Preplanned Studies

Willingness of the General Public to Receive A COVID-19 Vaccine Booster — China, April–May 2021

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Summary

What is already known about this topic?

A coronavirus disease 2019 (COVID-19) vaccine booster is planned for administration to eligible individuals. Understanding the factors that influence attitudes towards the booster shot will help to identify groups that will most readily accept a booster dose.

What is added by this report?

Of the individuals polled, 75.2% reported they would receive a booster shot. Sociodemographic characteristics influencing booster vaccine acceptance included age, gender, occupation, and education. Moreover, those who had been vaccinated against influenza, who believed herd immunity would be effective against severe acute respiratory syndrome coronavirus 2, and who reported reduced anxiety after vaccination were more likely to accept a booster dose.

What are the implications for public health practice?

A booster shot of the COVID-19 vaccine could be widely accepted. Communicating about the effectiveness of the COVID-19 vaccine and the impact of infection on people's health could help increase public willingness to get a booster dose.

On October 11, 2021, the strategic advisory group of experts (SAGE) of the World Health Organization (WHO) recommended that an additional dose of coronavirus disease 2019 (COVID-19) vaccine should be offered to moderately and severely immunocompromised people and to those aged 60 and over who were previously immunized with Sinovac or Sinopharm inactivated vaccines (*1*). The National Health Commission of the People's Republic of China (NHC) and the United States Centers for Disease Control Advisory Committee on Immunization Practices (ACIP) are planning a COVID-19 vaccine booster so that vaccinated people can maintain protection over the coming months (*2–3*). Numerous studies have shown that vaccination willingness is influenced by a variety of factors and that it changes over time (*4–5*). It is necessary to understand the public's willingness to receive a COVID-19 vaccine booster. Identifying factors that influence booster vaccine acceptance will aid in determining who is most likely to accept a booster dose.

Online questionnaires were completed by 2,047 vaccinated Chinese adults in April and May 2021. Respondents' sociodemographic characteristics, attitudes towards vaccination, and attitudes towards a COVID-19 vaccine booster were collected. All data were analyzed using R statistical software (version 4.0.3, R Core Team, Vienna, Austria). Logistic regression models were built to identify factors associated with respondents' acceptance of a COVID-19 vaccine booster. The odds ratio (OR) and its corresponding 95% confidence interval (CI) were calculated.

Of the respondents, 75.2% reported they planned to receive a booster shot. Respondents who expressed significantly higher acceptance of a booster dose tended to be aged 25–54 years old, male, non-healthcare workers, and less educated. Moreover, those who had been vaccinated against influenza (OR=1.26, 95% CI: 1.01–1.57), who believed herd immunity would be effective against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection (OR=3.58, 95% CI: 2.69–4.77), or who reported reduced anxiety after vaccination (OR=1.27, 95% CI: 1.02–1.59) were more likely to report planning to receive a booster dose.

Based on these results, it seems that a booster shot of the COVID-19 vaccine could be widely accepted in China. Communicating to the public the effectiveness of COVID-19 vaccines and the impact of COVID-19 infection on one's health could increase individuals' willingness to receive a booster dose.

In April and May 2021, an online questionnaire was disseminated via WeChat, a Chinese multipurpose social media app. Using WeChat moments, which spread questionnaires by snowballing, 1,656 respondents were recruited. To reduce the risk of bias due to starting with a single sample source, 403

additional respondents were recruited via the Tencent questionnaire sample database. This database contains over 1 million people with verified personal information, and we used the recruitment service to recruit subjects aged ≥18. Incomplete questionnaires were excluded. The final sample consisted of 2,047 respondents. Respondents' sociodemographic characteristics, flu vaccination history, attitudes towards herd immunity, anxiety levels after initial vaccination, acceptance of a booster shot, and antibody tests were collected. The study was approved by Peking University Third Hospital Medical Science Research Ethics Committee (No. 2021-184-01).

The age- and gender-standardized acceptance rate of a COVID-19 vaccine booster was calculated using the 2010 population census of China as the reference (*6*). Logistic regression models were built to identify factors influencing COVID-19 vaccine booster acceptance (event: receiving COVID-19 vaccine booster when available). All data were analyzed using R statistical software. A *P*-value <0.05 was considered statistically significant.

Of the 2,047 vaccinated respondents (Table 1), 1,540 (75.2%) reported that they planned to receive a COVID-19 vaccine booster shot when it was available. The age- and gender-standardized acceptance rate was 75.8% (Table 2). In addition, 1,257 (81.6% of those who planned to receive the booster shot) reported that they would receive antibody tests, which could help to determine the effectiveness of the booster dose.

COVID-19 vaccine booster acceptance rate was highest among adults aged 45–54 years (81.2%) and lowest among adults aged ≥65 years (69.6%). Male respondents were more likely than female respondents to accept a COVID-19 vaccine booster (80.2% *vs.* 72.2%), and those who were not healthcare workers were more likely to accept a booster dose than healthcare workers (79.3% *vs.* 67.0%). Respondents who held a bachelor's degree or below were more likely to accept a booster dose (68.9%, 74.5%, 83.3%, *vs.* 85.4%). Vaccine booster acceptance was slightly higher among respondents who earned <5,000 CNY per month (77.7% *vs.* 73.6%). Respondents who lived in rural areas were more likely to accept a booster dose (83.1% *vs.* 74.1%). Moreover, those who had been vaccinated against influenza (77.7% *vs.* 73.4% who had not been), who believed herd immunity would be effective against SARS-CoV-2 (78.9% *vs.* 47.5% who did not believe this), and who reported reduced anxiety after vaccination (77.0% *vs.* 71.7% who did not report this) were more likely to accept a booster dose.

TABLE 1. Characteristics of the study population.

Characteristics	WeChat sample (n=1,644)	Tencent sample (n=403)
Age group, years		
18–24	184 (11.3)	14 (3.5)
25–34	614 (37.6)	18 (4.5)
35–44	451 (27.6)	43 (10.7)
45–54	254 (15.5)	245 (60.8)
55–64	91 (5.6)	68 (16.9)
≥65	41 (2.5)	15 (3.7)
Gender		
Male	613 (37.3)	164 (40.7)
Female	1,031 (62.7)	239 (59.3)
Non-healthcare staff		
Yes	973 (59.2)	398 (98.8)
No	671 (40.8)	5 (1.2)
Education		
Junior high school and below	105 (6.4)	135 (33.5)
Senior high school	78 (4.7)	216 (53.6)
Associate or bachelor	809 (49.2)	49 (12.2)
Master and above	652 (39.7)	3 (0.7)
Income (CNY per month)		
0–2,000	201 (12.2)	106 (26.3)
2,000–5,000	300 (18.3)	221 (54.8)
5,000–10,000	459 (27.9)	66 (16.4)
10,000 and above	684 (41.6)	10 (2.5)
Area type		
Rural	1,498 (91.6)	285 (70.9)
Urban	138 (8.4)	117 (29.1)
Flu vaccination history		
Yes	680 (41.4)	189 (46.9)
No/unsure	964 (58.6)	214 (53.1)
Whether herd immunity works		
Yes	1,423 (86.6)	382 (94.8)
No/unsure	221 (13.4)	21 (5.2)
Whether vaccination help reduce anxiety		
Yes	1,098 (66.8)	268 (66.5)
No	546 (33.2)	135 (33.5)

Note: All data are described in term of "Number (%) of participants".
Abbreviation: CNY=China Yuan.

The multiple logistic regression model identified the people most likely to get the booster dose as soon as it was available (Table 3). Those who expressed significantly higher acceptance of a booster dose included respondents who were: 25–34 years old

TABLE 2. The process of calculating age- and gender- standardized acceptance rate of a COVID-19 vaccine booster.

Age (year)	Gender	Observed acceptance rates (%)	Population according to census 2016	Expected number
18–24	Female	71.0	83,878,762	59,553,921
	Male	77.0	85,832,496	66,091,022
25–34	Female	69.0	97,793,195	67,477,305
	Male	76.4	100,358,860	76,674,169
35–44	Female	73.1	118,780,141	86,828,283
	Male	80.5	123,999,782	99,819,825
45–54	Female	78.3	90,208,072	70,632,920
	Male	86.2	94,139,652	81,148,380
55–64	Female	67.7	69,062,392	46,755,239
	Male	81.8	70,917,364	58,010,404
≥65	Female	60.6	49,507,029	30,001,260
	Male	82.6	48,430,783	40,003,827
Total		75.2	1,032,908,528	782,996,554

Note: The age- and gender- standardized acceptance rate of a COVID-19 vaccine booster equals 75.8%.
Abbreviation: COVID-19=coronavirus disease 2019.

(OR=2.06, 95% CI: 1.09–3.91); 35–44 years old (OR=2.24, 95% CI: 1.18–4.28); 45–54 years old (OR=2.07, 95% CI: 1.09–3.94); male (OR=1.33, 95% CI: 1.05–1.67); and non-healthcare workers (OR=1.50, 95% CI: 1.17–1.92). Booster shot acceptance was also higher among those who had: a junior high school level of education or below (OR=2.64, 95% CI: 1.50–4.62); a high school level of education (OR=2.12, 95% CI: 1.34–3.35); and who had been vaccinated against influenza (OR=1.26, 95% CI: 1.01–1.57). Finally, those who believed herd immunity would be effective against SARS-CoV-2 or who reported reduced anxiety after vaccination were more likely to accept a booster dose (OR=3.58, 95% CI: 2.69–4.77 and OR=1.27, 95% CI: 1.02–1.59, respectively).

DISCUSSION

This survey demonstrated that most of the vaccinated respondents (75.2%) would accept a COVID-19 vaccine booster shot when it became available. Although data on the efficacy and safety of the booster shot are still lacking, booster shots have a higher level of acceptance now than earlier doses of the vaccines did (*4*). Multiple studies have shown that vaccine acceptance changes over time, and the proportion of people who accept a vaccine may rise as the pandemic continues to fluctuate and the safety of vaccines is properly reported (*4–5*). Sociodemographic characteristics were important factors affecting the acceptability of the COVID-19 vaccine booster. Respondents who were aged 25–54 years old, male, non-healthcare workers, and less educated expressed significantly higher acceptance of the booster dose. According to WHO recommendations, people aged 60 or older who received inactivated vaccines should receive booster shots. The relatively low acceptance among people over 60 is therefore of great concern.

Moreover, those who had been vaccinated against influenza (OR=1.26, 95% CI: 1.01–1.57), who believed herd immunity would be effective against SARS-COV-2 (OR=3.58, 95% CI: 2.69–4.77) or who reported reduced anxiety after vaccination (OR=1.27, 95% CI: 1.02–1.59) were more likely to accept a booster dose. These results suggest that strong confidence in the vaccines would lead to more people getting vaccinated, which is consistent with previous studies (*7–8*). Therefore, efforts focused on clearly communicating to the public the effectiveness and safety of the COVID-19 booster vaccination and the risk of getting sick and dying from COVID-19 could help increase public willingness to get vaccinated.

This is the first study to address public acceptance of a booster shot of COVID-19 vaccines, and we find that they are likely to be widely accepted. This survey identifies priority groups to target for COVID-19 vaccine booster shots, which is of crucial importance in public health policy implementation (*9*).

This study was subject to some limitations. First is that convenience sampling was used, which may affect the representativeness of the individuals sampled compared to the population as a whole. The epidemic

TABLE 3. Influencing factors on COVID-19 vaccine booster preference.

Characteristics	COVID-19 vaccinebooster preference		Univariate analysis		Multivariate analysis	
	No (percentage %)	Yes (percentage %)	Crude OR (95% CI)	*P*	Adjusted OR (95% CI)	*P*
Age group, years						
18–24	53 (26.8)	145 (73.2)	1.19 (0.62, 2.29)	0.596	1.99 (0.97, 4.10)	0.062
25–34	178 (28.2)	454 (71.8)	1.11 (0.61, 2.02)	0.727	2.06 (1.09, 3.91)	0.026
35–44	119 (24.1)	375 (75.9)	1.37 (0.75, 2.52)	0.304	2.24 (1.18, 4.28)	0.014
45–54	94 (18.8)	405 (81.2)	1.88 (1.02, 3.46)	0.044	2.07 (1.09, 3.94)	0.026
55–64	42 (26.4)	117 (73.6)	1.21 (0.62, 2.37)	0.570	1.14 (0.56, 2.30)	0.719
≥65	17 (30.4)	39 (69.6)	Ref.		Ref.	
Gender				<0.001		0.016
Male	154 (19.8)	623 (80.2)	1.56 (1.26, 1.93)		1.33 (1.05, 1.67)	
Female	353 (27.8)	917 (72.2)	Ref.		Ref.	
Non-healthcare staff				<0.001		0.002
Yes	284 (20.7)	1,087 (79.3)	1.88 (1.53, 2.32)		1.50 (1.17, 1.92)	
No	223 (33.0)	453 (67.0)	Ref.		Ref.	
Education						
Junior high school and below	35 (14.6)	205 (85.4)	2.65 (1.79, 3.93)	<0.001	2.64 (1.50, 4.62)	0.001
Senior high school	49 (16.7)	245 (83.3)	2.26 (1.60, 3.20)	<0.001	2.12 (1.34, 3.35)	0.001
Associate or bachelor	219 (25.5)	639 (74.5)	1.32 (1.05, 1.65)	0.016	1.26 (0.98,1.63)	0.070
Master and above	204 (31.1)	451 (68.9)	Ref.		Ref.	
Income (CNY per month)						
0–2,000	71 (23.1)	236 (76.9)	1.22 (0.89, 1.67)	0.220	0.64 (0.40, 1.01)	0.054
2,000–5,000	114 (21.9)	407 (78.1)	1.31 (1.00, 1.71)	0.049	0.83 (0.59, 1.16)	0.269
5,000–10,000	136 (25.9)	389 (74.1)	1.05 (0.81, 1.36)	0.725	0.86 (0.65, 1.15)	0.309
10,000 and above	186 (26.8)	508 (73.2)	Ref.		Ref.	
Residence				0.002		0.553
Rural	43 (16.9)	212 (83.1)	1.72 (1.22, 2.43)		1.14 (0.74, 1.76)	
Urban	461 (25.9)	1,322 (74.1)	Ref.		Ref.	
Flu vaccination history				0.028		0.039
Yes	194 (22.3)	675 (77.7)	1.26 (1.03, 1.55)		1.26 (1.01, 1.57)	
No/unsure	313 (26.6)	865 (73.4)	Ref.		Ref.	
Whether herd immunity works				<0.001		<0.001
Yes	380 (21.1)	1,425 (78.9)	4.14 (3.14, 5.46)		3.58 (2.69, 4.77)	
No/unsure	127 (52.5)	115 (47.5)	Ref.		Ref.	
Whether vaccination help reduce anxiety				0.008		0.035
Yes	314 (23.0)	1,052 (77.0)	1.33 (1.08, 1.63)		1.27 (1.02, 1.59)	
No	193 (28.3)	488 (71.7)	Ref.		Ref.	

Abbreviations: COVID-19=coronavirus disease 2019; OR=odds ratio; CI=confidence interval; CNY=China Yuan; Ref.=reference.

was relatively stable when the survey was conducted and therefore not causing a great amount of panic among members of the public, which suggests that this sample provided some insight to public willingness to get a booster dose. Second, acceptance of a COVID-19 vaccine booster could also be influenced by information spread in the media and on social networks, including the local number of daily confirmed cases, the capacity of healthcare services, and relevant policies in different areas. However, we are

unable to consider these issues in this study due to unavailability of the data. Further investigation is therefore needed in the future.

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