



Original article

Acceptance and willingness to pay for COVID-19 vaccines available in Vietnam: an online study during the fourth epidemic wave

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Abstract: COVID-19 vaccines available in Vietnam have different prices, efficacies, and side effects. We studied acceptance and willingness to pay (WTP) for COVID-19 vaccines in Vietnam, using a self-designed online questionnaire. Respondents were 2093 unvaccinated adults. Multiple regression analyses identified factors associated with vaccine acceptance and WTP. Acceptance of free vaccines was around 90% for the three available in Vietnam (Astra Zeneca, SPUTNIK V, and Pfizer-BioNTech). WTP for the same vaccines was about 70%. Vaccine acceptance was associated with being female and/or chronically ill or undergoing COVID-19-related job changes. WTP was associated variously with family economic status, occupational changes due to COVID-19, chronic disease, and perceived risk of infection. Most respondents were willing to be vaccinated and many were willing to pay for it, depending on personal and family circumstances. Vietnam should budget for free vaccines to support those unable to pay.

Keywords: COVID-19; willingness to pay; acceptance; vaccine; vaccination.

1. INTRODUCTION

The COVID-19 pandemic has become a global health crisis, which has increased the burden of morbidity and mortality and affects societies and economies worldwide (1-3). Control measures aim at reducing transmission include social distancing, hand washing, wearing a face mask, and isolation to avoid infection (4), but it is agreed that the most effective way to control the spread of COVID-19 is vaccination (5, 6).

COVID-19 vaccines have been produced and deployed in many countries. Recent evidence suggests that vaccination has brought very positive effects in controlling the pandemic (6, 7). Scientific and media reporting on COVID-19 has covered effectiveness, side effects, and possible

complications (8, 9), which may affect the level of acceptance of vaccination. A global survey found that 71.5% of participants would be very or somewhat likely to accept a COVID-19 vaccine (10). Vaccine acceptance is influenced by many factors, including age, sex, underlying medical conditions or morbid obesity, side effects, effectiveness, and safety of the vaccine (11, 12). The acceptance rate can also be affected by whether the vaccine is provided free of charge or has to be paid for, and by income level (13, 14).

Vietnam has had relatively good success in controlling the COVID-19 pandemic by quick and relevant responses focusing on identification and isolation of cases, strict quarantine, contact tracing, and targeted lockdowns (4), but now they are facing the fourth wave of coronavirus infection outbreaks that is much more serious than the previous waves.

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COVID-19 vaccines have become available, and the Vietnamese government has developed a policy on imported vaccines and a plan for vaccine distribution (15). A previous study assumed that a vaccine pricing policy may be deployed in Vietnam, which might affect the acceptance and willingness to pay (WTP) for the COVID-19 vaccines (16). Currently, there are no data on acceptance and WTP for actual COVID-19 vaccine products to guide Vietnamese policymakers. The aim of this study is to provide evidence on the rate of acceptance, the WTP, and the predictors of both, for the COVID-19 vaccine products actually available in the setting of Vietnam, which may also be similar in other countries with similar situations.

2. MATERIALS AND METHOD

2.1. Study design and population

A cross-sectional study was conducted from May 17-23, 2021 in Vietnam. Participants who are able to access the internet and are 18 years old or above were invited to complete an online questionnaire. Individuals already vaccinated against COVID-19 were excluded. A snowball technique was applied; we started with friends and colleagues via social media (such as Facebook or Zalo) and asked them to share with others. The due date for sharing the link was May 23, 2021.

2.2. Variables

The following independent variables were collected: (1) demographic information including urban or rural residence, age, sex, ethnicity, occupation, education, marital status, family size, family economic status, and occupational changes or income reduction due to COVID-19; (2) chronic diseases such as hypertension, coronary heart disease, diabetes, asthma, cancer, or chronic obstructive pulmonary disease as well as allergy history; (3) information about being affected by the pandemic, including occupation changes (e.g. changed the number of hours, changed position, lost job), income reduction, and potential exposure of participants at all four levels (F0 is defined as confirmed COVID-19 cases, F1 are people in contact with F0, F2 are those in contact with F1 and similarly for F3 and F4); (4) perceptions of COVID-19 pandemic: a feeling of being at risk of COVID-19 infection in the near future; and (5) any side effects of COVID-19 vaccine that they are aware of.

Dependent variables included: (1) acceptance of vaccination in general; (2) acceptance to be vaccinated with any of the three specific vaccines planned to be made available in Vietnam, free or paid; (3) WTP for any of these vaccines.

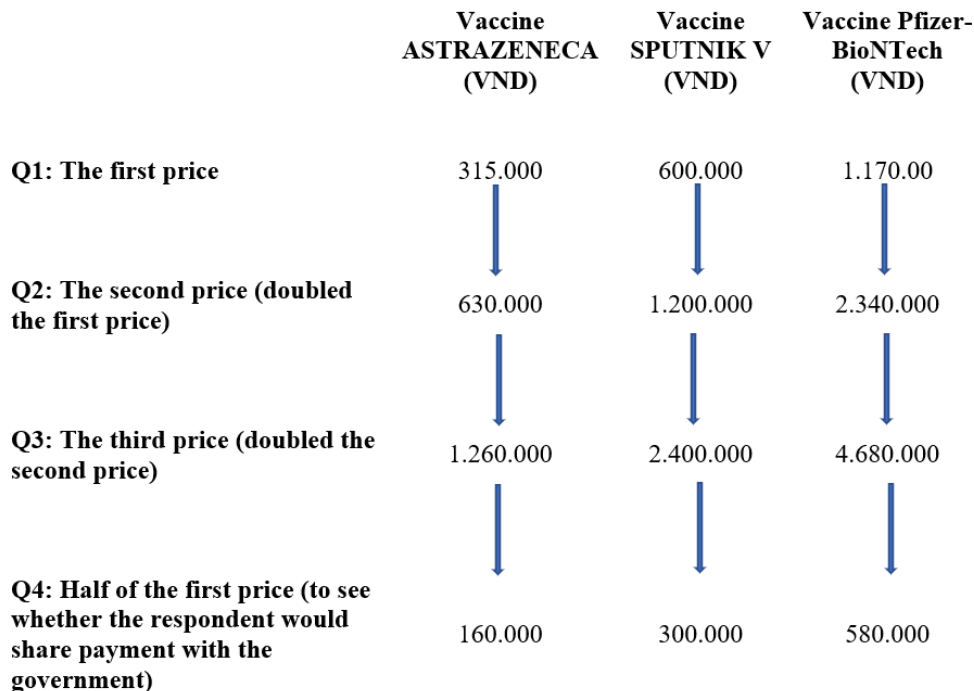


Figure 1. The bidding game technique for WTPs of vaccines

Previous studies were conducted based on assumptions of efficacy, safety, and price. However, the Vietnamese government plans to import vaccines selected from those with global availability considering price and efficacy, so we studied those being considered, with different reported efficacy and price, with the intention of providing evidence that may guide policymakers to make informed decisions. Information on the name of the vaccine, name of the company producing it, efficacy, and side effects of each vaccine

(AstraZeneca, Sputnik V, and Pfizer-BioNTech, which the Vietnamese government plans to import) (17) were given and respondents were asked whether they would accept them, as free or paid vaccines. If they agreed to pay from their pocket, we suggested four possible prices and asked which they would agree to pay. The prices we proposed were based on data on the website (17) and added 30% for management and distribution (18) to get the first price, then doubled that and doubled it again. We also asked whether the respondent would

pay half of those prices to share the payment with the government. The highest price chosen by each respondent was defined as the level of WTP. If the participant said “no” to all four prices, we concluded that they were unwilling to pay. The bidding game technique for WTP was summarized in Figure 1.

2.3. Statistical analysis

Descriptive statistics were performed to describe variables including frequency, and percentage. Chi-square test was utilized to determine associations between types of vaccine and willingness to pay for paid/ free vaccines. Univariate and multivariate logistic regressions were employed to identify predictors of acceptance to be vaccinated and WTP (yes/no WTP) for each vaccine. Independent variables were age, gender, education level, marital status, family size, family economic status, allergy, residence, occupation, chronic diseases, occupation change, and income reduction due to COVID-19. Significant factors from univariate analysis were included in multivariate analysis. We also run additional models which included all variables for each vaccine in multivariate analysis. Data was analyzed by using SPSS Statistics for Windows, Version 23.0.

2.4. Ethical considerations

Those invited to complete the questionnaire online were provided with a brief description of the study and its objectives. By deciding to complete the survey they gave their consent to participate and for the data provided to be used. No identifying information was collected. The study was approved by the Ethics Committee of Thai Nguyen University of Medicine and Pharmacy (No 606/ ĐHYD-HĐĐĐ).

3. RESULTS

Finally, the data from 2093 respondents who completed the survey were included in the analysis (we had to eliminate 93 respondents because of incomplete or incorrect responses such as under 18 years old, or not clear year of birth); their baseline characteristics are presented in Table 1. The majority of the respondents were female (71.0%) and aged from 18 to 29 (57.1%); more than half were from urban areas (59.1%). Most of the respondents had a college/university education level (79.5%). The participants were mainly students (38.9%), government staff (22.1%), health staff (18.8%), and others.

The proportion of respondents reporting occupation changes and income reduction due to the COVID-19 pandemic were 26.2% and 37.2%, respectively. Most (90.0%) reported not having had potential exposure to COVID-19 cases during the previous waves of the pandemic and 84.9% reported having had no contact with COVID-19 cases in the current wave.

Table 1. Characteristics of respondents

	Variables	Frequency	Percentage
Residence	Urban area	1236	59.1
	Rural area	857	40.9
Age (years)	From 18 to 29	1195	57.1
	From 30 to 39	539	25.8
	From 40 to 49	279	13.3
	50 and above	80	3.8

	Variables	Frequency	Percentage
Sex	Female	1485	71.0
	Male	608	29.0
Ethnicity	Kinh	1665	79.6
	Other	428	20.4
Occupation	Health staff	394	18.8
	Other governmental staff	463	22.1
	Worker	101	4.8
	Student	814	38.9
	Own business	73	3.5
	Other	248	11.9
Education	High school or lower	430	20.5
	Above	1663	79.5
Marital status	Single	1106	52.8
	Married	924	44.1
	Divorced/ Widowed	63	3.0
Family size	One	73	3.5
	Two	91	4.3
	3 to 4 people	608	29.0
	Five or more	1321	63.1
Family economic status	Poor, near poor	101	4.8
	Others (average, high income)	1992	95.2
Chronic diseases	Yes	124	5.9
	No	1969	94.1
Allergy	Yes	593	28.3
	No	1251	59.8
	Do not know/remember	249	11.9
Occupational changes due to COVID-19	Yes	548	26.2
	No	1545	73.8
Income reduction due to COVID-19	Yes	778	37.2
	No	1315	62.8
Current contact level*	F1, F2	78	3.7
	F3, F4	238	11.4
	None	1777	84.9
Previous three waves contact (F1 to F4)*	Yes	199	9.5
	No	1894	90.5
Feeling of being at risk of COVID-19 infection in the near future	Yes	527	25.2
	No	443	21.2
	Do not know	1123	53.7

*Classifications of COVID-19 cases and exposures: F0 is defined as confirmed COVID-19 cases, F1 is defined as people in contact with F0, F2 is defined as people in contact with F1, and similarly for F3, F4

The majority of the respondents would like to be vaccinated against COVID-19 infection (89.3%). Approximately 90% of the respondents were willing to accept any of the three potentially available COVID-19 vaccines (Astra Zeneca, SPUTNIK V, and Pfizer-BioNTech) if they were provided for free. However, only 70% were willing to pay, and this rate similar for all three types of vaccine. There was no significant difference among the three vaccines, as to the acceptability of either free or paid vaccine application (Table 2).

Among the group willing to pay, the mean (SD) amounts of money the respondents were prepared to pay for each vaccine were: 902,438±401,904 for Astra Zeneca, 1,429,147±860,195 for Sputnik V, and 2,302,438±1,697,315 (VND) for Pfizer-BioNTech. It should be noted that we applied a snowballing sampling technique so these results may not be representative for the whole Vietnamese population.

The results of the multivariate analysis revealed factors associated with willingness to have COVID-19 vaccination (Table 3). Females were 1.75 times less likely to be willing compared to males (aOR=0.57, 95%CI 0.4-0.81). Respondents from rural areas were 1.44 times more likely to

be willing than those from urban areas (aOR=1.44, 95%CI 1.06-1.96). Having an underlying health condition was significantly associated with willingness to get the vaccine. People without chronic diseases were 2.42 times more willing to get the vaccine (aOR=2.42, 95% CI 1.51-3.89). The proportion of those willing to get the vaccine among respondents who reported occupational changes due to COVID-19 was less than those without any job-related changes (aOR=1.55, 95%CI 1.14-2.1). The respondents' occupation showed significant association with willingness to get the COVID-19 vaccine: health staffs were significantly, and about 2.5 times, more willing to be vaccinated compared to all other groups.

Table 2. Associations between types of vaccine and willingness for free or paid vaccines

Vaccines	Willing		Not willing		p
	n	%	n	%	
1. Willingness to get vaccine if free					
Astra Zeneca	1848	88.3	245	11.7	0.598
Sputnik V	1839	87.9	254	12.1	
Pfizer-BioNTech	1860	88.9	233	11.1	
2. Willingness to get vaccine if have to pay					
Astra Zeneca	1456	69.6	637	30.4	0.264
Sputnik V	1465	70.0	628	30.0	
Pfizer-BioNTech	1419	67.8	674	32.2	

Table 3. Factors associated with willingness to accept vaccination

Variables	Willing to get vaccine	aOR* (95%CI)	p-value
Residence			
Urban area	1083 (87.6)	Ref	0.022
Rural area	786 (91.7)	1.44 (1.06 - 1.96)	
Sex			
Male	562 (92.4)	Ref	0.002
Female	1307 (88.0)	0.57 (0.40 - 0.81)	
Occupation			
Health staff	372 (94.4)	Ref	0.01
Worker	89 (88.1)	0.37 (0.18 - 0.79)	
Other governmental staff	400 (86.4)	0.4 (0.24 - 0.67)	
Student	739 (90.8)	0.6 (0.37 - 0.99)	
Own business	60 (82.2)	0.32 (0.15 - 0.68)	
Others	209 (84.3)	0.36 (0.21 - 0.63)	
Chronic diseases			
Yes	98 (79.0)	Ref	0.000
No	1771 (89.9)	2.42 (1.51 - 3.89)	
Occupational changes due to COVID-19			
Yes	470 (85.8)	Ref	0.005
No	1399 (90.6)	1.55 (1.14 - 2.1)	

Results from the multivariate analysis revealed the factors significantly associated with yes or no WTP for all three vaccines (details are presented in Appendices 1, 2, and 3). Health staffs were more willing than others for any of the three vaccines. Family economic status was also associated with WTP for all three vaccines; respondents of average economic status and above were 1.59 (aOR=1.59, 95%CI 1.05-2.44) times more likely to pay for Astra Zeneca; 1.67 (aOR=1.67, 95%CI 1.1-2.54) times more likely to pay for Sputnik V, and 1.52 (aOR=1.52, 95%CI 1.0-2.31) times more likely to pay for the Pfizer-BioNTech vaccine than were those in poor/near-poor families. Occupational changes due to COVID-19 was

one factor associated with WTP; those reporting no occupational changes were 1.64 (aOR=1.64, 95% CI 1.28-2.09) times more likely to pay for Astra Zeneca; 1.44 (aOR=1.44, 95% CI 1.13-1.83) times more likely to pay for Sputnik V, and 1.55 (aOR=1.55, 95% CI 1.22-1.98) times more likely to pay for the Pfizer-BioNTech vaccine than were those with occupational changes. In addition, respondents who perceived that they would quite possibly get infected with COVID-19 were more likely to be willing to pay for the Pfizer-BioNTech vaccine.

In the additional models which included all variables for each vaccine in the multivariate analysis, we could not find

any additional independent variable significant within a multivariate regression model (Appendix 4,5,6).

4. DISCUSSION

This is one of the few studies on acceptance and WTP since a range of COVID-19 vaccines became available, with different reported levels of efficacy, prices, and side effects. It was conducted in the light of the current plans of the Ministry of Health in Vietnam to import vaccines. However, in the context of limited resources, it may be useful to consider the acceptance rate and WTP (share from out-of-pocket payments) for the vaccines being considered. There is an urgent need for evidence to inform policymakers, which should be based on the demand from society. Overall, 89.3% of respondents stated that they would accept to be vaccinated against COVID-19. The acceptance rate decreased, however, 20% of respondents would have to make out-of-pocket payments for any of the three vaccines. Rural or urban residence, sex, job, job changes (time, position, loss) due to the pandemic, and health status (with/without chronic diseases) were predictors of vaccine acceptance. The mean amounts respondents were willing to pay were US\$39.19 for Astra Zeneca, US\$62.06 for Sputnik V, and US\$99.98 for Pfizer-BioNTech vaccines.

The overall vaccine acceptance in Vietnam appeared to be higher than that reported for many other countries in a global survey where, on average, 71.5% of participants reported that they would be very or somewhat likely to accept a COVID-19 vaccine (10) but similar to the response in China (79.41%) (19). It should be noted that the global survey was conducted in 2020 when the COVID-19 vaccines were still in clinical trials, and people may not have been aware of their real efficacy, safety, and side effects. Since that time there is much more evidence accumulating from actual vaccine administration in several countries (20, 21). At the time of this survey, the pandemic in Vietnam was becoming more serious than it had been in the first year. We assume that with increased general awareness about the disease and about the vaccines, acceptance would also have increased to the current high level. On the other hand, in many countries such as the USA and the United Kingdom, coverage of other vaccines is not so high despite the availability of vaccination services (22, 23) and new foci of anti-vaccine activities have developed recently (24). All of these issues may affect the acceptance of a COVID19 vaccine in these countries.

The acceptance rate was similar for the three vaccines mentioned in the survey, and for all of them, the high acceptance rate of nearly 90% if offered without charge decreased to just under 70% if the out-of-pocket payment had to cover all the costs. However, even with whole or partial payment, the acceptance rate we found was higher than reported in the USA, where overall acceptance was 69% and dropped to 58% if payment was demanded (25). At the time of that survey, respondents would have known that their government was already providing the vaccines for free, which may have affected them (26). Our results were similar to those reported from China, where acceptance was 80% for free vaccines and 66.6% for paid ones (27). Our result showing a drop in acceptance rate if payment is required suggested that to maximize vaccine coverage, the government should cover the costs. However, their budget is also limited,

so they may ask for out-of-pocket payment or shared payment, to which nearly 70% agreed. This result is in line with the acceptance of other vaccines in Vietnam. Most people are willing to have most vaccines, which are mostly provided by the government for free but may also involve payment. For example, in 2019, coverage of the rubella vaccine among children under 5 in high-risk regions was 95.9%, which is similar to routine childhood vaccines (28). It is also similar to the results of a previous study on the acceptance of a dengue vaccine which found that 77.3% of patients with dengue were willing to pay on average US\$ 67.4 for a vaccine (29). This context no doubt contributed to the high acceptance of COVID-19 vaccination in Vietnam.

We named three existing and likely to be available vaccines in the survey, but we did not find any significant differences in vaccine acceptance rates among the three, whether for free distribution or with out-of-pocket payment. Other studies may only have used assumptions of differences in the vaccine efficacy rates and/or duration of protection and/or free/not free vaccines (30). For example, in China, for free vaccines: 50% efficacy would give 75.6% acceptance to be vaccinated, while 80% efficacy gave 80.6% acceptance; at market price: 50% efficacy gave 53.5% acceptance to be vaccinated but if efficacy was increased to 80%, acceptance increased to 66.6% (27). The results in our study could be due to the current context in Vietnam, where Covid19 vaccines are still very scarce. The government has a priority list for high-risk groups including health care workers, most of whom are still not vaccinated. Most reported that they would be pleased to be vaccinated and showed no preference for one vaccine over another.

Those residing in rural areas were more likely to want the vaccine than their urban counterparts. This result is similar to findings in India from October 2020; people living in semi-urban areas were more likely to accept vaccines than those in urban areas (31). In our case, because we recruited participants online, the respondents giving their residence as a rural area may in fact be in a smaller rural town, as opposed to a major city. The difference with regard to urban/rural residence is therefore difficult to interpret.

Willingness to vaccinate in females was less than among males. The same phenomenon was described in the USA, where females were slightly but significantly less willing than males to accept a vaccine (32), and in Russia (11). According to Tran *et al.* (2021), males were more willing than females because of the high reported rates of COVID-19-related morbidity and mortality among males; males may also have a better perception of the vaccine. In the global study, which collected data randomly from 19 countries, however, males were slightly less willing than females (10). It also be noted that our sample characteristics may be different with these studies, therefore the results of generated from the multivariate analysis model can be different with regard to gender.

Health status (with/without chronic diseases) was another factor that influenced vaccine acceptance. People without chronic diseases were more willing to get vaccinated than those with conditions. A USA study that considered people with underlying medical conditions or morbid obesity found similar results (32). In contrast, in an Indian study, people without chronic diseases were less likely to want a vaccine

(31). In Vietnam, this effect may have been influenced by the media reporting negatively about vaccine trials and vaccine programs, suggesting that people with the chronic disease might be at higher risk for complications. In the government planning, however, those with chronic diseases are given high priority for vaccination.

Perhaps not surprisingly, health staffs were more ready to be vaccinated than people with other jobs. Health staff should have a better awareness of the disease and the benefits of vaccination, and would also be at higher risk of contracting COVID-19 infection. This is in line with a previous study in Asia-Pacific, in which 95% of healthcare workers were willing to be vaccinated, depending on vaccine safety, recommendation, and availability (33).

Respondents were willing to pay for the vaccine, in two doses, US\$39.19 for Astra Zeneca, US\$62.06 for Sputnik V, and US\$99.98 for the Pfizer-BioNTech vaccine. These proposed prices seemed appropriate in current Vietnam context as several reasons, such as we must be based on the original price of producers; it was acceptable in comparison with prices of other vaccines in Vietnam and the GDP per capita (in year 2020, GDP per capital was US\$ 2,655). A previous study in Vietnam suggested that the average amount would be US\$ 85.92 ± 69.01 (16), but that study was conducted before the vaccines actually became available and had to make assumptions of 95% effectiveness and proposed prices at US\$12.5, 25, 50, 100 or 200. In other Asian countries, people were willing to pay varying amounts: in China, an average of US\$ 19.2 per dose (19), in Indonesia: 78.3% were willing to pay for a COVID-19 vaccine at US\$ 57.20 (34), and in Malaysia, US\$30.66 ± 18.12 per dose (35). Expected prices were higher in Western countries; one USA study found that people would pay US\$318.76 for a vaccine with 95% efficacy and a 3-year protection, but only US\$236.85 for one with 50% efficacy and one year of protection (26). A population in Chile was willing to pay up to US\$232 per vaccine (36). Again, however, these studies were conducted based on assumptions before the vaccines actually became available. The different studies are also difficult to compare as the prices proposed to the participants varied greatly as do the incomes.

Occupation, family economic status, and job changes due to the COVID-19 were predictors of being willing to make out-of-pocket payments for COVID-19 vaccine. These results are in line with previous studies (31, 35), however with the caution that different sample characteristics among these studies. Those factors implied that a good and sustainable income is the most important contributor to WTP for vaccines. although the proposed prices are quite high in comparison with other available vaccines in Vietnam and with GDP per capita. Therefore, it should be noted for the government if considering a cost-sharing policy for the COVID-19 vaccine, that the groups with these characteristics may need to be subsidized.

Strengths and limitations

This is the first study in Vietnam and one of very few studies in the world looking at vaccine acceptance and WTP that was implemented since COVID-19 vaccines became available. It meant that we could ask the respondents questions based on real and current information on the three

vaccines, not on theoretical scenarios based on assumptions about the vaccines and costs.

Our survey was conducted online and therefore was only a closed questionnaire, we could not probe for further answers or explanations. We also could not reach people who are unable to access the Internet, but our respondents did come from 63 of the 65 provinces in the country. There was no doubt some bias due to the recruitment strategy adopted. The majority of the respondents were under 50 years old, many were students and health staff, relatively well-educated people with normal economic status. These characteristics may have contributed to the high rates of both vaccine acceptance and willingness to pay. However, these people are also perhaps most likely to become infected, living in the urban centers, traveling, and meeting friends and family for social interactions so the high rate is still encouraging. To have a more complete picture of vaccine acceptance, we suggest that it would be interesting to do a survey in a very rural area with interviewers to find out what the people know about COVID-19 and about the vaccine, and whether they would be vaccinated.

Conclusion

In conclusion, we found that, in spite of the relatively low risk of contracting COVID-19 infection in Vietnam up to now, the rate of willingness to be vaccinated against Covid-19 was high, either with or without whole or partial payment out-of-pocket, for all three vaccines that are expected to be available. Due to a limited budget, a policy of cost-sharing may be applied. To maximize the rate of vaccination coverage, certain groups will probably need government subsidies. Sex, occupation, having a chronic condition, and job change due to COVID-19 were predictors of vaccine acceptance. The mean value of WTP was (US\$39.19), (US\$62.06), and (US\$99.98) for AstraZeneca, SputnikV, and Pfizer-BioNTech vaccines, respectively. Predictors of yes or no WTP included occupation, family economic status, and occupational changes, and these identifiers can be used to focus resources in an effort to strengthen vaccine coverage if cost-sharing is going to be applied. These results are very relevant for this sample and it should be careful when generating to the wider Vietnamese population. These findings may be influenced by the context of Vietnam but are also useful for comparison with other countries in the region and elsewhere.

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CONFLICT OF INTEREST


The authors declare that there is no conflict of interest.


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SUPPLEMENTARY MATERIALS

Appendix 1. Multivariate logistic regression demonstrating factors associated with willingness to pay for Astra Zeneca

Variables	Willing to pay for Astra Zeneca vaccine	aOR* (95%CI)	p-value
Age (year)			
	From 18 to 29	798 (66.8)	Ref
	From 30 to 39	388 (72)	0.97 (0.67 - 1.39)
	From 40 to 49	209 (74.9)	1.15 (0.73 - 1.82)
	50 and above	61 (76.2)	1.24 (0.66 - 2.34)
Sex			
	Male	448 (73.7)	Ref
	Female	1008 (67.9)	0.8 (0.64 - 1.002)
Occupation			
	Health staff	320 (81.2)	Ref
	Worker	66 (65.3)	0.45 (0.27 - 0.75)
	Other governmental staff	325 (70.2)	0.49 (0.35 - 0.69)
	Student	541 (66.5)	0.61 (0.42 - 0.89)
	Own business	50 (68.5)	0.65 (0.36 - 1.17)
	Others	154 (62.1)	0.45 (0.31 - 0.67)
Education			
	High school or lower	275 (64.0)	Ref
	Above	1181 (71.0)	1.14 (0.89 - 1.47)
Marital status			
	Single	730 (66.0)	Ref
	Married	682 (73.8)	1.16 (0.79 - 1.68)
	Divorced/ Widowed	44 (69.8)	1.11 (0.58 - 2.11)
Family size			
	One	45 (61.6)	Ref
	Two	55 (60.4)	0.95 (0.49 - 1.83)
	From three people	1356 (70.3)	1.43 (0.86 - 2.38)
Family economic status			
	Poor/near poor	55 (54.5)	Ref
	Others (average, high income)	1401 (70.3)	1.59 (1.05 - 2.44)
Allergy			
	Yes	386 (65.1)	Ref
	No	907 (72.5)	1.3 (1.05 - 1.62)
	Do not know/remember	163 (65.5)	1.08 (0.78 - 1.48)
Occupational changes due to COVID-19			
	Yes	326 (59.5)	Ref
	No	1130 (73.1)	1.64 (1.28 - 2.09)
Income reduction due to COVID-19			
	Yes	507 (65.2)	Ref
	No	949 (72.2)	1.07 (0.85 - 1.35)

*aOR: Adjusted Odd Ratio

Appendix 2. Multivariate logistic regression demonstrating factors associated with willingness to pay for Sputnik V

Variables	Willing to pay for Sputnik V vaccine	aOR* (95%CI)	p-value
Occupation			
Health staff	307 (77.9)	Ref	
Worker	68 (67.3)	0.63 (0.39 - 1.03)	0.063
Other governmental staff	325 (70.2)	0.64 (0.47 - 0.88)	0.005
Student	564 (69.3)	0.69 (0.52 - 0.92)	0.011
Own business	50 (68.5)	0.74 (0.43 - 1.29)	0.294
Others	151 (60.9)	0.48 (0.34 - 0.68)	0.000
Family economic status			
Poor/near poor	56 (55.4)	Ref	
Other (average, high income)	1409 (70.7)	1.67 (1.1 - 2.54)	0.016
Occupational changes due to COVID-19			
Yes	339 (61.9)	Ref	
No	1126 (72.9)	1.44 (1.13 - 1.83)	0.003
Income reduction due to COVID-19			
Yes	508 (65.3)	Ref	
No	957 (72.8)	1.16 (0.93 - 1.46)	0.189

*aOR: Adjusted Odd Ratio

Appendix 3. Multivariate logistic regression demonstrating factors associated with willingness to pay for Pfizer-BioNTech vaccine

Variables	Willing to pay for Pfizer-BioNTech vaccine	aOR* (95%CI)	p-value
Age (year)			
	From 18 to 29	770 (64.4)	Ref
	From 30 to 39	393 (72.9)	1.18 (0.82 - 1.69)
	From 40 to 49	200 (71.7)	1.19 (0.77 - 1.84)
	50 and above	56 (70.0)	1.23 (0.66 - 2.28)
Occupation			
	Health staff	306 (77.7)	Ref
	Worker	65 (64.4)	0.61 (0.37 - 0.99)
	Other governmental staff	331 (71.5)	0.72 (0.52 - 0.99)
	Student	508 (62.4)	0.57 (0.39 - 0.82)
	Own business	54 (74.0)	1.04 (0.57 - 1.89)
	Others	155 (62.5)	0.56 (0.39 - 0.82)
Education			
	High school or lower	265 (61.6)	Ref
	Above	1154 (69.4)	1.12 (0.87 - 1.43)
Marital status			
	Single	714 (64.6)	Ref
	Married	661 (71.5)	0.85 (0.59 - 1.22)
	Divorced/ Widowed	44 (69.8)	0.85 (0.45 - 1.62)
Family economic status			
	Poor/near poor	53 (52.5)	Ref
	Other (average, high income)	1366 (68.6)	1.52 (1.0 - 2.31)
Chronic diseases			
	Yes	74 (59.7)	Ref
	No	1345 (68.3)	1.65 (1.11 - 2.47)
Allergy			
	Yes	378 (63.7)	Ref
	No	887 (70.9)	1.31 (1.06- 1.62)
	Do not know/remember	154 (61.8)	0.99 (0.72 - 1.35)
Occupational changes due to COVID-19			
	Yes	319 (58.2)	Ref
	No	1100 (71.2)	1.55 (1.22 - 1.98)
Income reduction due to COVID-19			
	Yes	491 (63.1)	Ref
	No	928 (70.6)	1.11 (0.89 - 1.39)
Feeling of being at risk of COVID-19 infection in the near future			
	Yes	386 (73.2)	Ref
	No	285 (64.3)	0.69 (0.51 – 0.91)
	Do not know	748 (66.6)	0.78 (0.62 - 0.99)

*aOR: Adjusted Odd Ratio

Appendix 4. Multivariate logistic regression demonstrating factors associated with willingness to pay for Astra Zeneca (included all independent variables)

Variables	Willing to pay for Astra Zeneca vaccine	aOR* (95%CI)	p-value
Residence			
Urban area	857 (69.3)		
Rural area	599 (69.9)	1.033 (0.839 - 1.272)	0.761
Age (year)			
From 18 to 29	798 (66.8)	Ref	
From 30 to 39	388 (72.0)	0.946 (0.653 - 1.369)	0.767
From 40 to 49	209 (74.9)	1.144 (0.724 - 1.807)	0.566
50 and above	61 (76.2)	1.236 (0.641 - 2.383)	0.526
Ethnicity			
Kinh	1147 (68.9)	Ref	
Other	309 (72.2)	1.170 (0.910 - 1.504)	0.221
Sex			
Male	448 (73.7)	Ref	
Female	1008 (67.9)	0.800 (0.638 - 1.003)	0.053
Occupation			
Health staff	320 (81.2)	Ref	
Worker	66 (65.3)	0.475 (0.281 - 0.802)	0.005
Other governmental staff	325 (70.2)	0.505 (0.359 - 0.712)	0.000
Student	541 (66.5)	0.615 (0.419 - 0.902)	0.013
Own business	50 (68.5)	0.652 (0.362 - 1.172)	0.153
Others	154 (62.1)	0.472 (0.320 - 0.697)	0.000
Education			
High school or lower	275 (64.0)	Ref	
Above	1181 (71.0)	1.144 (0.887 - 1.475)	0.300
Marital status			
Single	730 (66.0)	Ref	
Married	682 (73.8)	1.152 (0.792 - 1.676)	0.460
Divorced/ Widowed	44 (69.8)	1.091 (0.570 - 2.088)	0.793
Family size			
One	45 (61.6)	Ref	
Two	55 (60.4)	0.937 (0.485 - 1.810)	0.846
From three people	1356 (70.3)	1.426 (0.850 - 2.394)	0.179
Family economic status			
Poor/near poor	55 (54.5)	Ref	
Others (average, high income)	1401 (70.3)	1.636 (1.062 - 2.518)	0.025
Chronic disease			
No	1371 (69.6)		
Yes	85 (68.5)	0.816 (0.535 - 1.244)	0.344
Allergy			
Yes	386 (65.1)	Ref	
No	907 (72.5)	1.309 (1.052 - 1.629)	0.016
Do not know/remember	163 (65.5)	1.090 (0.790 - 1.505)	0.599
Occupational changes due to COVID-19			
Yes	326 (59.5)	Ref	
No	1130 (73.1)	1.626 (1.273 - 2.077)	0.000
Income reduction due to COVID-19			
Yes	507 (65.2)	Ref	
No	949 (72.2)	1.073 (0.852 - 1.351)	0.552
F Current contact level*			
F1, F2	47 (60.3)	Ref	
F3, F4	160 (67.2)	1.035 (0.587 - 1.827)	0.905
None	1249 (70.3)	1.245 (0.753 - 2.059)	0.393
Previous three waves contact (F1 to F4)*			
Yes	135 (67.8)	Ref	

Variables	Willing to pay for Astra Zeneca vaccine	aOR* (95%CI)	p-value
Feeling of being at risk of COVID-19 infection in the near future	No	1321 (69.7)	1.057 (0.761 - 1.467)
	Yes	385 (73.1)	Ref
	No	302 (68.2)	0.827 (0.616 - 1.112)
	Do not know	769 (68.5)	0.867 (0.680 - 1.105)

*aOR: Adjusted Odd Ratio

Appendix 5. Multivariate logistic regression demonstrating factors associated with willingness to pay for Sputnik V (included all independent variables)

Variables	Willing to pay for Sputnik V vaccine	aOR* (95%CI)	p-value
Residence	Urban area	857 (69.3)	1.066 (0.867 - 1.312)
	Rural area	608 (70.9)	
Age (year)	From 18 to 29	821 (68.7)	0.922 (0.638 - 1.332)
	From 30 to 39	388 (72.0)	
	From 40 to 49	197 (70.6)	
	50 and above	59 (73.8)	
Ethnicity	Kinh	1157 (69.5)	1.103 (0.861 - 1.414)
	Other	308 (72.0)	
Sex	Male	440 (72.4)	0.867 (0.694 - 1.083)
	Female	1025 (69.0)	
Occupation	Health staff	307 (77.9)	0.646 (0.385 - 1.086)
	Worker	68 (67.3)	
	Other governmental staff	325 (70.2)	
	Student	564 (69.3)	
	Own business	50 (68.5)	
	Others	151 (60.9)	
Education	High school or lower	289 (67.2)	1.029 (0.796 - 1.332)
	Above	1176 (70.7)	
Marital status	Single	751 (67.9)	1.272 (0.875 - 1.848)
	Married	669 (72.4)	
	Divorced/ Widowed	45 (71.4)	
Family size	One	49 (67.1)	0.922 (0.470 - 1.808)
	Two	60 (65.9)	
	From three people	1356 (70.3)	
Family economic status	Poor/near poor	56 (55.4)	1.689 (1.099 - 2.596)
	Others (average, high income)	1409 (70.7)	
Chronic disease	No	1384 (70.3)	0.716 (0.476 - 1.079)
	Yes	81 (65.3)	
Allergy	Yes	405 (68.3)	1.117 (0.897 - 1.392)
	No	898 (71.8)	
	Do not know/remember	162 (65.1)	
Occupational changes due to COVID-19	Yes	339 (61.9)	1.416 (1.109 - 1.808)
	No	1126 (72.9)	
Income reduction due to COVID-19			0.005

Variables	Willing to pay for Sputnik V vaccine	aOR* (95%CI)	p-value	
F Current contact level*	Yes	508 (65.3)	1.189 (0.946 - 1.494)	
	No	957 (72.8)		
Previous three waves contact (F1 to F4)*	F1, F2	49 (62.8)	1.144 (0.646 - 2.027)	
	F3, F4	168 (70.6)		
	None	1248 (70.2)		1.143 (0.690 - 1.893)
Feeling of being at risk of COVID-19 infection in the near future	Yes	139 (69.8)	1.016 (0.730 - 1.414)	
	No	1326 (70.0)		
	Yes	385 (73.1)	0.809 (0.603 - 1.085)	
	No	304 (68.6)		
	Do not know	776 (69.1)		0.873 (0.686 - 1.112)

*aOR: Adjusted Odd Ratio

Appendix 6. Multivariate logistic regression demonstrating factors associated with willingness to pay for Pfizer-BioNTech vaccine (included all independent variables)

Variables	Willing to pay for Pfizer-BioNTech vaccine	aOR* (95%CI)	p-value
Residence	Urban area	857 (69.3)	0.995 (0.812 - 1.220)
	Rural area	608 (70.9)	
Age (year)	From 18 to 29	821 (68.7)	1.176 (0.816 - 1.695)
	From 30 to 39	388 (72.0)	
	From 40 to 49	197 (70.6)	
	50 and above	59 (73.8)	
Ethnicity	Kinh	1157 (69.5)	0.867 (0.683 - 1.101)
	Other	308 (72.0)	
Sex	Male	440 (72.4)	0.964 (0.775 - 1.199)
	Female	1025 (69.0)	
Occupation	Health staff	307 (77.9)	0.578 (0.347 - 0.964)
	Worker	68 (67.3)	
	Other governmental staff	325 (70.2)	
	Student	564 (69.3)	
	Own business	50 (68.5)	
	Others	151 (60.9)	
Education	High school or lower	289 (67.2)	1.121 (0.872 - 1.440)
	Above	1176 (70.7)	
Marital status	Single	751 (67.9)	0.824 (0.568 - 1.196)
	Married	669 (72.4)	
	Divorced/ Widowed	45 (71.4)	
Family size	One	49 (67.1)	0.700 (0.359 - 1.365)
	Two	60 (65.9)	
	From three people	1356 (70.3)	
Family economic status	Poor/near poor	56 (55.4)	1.451 (0.944 - 2.232)
	Others (average. high income)	1409 (70.7)	
Chronic disease	No	1384 (70.3)	

Variables	Willing to pay for Pfizer-BioNTech vaccine	aOR* (95%CI)	p-value
Allergy	Yes	81 (65.3)	0.602 (0.403 - 0.901)
	Yes	405 (68.3)	
	No	898 (71.8)	1.295 (1.043 - 1.607)
Occupational changes due to COVID-19	Do not know/remember	162 (65.1)	0.967 (0.705 - 1.328)
	Yes	339 (61.9)	
Income reduction due to COVID-19	No	1126 (72.9)	1.570 (1.232 - 2.001)
	Yes	508 (65.3)	
F Current contact level*	No	957 (72.8)	1.110 (0.885 - 1.392)
	F1. F2	49 (62.8)	
Previous three waves contact (F1 to F4)*	F3. F4	168 (70.6)	1.038 (0.582 - 1.852)
	None	1248 (70.2)	0.926 (0.555 - 1.544)
	Yes	139 (69.8)	
Feeling of being at risk of COVID-19 infection in the near future	No	1326 (70.0)	0.961 (0.691 - 1.337)
	Yes	385 (73.1)	
	No	304 (68.6)	0.684 (0.512 - 0.915)
	Do not know	776 (69.1)	0.782 (0.614 - 0.995)

*aOR: Adjusted Odd Ratio