immediately, this helps protect the person against disease.^[7]

There are different types of COVID-19 vaccines; however, all types of vaccines stimulate the person's body to produce "T-Lymphocytes" and "B-lymphocytes" that will be able to respond to future exposure. The mRNA vaccine triggers cells to produce the coronavirus "spike" protein; the immune system recognizes this spike protein as foreign, so they respond by building antibodies. The viral vector vaccines contained a weakened and inactive virus that triggered cells to produce the coronavirus "spike." As our immune system recognizes this spike protein as foreign, they produce antibodies. The protein subunit vaccines contained an inactive virus that causes COVID-19. After vaccination, the immune system recognizes the protein as foreign; as a result, they stimulate the body to produce T-lymphocytes and antibodies.^[11] Therefore, vaccines help our immune system to fight the virus that causes COVID-19 when we are infected in the future.^[12]

As of July 6, 2021, 4.7% of the overall population in Thailand were fully vaccinated, which is 11,328,043 doses. At present, there are three vaccine brands available in Thailand which are Sinovac, AstraZeneca and Sinopharm.^[13] However, Pfizer will be distributed in Thailand towards the end of July for citizens aged 12–17 years old. As a result, people aged 12–17 will be the next group to receive the COVID-19 vaccine.^[14] Thus, it is important to study the attitudes and willingness towards COVID-19 vaccine of this age group. Therefore, this research aims to study knowledge, attitudes, and willingness toward COVID-19 vaccine of year 10–13 students, aged between 13 and 17 of Satit Prasarnmit International Programme, Bangkok, Thailand.

MATERIALS AND METHODS

This study is a cross-sectional observational study. An online questionnaire was purposely developed and made available through Google Forms between the 24th to the 30th of May 2021. It was sent to all Year 10 to Year 13 students enrolled in the academic year 2020/2021 in Satit Prasarnmit International Programme, Bangkok, Thailand. The survey was completely free and voluntary, and no personal data were collected from any participant. Moreover, the survey informed participants about the study's objectives and the ethical guarantee of confidentiality and anonymity which is stated in the informed consent also have the right to withdraw at any time. The permission from the Institutional Ethics Committee was approved before starting this study.

The questionnaire was developed based on a literature review including information provided by and guidelines from the WHO and Ministry of Public Health in Thailand regarding COVID-19. Studies have already studied the same topics and some similar items were used to assess and analyses. A preliminary draft of the survey was reviewed by three infection control specialists to ensure that it was validated. A small group of high school students was given the pretest to assess understanding and difficulty. The psychometric characteristics of the questionnaires were tested, as described in the statistical analysis subsection. The final version of the questionnaire contained 28 questions: Seven about demographic information of the respondents, 15 about the knowledge of respondents towards COVID-19 and COVID-19 vaccines, our about the attitude of respondents towards COVID-19 vaccines, and three about the respondent willingness towards the vaccines. The 21 items were divided into four sections.

Socio-demographic Information

The questions in the response consisted of age, gender, year level, parental occupation, background information about their chronic disease and if they know anyone that is/was infected with COVID-19. A number was assigned to each response for each question (e.g., for chronic disease, one was assigned to being diagnosed with chronic disease, and two was assigned for not being diagnosed with chronic disease).

COVID-19 Related Knowledge

The scale consisted of fifteen multiple-choice questions regarding the knowledge of COVID-19 vaccine, COVID-19 symptoms, background information about COVID-19, mode of transmission, chain of infection, preventative methods, COVID-19 vaccine brand, COVID-19 vaccine efficiency rate and death rate from COVID-19. The participants were asked to respond if they considered those statements as "True," "False" or "I don't know." A point was given for the correct answer, with 1 point was assigned to each correct answer, while providing an incorrect answer or responding "I don't know" received 0 point. The sum of all responses demonstrated the knowledge of individuals towards COVID-19; hence, a higher score indicates more knowledge.

Attitude towards COVID-19 Vaccine

This scale was composed of four items, and the response categories consisted of a five-point Likert scale (from 1-strongly unconfident to 5-strongly confident), with the highest score corresponding to a more positive attitude towards the willingness to vaccinate against COVID-19 vaccine.

Willingness to be Vaccinated against COVID-19 Vaccine

This scale was composed of three items which consisted of 1 five-point Likert scale, an open-response question towards

people's level of willingness to be vaccinated against COVID-19 vaccine and an open-response question in regard to which COVID-19 vaccine brand are they most willing to be vaccinated against. The five-point Likert scale is rated from 1-yes immediately to 5-not at all, with the highest score corresponding to a more positive attitude towards the willingness to vaccinate against COVID-19 vaccine.

Statistical Analysis

The analysis was performed using SPSS for Windows version 26. To analyze the psychometric of people's willingness towards COVID-19 vaccine: Socio-demographic informations, knowledge, attitudes toward COVID-19 vaccine, scale level of willingness to be vaccinated against COVID-19, an exploratory factor analysis, using principal component analysis with varimax rotation, was carried out. The descriptive studies were presented in absolute (n) and relative (%) frequencies, mean (M), and standard deviations (SD). To assess the differences between the outcome variables (knowledge, attitudes, and willingness to be vaccinated against COVID-19 vaccine) and the socio-demographic characteristics, considering the sample size, independent *t*-tests and the ANOVA were used, as appropriate. Pearson's correlation calculated the correlations between the outcomes of the study. Finally, a generalized linear model was calculated to determine the predictive variables of the willingness to vaccinate against COVID-19 vaccine. Exp (β) and the respective 99% confidence intervals (99% CI) were presented. Statistical significance was defined as $P < 0.01$.

RESULTS

This study comprised a total of 136 high school students. The socio-demographic information of the samples is presented in Table 1. Most high school students were female ($n = 106$, 77.9%). As presented in Table 1, the highest number of respondents are in year 12 ($n = 50$, 36.8%), followed by year 11 ($n = 36$, 26.5%), year 13 ($n = 34$, 25%), and year 10 ($n = 16$, 11.8%). The data also consisted of people with congenital diseases by ($n = 20$, 14.7%) compared to people without congenital disease ($n = 116$, 85.3%). Furthermore, there are more respondents reported to not know anyone with COVID-19 ($n = 99$, 72.8%) than respondents who do know ($n = 37$, 27.2%).

Students revealed a moderate knowledge about COVID-19, correctly answering a mean of 11.08 questions in a total of 15 (SD = 1.74). There were differences in the level of knowledge according to the sex of the students: Female students showed a higher level of knowledge ($\chi = 11.0$, SD = 1.67) compared to male students ($\chi = 11.10$, SD = 1.95). The differences in the year level of the students showed a difference in the knowledge: Year 10 ($\chi = 10.53$, SD = 1.50) showed the least knowledge compared to the highest knowledge from year

Table 1: Difference in outcomes according to the socio-demographic information of participants (n=136)

Socio-demographic characteristic	n (%)	Knowledge about COVID-19 (Range 0–15)		Attitude toward COVID-19 vaccine (Range 3–15)		Willingness to vaccinate against COVID-19 vaccine (Range 1–5)	
		Mean	SD	Mean	SD	Mean	SD
		11.08	1.74	8.49	2.51	2.29	1.26
Gender							
Male	30 (22.1)	11.00	1.95	9.30	3.25	2.63	1.43
Female	106 (77.9)	11.10	1.67	8.25	2.22	2.20	1.20
Year level							
Year 10	16 (11.8)	10.63	1.50	10.06	2.41	2.88	1.36
Year 11	36 (26.5)	10.94	2.04	8.56	2.52	2.44	1.32
Year 12	50 (36.8)	11.18	1.62	8.32	2.27	2.20	1.14
Year 13	34 (25)	11.29	1.62	7.91	2.66	2.00	1.26
Diagnosed with congenital disease							
No	116 (85.3)	11.18	1.73	8.59	2.47	2.30	1.27
Yes	20 (14.7)	10.50	1.61	7.85	2.70	2.25	1.21
Know anyone infected with COVID-19							
No	99 (72.8)	11.26	1.54	8.36	2.42	2.29	1.23
Yes	37 (27.2)	10.59	2.09	8.81	2.74	2.30	1.35

COVID-19: Coronavirus Disease 2019

13 ($\chi = 11.29$, $SD = 1.62$). Furthermore, people without congenital disease showed a higher level of knowledge about COVID-19 ($\chi = 11.18$, $SD = 1.73$) than people with congenital disease ($\chi = 10.50$, $SD = 1.61$). Data also showed that people who do not know anyone with COVID-19 showed a higher level of knowledge towards COVID-19 ($\chi = 11.26$, $SD = 1.54$) than people who know ($\chi = 10.59$, $SD = 2.09$).

Concerning attitudes toward COVID-19, students showed a low level of attitudes toward COVID-19 vaccine ($\chi = 11.08$, $SD = 1.74$), these being higher among males ($\chi = 9.30$, $SD = 3.25$) than females ($\chi = 8.25$, $SD = 2.22$). The attitudes toward COVID-19 vaccines were relatively higher in year 10 ($\chi = 10.06$, $SD = 2.41$) compared to the lowest in year 13 ($\chi = 7.91$, $SD = 2.66$). Furthermore, people with congenital disease have a lower attitude towards COVID-19 vaccine ($\chi = 10.50$, $SD = 1.61$) compared with those who do not have congenital disease ($\chi = 11.18$, $SD = 1.73$).

Regarding the willingness to vaccinate against COVID-19 vaccine, students showed a low level of willingness ($\chi = 2.29$, $SD = 1.26$). An analysis by sex showed that males are more interested into being vaccinated against COVID-19 vaccine ($\chi = 2.63$, $SD = 1.43$) compared to female ($\chi = 2.20$, $SD = 1.20$). In addition, year 10 students demonstrated the most interest in getting vaccinated against COVID-19 ($\chi = 2.88$, $SD = 1.36$) compared to the year 13 students ($\chi = 2.00$, $SD = 1.26$). However, the results showed that people who know someone with COVID-19 ($\chi = 2.30$, $SD = 1.35$) are no more or less willing to get vaccinated against COVID-19 vaccine compared with people who do not know someone with COVID-19 ($\chi = 2.29$,

$SD = 1.23$) since the results demonstrate significant differences of 0.01.

The analysis of the correlation between the outcomes of the study - attitudes and willingness to vaccinate against COVID-19 vaccine - revealed the existence of positive and statistically significant correlation ($r = 0.618^{**}$, $P > 0.01$) [Table 2].

Results from the generalized linear model indicated that the attitude toward COVID-19 vaccine had a statistically significant effect on the willingness to vaccinate against COVID-19 ($\beta = 0.384$, $P < 0.01\%$). Having a positive attitude toward the vaccines will lead to a higher level of willingness toward being vaccinated [Table 3].

Results from the multiple-choice question indicated that the main reason behind vaccine hesitancy is found to be the concerned over the unknown side effects (24.3%), followed by the lack of confidence in government (16.9%), personal reasons (11.8%), and their belief that they are not exposed to the diseases (0.7%) [Table 4].

Results from the multiple-choice question indicated that the COVID-19 vaccine brand that most people prefer to be vaccinated against is Pfizer (72.1%), followed by Johnsons and Johnsons (10.3%), Moderna (8.1%), Astra Zeneca (5.1%), and Sinovac (4.4%) [Table 5].

DISCUSSION

A total of 136 high school students of Satit Prasarnmit International Programme participated in this study. Most

Table 2: Pearson's correlation coefficient between the study outcomes

Variable	Knowledgeabout COVID-19	Attitude towards COVID-19 vaccine	Willingness to vaccine
Knowledge about COVID-19	1		
Attitude towards COVID-19 vaccine	0.099	1	
Willingness to vaccinate against COVID-19 vaccine	0.064	0.618**	1

**Correlation is significant at 0.01, COVID-19: Coronavirus Disease 2019

high school students were female ($n = 106$, 77.9%), currently studying in year 12 ($n = 50$, 36.8%), do not have congenital disease ($n = 116$, 85.3%), and do not know anyone infected with COVID-19 ($n = 99$, 72.8%). The mean knowledge score on COVID-19 was 11.08 questions in a total of 15 (SD = 1.74). This indicates a moderate level of knowledge toward COVID-19. The level of attitudes towards COVID-19 vaccine demonstrated a low level ($\chi = 11.08$, SD = 1.74). Regarding the willingness to vaccinate against COVID-19 vaccine, students showed a low level of willingness ($\chi = 2.9$, SD = 1.26).

Regarding to knowledge towards COVID-19, similar findings were found in a study by Petpaiboon (2021) who studies knowledge, attitudes and preventive behaviors toward COVID-19 among high school students, the mean score toward COVID-19 knowledge was 5.22 suggesting a moderate understanding.^[15] The similarity between the finding can be attributed to the study population as both were high school students. On the other hand, a study in Phayao Province of Thailand by Glomjai *et al.* (2021) had demonstrated high knowledge towards COVID-19 (average score of 79.50%).^[16] The difference between the findings of knowledge may be because 93.88% of the study population included in the study were aged 20 years old and above, while our study consisted of high school students currently studying in an International Programme. In addition, it is reported that the respondents from Glomjai *et al.* study received information about COVID-19 from the Center for the Outbreak of Coronavirus Disease Management 2019, while the respondents from our study received information from social media and parents. This may be attributed to the reason that social media and parents might be less reliable sources of information compared to the Center for the Outbreak of Coronavirus Disease Management 2019. The results found that as the Year level increases, higher knowledge towards COVID-19 was found. Year 13 showed the highest score ($\chi = 11.29$, SD = 1.62) compared to Year 10 who scored the lowest ($\chi = 10.63$, SD = 1.50). The results toward gender differences indicate that the mean score of the COVID-19 related knowledge of female students was higher ($\chi = 11.10$, SD = 1.67) than the male students of Satit Prasarnmit International Programme ($\chi = 11.00$, SD = 1.95). Similar finding was present in a study towards knowledge, attitudes, and practice (KAP) in Chinese primary school students by Xue *et al.* (2021). A relatively higher portion of participants' score increases as the grade level increases, and girls were found to have significantly higher KAP scores than

boys.^[17] The similarity in results can be attributed to the study population as both were all students.

In our study, results regarding the attitude toward COVID-19 vaccines is low ($\chi = 8.49$, SD = 2.51). This may be because the main reason behind COVID-19 vaccine hesitancy is their concern towards the unknown side effects ($n = 33$, 24.3%). This finding is similar to the study of attitudes towards COVID-19 Vaccination among Hospital Staff in Belgium by Spinewine *et al.* (2021), which also demonstrates a low attitude towards COVID-19 vaccines as people are concerned with the unknown side effects of the vaccine.^[18] Moreover, a study of attitude towards vaccines and intention to vaccinate against COVID-19 in England by Paul *et al.* (2020) also finds similar results as the main reasons behind people's hesitancy and unwillingness toward COVID-19 vaccine is due to the unknown negative side effects of the vaccine.^[19] The similarity between the finding may be because the time for vaccine development is very short, so it is not yet possible to determine the long term possible side effects. From Table 1, the data show that people who know someone infected with COVID-19 have higher attitudes toward COVID-19 vaccine ($\chi = 8.81$, SD = 2.74) compared to those who do not know anyone infected with COVID-19 ($\chi = 8.36$, SD = 2.42). A similar result is found in a study towards the willingness to take COVID-19 vaccine among people most at risk of exposure in Southern Ethiopia by Zewude and Habtegiorgis. (2021), as people who have a close relative or friend infected by COVID-19 demonstrated a more positive attitude toward the COVID-19 vaccine than people who do not.^[20] In addition, the results further indicated that people who have a close friend or relative who died of COVID-19 have developed the highest positive attitude towards the COVID-19 vaccine compared to those who do not.^[20] Moreover, a study toward vaccine hesitancy by Davies. (2020) supported the results as it stated that the reasons behind vaccine hesitancy may be caused by individuals having no personal experience of people in their proximity having been critically ill or passing away as a result of COVID-19.^[21] The similarity between the results can be explained by the attitude-to-behavior process model.^[22] Since there is an event that triggers an attitude of the person towards COVID-19, therefore people who know someone that got infected by COVID-19 have a higher attitude towards COVID-19 vaccine. Referring to Table 1, respondents with chronic diseases have a lower attitude towards COVID-19 vaccine and are more unwilling to vaccinate against COVID-19 vaccine compared to respondents without chronic diseases.

The result is similar to a study towards the willingness to vaccinate against COVID-19 among Bangladeshi adults by Abedin *et al.* (2021) as it also found that the proportion of vaccine unwillingness were higher for respondents with chronic diseases than respondents without chronic diseases.^[23] Another study toward Factors Affecting COVID-19 Vaccine Acceptance: An International Survey among Low- and Middle-Income Countries by Bono *et al.* (2021) also finds that the presence of chronic diseases demonstrates a lower level of willingness to be vaccinated against COVID-19.^[24] The reason for the similarity might be because people with chronic disease have weaker immune systems; therefore, they might feel scared that their symptoms might get worse after vaccination. However, a study conducted among participants with chronic diseases about their perceptions towards COVID-19 risks and vaccination by Ricotta *et al.* (2021) suggested that respondents who reported chronic respiratory diseases were 5.7% more willing to be vaccinated than healthy respondents.^[25] This difference in result may be because of the study population as the data collected in this study is from the United States; however, our study collected results from Thai high school students. Referring to the level of willingness to vaccinate against COVID-19 of students in Satit Prasarnmit International Programme, Bangkok, Thailand students show that there is a low level of willingness to vaccinate against COVID-19 ($\chi = 2.29$, $SD = 1.26$). Regarding gender differences, it can be identified that male students of Satit Prasarnmit International Programme are more willing to vaccinate against COVID-19 vaccine ($\chi = 2.63$, $SD = 1.43$) than the female students ($\chi = 2.20$, $SD = 1.20$). The rationale behind this may be due to the level of knowledge and attitude of the male students as results showed that male students have lower knowledge towards COVID-19 compared to the female students; therefore, their attitude toward COVID-19 vaccine is higher. Moreover, the same pattern is found in the differences between year levels. Year 13 scored higher towards the knowledge of COVID-19; therefore, their attitude toward COVID-19 vaccine is lower. Referring to Table 1, Year 13 had demonstrated the lowest level of willingness to be vaccinated against COVID-19 vaccine ($\chi = 2.00$, $SD = 1.26$). On the contrary, the year 10 students had shown the lowest knowledge score among other year groups, so, their attitude score showed the highest, therefore their response towards their willingness to vaccinate against COVID-19 vaccine is the highest ($\chi = 2.88$, $SD = 1.36$). A similar pattern is found in a study of attitude towards vaccines and intention to vaccinate against COVID-19 in England by Paul *et al.* (2020) as this study also found that negative attitudes towards vaccines leads to a 5 times higher relative risk of being unwilling to get COVID-19 vaccine.^[19] This may be related to the rationale that one of the factors contributing towards one willingness is their attitude. Because both study participants show a low level of attitudes, their willingness towards COVID-19 vaccine is low.

The strength of the study is that it uses Google forms to collect results. As a result, it is a simple, cost-effective tool and

follows the government guideline of social distancing as it is conducted digitally. Nevertheless, few limitations were found in this study. The questionnaire was given to Satit Prasarnmit International Programme students during the third wave of COVID-19 in Thailand (April to June 2021). Therefore, this data are collected through Google Forms, and it is distributed electronically using Google hangout. Moreover, the data are collected through an online platform, which can result in some bias especially in the knowledge scale as there is no guarantee that students did not search for the answers.

CONCLUSION

This study revealed students in Satit Prasarnmit International Programme had moderate knowledge toward COVID-19, negative attitudes toward COVID-19 vaccine and low willingness to vaccinate against COVID-19. Furthermore, it indicates that there is a casual relationship between attitudes towards COVID-19 vaccine and the willingness of individuals to be vaccinated against COVID-19 vaccine. Thus, attitude toward COVID-19 vaccine acts as a major predictive factor towards the willingness to vaccinate against COVID-19 vaccine. Therefore, to increase people's willingness to be vaccinated against COVID-19 vaccine, it is necessary to increase people's attitude toward COVID-19 vaccine. According to Table 4, students are most concerned about the unknown side effects, so schools can provide more information about side effects after vaccination. It also should be noted that people with chronic disease have lower willingness to be vaccinated with COVID-19, but they are

Table 3: Generalized linear model predicting the willingness to vaccinate against COVID-19 vaccine

Variable	B	SE	Beta	Sig
Intercept	-0.591	0.917		0.522
Diagnosed with congenital disease	0.231	0.258	0.084	0.374
Know anyone who is infected with COVID-19	-0.155	0.205	-0.078	0.453
Knowledge about COVID-19	0.109	0.055	0.207	0.051
Attitude towards COVID-19 vaccine	0.154	0.041	0.384	0.000

COVID-19: Coronavirus Disease 2019

Table 4: Frequency distribution of reasons for hesitancy to take the vaccine

Reasons for Vaccine Hesitancy	Responses		Percent of Cases (%)
	n	Percent	
Concerned about the unknown side effects	33	24.3	45.2
Lack of confidence in the government	23	16.9	31.5
Personal reasons	16	11.8	21.9
Believed that they are not exposed to the disease	1	0.7	1.4
Total	73	53.7	100

Table 5: Frequency distribution of vaccine brand preferences

Vaccines brand	Frequency	Percent
Pfizer	98	72.1
Johnsons and Johnsons	14	10.3
Moderna	11	8.1
AstraZeneca	7	5.1
Sinovac	6	4.4
Total	136	100

most required for the vaccination. Hence, schools should address the fears and concerns toward this group and increase awareness about vaccine safety as well as the reasons why COVID-19 vaccines are necessary.

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