

Research article

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Knowledge, attitude and acceptance of people toward COVID-19 vaccine: A cross-sectional study in Vietnam

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Abstract

Background: This study aimed to investigate the community's knowledge, attitudes and acceptance of COVID-19 vaccines and identify factors associated with COVID-19 vaccine acceptance.

Subjects and methods: Cross-sectional study, collected by online survey of people including 8 questions on knowledge, 6 questions on attitudes and 6 questions on COVID-19 vaccine acceptance.

Results: A total of 1,485 responses were included in the analysis. Females accounted for 59.8%, only 2.2% were 60 years of age or older. Most of them lived in Ho Chi Minh City (39.3%). The rates of good knowledge, positive attitude and vaccine acceptance were 92.1%; 90.8% and 94.2%, respectively. Factors associated with increased acceptance of COVID-19 vaccination were female ($p < 0.05$), married ($p < 0.001$), having a university degree or higher ($p < 0.001$), living in Ho Chi Minh City ($p < 0.05$), working as health care worker ($p = 0.001$), currently pregnant ($p = 0.034$) or breastfeeding ($p = 0.011$). Having good knowledge and positive attitudes were associated with increased acceptance of COVID-19 vaccination ($p < 0.001$).

Conclusion: The study showed that people with good knowledge, positive attitudes and high acceptance of COVID-19 vaccination and that there was a strong association among these factors. This study is a useful reference for implementing similar surveys in the future.

Keywords: Knowledge, attitude, acceptance, COVID-19 vaccine, Vietnam

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1. INTRODUCTION

Vaccination against infectious diseases is considered a significant step forward in public health and primary health care, saving millions of people each year [1, 2]. Vaccination against COVID-19 has been recognized as an effective measure to reduce disease incidence, prevent transmission, and protect the community from the spread of SARS-CoV-2.

Moreover, COVID-19 vaccination has significantly contributed to lowering hospitalization rates, intensive care unit (ICU) admissions, and mortality associated with SARS-CoV-2 infection [3].

As of July 2021, approximately 10.9% of the global population had been fully vaccinated against COVID-19; however, only 0.4% of the Vietnamese population

had completed the full vaccination regimen [4]. At that time, the national immunization campaign faced multiple challenges, which may have arisen from various factors including limited resources and vaccine supply shortages, public mistrust, concerns about vaccine side effects, and insufficient vaccine-related knowledge [5, 6].

Given the urgency of the pandemic, numerous studies have been conducted globally. For instance, a study in Ethiopia reported that 74.0% of participants demonstrated good knowledge, 44.7% had a positive attitude, and 62.6% expressed an intention to receive the COVID-19 vaccine [7]. In Libya, 37.0% of participants expressed concerns about severe vaccine-related complications [5]. Similarly, in Jordan, only 37.4% of respondents were willing to accept the COVID-19 vaccine, and nearly half (49.6%) stated that concerns about side effects would prevent them from being vaccinated [8]. These findings highlight the prevalence of vaccine hesitancy in various regions.

To support pandemic control efforts and strengthen the COVID-19 vaccination campaign in Vietnam, it is essential to conduct research on public knowledge, attitudes, and vaccine acceptance, as well as to identify the associated factors. The findings of this study are expected to provide valuable insights for healthcare professionals in optimizing COVID-19 vaccination counseling strategies. Additionally, insights from this research will assist policymakers, government agencies, and relevant stakeholders in developing targeted communication strategies and implementing vaccination programs that effectively engage the population. Therefore, this study aims to

assess the community's knowledge, attitudes, and acceptance of COVID-19 vaccines and explore the associated determinants.

2. MATERIAL AND METHODS

2.1. Study participants

The eligibility criteria for this research study were: (1) age of 18 years old or older, (2) being a Vietnamese citizen, (3) living in Vietnam and being willing to participate in the survey. The exclusion criteria were: (1) the participants did not accomplish the required fields in the survey; (2) the participants answered questions invalidly or controversially.

2.2. Study design

Study design: A cross-sectional.

The sample size was calculated using the following formula:

$$n = Z_{1-\frac{\alpha}{2}}^2 P(1 - P)/d^2$$

Where n was the required sample size; $Z_{1-\frac{\alpha}{2}}$ was 1.96 according to a 95% confidence interval; P was 62.6% (the percentage of people accepting COVID-19 vaccine from a study in Ethiopia [7]); and d was 0.05 (a margin of error). The estimated sample size was 360 participants. Finally, considering a 10% exclusion rate of invalid responses, the minimum sample size required for this study was 396 participants.

Sampling Method: A convenience sampling approach was employed through an online survey distributed via Google Forms. The survey link was shared by members of the research team through their personal accounts, community groups, and fan pages on social media platforms (Facebook and Zalo) between July 30 and September 20, 2021.

Survey Development: The questionnaire was developed based on instruments used in similar studies

reported in the literature [5-9], combined with expert consultation involving two postgraduate-trained pharmacists with over 10 years of professional experience. The first section of the questionnaire included 16 items assessing participants' sociodemographic and health-related characteristics. The main section followed the KAA (Knowledge–Attitude–Acceptance) model, comprising three domains: Knowledge (8 items), Attitude (6 items), and Acceptance of COVID-19 vaccines (6 items).

2.3. Statistical Analysis

Survey data were initially processed using Microsoft Excel 365 and subsequently exported to IBM SPSS Statistics version 26.0 for statistical analysis. The Chi-square test was applied to examine the associations between independent variables (e.g., gender, educational level) and the dependent variable (vaccine acceptance). A p-value of < 0.05 was considered statistically significant with a 95% confidence interval.

2.4. Ethical consideration

The protocol was approved by the Ethical Committee of the Pham Ngoc Thach University of Medicine, Vietnam (13/653/TĐHYKPNT-HĐĐĐ).

3. RESULTS

3.1. Socio-demographic and medical characteristics of participants

A total of 1,519 participants completed the questionnaire, of which 34 responses were excluded, resulting in 1,485 eligible responses for analysis. Among these, 59.8% were female, and more than half (51.8%) were married. Only 2.2% of respondents were aged 60 years or older. The majority resided in Ho Chi Minh City (39.3%) and held at least a university degree (69.1% undergraduate; 21.7% postgraduate). Healthcare workers, including medical students, accounted for 23.8% of the sample, with approximately 20.7% identified as frontline workers involved in COVID-19 response efforts.

At the time of the survey, 25 participants (1.7%) were currently infected with COVID-19, and 39 individuals (2.6%) had previously been infected. Regarding vaccination status, 42.4% had not yet received any COVID-19 vaccine dose; 44.3% had received one dose, and only 13.3% had been fully vaccinated with two doses. Among those who had been vaccinated, 90.9% reported experiencing common side effects.

3.2. Knowledge of participants towards COVID-19 vaccine

Table 1. Knowledge of participants towards COVID-19 vaccine (n = 1485)

Questions	Participants correctly answered	
	Frequency (n)	Percent (%)
A1. Getting the COVID-19 vaccine means being fully protected and permanently immune from the Coronavirus (COVID-19). (Correct answer: False)	1197	80.6
A2. Getting the COVID-19 vaccine reduces the risk of infection, severe illness, and death from the Coronavirus. (Correct answer: True)	1418	95.5
A3. Getting the COVID-19 vaccine is especially essential for people with underlying medical conditions/ chronic diseases and immunocompromised people (HIV, cancer, organ transplant, ...)	1066	71.8

(Correct answer: True)		
A4. I am at risk of infecting Coronavirus because of getting COVID-19 vaccine.	1055	71.0
(Correct answer: False)		
A5. All COVID-19 vaccines require 2 doses.	441	29.7
(Correct answer: False)		
A6. The common side effects after getting COVID-19 vaccine include fever/ chills, fatigue, headache/ muscle pain, swelling/ redness/ pain at the injection site, ...	1380	92.9
(Correct answer: True)		
A7. If you have been vaccinated for COVID-19, there is unnecessary to do 5K message (Face mask – Disinfection – Distance – No gathering – Health declaration).	1396	94.0
(Correct answer: False)		
A8. Before getting COVID-19 vaccine, it is necessary to use paracetamol to prevent fever and pain post-vaccination.	927	62.4
(Correct answer: False)		
Classification of knowledge towards COVID-19 vaccine		
Good knowledge	1367	92.1
Poor knowledge	118	7.9

Most participants (95.5%) understood that COVID-19 vaccination reduces the risk of infection, severe illness, and death caused by the coronavirus. Approximately 94.0% were aware that the “5K” strategy comprising Mask wearing, Disinfection, Distancing, No gatherings, and Health declaration remains essential even after receiving the COVID-19 vaccine. However, only 29.7% of respondents were aware that not all COVID-19 vaccines require two doses. Fewer than two-thirds of participants recognized that the prophylactic use of paracetamol prior to vaccination is unnecessary for preventing post-vaccination fever and pain. Overall, 92.1% of participants demonstrated a “good knowledge” regarding COVID-19 vaccines.

3.3. Attitude of participants towards COVID-19 vaccine

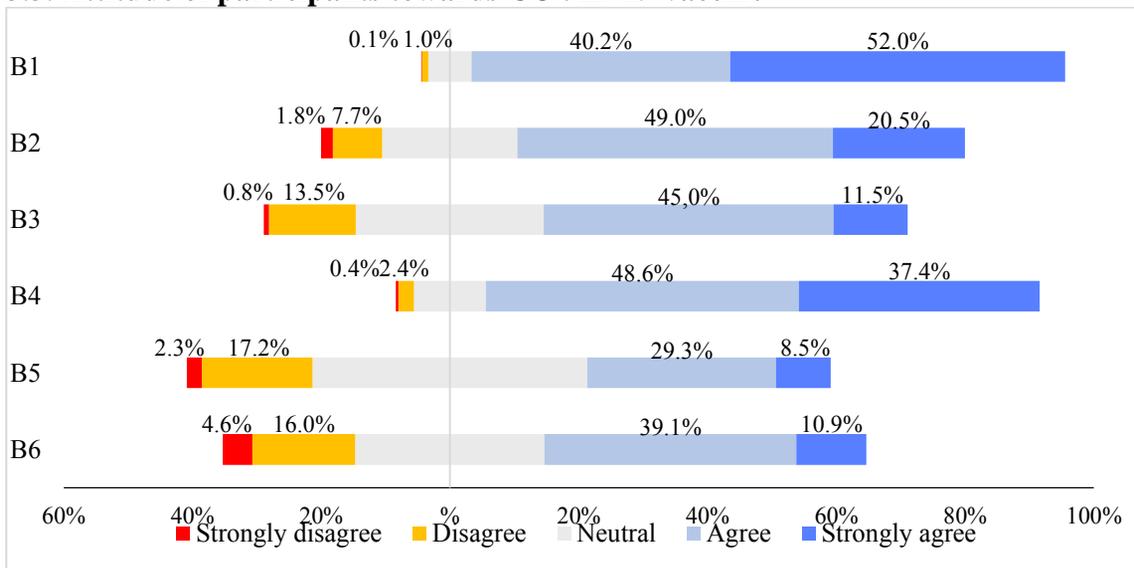


Figure 1. Attitude towards COVID-19 vaccine (n = 1485)

Note: B1. You believe vaccination is an effective way to protect people from COVID-19. B2. You believe the COVID-19 vaccine is safe. B3. You are concerned about the risk of serious vaccine-related complications after COVID-19 vaccination. B4. The benefits of COVID-19 vaccine outweigh the risks. B5. COVID-19 vaccines made in Asia or Vietnam are the same effective and safe as those made in America or Europe. B6. The COVID-19 vaccine is being distributed reasonably and fairly.

The majority of participants (92.2%) regarded vaccination as an effective means of protection against COVID-19, with 86.0% believing that the benefits of vaccination outweigh the risks. However, 56.5% expressed concerns about serious vaccine-related complications. Additionally, 20.6% perceived the distribution of COVID-19 vaccines as inequitable and unfair. Nearly half (42.7%) remained neutral regarding the efficacy and safety of vaccines developed in different countries. Overall, 90.8% of participants demonstrated a positive attitude toward COVID-19 vaccination.

3.4. Acceptance of participants towards COVID-19 vaccine

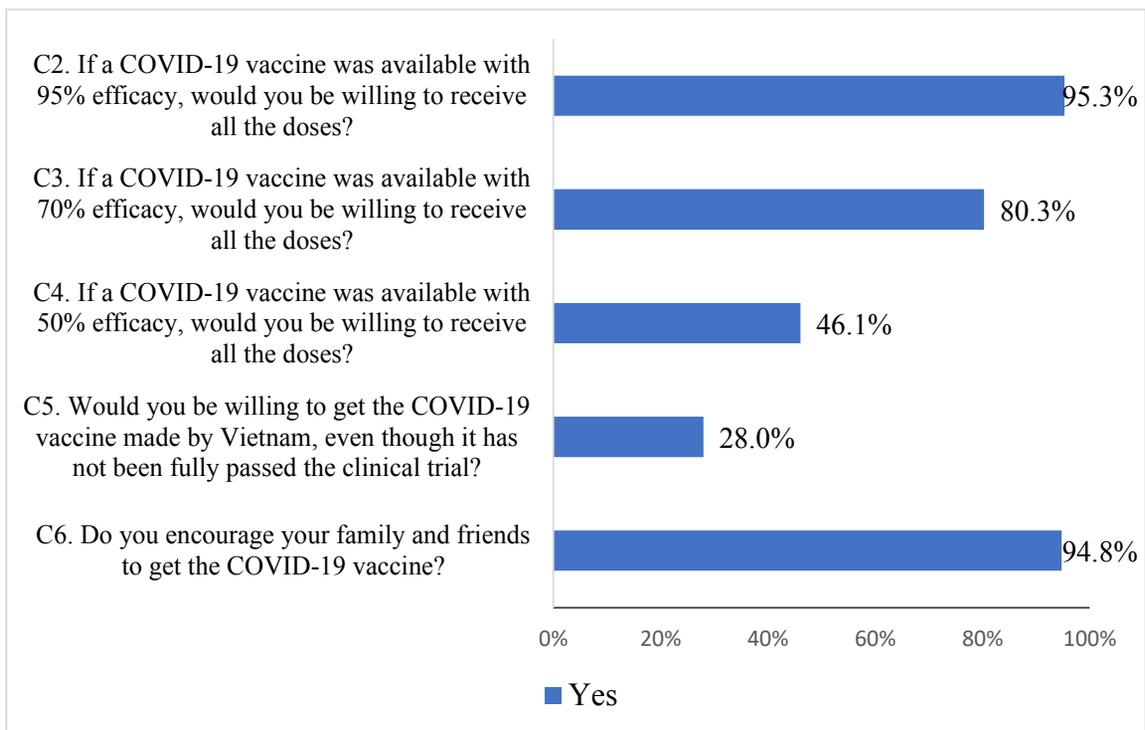
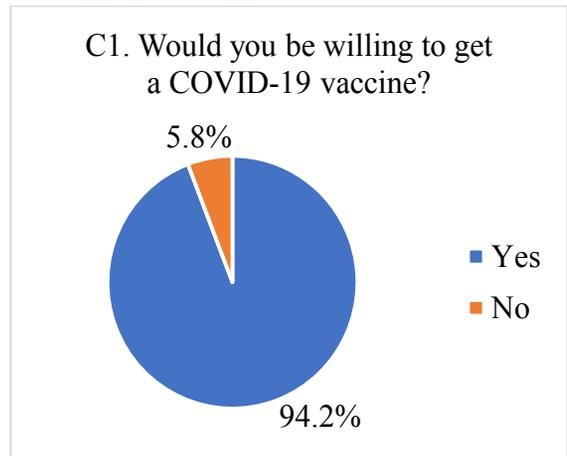


Figure 2. Acceptance towards COVID-19 vaccine (n = 1485)

Regarding vaccination intent, most participants (94.2%) expressed willingness to receive a COVID-19 vaccine. When asked about their acceptance of vaccines with varying efficacy levels, 95.3% were willing to receive a vaccine with 95% efficacy, 80.3% accepted a vaccine with 70% efficacy, and 46.1% accepted a vaccine with 50% efficacy. Notably, nearly all participants (94.8%) stated that they would encourage their family and friends to get vaccinated against COVID-19. Furthermore, 28.0% reported willingness to receive a domestically produced COVID-19 vaccine, even if it had not yet completed clinical trials.

3.5. Factors related to knowledge, attitude and acceptance towards COVID-19 vaccination of participants

Table 2. Factors related to knowledge, attitude and acceptance towards COVID-19 vaccination (n = 1485)

Variables	Good knowledge	Positive attitude	Acceptance
Age (year)	0.414	0.528	0.351
18 – 39 (n = 1116)	1031 (92.4)	1010 (90.5)	1055 (94.5)
≥ 40 (n = 369)	336 (91.1)	338 (91.6)	344 (93.2)
Gender	0.000*	0.046*	0.001*
Male (n = 597)	523 (87.6)	531 (88.9)	548 (91.8)
Female (n = 888)	844 (95.0)	817 (92.0)	851 (95.8)
Marital status	0.000*	0.000*	0.000*
Married (n = 769)	735 (95.6)	738 (96.0)	756 (98.3)
Single (including unmarried, divorced and widowed) (n = 716)	632 (88.3)	610 (85.2)	643 (89.8)
Level of education	0.000*	0.000*	0.000*
≤ High school (n = 137)	82 (59.9)	89 (65.0)	87 (63.5)
≥ University (n = 1348)	1285 (95.3)	1259 (93.4)	1312 (97.3)
Occupation	0.000*	0.336	0.001*
Healthcare workers (including students in health science major) (n = 353)	350 (99.2)	325 (92.1)	345 (97.7)
Other (non-healthcare workers) (n = 1132)	1017 (89.8)	1023 (90.4)	1054 (93.1)
Existing underlying medical condition	0.009*	0.132	0.335
Yes (n = 376)	358 (95.2)	334 (88.8)	358 (95.2)
No (n = 1109)	1009 (91.0)	1014 (91.4)	1041 (93.9)
Are you a pregnant woman?	0.411 ^a	0.138 ^a	0.034 ^{a*}
Yes (n = 22)	19 (86.4)	18 (81.8)	18 (81.8)
No (n = 1463)	1348 (92.1)	1330 (90.9)	1381 (94.4)
Are you a breastfeeding woman?	0.079 ^a	0.016 ^{a*}	0.011 ^{a*}
Yes (n = 44)	37 (84.1)	35 (79.5)	37 (84.1)
No (n = 1441)	1330 (92.3)	1313 (91.1)	1362 (94.5)
Residency region	0.000*	0.029*	0.000*
Ho Chi Minh City (n = 584)	568 (97.3)	542 (92.8)	568 (97.3)
Others (n = 901)	799 (88.7)	806 (89.5)	831 (92.2)
Do you work in the COVID-19 frontline?	0.003*	0.000*	0.000*
Yes (n = 308)	296 (96.1)	300 (97.4)	306 (99.4)
No (n = 1177)	1071 (91.0)	1048 (89.0)	1093 (92.9)

The COVID-19 vaccination status	0.000*	0.000*	0.000*
Have not been vaccinated (n = 629)	527 (83.8)	515 (81.9)	545 (86.6)
Have been vaccinated (n = 856)	840 (98.1)	833 (97.3)	854 (99.8)
Do you experience any common side effect after taking the COVID-19 vaccine?	0.650	0.714	1.000
Yes (n = 778)	764 (98.2)	756 (97.2)	776 (99.7)
No (n = 78)	76 (97.4)	77 (98.7)	78 (100.0)
Currently infected with COVID-19	0.000 ^{a*}	0.000 ^{a*}	0.000 ^{a*}
Yes (n = 25)	8 (32.0)	9 (36.0)	9 (36.0)
No (n = 1460)	1359 (93.1)	1339 (91.7)	1390 (95.2)
Previously infected with COVID-19	0.001 ^{a*}	0.002 ^{a*}	0.000 ^{a*}
Yes (n = 39)	29 (74.4)	29 (74.4)	29 (74.4)
No (n = 1446)	1338 (92.5)	1319 (91.2)	1370 (94.7)
Have family member or friend infected with COVID-19	0.000*	0.000*	0.000*
Yes (n = 225)	180 (80.0)	175 (77.8)	183 (81.3)
No (n = 1260)	1187 (94.2)	1173 (93.1)	1216 (96.5)
Have family member or friend died due to COVID-19	0.000*	0.000*	0.000 ^{a*}
Yes (n = 82)	49 (59.8)	49 (59.8)	51 (62.2)
No (n = 1403)	1318 (93.9)	1299 (92.6)	1348 (96.1)
Knowledge		0.000*	0.000*
Good (n = 1367)		1290 (94.4)	1336 (97.7)
Poor (n = 118)		58 (49.2)	63 (53.4)
Attitude	0.000*		0.000*
Positive (n = 1348)	1290 (95.7)		1330 (98.7)
Negative (n = 137)	77 (56.2)		69 (50.4)

Note: * $p < 0.05$: Statistically significant. Chi-square test was used.^a Fisher's exact test was applied when the expected frequency was less than 5.

Factors associated with vaccine acceptance: Factors significantly associated with increased COVID-19 vaccine acceptance included being female ($p < 0.05$), married ($p < 0.001$), having a university-level education or higher ($p < 0.001$), residing in Ho Chi Minh City ($p < 0.05$), being a healthcare worker ($p = 0.001$), being pregnant ($p = 0.034$), or breastfeeding ($p = 0.011$). Age and underlying medical conditions were not significantly associated with vaccine acceptance ($p > 0.05$). A higher level of knowledge and a positive attitude were also associated with greater vaccine acceptance ($p < 0.001$).

4. DISCUSSION

This study revealed that 92.1% of participants had good knowledge of COVID-19 vaccines. This rate was higher than those reported in Ethiopia (74.0%) [7], Bangladesh (57.0%) [9], and Oman (88.0%) [10]. Such differences may be attributed to variations in demographic characteristics, survey instruments, and research methodologies. The majority (95.5%) were aware that COVID-19 vaccination reduces the risk of infection, severe illness, and death, a rate higher than the 86.0% reported in Libya [5], reflecting a high level of public

understanding of vaccine efficacy. However, only 29.7% of participants knew that not all COVID-19 vaccines require two doses [11].

In terms of attitudes, 90.8% of participants demonstrated a positive outlook toward COVID-19 vaccines, surpassing the rates in Australia (80.5%) [12], Oman (59.3%) [10], and Ethiopia (44.7%) [7]. Most participants (92.2%) believed that vaccination offers effective protection against COVID-19. Notably, 37.8% believed that the safety and efficacy of vaccines produced in Asia or Vietnam are comparable to those developed in the U.S. or Europe, indicating confidence in domestic and regional vaccines, particularly in the context of supply shortages.

The willingness to accept COVID-19 vaccines was also remarkably high (94.2%), exceeding figures from countries such as China (87.4%) [13], though slightly lower than Malaysia (94.3%) [14]. Interestingly, 28.0% of participants expressed willingness to receive a domestically produced COVID-19 vaccine even before it had completed clinical trials, reflecting public trust in Vietnam's vaccine research and development capabilities. A study by Abu-Farha et al. [15] found that the primary motivation for participating in vaccine trials was the desire to return to normal life. The high vaccine acceptance rate observed in this study is not surprising given the long-standing public trust in vaccination programs in Vietnam [16].

Higher vaccine acceptance among females, married individuals, and especially those who were pregnant or breastfeeding may be explained by a protective motivation not only for themselves but also for their families and

children. Similar findings have been reported in multinational studies across 19 countries [17], as well as in Australia [12] and Bangladesh [9]. In contrast, a study in Jordan [8] found that males were more likely to accept vaccination than females.

Furthermore, those with good knowledge and a positive attitude were more likely to accept COVID-19 vaccines, consistent with findings from Ethiopia [7]. Therefore, providing accurate and accessible information about COVID-19 vaccines and addressing public concerns is essential to increase vaccine uptake in the Vietnamese population.

Limitations should be acknowledged. First, the use of an online survey may have biased the sample toward individuals with internet access, primarily urban residents. Moreover, the convenience sampling method did not ensure demographic representativeness in terms of age, sex, ethnicity, or geographical distribution relative to the general Vietnamese population. Nevertheless, this study provides important preliminary insights into public knowledge, attitudes, and acceptance of COVID-19 vaccines, especially in Ho Chi Minh City, during the early stages of the national vaccination campaign (August - September 2021).

5. CONCLUSION

This study indicates that the Vietnamese public had good knowledge, a positive attitude, and a high level of acceptance toward COVID-19 vaccination. A significant association was found between knowledge, attitude, and vaccine acceptance. The findings suggest that the validated KAA questionnaire may serve as a useful tool for future research exploring COVID-19 vaccine acceptance in Vietnam and comparable settings.

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