Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Letter to Editor

A survey of Chinese Residents' knowledge, attitudes and behaviors toward COVID-19: A National cross-sectional study

To the Editor,

The coronavirus disease 2019 (COVID-19), which was named novel coronavirus pneumonia at the time of this survey, is an infectious respiratory disease.[1] COVID-19 has the characteristics of fast transmission, strong contagion, and general population susceptibility, and the main transmission routes are respiratory, direct, and contact transmission.[2–4] Strict isolation and hand hygiene are important measures to control the spread of the disease.[5] This study investigates Chinese residents' knowledge about and attitudes and behaviors toward COVID-19, analyzes the influencing factors of these, and provides a basis for better COVID-19 prevention and control.

We developed the National Questionnaire on Chinese Residents' Knowledge About and Attitudes and Behavior Toward Novel Coronavirus Pneumonia. The final questionnaire included: ① general sociological characteristics of the respondent; ② residents' knowledge of COVID-19 including epidemiological knowledge, clinical symptoms, and transmission channels; ③ residents' knowledge about and attitudes toward COVID-19 including the fear of COVID-19, whether they could respond positively, and the performance of family members; and ④ behavioral aspects related to COVID-19 including quarantine measures, preventive measures, and community management cooperation.

The snowball sampling method was used to select the research respondents who completed the survey questionnaire online using the WeChat platform. Considering factors such as timeliness, geographical area, and group, 15 research respondents from 7 areas-the Shandong, Hubei, Sichuan, Zhejiang, Chongqing, Jiangsu, and Heilongjiang-were selected as the first-level respondents. These respondents then forwarded the questionnaire to 20 representative peers as the second-level respondents who posted the questionnaire to their circle of friends.

The questionnaire survey was conducted one week after the outbreak of COVID-19, on January 7, 2019. A total of 3765 questionnaires were recovered.

The majority of respondents (56.26%) had an intermediate level of knowledge about COVID-19, and 40.56% had a high level of

Table 1
Analysis of related factors of knowledge about and attitudes and behavior toward the novel coronavirus pneumonia of groups with different characteristics.

Variable	n	Knowledge level (%)			x^2	*P*	Attitude		x^2	*P*	Behavior		x^2	*P*
		Low	Medium	High			Fear	Positive			Positive	Negative		
Gender					29.49	0.000			37.33	0.000			2.387	0.135
Male	1347	42 (3.12)	843 (62.58)	462 (34.30)			507 (37.64)	840 (62.36)			1290 (95.77)	57 (4.23)		
Female	2343	87 (3.71)	1251 (53.39)	1005 (42.9)			1125 (48.02)	1218 (51.98)			2217 (94.62)	126 (5.38)		
Age					142.04	0.000			118.63	0.000			46.89	0.000
18–29	1107	42 (3.80)	783 (70.73)	282 (25.47)			348 (31.44)	759 (68.56)			1011 (91.33)	96 (8.67)		
30–49	1908	69 (3.61)	981 (51.42)	858 (44.97)			954 (50)	954 (50)			1842 (96.54)	66 (3.46)		
50–69	651	21 (3.23)	312 (47.92)	318 (48.85)			345 (53)	306 (47)			630 (96.77)	21 (3.23)		
≥70	24	0 (0)	12 (50)	12 (50)			12 (50)	12 (50)			24 (1)	0 (0)		
Residence area					84.23	0.000			7.41	0.007			6.67	0.013
Urban	2442	54 (2.21)	1308 (53.56)	1080 (44.23)			1059 (43.37)	1383 (56.63)			2337 (95.70)	105 (4.30)		
Rural	1248	78 (6.25)	780 (62.50)	390 (31.25)			600 (48.08)	648 (51.92)			1170 (93.75)	78 (6.25)		
Education					67.92	0.000			20.58	0.000			15.21	0.000
Primary school	231	15 (6.50)	153 (66.23)	63 (27.27)			135 (58.44)	96 (41.55)			213 (92.21)	18 (7.79)		
High school	1509	63 (4.17)	930 (61.63)	516 (34.20)			642 (42.54)	867 (57.46)			1416 (93.84)	93 (6.16)		
College	1950	54 (2.77)	1005 (51.54)	891 (45.69)			882 (45.23)	1068 (54.77)			1878 (96.31)	72 (3.69)		
Region					35.43	0.000			10.16	0.038			30.83	0.000
Chongqing	1524	81 (5.31)	822 (53.94)	621 (40.75)			645 (41.53)	879 (57.68)			1464 (96.06)	57 (3.74)		
Hubei	687	18 (2.62)	372 (54.15)	297 (43.23)			336 (48.91)	351 (51.09)			642 (93.45)	45 (6.55)		
Sichuan	492	9 (1.83)	303 (61.59)	180 (36.58)			222 (45.13)	270 (54.87)			465 (94.51)	27 (5.49)		
Shandong	420	12 (2.86)	252 (60.00)	156 (37.14)			189 (45)	231 (55)			414 (98.57)	6 (1.43)		
Zhejiang	303	6 (1.98)	192 (63.37)	105 (34.65)			147 (48.51)	156 (51.49)			276 (91.09)	27 (8.91)		

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knowledge. The chi-squared test showed that age, gender, level of education, and living environment were significantly correlated with COVID-19 knowledge ($P < 0.05$) (Table 1).

Residents who had a positive attitude toward COVID-19 accounted for 55.78%, and those who were fearful accounted for 44.23%. The chi-squared test showed that age, gender, level of education, and living environment were significantly correlated with attitudes towards COVID-19 ($P < 0.05$) (Table 1).

Almost all respondents (99.52%) were able to take active protective measures, 99.36% would actively cooperate with the management of community neighborhood committees, 97.45% would actively promote prevention measures for COVID-19, and 99.12% actively reported their exposure history in high-risk areas. However, 19.4% said that they would not actively avoid going to crowded places. The chi-squared test showed that age, level of education, and living environment were significantly correlated with COVID-19 behavior ($P < 0.05$) (Table 1).

In response to the outbreak of the novel coronavirus pneumonia, Chinese residents were able to face the negative impact caused by the epidemic and take the correct protective measures, but their level of knowledge was not optimal. Therefore, it is necessary to increase health education for people in rural areas and those with low levels of education to increase the level of their knowledge.

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Declaration of competing interest

The authors declare that they have no conflicts of interests.

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