American Journal of Nursing Science
2022; 11(6): 182-191
http://www.sciencepublishinggroup.com/j/ajns
doi: 10.11648/j.ajns.20221106.13
ISSN: 2328-5745 (Print); ISSN: 2328-5753 (Online)

Assessment of the Students' Knowledge and Attitude Regarding the Importance of COVID-19 Third-Dose Vaccines

Sabah Mahmoud Mahran, Amal Nouh Almutairi, Elaf Abdulmuin Alsahafi, Boshra Saeed Alghamdi, Jumana Abdulmajeed Mohammed

Public Health Department, King Abdulaziz University, Jeddah, Saudi Arabia

Email address:

smahran@kau.edu.sa (Sabah Mahmoud Mahran)

To cite this article:

Sabah Mahmoud Mahran, Amal Nouh Almutairi, Elaf Abdulmuin Alsahafi, Boshra Saeed Alghamdi, Jumana Abdulmajeed Mohammed. Assessment of the Students' Knowledge and Attitude Regarding the Importance of COVID-19 Third-Dose Vaccines. *American Journal of Nursing Science*. Vol. 11, No. 6, 2022, pp. 182-191. doi: 10.11648/j.ajns.20221106.13

Received: November 18, 2022; **Accepted**: December 19, 2022; **Published**: December 29, 2022

Abstract: Background A highly contagious illness called COVID-19 mostly affects people's respiratory systems and vaccines are the most cost-effective technique for controlling infectious diseases. Aim: The study aimed to assess the knowledge and attitude regarding the importance of the COVID-19 third-dose vaccine among preparatory year students at King Abdelaziz University. Subjects and Methods: Quantitative cross-sectional descriptive design was used. Data was collected virtually by using the Google online form questionnaire. Non-probability, purposive sampling technique was used from 293 KAU students. Results: In total, 293 studied sample participants were in this research. Out of the total, 70% (n=205) were female and 30% (n=88) were male. The findings revealed that 52.2% of students reported moderately agreeing regarding their knowledge of the importance of the COVID-19 Vaccine. Also, the results showed that the overall responses of students were agreeing regarding their attitude toward the third dose of the COVID-19 Vaccine with mean = of 2.58 as reported. In conclusion, there is a statistically significant difference between socio-demographic characteristics (gender) with students' attitudes and knowledge regarding the COVID-19 third dose at (p-value= 0.03). The findings recommend applying prevention strategies for preparatory year students in a university. To improve student knowledge about booster doses, instructional activities and videos should be produced and delivered during the orientation day.

Keywords: COVID-19 Third Dose, Attitude, Knowledge, Vaccine, Nursing Students

1. Introduction

1.1. Background

COVID-19 is a disease caused by Coronavirus 2 (severe acute respiratory syndrome) (COVID-19) a highly infectious disease that mostly affects patients' respiratory systems [1]. The initial instances of COVID-19 were linked to an animal market in Wuhan, China [2].

Recently the World Health Organization [3] reported that COVID-19 there have been 494,587,638 confirmed cases of COVID-19, including 6,170,283 deaths globally. Whereas the Saudi Ministry of Health COVID-19 has been confirmed in 751,717 people, with 9,055 of them dying since the pandemic started [4]. The most common manifestations of COVID-19 are fever, cough, exhaustion, and loss of taste or smell (WHO, 2022). While the risk factors for serious and life-threatening disease progression are old age, obesity, diabetes, and hypertension [6].

Vaccines are the most cost-effective technique for controlling infectious diseases, as they minimize morbidity and mortality (7]. KSA planned to administer COVID-19 inoculation to its population once a reliable and effective vaccine became available as part of its continuous attempts to contain the pandemic. The Food and Drug Authority of Saudi Arabia (SFDA) granted emergency use authorization to the Pfizer-BioNTech COVID-19 vaccine on the same day that the Phase III study was released [8].

A substantial and expanding body of literature has examined the COVID-19 vaccination from various aspects.

Few studies have explored the knowledge and attitude regarding the COVID-19 vaccine. Nine kinds of literature were found [17; 10; 9; 14; 13; 12; 15; 11& 16). Most of the studies were carried out in the Middle East. Most of the literature was conducted in community settings targeting the public population. Nevertheless, some of them targeted specific groups.

Vaccine reluctance has been identified as a major concern to global public health across many studies [16, 15,14]. As well as a significant impediment to COVID-19 immunization efforts [14]. According to a study, persuading people to obtain the COVID-19 vaccine is based on several factors, including misconceptions, illiteracy, and distrust in the health system, as well as vaccine effectiveness and safety [15]. However, despite the underlying faith in the local system, a study reveals that the large dissemination of misinformation caused by the COVID-19 pandemic, as well as easy access to multiple media outlets can impair vaccine adoption [11].

In a study that was carried out in Ethiopia, the study goal was to look at the adult population of Ethiopia's knowledge, attitudes, acceptability, and predictors of acceptance of the COVID-19 vaccine, where the number of participants was 492. The finding of the study was that the percentages of those with good information, a positive attitude, and the desire to receive the COVID-19 vaccine were 74 percent, 44.7 percent, and 62.6 percent, respectively. As a result, government-sponsored health education and communication are critical tools for overcoming public opposition to the COVID-19 vaccine [8]. One more study was done in South Korea; the goal of this study was to see how immigrants responded to the COVID-19 vaccine. 463 immigrants participated in the study. This study discovered that people's perceptions toward COVID-19 immunization were mostly favorable. COVID-19 immunization was guaranteed to 55.3 percent of immigrants. Only 36.7 percent said the COVID-19 vaccination was safe. 72.6 percent of immigrants had a positive attitude toward COVID-19 immunizations, while 27.4% had a negative attitude. Lastly, to improve vaccine acceptability, up-to-date, accurate information about COVID-19 vaccine safety is needed, as well as vaccine risk communication tactics [10].

The research was done in Oman. The purpose of the study was to assess knowledge, attitudes, and practice regarding COVID-19 vaccines. The Finding indicates COVID-19 symptoms, mechanism of transmission, and attitudes toward the disease were all appropriate; 88.4% had heard of the vaccine, 59.3% would recommend it to others, 56.8% would take it themselves, and 47.5 percent would take a second dose. The readiness to accept the vaccine was influenced by the history of chronic disease, the source of vaccine knowledge, and the level of education [11].

Also, the study was done to learn more about Jordanian healthcare personnel's knowledge, and attitudes about the COVID-19 vaccine, two private hospitals in Amman were included, the sample was n = 341 healthcare workers, and the findings were that the COVID-19 vaccination was substantially more likely to be taken up by health care professionals who had received the seasonal flu vaccine. Physicians were substantially more likely than nurses to take or register for immunization. Lack of confidence, insufficient understanding, and unbelief in the effectiveness of vaccines are the most prominent causes of vaccine apprehension among the study participants [12]. Besides that, a study was conducted in Egypt, aiming to assess the participant's knowledge, attitudes, and practices regarding the coronavirus vaccine. A total of 871 people (465 women) took part, and 81 percent of them were still committed to taking cautious measures to protect themselves. Overall, the study participants had an excellent understanding of the coronavirus vaccine and were willing to take it, indicating admirable efforts to combat the virus [13]. In addition, a study conducted in Jordan on the community population aims to look at the acceptance of COVID-19 vaccines and their predictors, as well as public perceptions of these vaccines. A total of 3,100 participated. The result of this study showed that Jordan ranked among the lowest countries in terms of COVID-19 vaccine acceptability, with 36.3 percent of Jordan's population refusing to be vaccinated and 26.3 percent undecided. This reluctance was linked to vaccine safety concerns as well as expense [14].

A study was implemented in Saudi Arabia, targeting medical students from several universities (n=1445), and the goal was to investigate medical students' knowledge and attitudes concerning the COVID-19 vaccination as well as to compare knowledge levels across preclinical and clinical years. The findings showed preclinical students had relatively little understanding and considerably negative attitudes concerning the COVID-19 vaccine. Medical students agreed that developing and administering the COVID-19 vaccine is critical. Whereas Approximately 33.3 percent (n=481) of individuals were vaccination hesitant, and shockingly, nearly half of them (48.6%) believed the COVID-19 vaccine was involved in a conspiracy; the bulk of them were pre-clinical researchers (97.9 percent) [15]. Another study was carried out in the kingdom of Saudi Arabia on the public population (n: 1599). The goal of this study was to determine how well Saudi Arabians knew about and felt about the COVID-19 vaccine. The overall response of research participants indicates that the COVID-19 vaccination is well received by the public. The majority of those who took part in the study were aware that COVID-19 infection differs from individual to individual, that the vaccine is safe, and that vaccination is required [16]. In a different study conducted in Jazan, 655 people were involved in the study. The goal of the study is to evaluate community attitudes and perceptions of the COVID-19 vaccine. The findings of the study showed that most of the participants in this study (67 percent) were female, with a median age of 23 years. 67 percent of study participants had favorable views of COVID-19 vaccines. In conclusion significantly linked to having previously received the influenza vaccine and trust in the current healthcare system [17].

A scarcity of information regarding the Coronavirus vaccine among students in the preparatory year in terms of

knowledge and attitude was found. For this reason, this study aims to assess the level of knowledge and attitude regarding the importance of the COVID-19 third-dose vaccine among preparatory students at King Abdulaziz University.

1.2. Aim of the Study

The study aimed to assess the knowledge and attitude regarding the importance of the COVID-19 third-dose vaccine among preparatory students at King Abdelaziz University.

2. Materials and Methods

2.1. Research Design

A quantitative cross-sectional descriptive design was used to assess the knowledge and attitude regarding the importance of the COVID-19 third-dose vaccine among preparatory year students.

2.2. Study Setting

This study was contributed to King Abdulaziz University in Jeddah preparatory year female and male section. This University is Characterized by having (82152) students from different nationalities and backgrounds this university contains 19 different faculties and gives varying degrees including diploma, bachelor, master, and Ph.D. degrees. The reason behind selecting this university is that it is one of the biggest universities in Saudi Arabia. King Abdulaziz University entered the list of the top (200) universities in the world, and this classification was in the year 2020-2021, as a result of its publication on the World University Rankings website (QS), and it was ranked number (143) in the classification, it is worth noting that this university - according to the Academic Ranking of World Universities (ARWU) academic classification of universities in the world - has outperformed itself and many universities by ranking first in the Arab world.

2.3. Sampling and Sample Size

Participants were recruited from King Abdulaziz University in Jeddah. Non-probability, purposive sampling technique was used. The inclusion criteria were (a) Female and male students. (b) Students in the preparatory year. Because of the limited time in conducting this study, the exclusion criteria were (a) Students who are not in the preparatory year. (b) Students who are studying in the medical field. The researchers used the raw soft sample size calculator to calculate the sample size in this research and it's estimated that the study's minimal sample size was (289) which can be obtained by fixing an error ($P< 0.05$) with a minimum level of (95) percent confidence while the people who filled the questionnaire were (293) participants.

2.4. Instrumentation

In this study, the researchers used an adapted questionnaire from [9]. COVID-19 Vaccine knowledge, attitude, acceptance, and determinants of COVID-19 Vaccine Acceptance among Ethiopian Adults. It is worth noting that the tool was modified by the researchers to be more specific about the knowledge and attitude toward the third dosage of the COVID-19 vaccine. Three sections make up the questionnaire. Part A includes socio-demographic characteristics (5 items) age, sex of respondents, did you receive the initial and the second dose of the Coronavirus vaccine, do you live in Jeddah or not, and marital status. Part B includes the knowledge of COVID-19 third dose among the participants (7 items) the participants' responses for this part was Measured by using a 2-point scale as follows: no= (1), yes= (2) Yes. Part C includes the attitude of the participants regarding the third COVID-19 vaccine dosage (7 items) Using a 3-point scale, the participants' replies for this section were measured as follows: (2) =Agree, (1) =Disagree and (0) = undecided. The researchers decided to use a small questionnaire that does not take more than five minutes because the goal of the researchers was to gather many volunteers in a little period. The questionnaire was written in Arabic because it's the mother tongue in Saudi Arabia, thereupon the people will understand it more easily and it will take less effort to fill out the questionnaire.

2.5. Data Collection Procedure

There are a variety of ways to acquire primary data, one of which is to utilize a questionnaire, which was the one used in this research. The participants were approached online using social media including (What is App, Twitter, and email). There were no incentives for respondents to participate. The questionnaire was distributed using an online google forms tool and the data collection starts from March 2022 to April 2022. The questionnaire was composed of socio-demographic characteristics, the respondents' level of knowledge about the third COVID-19 vaccine, and their level of attitude toward the third COVID-19 vaccine.

2.6. Data Analysis

Descriptive analysis in Statistical Package for Social Sciences (SPSS) version 26's was used to analyze the data as percentages and frequencies. knowledge and attitudes of males and females toward the third dose of the COVID-19 vaccine were compared using the T-test. The Analysis of Variance (ANOVA) test was used to determine whether the participant's marital status, age, knowledge, and attitude toward the COVID-19 third-dose vaccine were linked.

2.7. Ethical Considerations

From the nursing faculty, ethical approval was received. Furthermore, the participants did not suffer any harm, and their rights were respected and protected. Researchers strive to uphold their ethical obligation to protect the privacy and information of participants. Researchers have gathered and accessed information about participants while maintaining their anonymity. No identifiable information or data can

indisputably jeopardize the participants' confidentiality. Participants in the study were informed of its goal and purpose by writing the study's purpose on the first page of the google form.

3. Results

3.1. Demographic Characteristics of Study Participants

The demographic characteristics of the respondents are illustrated in Table 1 as well as Figures 1, 2, 3, 4, and 5 show various perspectives. In sum, 293 participants were in this research. Out of the total, 70% were female and 30% were male. The participant's age was specified as follows: (85%) were aged 18 – 22, (6%) were aged 23-26, (7%) were aged 27-30, and (4.8%) were aged more than 30. Among the overall number of subjects, 91.1% were single, 7.2% were married and 1.7% were divorced. 95.6% of the respondents were Jeddah residents, while 4.4% were not. 99% have received the first and second doses of the Coronavirus vaccine.

Table 1. *Demographic characteristics of research participants (n=293).*

Variables	categories	Frequencies	percent
Sex	Male	88	30.0
	Female	205	70.0
Age	From 18 - 22	249	85.0
	From 23 - 26	28	9.6
	From 27 - 30	2	0.7
	More than 30	14	4.8
Marital status	Single	267	91.1
	Married	21	7.2
	Divorced	5	1.7
Do you live in Jeddah or not	Yes	280	95.6
	No	13	4.4
Did you receive the initial dose and second of the Coronavirus vaccine?	Yes	290	99.0
	No	3	1.0
		1465	500.1

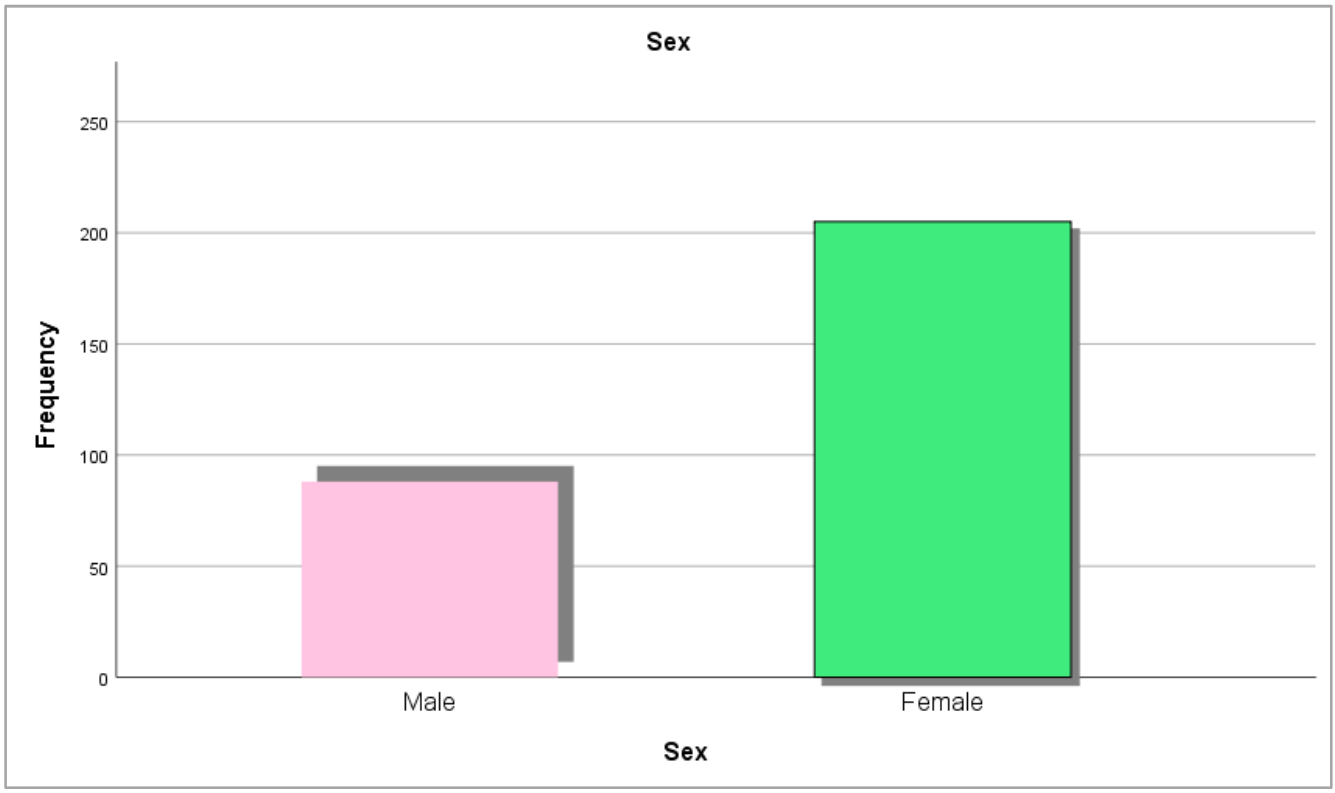

Figure 1. *SEX.*

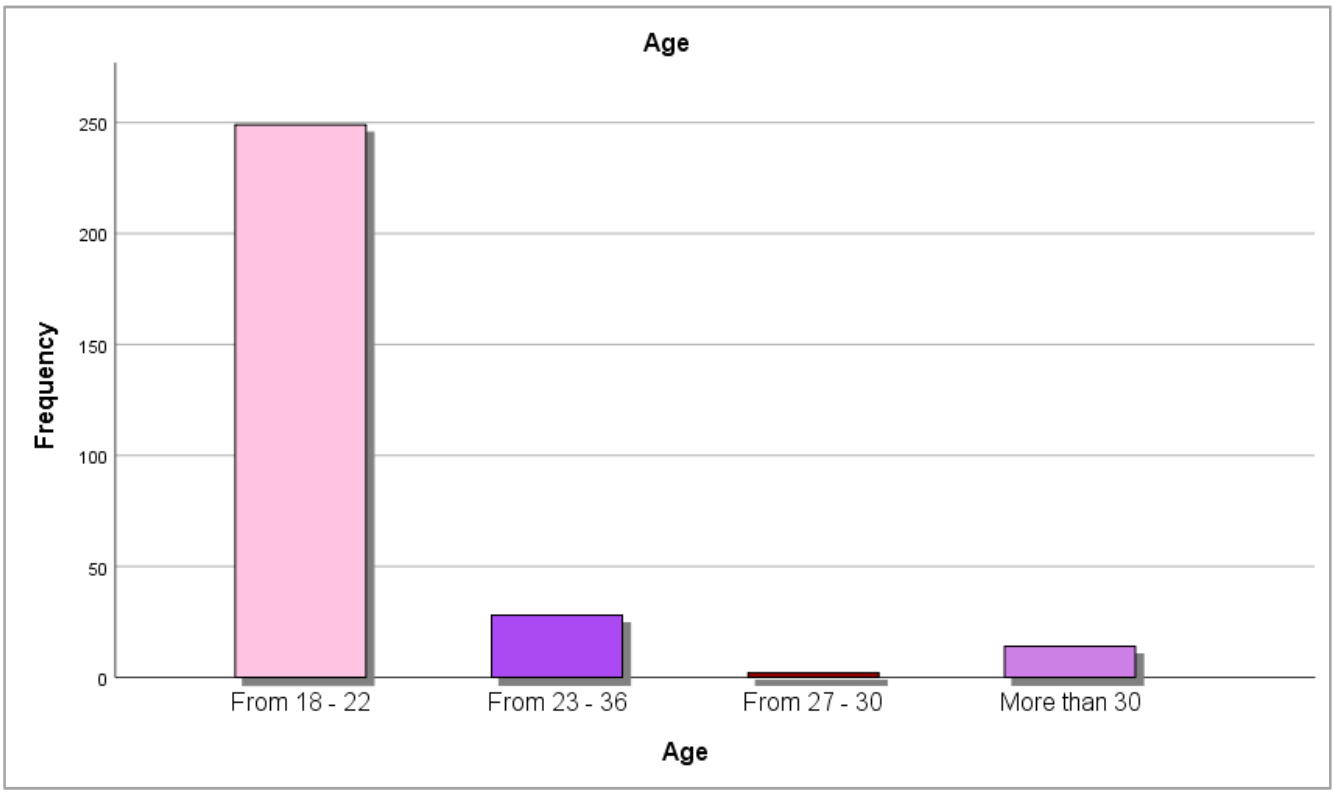

Figure 2. *Age group.*

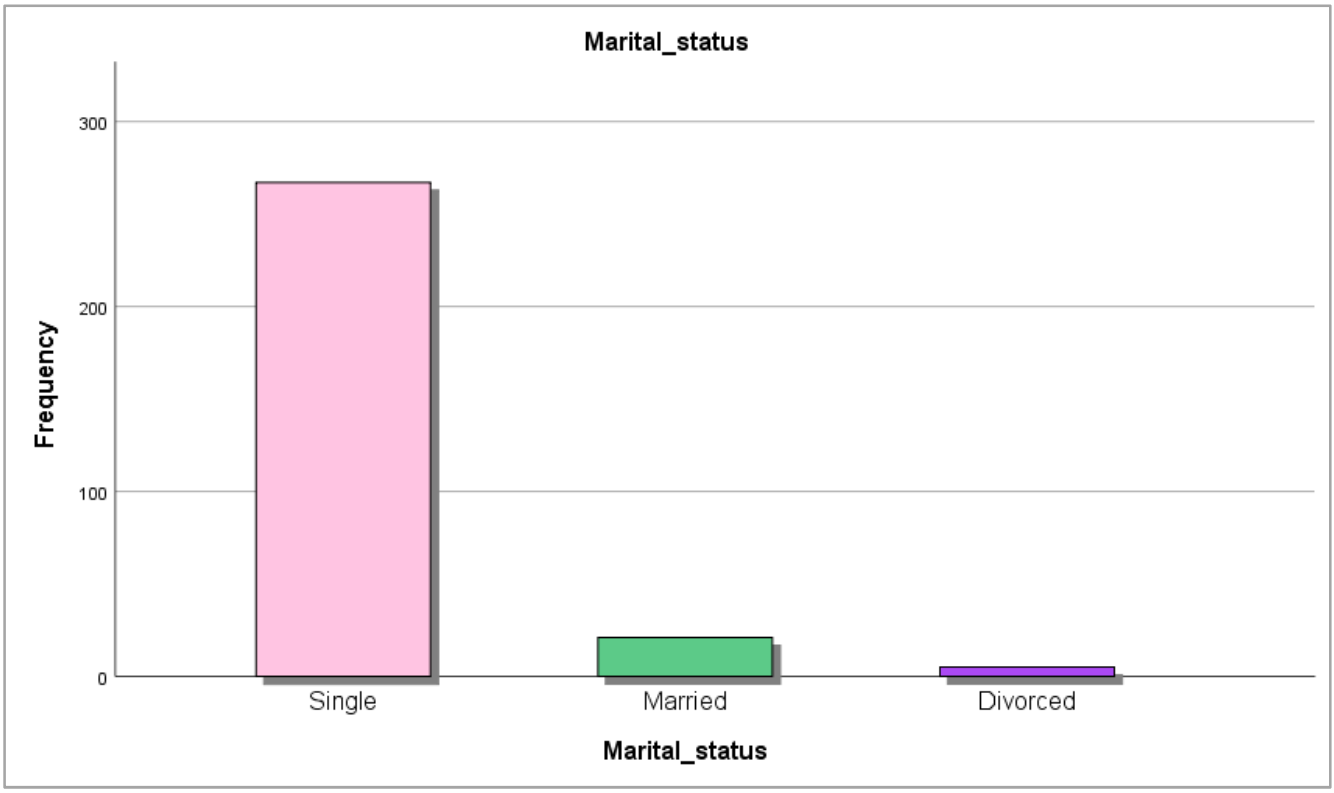

Figure 3. *Marital status.*

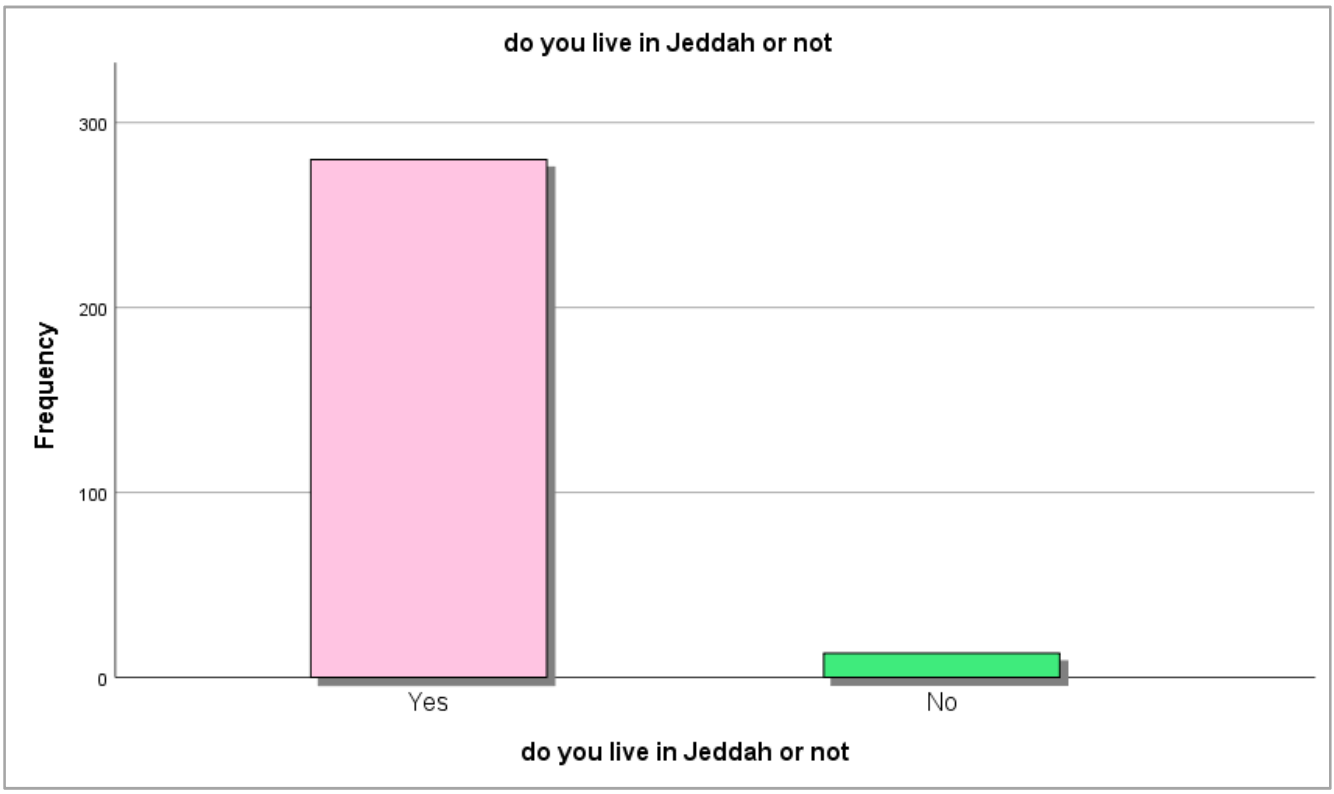

Figure 4. *Place of residence.*

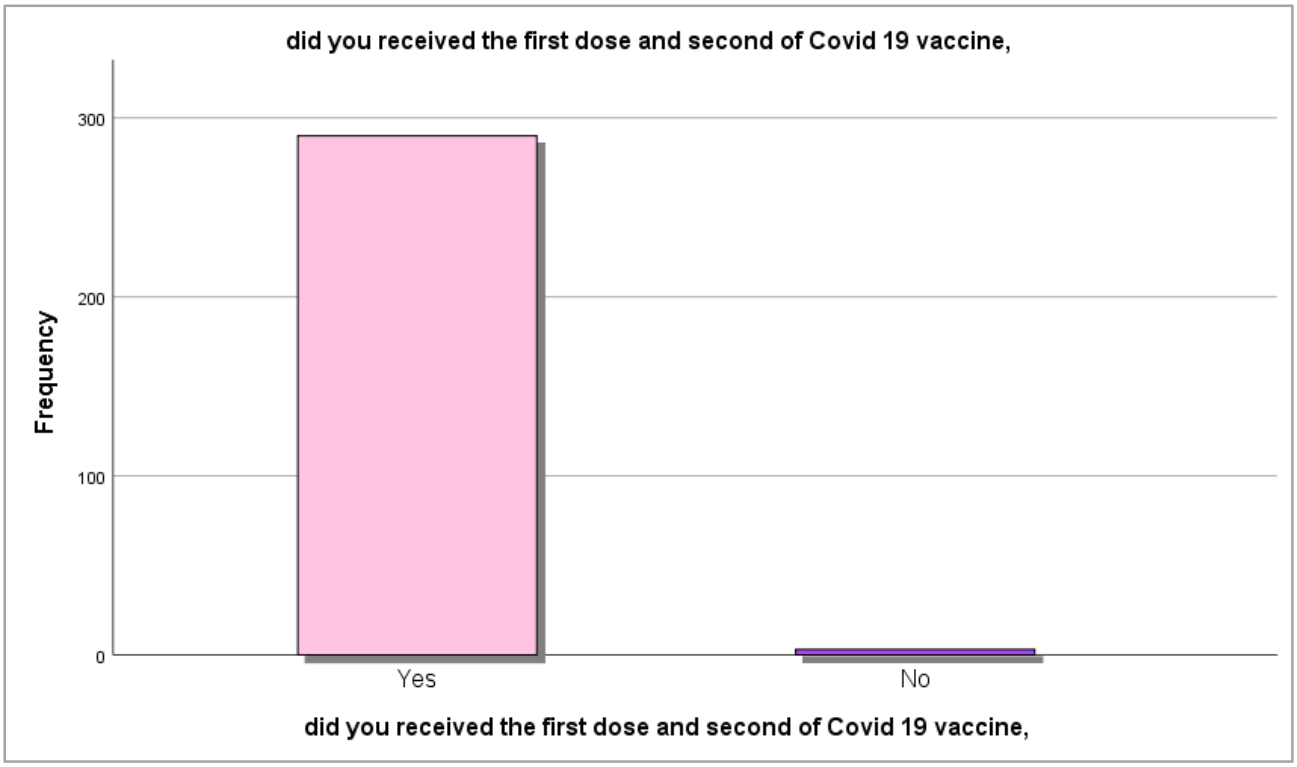

Figure 5. *Vaccine Dose.*

3.2. Participant's Knowledge About the Third Dose of the COVID-19 Vaccine

The results revealed that the mean of knowledge towards the third dose of the Coronavirus Vaccine is moderate with a percentage of 52.2. While 59% of the respondents have information on the coronavirus vaccine's progress. Additionally, 63.8% of the studied participants were familiar

with the COVID-19 Immunization effectiveness. 63.5% of the respondents reported, that using an excessive number of COVID-19 vaccinations is risky. Whereas 65.9% of the participants responded that the COVID-19 vaccine did not cause an increase in allergic reactions. (62.1%) do understand why the third dosage of the COVID-19 vaccination is important. (66.6%) that the COVID-19 vaccine would not make the autoimmune disease more common according to the participants. (50.0%) of the respondents do not have a good knowledge of the COVID-19 vaccine see Table 2.

Table 2. *Number and percentage of preparatory students' knowledge regarding the third dose of the COVID-19 vaccine.*

SN	Knowledge	N=293			
		Yes	%	No	%
1	Do you have any information on the coronavirus vaccine's progress?	173	59.0	120	41.0
2	Are you familiar with the COVID-19 Immunization effectiveness?	187	63.8	106	36.2
3	Is using an excessive number of COVID-19 vaccinations risky?	186	63.5	107	36.5
4	Does coronavirus Immunization increase allergic reactions?	100	34.1	193	65.9
5	Do you understand why the third dosage of the COVID-19 vaccination is important?	182	62.1	111	37.9
6	Are autoimmune diseases more common after vaccination?	98	33.4	195	66.6
7	Do you think that you have a high knowledge of the Coronavirus vaccine?	145	49.5	148	50.5
Mean		153	52.2	140	47.8

3.3. Factors Associated with the Knowledge Regarding the Importance of COVID-19

Based on the findings, there is no noticeable difference in the knowledge regarding the importance of COVID-19 third dose according to sex, age, marital status, and receiving the initial and the second doses of the coronavirus Immunization, where the p-value for all $p \leq 0.05$ see Table 3.

Table 3. *Knowledge-associated factors.*

	Test	Statistic	p-value
Sex	Independent t-test	1.464	0.146
Age	One-way ANOVA	1.537	0.205
Marital status	One-way ANOVA	1.400	0.248
Did you receive the initial dose and second of the coronavirus Immunization?	Independent t-test	0.967	0.334

The significant level at $p \leq 0.05$
*= significant **= highly significant

3.4. Participant's Attitudes About the Third Dose of the Coronavirus Vaccine

The results showed that the overall student's responses were agreeing regarding their attitude towards the third dose of the coronavirus Vaccine with a mean of 2.58. The most agreed item is (I think respondents' overall attitudes on the coronavirus disease vaccine are good) with a mean of 2.46. Then (do you mind urging your family, acquaintances, and relatives to receive the third dosage of the vaccine?) with a mean of 2.35. Then (Is the recently discovered third COVID-19 vaccination safe?) with a mean of 2.31. Then (does the recently discovered third dose of the coronavirus vaccine prove essential for us?) with a mean of 2.28. Then (without vaccination, it is impossible to lower the incidence of the coronavirus.) with a mean of 2.25. Then (are Americans made a third of the coronavirus vaccinations more secure than those produced in other countries?) with a mean of 1.9 back to Table 4.

Table 4. *Mean and standard deviation of preparatory student's attitude regarding the third dose coronavirus vaccine.*

Attitude	Disagree	Undecided	Agree	mean	SD (±)
Is the recently discovered third COVID-19 vaccination safe?	53	95	145	2.31	±0.761
	18.1	32.4	49.5		
Does the recently discovered third dose of the coronavirus vaccine prove essential for us?	73	65	155	2.28	±0.838
	24.9	22.2	52.9		
Are American-made thirds of the coronavirus vaccinations more secure than those produced in other countries?	90	142	61	1.9	±0.712
	30.7	48.5	20.8		
Do you mind urging your family, acquaintances, and relatives to receive the third dosage of the vaccine?	65	60	168	2.35	±0.821
	22.2	20.5	57.3		
Without vaccination, it is impossible to lower the incidence of the coronavirus.	83	55	155	2.25	±0.869
	28.32765	18.77133	52.90102		
I think respondents' overall attitudes on the coronavirus disease vaccine are good.	46	67	180	2.46	±0.751
	15.7	22.9	61.4		
Attitude means	2.58				
N	293				

3.5. Factors Associated with the Attitude Regarding the Importance of the COVID-19 Third-Dose Vaccine

In accordance with the findings, there is a significant statistical difference between males and females in their attitude regarding the importance of COVID-19 third dose (t = - 2.147, p-value= 0.03). The attitude of females (2.3) is more than males (2.15). And there is a significant difference between those who received the initial dose and second Coronavirus disease vaccine and who didn't (t = 2.25, p-value = 0.025), and the mean of those who received (2.27), and who didn't (1.5). But there no is statistically significant difference according to age (F= 0.179, p-value = 0.911) and marital status (F= 0.553, p-value = 0.576) see Table 5.

Table 5. *Attitude-associated factors.*

	Test	Statistic	p-value
Sex	Independent t-test	- 2.147	0.03
Age	One-way ANOVA	0.179	0.911
Marital status	One-way ANOVA	0.553	0.576

The significant level at p≤ 0.05
*= significant **= highly significant

4. Discussion

Despite several efforts by countries around the world to combat COVID-19, it continues to pose a threat to all parts of people's life. To properly avoid and control COVID-19, it is necessary to understand and improve people's KAP [18]. Though the creation of a COVID-19 vaccination offered hope to the world's population, vaccine hesitancy has become a global hurdle to the vaccine's successful uptake [11, 15, 16]. According to the literature, vaccination safety and efficacy are among the public's concerns and grounds for vaccine hesitancy [10, 14, 20]. Many studies have been conducted about COVID-19, but the third COVID-19 vaccination dose was the focus of this study. This study was done in Jeddah city because not many studies were done in Jeddah. The study's aim was to evaluate the 293 King Abdulaziz University freshmen's knowledge and attitudes toward the vaccine. Many people are hesitant and do not trust the healthcare system, and that is an obstacle that will not lead us to better outcomes. That is why it is important to do research, to find out the reason behind their hesitation, and to see if they have enough information about the importance of the vaccine.

The demographic data of the participants revealed a higher number of females, single and with a range of the ages of 18 – 22 years old. This suggests that females are more afraid of the infection, are more concerned about it, and are more eager to discuss and test their knowledge about the coronavirus vaccine. Students at King Abdelaziz University in their first year indicated that nearly 99% of participants in the current study had received the first and second doses of the COVID-19 vaccination. This indicates the great efforts of the KSA to provide the vaccine for all. In addition, the outcomes demonstrated a positive view for the third dosage of the COVID-19 vaccination. Significant others' perspectives have been noted as having a significant impact on vaccine uptake. Encouragement of relatives and friends to receive the third dose of the vaccine and a good attitude toward receiving the vaccine were found to be strongly related.

The findings showed that males' and females' attitudes toward the COVID-19 third-dose immunization differ statistically, with females showing a more positive attitude than males and there is no significant difference according to age and marital status. According to a different study [17], women are more likely to view the pandemic as a very serious health issue and to be open to receiving the vaccine. It was also proposed that women display more information on matters that have a significant impact on society. Another study looked at attitudes concerning COVID-19 immunizations and found that females were more hesitant than males [19]. However, in a Chinese study, male individuals were more likely to receive the COVID-19 vaccine [20]. Positive views concerning preventative measures are frequently more prevalent in women than in men, and this discovery is crucial because encouraging Covid-19 vaccination and including women in household-level education could eventually lead to improvements in vaccination programs [17].

The research revealed that students had a fair amount of information about the third dosage of the COVID-19 vaccine. The role of the Ministry of Health and the government is an important factor that has a significant contribution to the results, by educating the population about the importance of the vaccine and making it mandatory to take. Through the COVAX International Facility, the country offered a vaccine that meets the efficacy and safety standards set by the world's leading vaccine producers. The registration of both "Pfizer-BioNTech" and AstraZeneca Coronavirus vaccines has received approval from the Saudi Food and Drug Authority in the Kingdom. Additionally, all citizens and residents have the option of receiving a vaccine using the Sehaty app. In addition, all doubts about the vaccine, its relevance, and its effectiveness have been addressed. In comparison with another study [12], the knowledge and attitude were a lot more positive with a low level of hesitation. The primary cause of this discrepancy is that the study was conducted on healthcare professionals, who are more knowledgeable about COVID-19, the vaccination, and its efficacy. Participants in a different study had a sufficient understanding of the coronavirus and its vaccine, but they expressed considerable skepticism about it due to the paucity of clinical trials and worries about adverse effects [13].

The study's findings illustrated that participants' knowledge of the Corona vaccine is moderate, implying that nurse practitioners are crucial in helping people decide whether to get the COVID-19 immunization. Nurses assist with both the physical administration of vaccines and the education of vaccine recipients. Nurses communicate and care to the public, ultimately leading to personal and parental health care

decisions. Nurses can educate people about vaccine efficacy and safety by staying informed about the importance and procedure of required vaccinations. As a result, the most important function nurses play in the vaccination process is communication and the resulting public awareness.

5. Conclusion and Recommendations

5.1. Conclusion

This section brings the study to a close by highlighting the most important research findings in connection to the research goal and research questions. It also examines the study's weaknesses and makes recommendations for future research. The purpose of this study was to assess the students in King Abdulaziz University's preparatory year knowledge and their attitudes toward the significance of the COVID-19 third dose. The findings indicated that third dose COVID-19 vaccine knowledge is moderate, and third-dose COVID-19 vaccine attitudes are agreed upon. Additionally, there is a big difference in attitude between men and women. The Saudi Ministry of Health established the COVID-19 vaccination task force, which consists of the Public Health Institute working with the Ministry of Education, to raise knowledge of the effectiveness and safety of the vaccine. Furthermore, by providing accurate information about the vaccine, health planners and politicians should encourage COVID-19 vaccination uptake in all Saudi regions. With increasing knowledge, the positive attitudes towards the third dose of COVID-19 vaccination will increase as well as reduce the attitudes of unwillingly preparatory students in King Abdulaziz University to take the vaccine and they take it only as a university requirement.

Limitation:

This is one of the few studies conducted in Saudi Arabia that analyze the knowledge and attitudes of students in the preparatory year toward the COVID-19 vaccine. In terms of constraints, the participants in the study were all from King Abdulaziz University, there are no other universities included in the study because of the time limitation in comparison to female participants, the researchers had a limited number of male participants. One of the most important limitations is that this research is the first study for the researchers therefore the researchers do not have experience in how to write research thereupon the researchers in this study needed more time to write research than the researchers who have more experience writing research. In addition, no studies talked specifically about COVID-19 third-dose vaccine.

5.2. Recommendation

Based on the results of this study, the researchers make several recommendations that could be applied to future research or educational activities to make students more aware of the benefits the significance of the third dose of COVID-19:

Recommendation for an educational program:

1. Apply prevention strategies for the community, particularly for preparatory year students in a university. To improve student knowledge about booster doses, instructional activities and videos should be produced and delivered during the orientation day.
2. Present educational videos in the waiting area to all patients who receive care from primary health care centers about the importance of the COVID-19 third dose.
3. Implement an educational program to enhance the awareness of COVID-19 boosters in the school-age group by using social media. (TV shows, radio, social media applications, and the Saudi Ministry of Health website...).
4. Implement educational programs to enhance awareness of the efficacy and safety of vaccinations, which to improve behavioral attitudes about the COVID-19 vaccine.

Recommendations for research studies:

1. Accomplish preferred conducted not only for preparatory year students; it should involve students from various specializations to evaluate their knowledge of and attitudes concerning the third dose of the COVID-19 vaccine.
2. To strengthen and improve the study results, the researchers recommend adopting other designs such as a mixed-method study and more advanced statistical analysis.
3. Implement a similar study but focus on the influenza vaccine so we can have a well-educated community.

References

[1] Al-Zalfawi, S. M., Rabbani, S. I., Asdaq, S. M., Alamri, A. S., Alsanie, W. F., Alhomrani, M., Mohzari, Y. A., Alrashed, A. A., AlRifdah, A. H., & Almagrabe, T. (2021). Public Knowledge, Attitude, and Perception towards COVID-19 Vaccination in Saudi Arabia. *International Journal of Environmental Research and Public Health, 18*.

[2] Bulut C, Kato Y. Epidemiology of COVID-19. Turk J Med Sci. 2020 Apr 21; 50 (SI-1): 563-570. doi: 10.3906/sag-2004-172. PMID: 32299206; PMCID: PMC7195982. World Health Organisation. (2022). Who coronavirus (COVID-19) dashboard. Retrieved April 10, 2022, from https://COVID-19.who.int/

[3] Ministry Of Health (MOH). (2022, November 4). *Health Emergency Operation Center*. Ministry Of Health Saudi Arabia. Retrieved December 16, 2022, from https://www.moh.gov.sa/en/Ministry/MediaCenter/Ads/Pages/Ads-2022-11-04-001.aspx.

[4] Wolff, D., Nee, S., Hickey, N. S., & Marschollek, M. (2020). Risk factors for covid-19 severity and fatality: A structured literature review. Infection, 49 (1), 15–28. https://doi.org/10.1007/s15010-020-01509-1

[5] Ahn, D.-G., Shin, H.-J., Kim, M.-H., Lee, S., Kim, H.-S., Myoung, J., & Bum-Tae Kim and Seong-Jun Kim. (2020, March 21). Journal of Microbiology and Biotechnology. JMB. Retrieved April 10, 2022, from https://www.jmb.or.kr/journal/view.html?doi=10.4014%2Fjmb.2003.03011

[6] Barry, M., & Bahammam, A. (2021, April 1). COVID-19 vaccine in the Kingdom of Saudi Arabia: A true operation warp speed: Semantic scholar. undefined. Retrieved May 20, 2022, from https://www.semanticscholar.org/paper/COVID-19-vaccine-in-the-Kingdom-of-Saudi-Arabia%3A-A-Barry-Bahammam/52ec102969dfed1bfae8dff818e0c3efab43bf92

[7] Abebe, H., Shitu, S., & Mose, A. (2021, June 1). Understanding of COVID-19 vaccine knowledge, attitude, acceptance, and determinates of COVID-19 vaccine acceptance among the adult population in Ethiopia. Infection and drug resistance. Retrieved February 15, 2022, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8179743/

[8] Acharya, S. R., Moon, D. H., & Shin, Y. C. (2021, July 28). Assessing attitude toward COVID-19 vaccination in South Korea. Frontiers in psychology. Retrieved March 14, 2022, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8355350/

[9] Al-Marshoudi, S., Al-Balushi, H., Al-Wahaibi, A., Al-Khalili, S., Al-Maani, A., Al-Farsi, N., Al-Jahwari, A., Al-Habsi, Z., Al-Shaibi, M., Al-Msharfi, M., Al-Ismaili, A., Al-Buloshi, H., Al-Rawahi, B., Al-Barwani, K., & Al-Abri, S. (2021, June 4). Knowledge, attitudes, and practices (KAP) toward the COVID-19 vaccine in Oman: A pre-campaign cross-sectional study. MDPI. Retrieved April 21, 2022, from https://www.mdpi.com/2076-393X/9/6/602

[10] Lataifeh, L., Al-Ani, A., Lataifeh, I., Ammar, K., AlOmary, A., Al-hammer, F., & Al-Hussaini, M. (2022, February 9). Knowledge, attitudes, and practices of healthcare workers in Jordan towards the COVID-19 vaccination. MDPI. Retrieved April 26, 2022, from https://www.mdpi.com/2076-393X/10/2/263

[11] Elgendy, M. O., & Abdelrahim, M. E. A. (2021, July 20). Public awareness about coronavirus vaccine, vaccine acceptance, and hesitancy. Wiley Online Library. Retrieved February 17, 2022, from https://onlinelibrary.wiley.com/doi/10.1002/jmv.27199

[12] El-Elimat, T., AbuAlSamen, M. M., Almomani, B. A., Al-Sawalha, N. A., & Alali, F. Q. (2021). Acceptance and attitudes toward COVID-19 vaccines: A cross-sectional study from Jordan. PLOS ONE. Retrieved February 17, 2022, from https://journals.plos.org/plosone/article?id=10.1371%2Fjournal.pone.0250555

[13] Habib, S. S., Alamri, M. S., Alkhedr, M. M., Alkhorijah, M. A., Jabaan, R. D., & Alanzi, M. K. (2022, March 31). Knowledge and attitudes of medical students toward COVID-19 vaccine in Saudi Arabia. MDPI. Retrieved April 16, 2022, from https://www.mdpi.com/2076-393X/10/4/541

[14] Zahid, H. M., & Alsayb, M. A. (2021, August 2). Assessing the knowledge and attitude toward COVID-19 vaccination in Saudi Arabia. MDPI. Retrieved April 25, 2022, from https://www.mdpi.com/1660-4601/18/15/8185

[15] Alamer, E., Hakami, F., Hamdi, S., Alamer, A., Awaf, M., Darraj, H., Abutalib, Y., Madkhali, E., Alamer, R., Bakri, N., Qadri, M., Algaissi, A., & Alhazmi, A. (2021, November 1). Knowledge, attitudes, and perception toward COVID-19 vaccines among adults in Jazan Province, Saudi Arabia. MDPI. Retrieved February 16, 2022, from https://www.mdpi.com/2076-393X/9/11/1259

[16] Akalu, Y., Ayelign, B., & Molla, M. D. (2020, June 24). Knowledge, attitude and practice towards COVID-19 among chronic Diseas: IDR. Infection and Drug Resistance. Retrieved May 10, 2022, from https://www.dovepress.com/knowledge-attitude-and-practice-towards-COVID-19-among-chronic-disease-peer-reviewed-fulltext-article-IDR

[17] Callaghan, T., Moghtaderi, A., Lueck, J. A., Hotez, P. J., Strych, U., Dor, A., Franklin Fowler, E., & Motta, M. (2020, August 12). Correlates and disparities of COVID-19 vaccine hesitancy. by Timothy Callaghan, Ali Moghtaderi, Jennifer A. Lueck, Peter J. Hotez, Ulrich Strych, Avi Dor, Erika Franklin Fowler, Matt Motta:: SSRN. Retrieved May 10, 2022, from https://doi.org/10.2139/ ssrn.3667971

[18] Wang J, Jing R, Lai X, Zhang H, Lyu Y, Knoll MD, et al. Acceptance of COVID-19 vaccination during the COVID-19 pandemic in China. Vaccines. 2020; 8 (3): 482. https://doi.org/10.3390/ vaccines8030482.

[19] Ferdous, M. Z., Islam, M. S., Sikder, M. T., Mosaddek, A. S. M., Zegarra-Valdivia, J. A., & Gozal, D. (2020). Knowledge, attitude, and practice regarding COVID-19 outbreak in Bangladesh: An online-based cross-sectional study. PLOS ONE. Retrieved May 10, 2022, from https://doi.org/ 10.1371/journal.pone.0239254

[20] Harapan, H., Wagner, A. L., Yufika, A., Winardi, W., Anwar, S., Gan, A. K., Setiawan, A. M., Rajamoorthy, Y., Sofyan, H., & Mudatsir, M. (1AD, January 1). Acceptance of a COVID-19 vaccine in Southeast Asia: A cross-sectional study in Indonesia. Frontiers. Retrieved February 19, 2022, from https://www.frontiersin.org/articles/10.3389/fpubh.2020.00381/full