

COVID-19

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【 摘要 】 COVID-19 疫苗在我国的公众偏好和接种意愿研究。2021 年 1 月 5—12 日，在 1 241 名受访者中进行了 1 066 次有效反馈。使用包含 5 个疫苗属性（保护率、不良反应、保护持续时间、接种便利性、接种费用）的离散选择实验。采用条件 Logit 模型和面板混合 Logit 模型分析疫苗属性对接种意愿的影响。结果：高保护率（ $\text{OR} = 1.76, P < 0.001$ ）、低不良反应（ $\text{OR} = 1.93, P < 0.001$ ）、长保护持续时间（ $\text{OR} = 0.59, P < 0.001$ ）、便捷的接种过程（ $\text{OR} = 0.53, P < 0.001$ ）和低成本（ $\text{OR} = 0.14, P < 0.001$ ）是公众偏好的因素。结论：COVID-19 疫苗的公众偏好和接种意愿受所有 5 个疫苗属性的影响，其中保护率和安全性对接种意愿的影响最为显著。

【 关键词 】 COVID-19 疫苗 离散选择实验 选择偏好 疫苗接受度 接种意愿
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Public preference and vaccination willingness for COVID-19 vaccine in China

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【Abstract】 Objective To understand public preference and immunization willingness for COVID-19 vaccine in China and analyze influence factors provide references for sufficient vaccination coverage. **Methods** An online D-efficient discrete choice experiment was conducted from Jan 5 2021 to Jan 12 2021 in 1 241 people with 1066 valid feedbacks using choice sets with 5 vaccine attributes protection rate adverse effect protection duration convenience of vaccination and out-of-pocket cost. Conditional Logit and panel mixed Logit models were used to analyze the effect of vaccine attributes on preferences while random-effects Logit model was used to analyze the effect of vaccine attributes on vaccination willingness. **Results** The COVID-19 vaccine with high protection rate ($\text{OR}_{95\%} = 1.76, P < 0.001$) low adverse effects ($\text{OR}_{\text{low risk}} = 1.93, P < 0.001$) long protection duration ($\text{OR}_{5 \text{ years}} = 0.59, P < 0.001$) convenient vaccination process ($\text{OR}_{\text{convenient}} = 0.53, P < 0.001$) and less cost ($\text{OR}_{\text{cost}} = 0.14, P < 0.001$) was preferred by the public. **Conclusion** Public preference and vaccination willingness for COVID-19 vaccine influenced by all 5 vaccine attributes protection rate adverse effect protection duration convenience of vaccination and out-of-pocket cost. The efficacy and safety of the vaccine had the most significant impact. **【Key words】** COVID-19 vaccine discrete choice experiment selection preference vaccine acceptance willingness to pay

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Tab 1 Attributes and level balance for COVID-19 vaccine

A ttribute	L evel	N umber of a ppearances	P ercentage %
E fficacy %	50	8	25.00
	65	8	25.00
	80	8	25.00
	95	8	25.00
R isk of side effects	H igh	12	37.50
	M oderate	10	31.25
	L ow	10	31.25
D uration y	0.5	12	37.50
	1	11	34.38
	5	9	28.13
V accination convenience	I nconvenient	13	40.63
	M oderate	10	31.25
	C onvenient	9	28.13
O ut-of-pocket cost Y uan	600	8	25.00
	400	8	25.00
	200	8	25.00
	0	8	25.00

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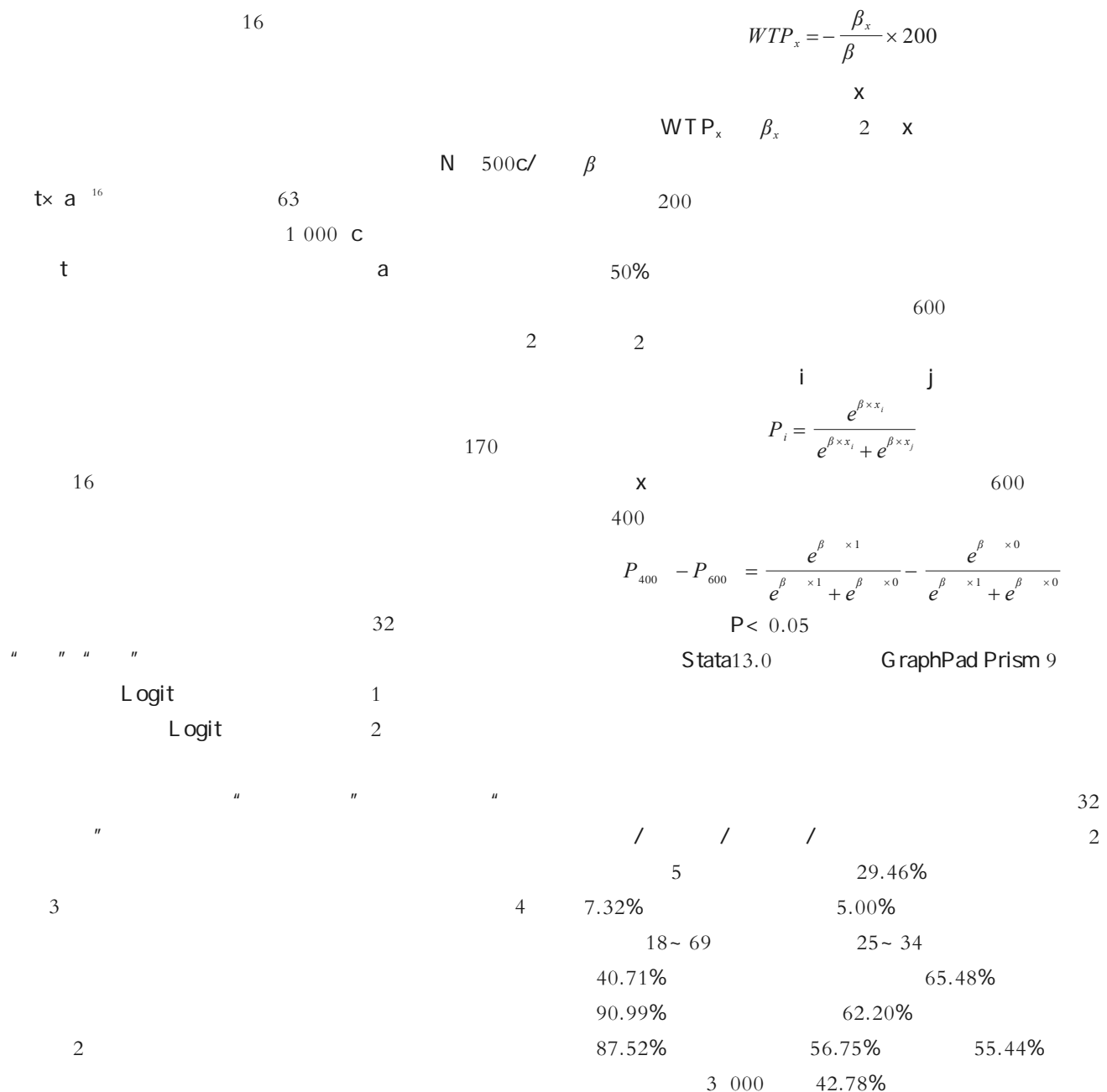
Attribute	Vaccine A	Vaccine B
Efficacy (%)	80	50
Risk of side effects	Moderate	High
Duration (y)	1	5
Vaccination convenience	Moderate	Convenient
Out-of-pocket cost (Yuan)	600	800

Which of these two COVID-19 vaccines do you prefer? ☐ Vaccine A ☐ Vaccine B

Would you be willing to get this vaccine? ☐ Yes ☐ On the fence ☐ No

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Fig 1 Example of a choice set



36.49%	72.61%	2	COVID-19	3	1	5
2						
Tab 2 Characteristics of respondents						
Characteristic	n	Percentage %				
Age y						
18–24	348	32.65				
25–34	434	40.71				
35–44	183	17.17			=1.93	P< 0.001
45	101	9.47	95%		=1.76	P< 0.001
Gender						
Male	368	34.52				
Female	698	65.48			=0.14	P< 0.001
Ethnic group						
Han	970	90.99	2		1	
Minority	96	9.01				
Marital status						
Unmarried	663	62.20	COVID-19			
Married	403	37.80			4	
Region						
Urban	933	87.52	3			
Town	75	7.04				
Rural	58	5.44				
Educational level						
Senior or below	92	8.63	95%		=1.57	P< 0.001
College	605	56.75			=1.48	P< 0.001
Master or above	369	34.62	0.002			=0.45 P=
Occupation						
Retired or unemployment	59	5.53			=0.34	P=0.001
Occupations	591	55.44			COVID-19	
Students	416	39.02			=0.09	P=0.009
Monthly income Yuan						
< 3 000	456	42.78	4		3	
3 000–5 999	244	22.89			2	2
6 000–9 999	205	19.23				
10 000	161	15.10				
Health status						
Excellent	168	15.76	2 763.61			
Very good	389	36.49	2 111.14			
Good	329	30.86				2 530.74
Fair or poor	180	16.89	1 695.44		50%	
Multimorbidity						
0	774	72.61	95%		80%	
1	210	19.70	65%			
2	82	7.69				
Total	1 066	100.00				

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Logit

Logit

Tab 3 Conditional Logit model and panel-data mixed Logit choice model of vaccine attributes effects on vaccine preferences

Attribute	Model 1 ^a				Model 2 ^b			
	95% CI		P		95% CI		P	
Efficacy %								
50 reference								
65	0.11	-0.05	0.27	0.170	0.11	-0.05	0.27	0.170
80	1.18	1.02	1.34	<0.001	1.18	1.02	1.34	<0.001
95	1.76	1.65	1.87	<0.001	1.76	1.66	1.87	<0.001
Risk of side effects								
High reference								
Moderate	1.47	1.36	1.58	<0.001	1.47	1.36	1.58	<0.001
Low	1.92	1.80	2.05	<0.001	1.93	1.80	2.05	<0.001
Duration y								
0.5 reference								
1	0.24	0.13	0.36	<0.001	0.24	0.13	0.36	<0.001
5	0.59	0.51	0.66	<0.001	0.59	0.51	0.66	<0.001
Vaccination convenience								
Inconvenient reference								
Moderate	0.48	0.35	0.61	<0.001	0.49	0.35	0.62	<0.001
Convenient	0.53	0.43	0.64	<0.001	0.53	0.43	0.64	<0.001
Out-of-pocket cost Yuan	0.14	0.09	0.19	<0.001	0.14	0.09	0.19	<0.001

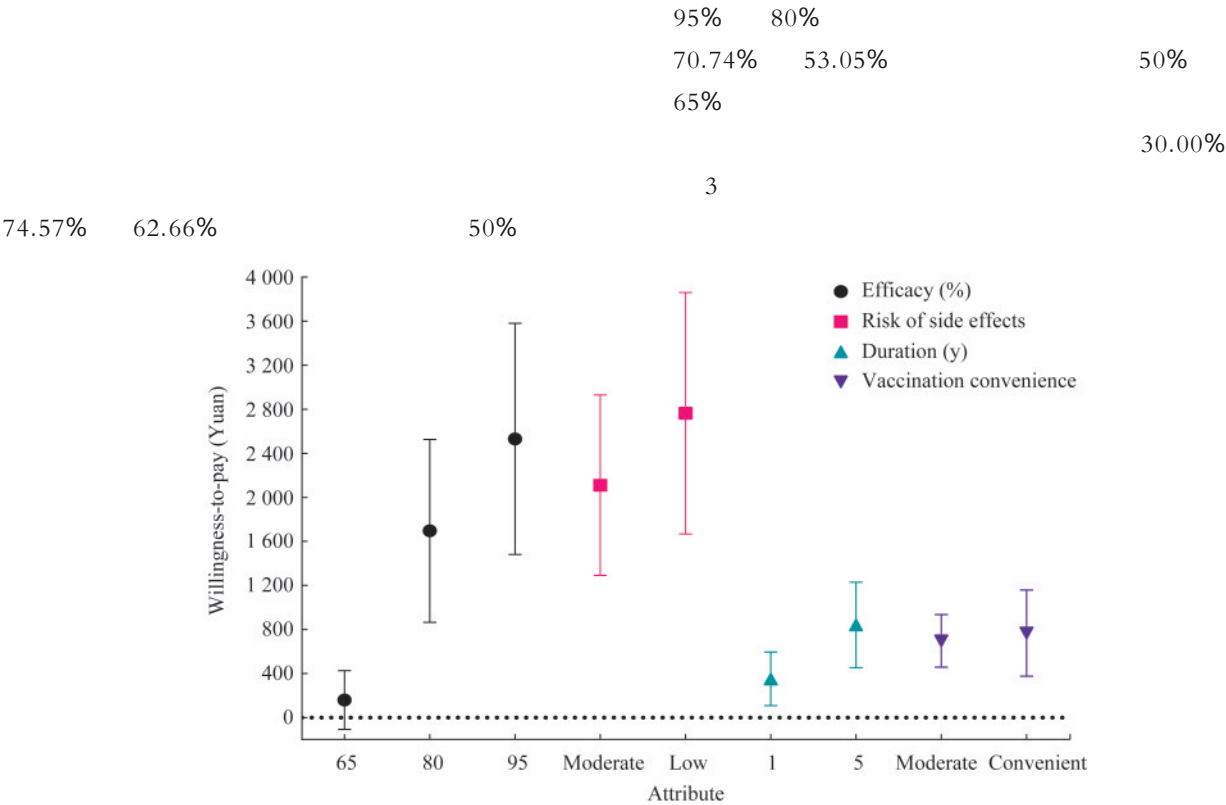
^a Model 1 was a conditional Logit model with only 5 vaccine attributes included ^b Model 2 was a panel-data mixed Logit choice model including 5 vaccine attributes adjusted for age gender ethnics marital status region education levels occupation monthly income health status and multimorbidity. Respondents=1 066 Observations=34 112.

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Tab 4 Random-effects Logit model of vaccine attributes effects on vaccination willingness

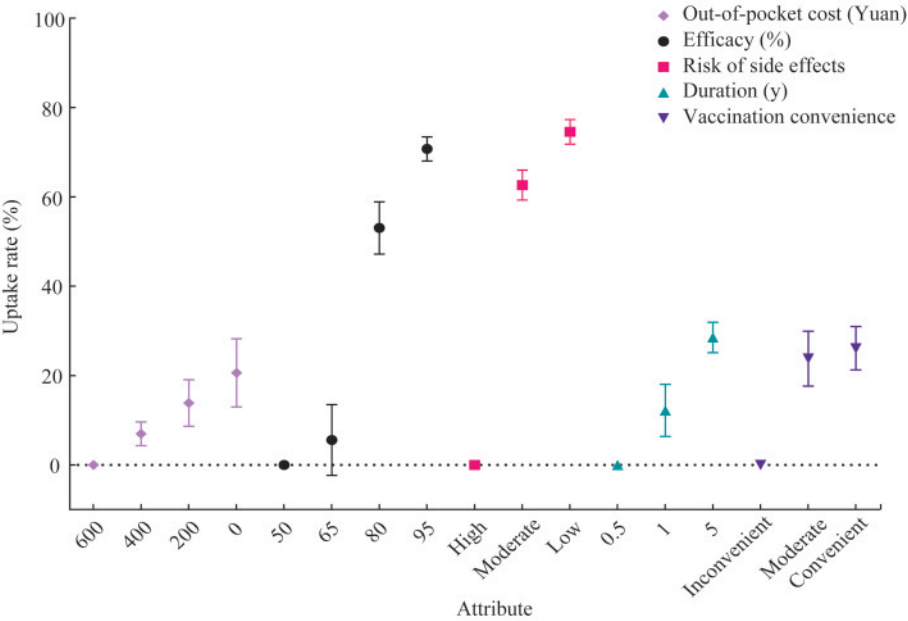
Attribute	Model 3 ^a				Model 4 ^b			
	95% CI		P		95% CI		P	
Efficacy %								
50 reference								
65	0.23	-0.03	0.48	0.080	0.23	-0.03	0.48	0.081
80	1.48	1.23	1.74	<0.001	1.49	1.23	1.74	<0.001
95	1.57	1.29	1.85	<0.001	1.58	1.30	1.86	<0.001
Risk of side effects								
High reference								
Moderate	0.45	0.17	0.73	0.002	0.47	0.18	0.75	0.001
Low	1.59	1.33	1.85	<0.001	1.61	1.35	1.87	<0.001
Duration y								
0.5 reference								
1	0.57	0.41	0.73	<0.001	0.58	0.41	0.74	<0.001
5	0.71	0.54	0.88	<0.001	0.72	0.55	0.89	<0.001
Vaccination convenience								
Inconvenient reference								
Moderate	-0.14	-0.31	0.03	0.117	-0.13	-0.30	0.04	0.123
Convenient	0.34	0.14	0.54	0.001	0.35	0.15	0.55	0.001
Out-of-pocket cost Yuan	0.09	0.02	0.15	0.009	0.09	0.02	0.15	0.010

^a Model 3 was a random-effects Logit model with only 5 vaccine attributes included ^b Based on Model 3 Model 4 adjusted age gender ethnic group marital status region educational level occupation monthly income health status and multimorbidity. Respondents=1 066 Observations=34 112.



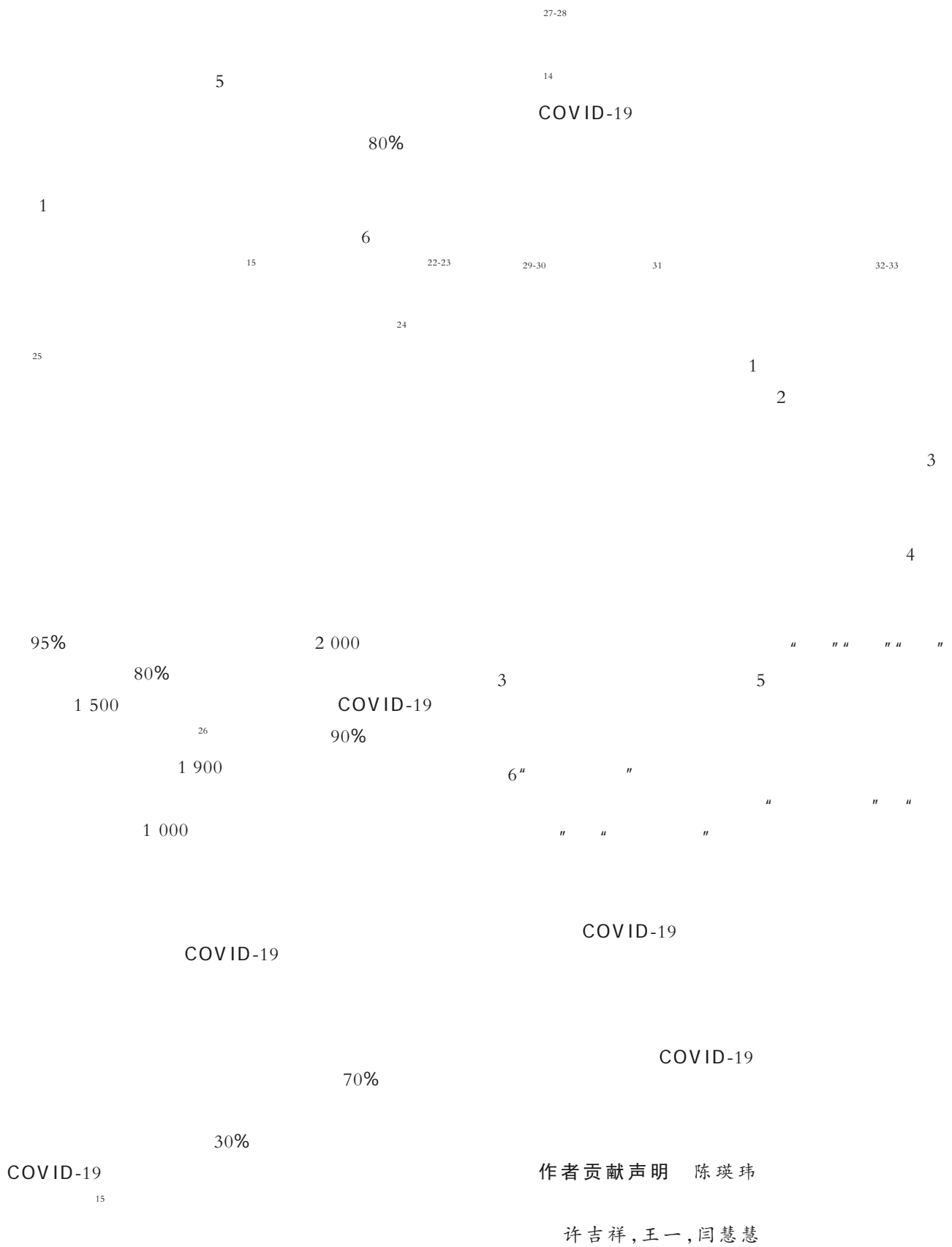
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Fig 2 Willingness-to-pay estimates for COVID-19 vaccine attributes



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Fig 3 Changes in probability of choosing vaccine



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