Public knowledge of novel coronavirus diseases 2019: a web-based national survey

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Yu Liu
Department of Gastroenterology, Changhai Hospital, The Second Military Medical University

Dan Wang
Department of Gastroenterology, Changhai Hospital, The Second Military Medical University

Hao Xu
Department of Gastroenterology, Changhai Hospital, The Second Military Medical University

Ying Xiao
Department of Nursing, Changhai Hospital, The Second Military Medical University

Cui Chen
Department of Gastroenterology, Changhai Hospital, The Second Military Medical University

Ru-Nan Chen
Department of Nursing, The Second Military Medical University

Liang-Hao Hu
Department of Gastroenterology, Changhai Hospital, The Second Military Medical University
lianghao-hu@hotmail.com*Corresponding Author*

Zhao-Shen Li
Department of Gastroenterology, Changhai Hospital, The Second Military Medical University
zhaoshen-li@hotmail.com*Corresponding Author*

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SUBJECT AREAS

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KEYWORDS

novel coronavirus disease 2019; transmission; psychological state; control; prevention

Abstract

Background Although the existing cases of COVID-19 in China have been reducing since late February 2020, the confirmed cases are surging abroad. Improving public knowledge regarding COVID-19 is critical to control the epidemic. The study aimed to determine the China's public knowledge of COVID-19 and attitude towards the control measures.

Methods A cross-sectional study was conducted in 48 hours, from 29 February 2020, 22:30 to 2 March 2020, 22:30, based on a self-administered web-based questionnaire. The survey was conducted on the WeChat network. Exponential non-discriminative snowball sampling were applied. The questionnaire was voluntarily submitted by WeChat users. The questionnaire covered the basic demographic information, public knowledge about epidemiological and clinical characteristics of COVID-19, psychological state, and attitude towards overall control measures. The primary outcome was the Chinese public knowledge regarding COVID-19 and the attitude towards the control measures and secondary outcome was psychological state of the public during this epidemic.

Results The study included 10,905 participants and 10,399 valid questionnaires were included for analysis. Participants with tertiary education, younger age and healthcare workers had better overall knowledge compared with other participants (all $P<0.05$). About 91.9% of the participants believed in person-to-person transmission and 39.1% believed in animal-to-person transmission. No significant correlation between anxiety and regional number of existing cases was found, while participants in Hubei were more anxious than those in other regions. In general, 74.1% of participants acknowledged the effectiveness of overall control measures and it was negatively correlated with regional number of existing cases ($r=-0.492$, $P=0.007$).

Conclusions In conclusion, the survey revealed that Chinese public had overall good knowledge regarding COVID-19 except for those indeterminate knowledge. With the dynamic change of global epidemic situation and more researches, further study would be conducted to explore the change of public knowledge and attitude about COVID-19 in the future.

Introduction

The novel coronavirus disease 2019 (COVID-19) has been declared by the World Health Organization

(WHO) a public health emergency of international concern on 31 January 2020 and the risk assessment was very high at both China and global level.[1] According to the COVID-19 situation report of WHO, till 29 February 2020, there were 79,394 confirmed cases all over China and 85,403 confirmed cases globally.[2] Existing cases in China began to reduce on 19 February 2020, however, confirmed cases surged since late February abroad.

The first case of this pneumonia was diagnosed on 8 December 2019 with unknown pathogen in Wuhan, Hubei, China.[3] One month later, the novel coronavirus was identified as the pathogen leading to the epidemic. In the following days, human to human transmission was confirmed and bat was found to be the potential origin of coronavirus.[3, 4] The epidemiological and clinical characteristics of COVID-19 were released by the China center of Disease Control and Prevention.[5] With more research being conducted, the guideline of COVID-19 in China has been updated to version 7.0.[6] Many questions remain to be clarified, such as whether the virus could be transmitted through the fecal-oral route, whether pets can be a source of infection and could plasma antibody in convalescent patients be a cure?

Improving public knowledge of the disease, its transmission patterns and effective protective measures are the foundation for the control and prevention of the disease. A lot of work has been done to raise public awareness of COVID-19.[7] The only relevant report investigated the public knowledge of COVID-19 on 29 January 2020, which preliminarily explored the public knowledge about COVID-19 at the early phase of the outbreak.[8] However, with the ongoing of epidemic and engaging media content, discrepancy may exist in the knowledge that people of varying socioeconomic levels or ages attain. Moreover, focus questions without definite answers would bring cognitive bias. On the other hand, the epidemic had negative effects on individuals' psychological state, especially in Hubei, center of the epidemic. The surging number of confirmed cases, relatives or acquaintances diagnosed with COVID-19 and overwhelming information all exerted great stress.

This study aimed to figure out the China's public knowledge of COVID-19. At the same time,

psychological state and attitude towards control measures were evaluated.

Materials And Methods

A cross-sectional study was conducted in 48 hours, from 29 February 2020, 22:30 to 2 March 2020, 22:30, based on a self-administered questionnaire. The questionnaire was created and released based on an online survey tool Sojump (Changsha Ranxing Information Technology Co., Ltd., Changsha, China, http://www.sojump.com) and distributed to participants via a popular social network platform, WeChat (Tencent Inc., Shenzhen, China, Version 7.0.12).

Questionnaire Design

The questionnaire was entitled “Public knowledge about the novel coronavirus pneumonia (COVID-19) epidemic”. Based on literature review, the questionnaire covered the following major aspects: the basic demographic information (including gender, age, marital status, educational level, occupation, etc.), public basic knowledge about the epidemiological characteristics (nature of the disease, transmissions, symptoms and therapies of COVID-19, etc.), personal protection measures, psychological state, and attitude towards the control measures.[3, 5, 9] Totally 17 groups of questions in the form of single choice or multiple choice questions were constructed.

To ensure the accuracy of the results, several mutually exclusive questions were set up to test the validity of the questionnaire and contradictive answers would get the invalid questionnaires excluded. A pilot test for the questionnaire was performed among 20 participants with various ages and jobs in different provinces to establish the validity of the content and ensure comprehension and feasibility. The language of the questionnaire was adjusted to be concise and unequivocal enough according to the pilot test. Cronbach alpha index for the questionnaire was 0.990 which was considered satisfying for the survey. The final formal questionnaire can be found in the supplementary material (Additional file 1), which was released on Sojump (https://www.wjx.cn/jq/60631081.aspx).

Samples and Survey Methods

WeChat is the most widely and frequently used social communication platform used by Chinese. More than 1.15 billion customers are active users of WeChat, distributed in over 200 countries with 20 different languages.[10, 11] Thus, the survey was conducted on the WeChat network. Exponential non-

discriminative snowball sampling were applied in this survey. The questionnaire was first released on 29 February 2020, 22:30 pm and data were collected at 2 March 2020, 22:30 pm.

The questionnaire was anonymous and did not contain any identifiable personal information. Every participant had full right and freedom to fill out the questionnaire or forward the link.

Definition

To simplify the analysis, the awareness score was defined as the accuracy of knowledge about COVID-19, which was calculated by adding up the correct answers related to nature of the disease, transmissions, symptoms and therapies of COVID-19 according to the current knowledge. The specific involved questions include Q9 (A1, A2, A4, A5, A9), Q10, Q11, Q12 (A1, A2, A6, A7, A8) and Q13. Each correct answer was assigned one score which made the total points 22.

Statistical Analysis

Data of valid questionnaire were analyzed with SPSS 23.0 (version 23.0, SPSS, Chicago, Illinois, USA). Categorical variables were exhibited as percentages (numbers, n) and differences among categorical variables were compared using Chi-square test or Fisher exact test when appropriate. The within-group comparison was made through Least Significant Difference test. The correlation of extreme anxiety and regional existing cases, as well as highly agreement with the overall control measures and regional existing cases were analyzed by Pearson correlation test with GraphPad Prism 8.0.2 (version 8.0.2, GraphPad Software Inc., California, USA). All tests were two tail with $P<0.05$ as statistical significance.

Results

Basic demographic characteristics of the participants

The study included 10,905 participants recruited within 48 hours. After excluding 566 invalid questionnaires, 10,399 questionnaires were included for analysis (Figure 1). Among the valid questionnaires, 9653 (98.1%) were finished by domestic participants and 192 (1.9%) were from abroad. Most participants were from southern China (Figure 2). A total of 4,768 (46.1%) participants were male and 7,539 (72.9%) were married. In terms of age, 7,888 (76.3%) participants were between 18 and 44 years old and 370 (3.6%) were between 60 and 74 years old. There were 2,588

(25.0%) health care workers and 8,347 (80.7%) participants received tertiary education. As Hubei was the center of the epidemic, the characteristics of participants were compared between Hubei and other regions. Basic characteristics were presented in Table 1.

A total of 9,845 (95.2%) participants heard of the disease and the rest 494 (4.8%) participants did not. Subsequent analysis was performed with data of the 9,845 participants. The majority of participants received the information about COVID-19 from the internet, followed by television (Additional file 2). Less than 10% of participants knew about the disease from other sources, including word of mouth (from family members, neighbors or grassroots cadres), newspapers or magazines and hospitals.

Public knowledge regarding COVID-19

Public knowledge regarding epidemiological characteristics of COVID-19

Overall, the public knowledge regarding epidemiological characteristics of COVID-19 were similar between participants from Hubei and other places.

In terms of pathogen, 8,505 (86.4%) participants considered COVID-19 was caused by virus, while 1.5% (143/9,845) considered it as bacteria, 8.9% (876/9,845) participants thought both virus and bacteria were pathogens of COVID-19 and 3.3% (321/9,845) had no idea. There were 98.0% (9,647/9,845), 75.1% (7,389/9,845), 68.8% (6,771/9,845) and 94.0% (9,251/9,845) of the participants believed in droplet transmission, aerosol transmission, fecal-oral transmission and contact transmission, respectively. More participants from Hubei believed in fecal-oral transmission. There were 91.9% (9,046/9,845) and 39.1% (3,845/9,845) participants believed there were person-to-person transmission and animal-to-person transmission, respectively. Totally 58.2% (5,727/9,845) and 50.3% (4,950/9,845) participants believed the virus could be transmitted through talking and shaking hands with others, respectively. Seniors were considered as susceptible population by 98.8% (9,729/9,845) participants. Only 65.7% (6,465/9,845) participants recognized children as susceptible population (Table 2).

Public knowledge regarding symptoms, therapies and personal protection of COVID-19

More than 95% of the participants recognized fever and cough as the symptoms of COVID-19 which

had good consistency between participants from Hubei and other regions. More participants from Hubei recognized debilitation as a symptom of COVID-19 compared with those from other regions (93.7% vs 91.3%, P=0.004, Table 3). Less people in Hubei deemed nasal congestion, rhinorrhea and sore throat as the symptoms of COVID-19 (Table 3, all P<0.01).

As for therapies, most participants believed there were no specific treatment for COVID-19 (85.2%), and only 5.7% (566/9,845) of the population considered there was specific vaccine to prevent the disease. There were 46.5% (4,581/9,845) of the participants agreed with the efficacy of integrative Chinese and Western medicine. It seemed more participants from Hubei had confidence in efficacy of traditional Chinese medicine compared with those from other regions (19.1% vs 16.8%, P=0.046). More participants from Hubei considered plasma of convalescent patients as effective therapy (68.0% vs 62.1%, P<0.001).

The overall awareness score was averagely 17.8±2.7 in 9,845 participants. Young adults, participants received tertiary education, and healthcare workers had higher awareness score compared with other participants (all P<0.01, Table 4). In terms of regional difference, those from Hubei had lower overall awareness score compared with other regions (16.9±2.5 vs 17.1±2.5, P=0.01, Table 4). There was no difference in awareness score between those who were extremely anxious about the epidemic and those not, as well as those who highly agreed with the effectiveness of overall control measures and those not (all P>0.05).

Psychological state regarding COVID-19

About 28.2% (2,777/9,845, Table 5) of the population worried about being infected extremely. More people worried about their relatives and friends than themselves (41.4% vs 28.2%, P<0.001). More participants in Hubei worried about themselves, relatives and friends being infected compared with those in other regions. Participants in Hubei were statistically more anxious and affected compared with those in other regions. But there was no significant correlation between the anxiety and the number of regional existing cases (Figure 3, r=0.193, P=0.316).

Public attitude towards the systematic control measures for COVID-19

Staying at home during Spring Festival was considered to be necessary by 93.7% of the participants,

while 88.2% of the participants agreed with the effectiveness. Closing down shopping malls and cancelling mass events were considered necessary by 92.1% participants and 88.6% believed these were effective. Overall, 74.1% (7,295/9,845) of the participants acknowledged that the overall control measures towards this epidemic was effective and only 1.3% did not. Yet less people in Hubei acknowledged its effectiveness (59.1% vs 76.2%, P<0.001). Moderate negative correlation was noticed between the overall agreement and the number of regional existing cases (Figure 4, r=-0.492, P=0.007).

Discussion

This study investigated the current Chinese public knowledge of COVID-19 via a 48-hour Web survey. More than ten thousand people at home and abroad participated. Most of the participants had overall good knowledge regarding the disease, yet knowledge gap was noticed in people of varying ages and educational levels. Residents of Hubei were more anxious compared with those of other regions. Highly agreement with the effectiveness of overall control measures was negatively correlated with the regional number of existing cases.

The overall knowledge regarding COVID-19 was satisfying, which can be attributed to the broadcasting of the latest situation and the scientific researches. The media played a pivotal role in raising the public awareness and improving their knowledge of the COVID-19. According to our data, 82.4% of participants learned about COVID-19 from Internet. With the widely use of smartphones, the information we got were abundant and timely updated.[12, 13] For example, we could get access to the live data of confirmed cases reported by the authority and know what happened to a person in Wuhan, Hubei as soon as it was posted on the web. With the social media, the spread of the information was explosive, both in speed and scale. Chinese internet users spend more than 5 hours online each day.[14] There is no doubt that people could gain more knowledge about the control and prevention of COVID-19. However, some information on the social media were unverified and were even rumor which may mislead receivers and cause panic. Seniors and people without tertiary education may have more difficulty in accepting scientific information and identifying rumors, which contributed to the discrepancy of knowledge attained. Public awareness of Hubei participants was not

as good as other regions and the lower percentage of healthcare workers in Hubei participants could be the reason. Besides, public awareness of Hubei residents more often originated from personal experience compared to other regions, leading to subjective opinion towards the disease.

It should be noted that more than half of the participants agreed with fecal-oral transmission and the efficacy of plasma antibody, which have not been verified with solid proof.[3, 15-18] The over reporting of related researches and specific cases made people too concerned about being infected. More than half of the participants believed COVID-19 could be transmitted through talking with others or shaking hands with others, respectively. The overwhelming and indistinguishable information on the social media as well as the exaggerated report of specific cases contributed to these cognitive bias. These results suggested the accuracy of media information during spreading should be improved.

Residents of Hubei were more anxious compared with those of other regions, however, the degree of anxiety had no correlation with the number of existing cases. The reasons for the result are as following. First, the prevalence of COVID-19 in Hubei (32,959/59.17 million) was nearly 70 times of Hong Kong SAR (60/7.45 million), a municipality with the second highest prevalence on 29 February, 2020. It was very likely that a resident in Hubei had relatives or acquaintances with COVID-19, which would greatly increase anxiety. For residents of other regions, the infected people may just appear in the news. Second, the enormous medical burden in Hubei raised concerns of not being diagnosed and treated timely when they were sick. Third, people in Hubei were at the forefront of the epidemic, focused by people all around the world. The overwhelming news and rumors online about Hubei and even regional discrimination at home and abroad brought great anxiety.

Highly agreement with the effectiveness of overall control measures was generally high and negatively correlated with the regional number of existing cases. About 90% of the participants considered social distancing policies necessary and effective. However, significant difference existed between participants of Hubei and other regions on the highly agreement with the effectiveness of overall control measures. This may be attributed to the extreme shortage of medical resources in Hubei at the stage of outbreak. Besides, the huge number of confirmed and suspected cases in Hubei upset the residents, particularly with reports that the quarantine and control measures may have

been initiated too late.[19, 20] According to the study on prediction of the epidemic trend after public health intervention in mainland China, if control measures are implemented five days later, the scale of the outbreak may triple and if implemented five days earlier, the scale of the epidemic may be reduced to one-third.[21]

There were limitations of the study. The questionnaire was first released by authors in WeChat friends circle and then the link was forwarded by their friends voluntarily. Thus, more participants were from Shanghai, where the study group located, followed by cities around Shanghai in Southern China. As a result, the percentage of healthcare workers and tertiary education were much higher than the average level of China. Besides, some special questions related to the epidemic were not included in the questionnaire to avoid negative effects on participants.

The current survey was initiated by the end of February and finished in 48 hours. With the dynamic change of the epidemic situation in China and overseas, knowledge and attitude towards COVID-19 may change. Moreover, our knowledge about the disease would improve as more researches being done. Further study would be conducted to explore the change of public knowledge and attitude in the future.

Conclusions

In conclusion, the survey revealed that the Chinese public had overall good knowledge regarding COVID-19 except for those indeterminate knowledge, which still needs to be elucidated. With the dynamic change of the global epidemic situation and more researches, further studies are needed to explore the change of public knowledge and attitude about COVID-19 in the future.

Declarations

Ethics Approval and Consent to Participate: The study was approved by the Ethics Committee of Changhai Hospital. Informed consent was obtained from the participant.

Consent for Publication: Informed consent was obtained from the participant for publication of this data.

Availability of data and materials: The datasets analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests: The authors declare that they have no competing interests.

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Authors' Contributors:

Yu Liu, Dan Wang and Hao Xu participated in the acquisition, analysis, and interpretation of data, as well as in the manuscript drafting.

Ying Xiao, Cui Chen, Ru-Nan Chen, Liang-Hao Hu and Zhao-Shen Li contributed to the conception, design, and data interpretation, as well as revised the manuscript for important intellectual content.

All authors have read and approved the manuscript, and ensure that this is the case.

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Tables

Table 1. Basic characteristics of 10,339 participants

Characteristics	Total	Hubei	Other regions	P
Male	4768 (46.1%)	512 (40.5%)	4265 (46.9%)	<0.001
Age, y				0.144
18-44	7888 (76.3%)	949 (75.1%)	6939 (76.5%)	
45-59	2081 (20.1%)	277 (21.9%)	1804 (19.9%)	
60-74	370 (3.6%)	38 (3.0%)	332 (3.7%)	
Married	7539 (72.9%)	975 (77.1%)	6564 (72.3%)	<0.001
Tertiary education	8347 (80.7%)	1034 (81.8%)	7313 (80.6%)	0.303
Healthcare workers	2588 (25.0%)	182 (14.4%)	2406 (26.5%)	<0.001
Heard of COVID-2019	9845 (95.2%)	1197 (94.7%)	8648 (95.3%)	0.352

Table 2. Knowledge about epidemiological characteristics of COVID-19 of 9,845 participants

Items	Answers	Total	Hubei	Other regions	P
Pathogens					0·546
Virus	√	8505 (86·4%)	1042 (87·1%)	7463 (86·3%)	
Bacteria	×	143 (1·5%)	12 (1·0%)	131 (1·5%)	
Both virus and bacteria	×	876 (8·9%)	103 (8·6%)	773 (8·9%)	
No idea	×	321 (3·3%)	40 (3·3%)	281 (3·2%)	
Transmission					
Droplet transmission	√	9647 (98·0%)	1176 (98·2%)	8471 (98·0%)	0·583
Aerosol transmission	√	7389 (75·1%)	907 (75·8%)	6482 (75·0%)	0·539
Fecal-oral transmission	○	6771 (68·8%)	856 (71·5%)	5915 (68·4%)	0·029
Contact transmission	√	9251 (94·0%)	1143 (95·5%)	8108 (93·8%)	0·018
Person-to-person transmission	√	9046 (91·9%)	1106 (92·4%)	7940 (91·8%)	0·488
Animal-to-person transmission	○	3845 (39·1%)	430 (35·9%)	3415 (39·5%)	0·018
Transmitted through talking with others	△	5727 (58·2%)	723 (60·4%)	5004 (57·9%)	0·095
Transmitted through shaking hands with others	△	4950 (50·3%)	625 (52·2%)	4325 (50·0%)	0·153
Susceptible population					
Children	√	6465 (65·7%)	693 (57·9%)	5772 (66·7%)	<0·001
Young adults	√	4567 (46·4%)	532 (44·4%)	4035 (46·7%)	0·150
Seniors	√	9729 (98·8%)	1192 (99·6%)	8537 (98·7%)	0·006
Others viewpoints					
It’s a non-communicable disease	×	4 (0·0%)	1 (0·1%)	3 (0·0%)	0·405
Infected person could be asymptomatic	√	7879 (80·0%)	989 (82·6%)	6890 (79·7%)	0·017

The questions could be classified into three following types based on the accuracy of answers: (1) questions with verified answer according to the current guidelines of COVID-19 and literatures. This type of answer was a definite true or false for one certain question, marked with “√” or “×”, respectively; (2) questions with pending answer without solid proof until the date of the current survey, marked with “○”; (3) subjective questions with no unified right answers which only represented the personal view, marked with “△”.

Table 3. Knowledge about symptoms, therapies and prevention measures for COVID-19 of 9,845 participants

Items	Answers	Total	Hubei	Other regions	P
Recognition of symptoms					
Fever	√	9801 (99·6%)	1193 (99·7%)	8608 (99·5%)	0·533
Cough	√	9559 (97·1%)	1160 (96·9%)	8399 (97·1%)	0·683
Debilitation	√	9016 (91·6%)	1122 (93·7%)	7894 (91·3%)	0·004
Nasal congestion	√	4056 (41·2%)	413 (34·5%)	3643 (42·1%)	<0·001
Rhinorrhea	√	4106 (41·7%)	406 (33·9%)	3700 (42·8%)	<0·001
Sore throat	√	5673 (57·6%)	648 (54·1%)	5025 (58·1%)	0·009
Pantalgia	√	5325 (54·1%)	661 (55·2%)	4664 (53·9%)	0·401
Recognition of therapies					
There is no specific treatment and only symptomatic and supportive treatments help	√	8385 (85·2%)	1026 (85·7%)	7359 (85·1%)	0·572
There is specific drug to treat the disease	×	162 (1·6%)	20 (1·7%)	142 (1·6%)	0·904
Traditional Chinese medicine has a good therapeutic effect	○	1683 (17·1%)	229 (19·1%)	1454 (16·8%)	0·046
Integrative Chinese and western medicine is very effective	○	4581 (46·5%)	573 (47·9%)	4008 (46·3%)	0·322
Plasma antibodies in convalescent patients is effective	○	6184 (62·8%)	814 (68·0%)	5370 (62·1%)	<0·001
The vaccine against COVID-19 is in use	×	566 (5·7%)	51 (4·3%)	515 (6·0%)	0·018
Traditional Chinese medicine (such as Shuanghuanglian) can prevent COVID-19	×	410 (4·2%)	52 (4·3%)	358 (4·1%)	0·740
No measures could prevent COVID-19	×	1103 (11·2%)	149 (12·4%)	954 (11·0%)	0·145
Personal prevention measures					
Wearing masks		9800 (99·5%)	1197 (100·0%)	8603 (99·5%)	0·005
Wearing goggles		2588 (26·3%)	396 (33·1%)	2192 (25·3%)	<0·001
Frequent hand-washing		9522 (96·7%)	1163 (97·2%)	8359 (96·7%)	0·361
Daily home disinfection		4785 (48·6%)	644 (53·8%)	4141 (47·9%)	<0·001
Covering mouth and nose when sneezing		6444 (65·5%)	771 (64·4%)	5673 (65·6%)	0·418
Measuring body temperature regularly		5645 (57·3%)	823 (68·8%)	4822 (55·8%)	<0·001
No protection		6 (0·1%)	0 (0·0%)	6 (0·1%)	1·000

The questions could be classified into three following types based on the accuracy of answers: (1) questions with verified answer according to the current guidelines of COVID-19 and literatures. This type of answer was a definite true or false for one certain question, marked with "√" or "×", respectively; (2) questions with pending answer without solid proof until the date of the current survey, marked with "○"; (3) subjective questions with no unified right answers which only represented the personal view, marked with "△".

Table 4. Awareness scores of 9,845 participants

Items	n	Awareness score	P
Gender			<0·001
Male	4540	17·620±2·691	
Female	5305	17·980±2·632	
Age			<0·001
18-44	7616	17·892±2·628	Ref·
45-59	1923	17·630±2·752	<0·001
60-74	306	17·026±2·846	<0·001
Marital status			<0·001
Married	7135	17·883±2·637	
Unmarried	2710	17·634±2·730	
Occupation			<0·001
Healthcare workers	2512	18·463±2·467	
Others	7333	17·592±2·694	
Education level			<0·001
Tertiary	8089	18·049±2·538	
Others	1756	16·731±2·954	
Region			0·019
Hubei	1197	17·645±2·602	
Others	8648	17·837±2·673	
Source of first information			<0·001
Internet	8112	17·867±2·639	Ref·
Television	778	17·195±2·757	<0·001
Word of mouth*	723	17·736±2·666	0·205
Others	232	18·297±2·950	0·015
Concern much about the epidemic			<0·001
Yes	8034	17·918±2·618	
No	1811	17·353±2·822	
Extremely anxious about the epidemic			0·341
Yes	1949	17·761±2·776	
No	7896	17·827±2·637	
Highly agreement with the effectiveness of control measures			0·735
Yes	7295	17·809±2·657	
No	2550	17·829±2·690	

* Word of mouth refers to the following three ways: hearing the information from family members, neighbors or grassroots cadres·

Table 5. Psychological state regarding the epidemic and attitudes towards the systemic control measures for COVID-19 of 9,845 participants

Items	Total	Hubei	Other regions	P
Psychological state regarding the epidemic				
Worry about self being infected				<0·001
Extremely	2777 (28·2%)	402 (33·6%)	2375 (27·5%)	
Slightly	5783 (58·7%)	679 (56·7%)	5104 (59·0%)	
Never	1285 (13·1%)	116 (9·7%)	1169 (13·5%)	
Worry about relatives and friends being infected				<0·001
Extremely	4075 (41·4%)	595 (49·7%)	3480 (40·2%)	
Slightly	5145 (52·3%)	560 (46·8%)	4585 (53·0%)	
Never	625 (6·3%)	42 (3·5%)	583 (6·7%)	
Be anxious about the epidemic				<0·001
Extremely	1949 (19·8%)	288 (24·1%)	1661 (19·2%)	
Slightly	6345 (64·4%)	769 (64·2%)	5576 (64·5%)	
Never	1551 (15·8%)	140 (11·7%)	1411 (16·3%)	
Daily mood affected by the epidemic				<0·001
Extremely	1897 (19·3%)	309 (25·8%)	1588 (18·4%)	
Slightly	6648 (67·5%)	768 (64·2%)	5880 (68·0%)	
Never	1300 (13·2%)	120 (10·0%)	1180 (13·6%)	
Pay close				0·171

attention to news related to the epidemic				
Extremely	8034 (81·6%)	988 (82·5%)	7046 (81·5%)	
Slightly	1771 (18·0%)	201 (16·8%)	1570 (18·1%)	
Never	40 (0·4%)	8 (0·7%)	32 (0·4%)	
Attitudes towards the control and prevention measures				
Staying at home during Spring Festival is necessary				0·562
Highly agreement	9229 (93·7%)	1117 (93·3%)	8112 (93·8%)	
Agreement	582 (5·9%)	74 (6·2%)	508 (5·9%)	
Disagreement	34 (0·3%)	6 (0·5%)	28 (0·3%)	
Staying at home during Spring Festival is effective				<0·001
Highly agreement	8682 (88·2%)	965 (80·6%)	7717 (89·2%)	
Agreement	1071 (10·9%)	204 (17·0%)	867 (10·0%)	
Disagreement	92 (0·9%)	28 (2·3%)	64 (0·7%)	
Closing down shopping malls and cancelling mass events are necessary				0·002
Highly agreement	9067 (92·1%)	1127 (94·2%)	7940 (91·8%)	
Agreement	708 (7·2%)	58 (4·8%)	650 (7·5%)	
Disagreement	70 (0·7%)	12 (1·0%)	58 (0·7%)	
Closing down shopping malls and cancelling mass events are effective				0·084
Highly agreement	8724 (88·6%)	1077 (90·0%)	7647 (88·4%)	
Agreement	1063 (10·8%)	110 (9·2%)	953 (11·0%)	
Disagreement	58 (0·6%)	10 (0·8%)	48 (0·6%)	
The overall control measures are effective				<0·001
Highly agreement	7295 (74·1%)	708 (59·1%)	6587 (76·2%)	
Agreement	2418 (24·6%)	444 (37·1%)	1974 (22·8%)	
Disagreement	132 (1·3%)	45 (3·8%)	87 (1·0%)	

Figures

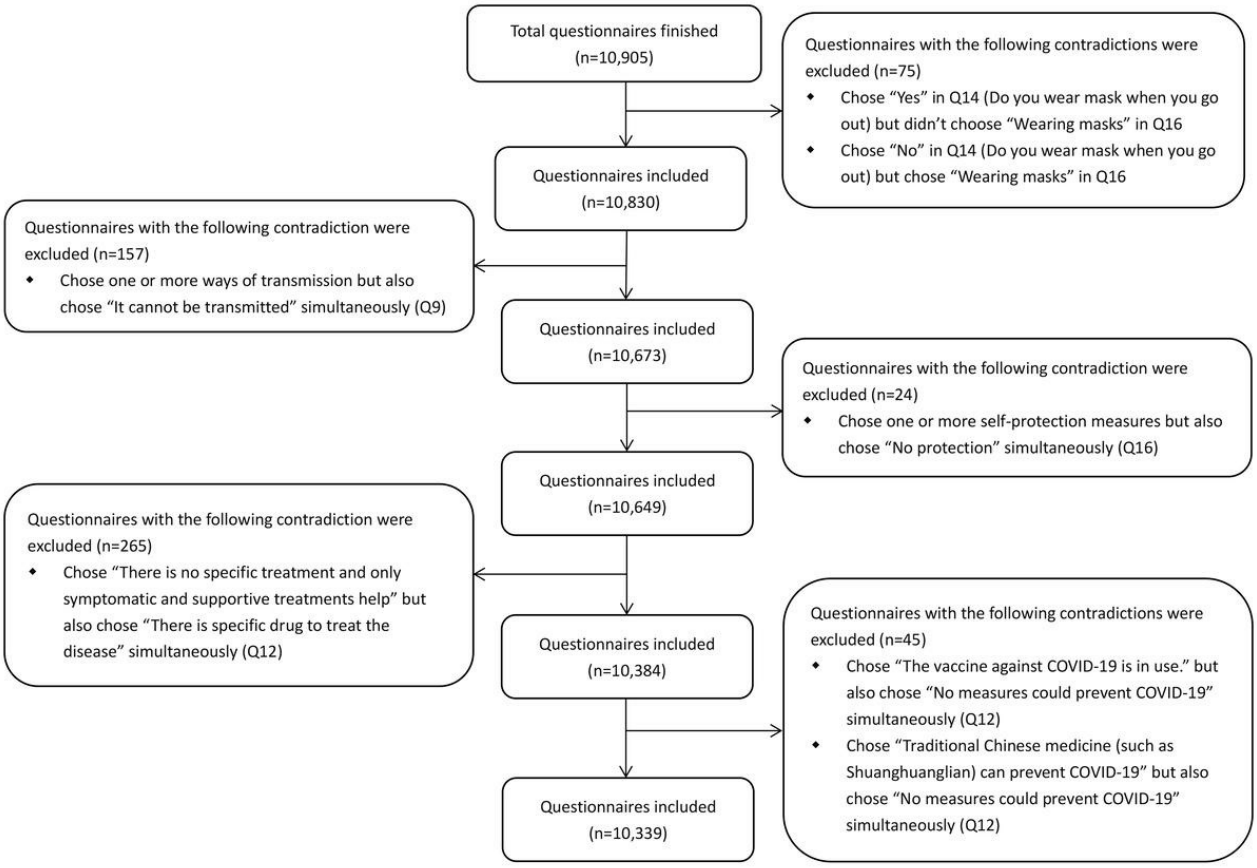

Figure 1

The flow chart of the study.

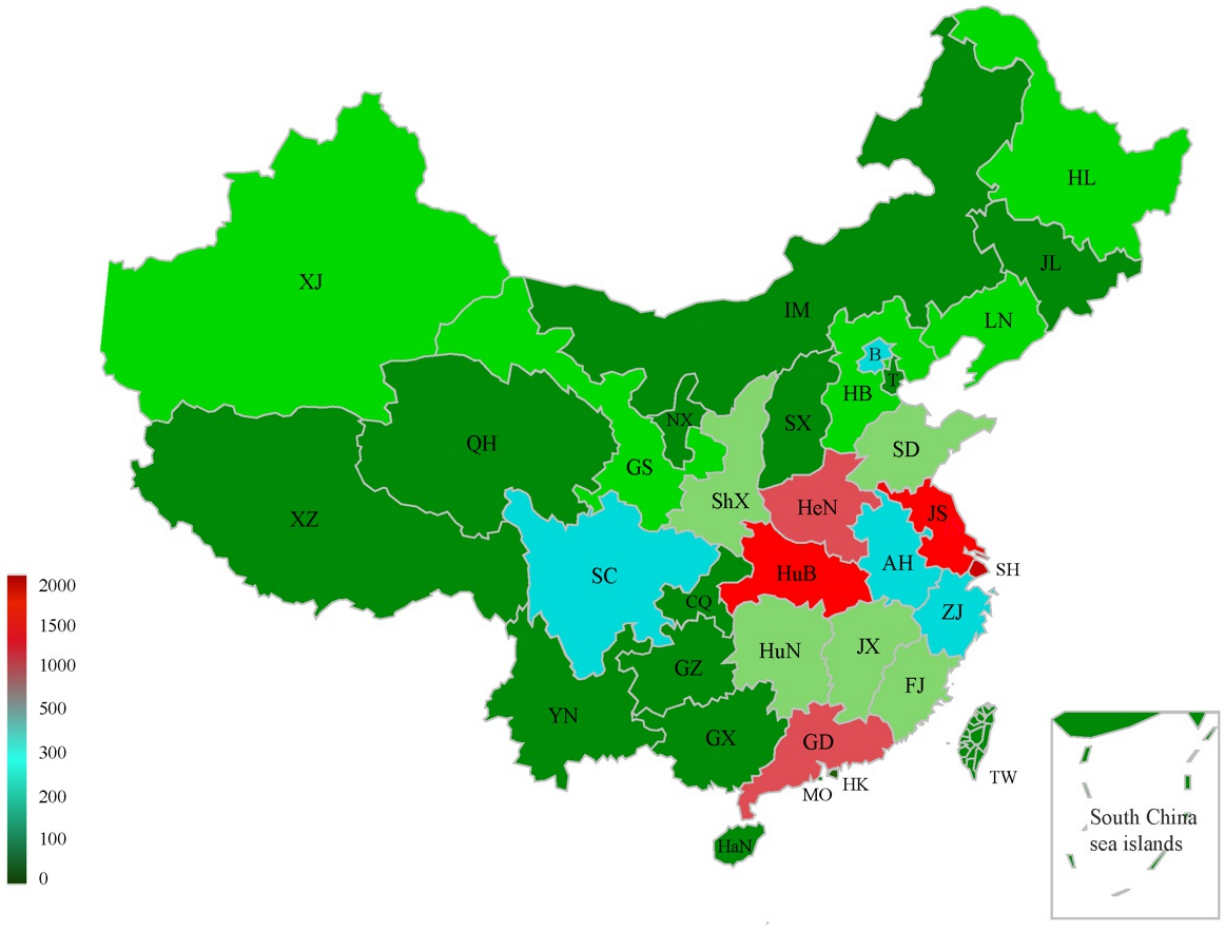

Figure 2

The regional distribution of the domestic participants. Note: The designations employed and the presentation of the material on this map do not imply the expression of any opinion whatsoever on the part of Research Square concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. This map has been provided by the authors.

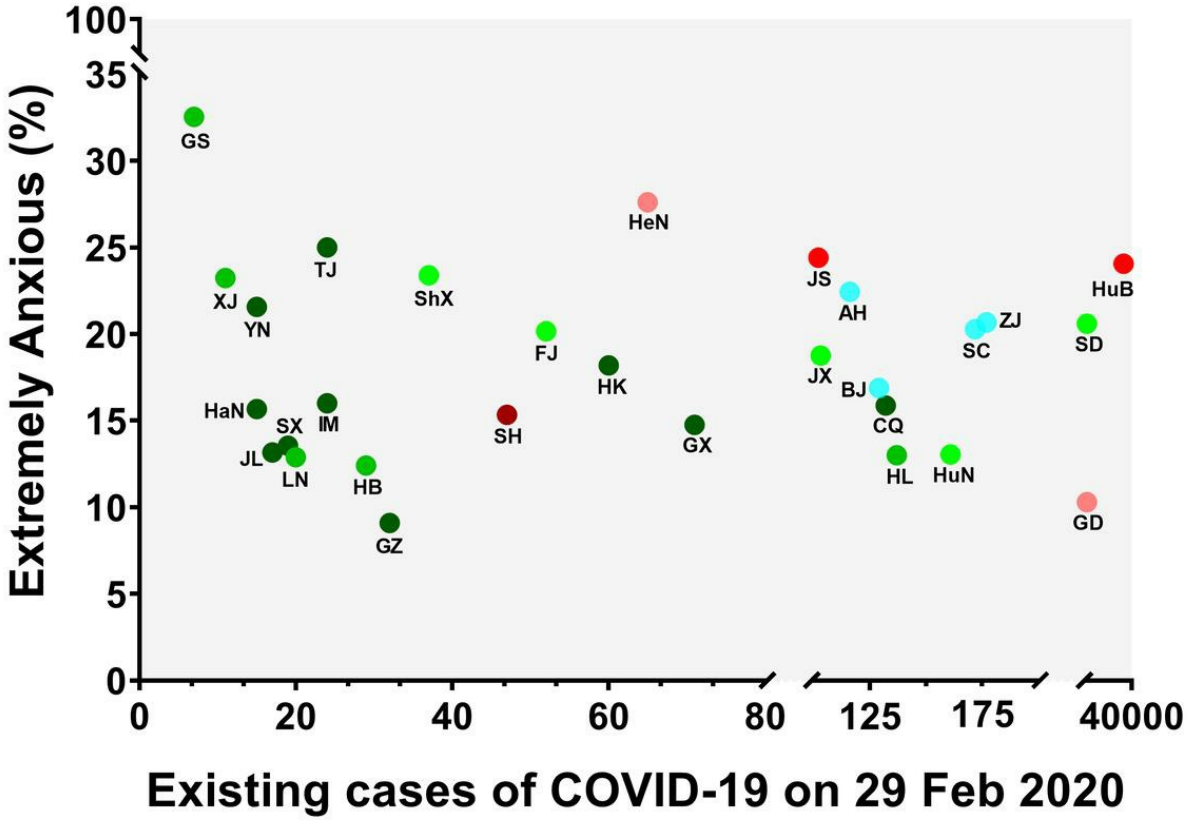

Figure 3

The correlation test. The correlation between extreme anxiety and number of regional existing cases on 29 February 2020 (r=0.178, P=0.356). To reduce participant bias, regions from foreign counties and districts with no more than 10 participants were excluded in the correlation analysis.

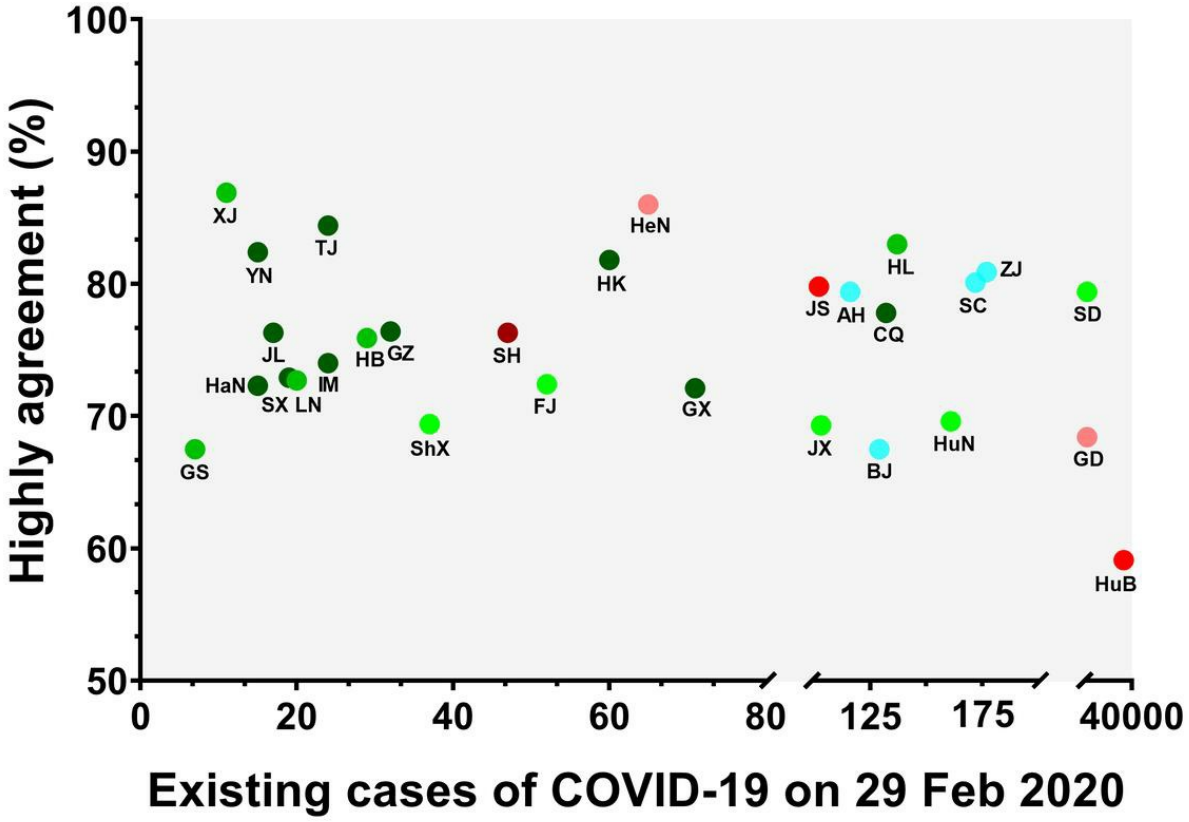

Figure 4

The correlation test. The correlation between highly agreement with overall control measures and number of regional existing cases on 29 February 2020 (r=-0.492, P=0.007). To reduce participant bias, regions from foreign counties and districts with no more than 10 participants were excluded in the correlation analysis.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

Additionalfile2.docx
Additionalfile1.docx