DEMAND, ABILITY TO PAY FOR COVID-19 VACCINE AND ASSOCIATED FACTORS OF HANOI MEDICAL UNIVERSITY STUDENTS IN 2020

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ABSTRACT

Background: The development of a vaccine against COVID-19 infection is on the way. However, opinions on the implementation of the vaccine and the needs to receive the COVID-19 vaccine vary considerably among people, which might influence the future demand forecast and pricing considerations for COVID-19 vaccine. **Objectives:** This study aims at 1) describing the demand and ability to pay, and 2) analysing factors associated with participants; intention to utilize the COVID-19 vaccine of medical students. **Subjects and methods:** We conducted a cross-sectional study among Hanoi Medical University students. Logistic regression was used to describe the correlation between COVID-19 vaccination needs and related factors. Linear regression was used to describe the correlation between the ability to pay for the COVID-19 vaccine and some associated factors. **Results:** Nearly 80% of the participants reported that they were willing to get vaccinated against COVID-19 if a vaccine were available. Factors associated with students' needs to accept the COVID-19 vaccine included worry about COVID-19 and the year of study of participants. The average price that people accept to pay for a vaccine against COVID-19 is 485.25 ± 418.64 thousand VND. **Conclusion:** In this study, many students aaalikely get vaccinated, and the need to uptake COVID-19 vaccine was considered to be associated with worry of COVID-19 and year of study.

Keywords: COVID-19 vaccine, demand, intention, ability to pay.

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1. INTRODUCTION

On March 11, 2020, coronavirus disease (COVID-19) was declared the worlds' next pandemic [1]. The genetic sequence of SARS-CoV-2 was published in January 2020 [2]. Since then, there have been over 200 vaccine candidates being developed and manufactured [3]. According to a study by R.D. Goldman et al., vaccination was believed to be one of the most effective strategies in limiting the spread of the disease [4]. During the early stages of the pandemic (March-June), studies of small samples of European and Australian adults suggested that most people surveyed reported that they would be vaccinated when a widely available vaccine was available [5, 6].

Similarly, a nationally representative study of adults in China conducted in March showed that of the total 2058 respondents, 1879 (91.3%) would accept vaccination if the COVID-19 vaccine were successfully developed and approved for listing in the future. Regarding the importance of some factors in vaccination decision-making, the majority considered that their doctor's recommendation (80.6%) or vaccine convenience (75.7%) was a key factor affecting their vaccination intention. Over half of the respondents (59.9%) thought the vaccine price was essential. 64.2% showed no preference for domestic or imported vaccines, while 32.5% would prefer a domestic vaccine [7].

So far, Vietnam has been considered one of the few countries that successfully control the pandemic. While many people continue to follow the iaa from COVID-19 strictly, the success in containing the disease makes several residents in Vietnam begin to underrate the necessity of preventive measures for COVID-19. Consequently, opinions on the vaccine implemeâ and willingness to receive the COVID-19 vaccine vary considerably among people, which might hinder the commercialization of the vaccine and mass vaccination for COVID-19.

Therefore, we conducted a cross-sectional study among medical students who have a particular understanding on the COVID-19 situation as well as the role of vaccines, to 1) describe the demand and ability to pay for a vaccine against COVID-19 among students at Hanoi Medical University; and 2) analyze factors associated with participants' intention to utilize COVID-19 vaccine.

2. METHODS

Study population

Students at Hanoi Medical University

Place and time

This study started on October 20, 2020, to December 9, 2020, at Hanoi Medical University. The data collection was from December 1, 2020, to December 9, 2020.

Study design

Descriptive cross-sectional study.

Sample size

We use a sampling calculation to estimate the population proportion. We conducted a pilot study with 50 participants and then used the proportion of students who needed to receive the COVID-19 vaccine in this study to calculate the sample size, and this proportion was 77%. The final sample size was 280 participants.

Convenient sampling was used.

Data collection tool

The anonymous online questionnaire was created using Kobotoolbox - an online suite of tools for online data collection.

Statistical analysis

After collecting the data, all information was extracted directly from Kobotoolbox to Excel and transferred to STATA 14.0 software for further analysis. Quantitative data were described by mean and standard deviation or median and quartile in case of non-normal distribution. Qualitative data were described graphically through percentages. Logistic regression was used to describe the correlation between COVID-19 vaccination needs and related factors. Linear regression was used to describe the correlation between the ability to pay for the COVID-19 vaccine and associated factors. The coefficient, and odds ratios were determined, with the significance level $\alpha = 0.05$, a confidence interval of 95%.

Ethical issues

This study proposal was approved by the Scientific Committee of the School of Preventive Medicine and Public Health, Hanoi Medical University.

3. RESULTS

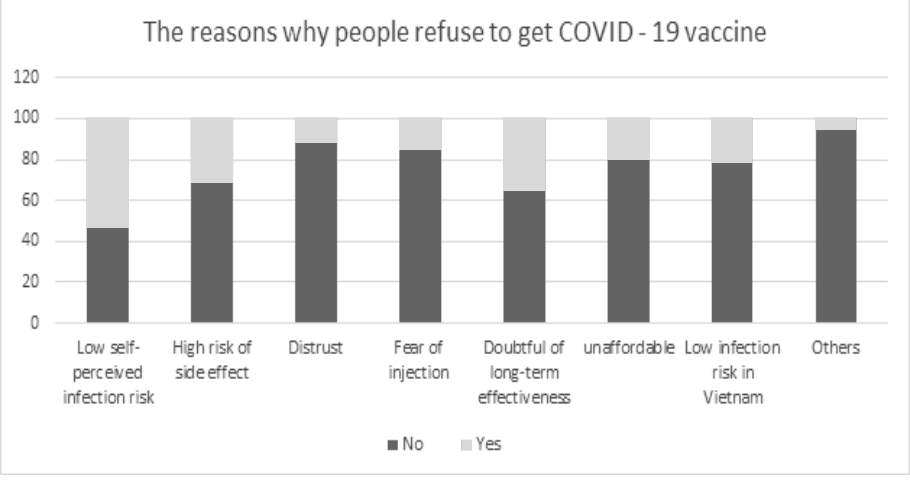
Table 1. Demographic Profile of Study Participants (n=280)

Characteristic		n	Percentage
Gender	Male	170	60.7
	Female	110	39.3
Age	Mean	20	
	Median (1st Quartile - 3rd Quartile)	20 (18 - 21)	
Ethnic group	Kinh	252	90.0
	Others	28	10.0
Place of birth	Hanoi	37	13.21
	Others	243	86.79
Year of study	1st	79	28.1
	2nd	47	16.79
	3rd	64	22.86
	4th	32	11.43
	5th	42	15.0
	6th	16	5.71

Characteristic		n	Percentage
Personal income	Less than 1 million VND	229	81.79
	1 million - 2 million VND	19	6.79
	2 million - 3 million VND	13	4.64
	More than 3 million VND	19	6.79
Source of income	Part-time jobs	37	56.1
	Relatives	21	31.8
	Scholarship	7	10.6
	Subsidy	1	1.5
Family income level	Poverty and near poverty	28	10
	Middle class and upper middle class	252	90
Living with family	Yes	69	24.64
	No	211	75.36

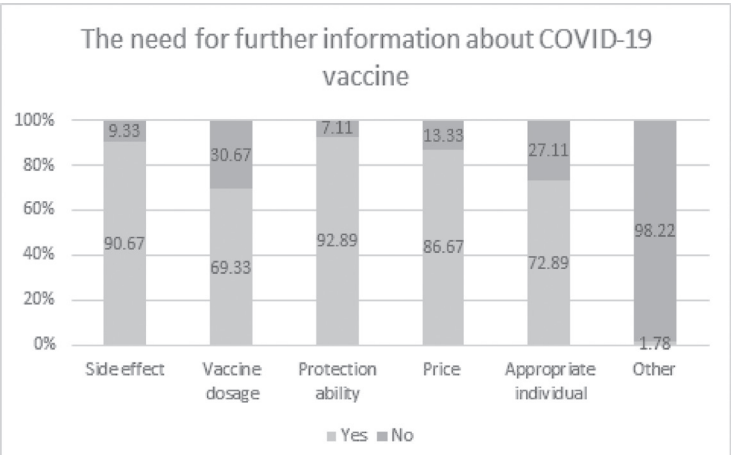
Table 1 demonstrates demographic information of the participants. A total of 280 surveys were completed online, and males accounted for 60.7% of the respondents. The average age of respondents is 20. Specifically, the highest proportion of the people participating in this survey was freshmen, at 28.1%, followed by third-year students, at 22.86%. More than 75% of survey-subjects have income less than 1 million VND and 56.1%. of the income comes from part-time jobs. Moreover, most people have average and above-average family income (90.0%).

Figure 1. The reasons why people refuse to get COVID – the 19 vaccine (n = 60)



On the other hand, we asked respondents whose vaccine hesitancy about their main reasons, and Figure 1 presents their answers. As it can be observed, the low self-perceived infection rate ranks first with 26.6%. Furthermore, those who responded that they couldn't afford it accounted for 11.9 %. Looking at the other categories, we saw that a common concern seems to be the low-infection risk in Vietnam, some respondents stated that a vaccine might not be safe or someone has fears of injection.

Figure 2. The need for further information about the COVID-19 vaccine (n = 225)



In addition, we asked candidates about the need for further information, such as price, vaccine dosage, side effects, etc... and the results are presented in Figure 2. It can be seen that 81.23% of respondents want to receive further information about the COVID-19 vaccine. The proportion of people that want to receive more information about the protection ability of vaccine COVID-19 ranks first with 92.89%, followed by the news about negative side effects (90.67%) and the price (86.67%).

Table 2. Factors associated with the COVID-19 vaccination need (n=280)

Logistic regression LR chi2(10) = 17.33

Prob > chi2 = 0.0674

Variables	Odds Ratio (univariable) [95% Conf. Interval]	Odds Ratio (multivariable) [95% Conf. Interval]
Gender Male Female	1 1.13 [0.63 - 2.03]	1 0.98 [0.52 - 1.84]
Place of birth Hanoi Others	1 0.53 [0.20 - 1.43]	1 0.58 [0.21 - 1.63]

Variables	Odds Ratio (univariable) [95% Conf. Interval]	Odds Ratio (multivariable) [95% Conf. Interval]
Major		
Others	1	1
General practitioner	1.24 [0.68 - 2.33]	0.98 [0.51-1.89]
Year of study	1.18 [0.98-1.43]	1.24 [1.00 - 1.52]
Worry of COVID-19		
Yes	1	1
No	0.40 [0.20-0.80]	0.39 [0.18 - 0.84]
Identify own selves at risk of COVID-19 infection		
High risk	1	1
Normal risk	0.77 [0.28 - 2.18]	0.92 [0.31 - 2.70]
Low risk	0.45 [0.16 - 1.30]	0.64 [0.21 - 1.94]
Approve herd immunity		
Haven't heard	1	1
No	0.53 [0.20 - 1.40]	0.38 [0.13 - 1.06]
Yes	0.53 [0.20 - 1.40]	0.43 [0.16 - 1.15]
Family income level		
Poverty and low income	1	1
Middle class and upper middle class	1.25 [0.51 - 3.10]	1.44 [0.56 - 3.70]

As can be seen from Table 2, vaccination need was found to be significantly associated with the year of study and the level of worry about COVID-19. The need for vaccination is more likely to increase as the students are more senior (OR = 1.24; 95% CI = 1.00 - 1.52), while the level of COVID's anxiety was negatively associated with the need (OR = 0.39; 95% CI = 0.18 - 0.84)

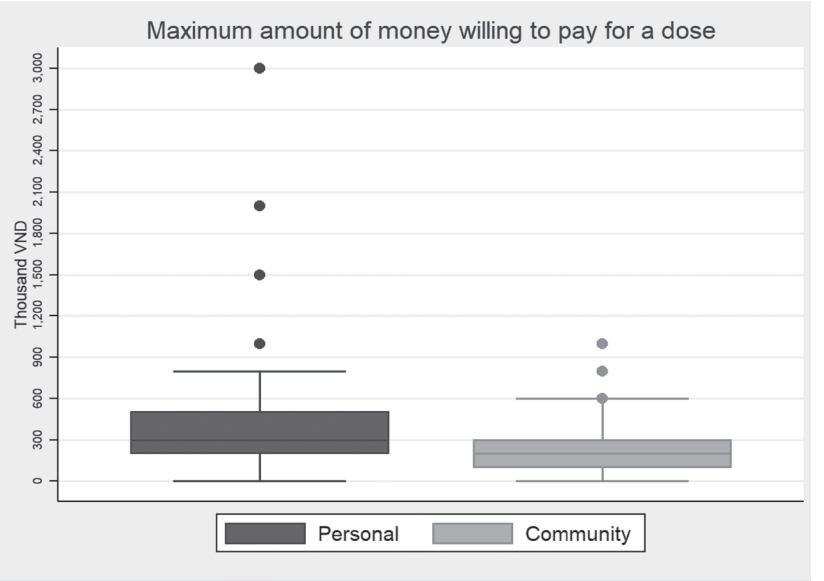
A remarkably higher proportion of the people who worry about COVID-19 were willing to get vaccinated (81.36%) than those who do not worry about it (63.64%). The willingness to be vaccinated is most significant among fourth-year students (84.38%), while uncertainty ranges (from 15.63% - 30.38%) across all the years of study.

In general, the older the students are, the higher they need uptaking COVID- the 19 vaccine. Besides, the group of students who confirmed that they were worried about COVID - 19 seemed to be more demanding of vaccination against COVID – 19.

Evaluating the acceptable price is an approach to estimate the maximum amount of money an individual iaa and services per time vaccinating. The decision to vaccinate depends on the willingness of society to pay for gaining health benefits. As it can be seen from the box plot (Figure 3), the average price that people accept to pay for a vaccine against COVID-19 is 485.25 ± 418.64 thousand VND (median:

300 thousand VND), which is notably higher than the recorded data of the question "How much do you think others will pay for the same vaccine?". More precisely, subjects believe is accepted by other ones is 243.16 ± 176.47 thousand VND.

Figure 3. Acceptable price range for a dose of COVID - 19 vaccine (n = 280)



Furthermore, according to the results presented in Table 3, with multivariate regression analysis (linear regression), no statistically significant correlation was found between the listed variables and the amount accepted.

Table 3. Factors related to how much participants accept to pay for a dose of COVID - 19 vaccine (n = 280)

Linear regression Number of obs = 280

Variables	Coef. (univariable) [95% Conf. Interval]	Coef. (multivariable) [95% Conf. Interval]
Gender Male Female	2.51 [-98.51 - 103.53]	15.49 [-89.65 - 120.62]
Place of birth Hanoi Others	- 20.42 [-166.09 -125.25]	7.17 [-142.35 - 156.70]
Major Others General practitioner	-29.42 [-129.78 - 70.94]	- 25.38 [-132.50 - 81.72]

Variables	Coef. (univariable) [95% Conf. Interval]	Coef. (multivariable) [95% Conf. Interval]
Year of study	13.97 [-17.16 - 45.11]	6.91 [-26.88 - 40.70]
Worry of COVID-19 Yes No	 - 45.60 [-181.06 - 89.86]	 - 35.76 [-177.90 - 106.38]
Identify own selves at risk of COVID-19 infection High risk Normal risk Low risk	 1.85 [-155.45 - 159.14] - 110.71 [-277.20 - 55.77]	 24.38 [-137. 59 - 186.35] - 81.31 [-255.93 - 93.32]
Approve herd immunity Haven't heard No Yes	 120.17 [-26.58 - 266.92] 33.21 [-110.52 - 176.93]	 104.57 [-53.38 - 262.52] 28.58 [-118.86 - 176.01]
Family income level Poverty and low income Middle class and upper middle class	 126.8 [-36.91 - 290.64]	 115.03 [-281.81 - 772.5]

4. DISCUSSION

Currently, COVID-19 is a global concern in general, and for the Vietnamese people in particular. In this study about the need and willingness to pay for COVID-19 vaccination, we decided to survey medical students, who are Vietnamese citizens as well as future healthcare workers, engaged in healthcare workers, and at the same risk of exposure as current healthcare workers. We pointed out that the COVID-19 vaccine's agreement relies on the risk of COVID-19 infection, beliefs about the seriousness of the COVID-19 infection, and understanding on the advantages of the vaccine in fighting against COVID-19. Factors that are associated with intention and ability to pay were also examined, such as participants' health understanding, presence of chronic diseases, and knowing someone in the society has a COVID-19 infection.

At first, most of the participants chose "have known" about the COVID-19 vaccine (94.2%). About the demand for vaccination, 78.6% of the participants (n = 220) need a vaccine. Meanwhile, in a similar study on adolescents in the United Kingdom published in November [8], only 53.6% of the respondents answered that they needed a dose of vaccine when participating in the vaccine trial. The higher number in our study may be due to the fact that our subjects are purely medical students, who have a higher frequency of exposure to the causes of the disease, and also a higher risk of infection than the other groups of citizens in the society.

Moreover, 43.26% received positive information about vaccines, "Vaccines are

highly effective, have few side-effects, are safe", only 15.25% had negative information, "Vaccines have high risk, or the ability to prevent disease is not good ". Nearly half of the total also said that they received this information from the official portal of health organizations (Ministry of Health, WHO, etc.). Meanwhile, a study in India on August 12, 2020, showed that 65.17% of candidates received information from non-official health organizations such as Facebook, WhatsApp, YouTube, and Instagram [9]. Also, our study illustrates that correlations between the year of study, the level of COVID-19 anxiety and the need for vaccination are statistically significant. The differences between types of jobs, the information that subjects have heard and their origins, the realities among their hometowns, or etc might lead to the variety of the demand for vaccination.

On the other hand, in our research, 21.4% of the participants answered that they did not need a COVID-19 vaccine. Among the reasons that were mentioned in the survey, the low self-perceived infection rate ranks first with 26.6%. The percentages of those who were concerned about the potential side effects of the experimental vaccine and long-term effects are equally recorded at around 17%. In comparison with research in European [10], the first place is that they were concerned about potential side effects of a vaccine, which data comprises 55%, followed by 15% of respondents who stated that a vaccine might not be safe, or some others believe that the vaccine may not be safe for specific groups, such as a pregnant woman. The differences between the key reasons for these two studies might be explained by the good control over the pandemic in Vietnam.

In terms of how much the participants are willing to pay for the vaccination, the average amount they agree to give for a dose of vaccine is 485.25 thousand VND, and they thought others would pay 243.16 thousand VND for the same dose of vaccine. The subjects have relatively different affordability in some characteristics, but when extrapolated, this difference is not statistically significant. Comparing between groups, there is no group with an outstanding ability to pay. This can be explained by the research subjects are students, most 81.79% have a personal income of less than 1 million VND, their economy still depends on their families, also 84.29% think that the income of their families is average.

Limitation and strength

The strength of our study is to examine a wide range of possible correlates. Moreover, if the data collection occurred during the late stages of the development of a COVID-19 vaccine, we could provide participants with information about details that could affect vaccine acceptability (e.g., dosing schedule). Meanwhile, a key limitation of this study is that we recruited a small sample size of participants that only are medical students. This limitation should be considered in interpreting and applying the results of the current study. Additional limitations include the cross-sectional design, which cannot examine the causal relation, and the lack of available data on non-respondents. Lastly, our survey assessed vaccination needs in medical students who have a high risk of infection and also know the important role of vaccines in preventing disease, and acceptability might be lower if participants are in different groups.

5. CONCLUSION

Once a COVID-19 vaccine becomes available, it will be a vital public health approach for defeating existing disparities and the overall disease burden due to COVID-19. Our research provides a preliminary insight into COVID-19 vaccination needs, with results indicating that many students at Hanoi Medical University, Vietnam would be likely to get vaccinated if a vaccine becomes available. As the vaccine development process continues, it will be noteworthy to monitor changes in people's vaccine acceptability. Our results highlight that the willingness to uptake COVID-19 vaccine may differ by several demographic characteristics, as well as the critical role that ***worry of COVID-19*** and ***year of study*** play in acceptability of a COVID-19 vaccine. These findings can help guide the planning and development of future public health efforts to increase acceptability (and uptake following vaccine licensure) of a COVID-19 vaccine.

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