COVID-19-related stigma and its' influencing factors: a rapid nationwide study in China

Tianyu Jiang

Institute of Social Medicine, School of Medicine, Zhejiang University, Hangzhou, Zhejiang, China

Xudong Zhou

Institute of Social Medicine, School of Medicine, Zhejiang University, Hangzhou, Zhejiang, China

Leesa Lin

Department of Infectious Disease Epidemiology, London School of Hygiene and Tropical Medicine, London, UK

Yanzheng Pan

Institute of Social Medicine, School of Medicine, Zhejiang University, Hangzhou, Zhejiang, China

Yuyuan Zhong

Institute of Social Medicine, School of Medicine, Zhejiang University, Hangzhou, Zhejiang, China

Xiaomin Wang (✉ xiaominwang2018@zju.edu.cn)

Institute of Social Medicine, School of Medicine, Zhejiang University, Hangzhou, Zhejiang, China

Hui Zhu (✉ zhuhui2002@zju.edu.cn)

School of Medicine, Zhejiang University, Hangzhou, Zhejiang, China

Research Article

Keywords: China, COVID-19, stigma, health literacy

Posted Date: August 28th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-66632/v1>

License: This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Background COVID-19 poses a significant challenge to global public health. During the pandemic, COVID-19 patients and people in outbreak areas have suffered from stigma associated with the disease. This study aimed to evaluate the prevalence of COVID-19-related stigma toward COVID-19 patients and people from the city of Wuhan in China and assess the association of COVID-19-related stigma, health literacy, and sociodemographic characteristics.

Methods A cross-sectional survey covering 5,039 respondents was conducted in 31 provinces in China using a convenience sampling method. Binary logistic regressions were used to identify the factors associated with COVID-19-related stigma.

Results Among the participants, 122 (2.4%) reported themselves and 254 (5.0%) reported the communities they lived in held a stigmatizing attitude toward COVID-19 patients, respectively. Additionally, 114 (2.5%) and 475 (10.3%) reported that themselves and the communities they lived in, respectively, held a stigma against people from Wuhan, where was the most severely affected area in China. People aged over 40, lived in areas with severe epidemics (aOR=2.15, 95% CI [1.12-4.13]), and who felt it difficult to find and understand information about COVID-19 (aOR=1.91, 95% CI [1.08-3.27]; aOR=1.88, 95% CI [1.08-3.29]) were more likely to stigmatize COVID-19 patients. People who were male, aged 41 to 50, and had difficulty understanding information (aOR=2.08, 95% CI [1.17-3.69]) were more likely to stigmatize people from Wuhan.

Conclusions COVID-19 patients and Wuhan residents suffered stigma at both the individual and community levels, although proportion of those holding a stigma was not very high. Provinces close to Wuhan had relatively high stigma toward COVID-19 patients and people from Wuhan. There was a correlation between better health literacy and lower stigma during the COVID-19 outbreak. Tailored interventions were encouraged to improve health literacy and consequently to reduce stigma toward both COVID-19 patients and Wuhan people from individual and community levels, respectively.

Background

Stigma can be defined as a social label associating an individual with characteristics of prejudice and discrimination [1,2]. Individuals suffering from stigma often feel shamed, stressed and isolated, leading to negative changes in their health behaviors [3,4]. For example, individuals being stigmatized for a health condition may delay or avoid treatment, and may not seek access to health services, which compromises the outcome of their medical condition [5].

In the field of infectious disease, stigma has been recognized as a global issue [6]. In recent decades, many studies concerning stigma related to infectious diseases have been conducted, including but not limited to human immunodeficiency virus (HIV) [7-9], tuberculosis (TB) [10-12] and severe acute respiratory syndrome (SARS) [13,14]. The relationship between knowledge and stigma is well-documented for infectious diseases prevention measures that do not require social distancing. For

example, people with higher education levels and HIV-related knowledge were less likely to stigmatize HIV patients [7,15]. This may be due to the fact that people with more HIV-related knowledge had a better understanding that they were not likely to get infected with HIV through social interactions (such as handshake, hug, and cheek kiss). However, emerging infectious diseases that are evolving in nature and have uncertain transmission patterns often cause panic among individuals and communities, as was seen with SARS, H1N1, and COVID-19. The transmission of certain infectious diseases through social interaction can ignite stigma toward disease-related groups [14] following the introduction of social-distancing policies to prevent such diseases. Previous studies have noted that social distancing measures may affect the attitudes of individuals and communities toward people with stigmatizing conditions, and may lead to stigma [14,16]. However, few studies have shed light on the relationship between knowledge and stigma in emerging infectious diseases that can be transmitted through social interactions.

Health literacy is usually defined as an individual's ability to obtain and process health information and take appropriate action [17]. Knowledge is an important dimension of health literacy [18]. Previous studies investigating the relationship between health literacy and stigma have mostly focused on mental illnesses and chronic diseases, and have shown that patients with low health literacy were more likely to feel stigmatized [19-21]. Few studies have investigated the relationship between health literacy and stigma toward infectious diseases that require social distancing.

Studies on stigma related to infectious diseases have revealed that it is not only individual patients who face stigma from infectious diseases, but can also be entire racial or ethnic groups who have or are perceived as having a higher likelihood of being infected [22]. Wuhan, the capital of Hubei Province, was the most severely affected area during the COVID-19 epidemic in China. In order to control the spread of COVID-19, the Chinese government took unprecedented measures, including locking down Wuhan, and requiring all Wuhan residents who migrated to other provinces before Wuhan was locked down to receive nucleic acid tests. Among the confirmed COVID-19 cases in many provinces, a considerable portion were imported cases from Wuhan [23]. Despite the government and media calling for tolerance, the development of a stigmatization towards residents of Wuhan was inevitable. For example, in some communities, residents of Wuhan were not allowed to enter and suffered unfair treatment. Therefore, this study aims to investigate both stigma faced by COVID-19 patients and stigma faced by residents of Wuhan.

The aims of this study are 1) to evaluate the prevalence of stigma during the COVID-19 outbreak in China and 2) to assess the association of stigma, health literacy, and sociodemographic characteristics during the COVID-19 epidemic.

Methods

Study design and participants

This was a national cross-sectional survey conducted in 31 provinces, municipalities, and autonomous regions in China (except Hong Kong, Macao, and Taiwan). The questionnaire used in this survey was developed for this study (Additional file 1). Tools to measure stigma in this study were referred to a previous study published in the BMC Public Health [24]. Two online focus groups were conducted to discuss the questionnaire design, with six people with public health and medical backgrounds in each group. Two independent experts with background in public health reviewed and further developed the questionnaire. We conducted 30 online face-to-face interviews with respondents of different ages and education levels to pre-test the questionnaire. The questionnaire included sociodemographic characteristics, COVID-19-related stigma, and health literacy during COVID-19 epidemic. We set up logic questions to check the validity of the data.

Sample selection

The respondents included in this study were aged over 16 years old and could read Mandarin. We conducted convenience sampling in 31 provinces, and 100-200 families were selected from each province. The family member from each family whose birthday was closest to the survey date was asked to fill in the questionnaire to ensure randomness in sampling. We encouraged younger family members to assist elderly family members in completing the questionnaire, if necessary. We conducted over-sampling for ethnic minority groups. We also over-sampled for Wuhan, as it was the epidemic outbreak center. We intentionally balanced respondents from urban and rural areas while conducting this survey. The final effective sample size from all 31 provinces was 5,039.

Data collection

Data were collected using the web-based questionnaire that was refined by the focus groups and pre-testing process. The survey was administered from March 1 to March 16, 2020. Before the investigation, investigators received online trainings, and thusly they were responsible for quality control. Respondents could fill in the questionnaire by scanning QR codes or clicking the questionnaire link on smartphones, tablets and other mobile devices. Before filling in the questionnaire, respondents were informed that this was an anonymous study and they could participate voluntarily. This investigation did not provide compensation to the respondents. The Ethics Committee of the School of Public Health at Zhejiang University reviewed and approved this study.

Data analysis

All data were analyzed using IBM SPSS Statistics Version 23.0 for Windows. Descriptive analyses included means for continuous variables and percentages for categorical data. Chi-square tests were conducted to compare COVID-19-related stigma between groups. Binary logistic regression analysis was used to examine the association of the independent variables with COVID-19-related stigma. All comparisons were two tailed. The significance threshold was $p\text{-value} < 0.05$.

Measurements

Health literacy

Questions on health literacy about COVID-19 were adapted from previous studies [25,26] and measured using two questions: (1) Do you agree that “it is difficult for me to find correct and comprehensive information about COVID-19”, (2) Do you agree that “it is difficult for me to understand information I got about COVID-19”. Each question was answered using a 5-point Likert scale ranging from 1 to 5 (1=Strongly disagree; 2=Disagree; 3=Fair; 4=Agree; 5=Strongly agree).

Stigma

Questions on COVID-19-related stigma were adapted from previous studies [24,27]. Four questions, including stigma toward COVID-19 patients and residents of Wuhan at the individual and community levels were used, respectively. The study participants who reported holding stigmatizing views were classified as “stigmatized”, while those who reported holding no stigmatizing views were classified as “not stigmatized”. People who lived in Wuhan were automatically exempted from stigma questions related to residents of Wuhan.

Social demographic characteristics

The sociodemographic characteristics comprised gender, age, education, ethnicity, urbanicity, and monthly household income. According to the data of confirmed COVID-19 cases in 31 provinces officially announced by the Chinese government as of March 1, the 31 provinces were divided into four areas: low case areas, low-medium case areas, medium case areas, and high case areas.

Results

A total of 5,039 participants (Table 1) with an average age of 33.0 (SD=12.5) were included for analysis. Most of them were female, were of Han ethnicity, received senior high school education, had a monthly household income above 705 United States dollars (USD), and lived in a medium case area.

At the individual level (Table 2), the majority (70.2%) of participants reported they felt compassion for and desired to help COVID-19 patients, 1,045 (20.7%) reported they felt compassion for COVID-19 patients but tended to avoid them, 29(0.6%) expressed their unwillingness to help COVID-19 patients, and 93(1.8%) expressed fear of COVID-19 patients. Less than one percent of participants expressed their unwillingness to help residents of Wuhan and 74(1.6%) expressed fear of residents of Wuhan. At the community level, 254(5.0%) participants reported their communities rejected COVID-19 patients, and 475(10.3%) participants reported residents of Wuhan were rejected by their communities. Approximately one-third of participants reported that they had difficulties finding comprehensive and correct information about COVID-19, and 759(15.0%) of the participants reported that it was difficult to understand the information they received about COVID-19.

Figure 1 shows the number of cumulative confirmed COVID-19 cases from the 31 provinces on the investigation data (March 1, 2020). Figure 2 illustrates the proportion of individual stigma toward COVID-

19 patients in each province. People living in Hubei, Anhui, Guizhou, Tianjin and Yunnan provinces had a relatively high stigma percentage of over 4% of the population. Figure 3 shows that more than 4% of the respondents living in Guizhou, Yunnan, and Qinghai provinces expressed a stigma toward residents of Wuhan. The proportion of reported stigma toward residents of Wuhan in Henan, Shanxi, Ningxia, Chongqing and Zhejiang provinces was between 3% and 4%.

As shown in Table 3, the prevalence of stigma toward COVID-19 patients among people over 50 was significantly higher than that of people under 20 (5.1% vs. 1.2%, $p=0.001$). Compared with people who had a junior high school or lower degree, people with a college or higher degree reported lower levels of stigma toward COVID-19 patients (2.0% vs. 4.0%, $p=0.01$). Minorities showed a higher level of (3.6% vs. 2.2%, $p=0.024$) stigma toward COVID-19 patients than did Han respondents. Participants who felt it was easy to find and understand information about COVID-19 expressed lower stigma toward COVID-19 patients than did those who felt it was difficult (1.4% vs. 3.7%, $p=0.001$; 1.5% vs. 4.5%, $p=0.001$). Individual stigma towards residents of Wuhan was more prevalent among male than female respondents (3.4% vs. 1.8%, $p=0.001$) and was relatively high among those who felt it was hard to understand COVID-19-related information (4.4% vs. 1.8%, $p=0.001$).

Logistic regression (Table 4) indicated that participants aged over 40, who were ethnic minorities ($aOR=2.71$, 95% CI [1.67-4.38]), and who felt it was difficult to find and understand information about COVID-19 ($aOR=1.91$, 95% CI [1.08-3.27]; $aOR=1.88$, 95% CI [1.08-3.29]) were more likely to stigmatize COVID-19 patients. Compared with people living in low case areas, people living in low-medium case areas and high case areas were 1.74 and 2.03 times more likely to stigmatize COVID-19 patients, respectively. Females were found to be less likely to stigmatize residents of Wuhan when compared with males ($aOR=0.55$, 95% CI [0.38-0.81]). Participants aged 41 to 50 and those with difficulty understanding information ($aOR=2.08$, 95% CI [1.17-3.69]) were more likely to stigmatize residents of Wuhan.

Discussion

To our knowledge, this is the first nationwide study investigating COVID-19-related stigma in China. Our study revealed the prevalence of stigma toward COVID-19 patients and residents of Wuhan at both the individual and community levels during the epidemic. Consequently, our results verified the correlation between better health literacy and lower stigma during emerging infectious diseases outbreaks and showed the difference in stigma in regions with different COVID-19 epidemic severities on a large scale across the country. Additionally, we found that socio-demographic factors, such as residency, gender, age, and ethnicity, affected COVID-19-related stigma.

Overall, the prevalence of stigma was low in China during the COVID-19 pandemic and most participants had a positive attitude towards COVID-19 patients and residents of Wuhan people. Noticeably, our study showed that participants reported stigma from communities was significantly higher than individual stigma, which might be affected by the social desirability effect, meaning that participants' responses concerning themselves may be biased in order to meet social expectations and moral standards. Social

desirability has been identified in previous studies on measuring individual stigma towards people with mental illness [28,29]. Stigma from communities is not unique to China, but has also been reported in the United States, Australia, Nepal and other countries [30], which deserves more attention in future studies.

Our study added to the literature by exposing the negative association between health literacy and stigma during an emerging infectious disease. Our findings verified that, during the COVID-19 pandemic, there was a significant association between health literacy and COVID-19-related stigma. Higher COVID-19-related health literacy, specifically, a better ability to find and understand information, might help reduce stigma toward COVID-19 patients and residents of Wuhan. Our findings are consistent with previous studies, which identified a correlation between health literacy and stigma on mental disease [31,32]. Consequently, in the field of infectious diseases, higher literacy concerning one disease may possibly help eliminate stigma. Additionally, it has been suggested that health literacy interventions, such as educational lectures to improve public knowledge and literacy, could help reduce stigma in the field of mental health [33]. Thus, further studies are needed to verify effective measures to reduce stigma during an emerging infectious disease.

In addition to health literacy, our research found that people in different regions held differing degrees of stigma toward COVID-19 patients. In general, provinces which were close to Wuhan, such as Anhui and Chongqing, and provinces with more ethnic minorities, such as Yunnan and Guizhou, had higher levels of stigma toward COVID-19 patients. Similarly, the proportion of respondents who held stigma towards residents of Wuhan was relatively high in provinces close to Wuhan, such as Henan, Chongqing and Shanxi, and provinces with more ethnic minorities such as Qinghai, Yunnan, Guizhou and Ningxia. The danger appraisal hypothesis states that an individuals' perception of danger would make them choose a safer social distance [34]. Another study on SARS-related stigma conducted in Hong Kong showed that living in a geographical location which was close to an area with a large number of cases could increase stigmatizing attitudes [35]. Specifically, residents living on the block with the most SARS patients reported holding the highest level of stigmatizing attitudes [36]. Similarly, in our study, people living in areas severely affected by the COVID-19 pandemic were at higher risk of social interaction with potential COVID-19 patients. Thus, they might expect to maintain a longer social distance and have less social interaction with potential COVID-19 patients, and therefore may hold higher levels of stigma.

Our study showed the influence of sociodemographic characteristics on COVID-19-related stigma, which might help identify subgroups who were more likely to stigmatize others during an infectious disease epidemic. In our study, females were more tolerant towards residents of Wuhan, while people over 40 years old and ethnic minorities were more likely to stigmatize COVID-19 patients, which is consistent with previous studies [15,30,37]. A previous study revealed that groups with higher education and income levels had lower levels of stigma toward patients with related diseases [20]. However, this difference was not found in our study. One possible reason for this may be that, during COVID-19 pandemic, China conducted a large-scale publicity campaign through traditional and social media, such as China Central Television (CCTV), WeChat official accounts and short video platforms [38], which may have helped

reduce barriers related to education and economic status in accessing adequate information concerning COVID-19.

There are some limitations in this study. First, this is a cross-sectional study, so it can not verify the causal relationship between the stigma-related variables. Second, the research data relies on the self-reporting of survey participants. Participants' responses regarding their stigma attitudes may be biased due to social desirability [28]. Third, we chose a snowball sampling method rather than a representative sampling method, due to the social-distancing policies in place during our investigation. However, we over-sampled ethnic minorities and ensured both the balance of urban-rural samples and the randomness of each sample in each household during the survey to reduce related bias.

Conclusion

In summary, our findings suggest that COVID-19 patients and residents of Wuhan suffered stigma at both the individual and community levels, although the proportion of respondents holding stigma was not high. Provinces closer to Wuhan had relatively higher levels of stigma toward COVID-19 patients and residents of Wuhan. There was a correlation between better health literacy and lower levels of stigma during the COVID-19 outbreak. Tailored interventions are encouraged to improve health literacy and consequently to reduce stigma toward both COVID-19 patients and residents of Wuhan at both the individual and community levels, respectively.

Declarations

Ethics approval and consent to participate

The protocol for this study was approved by the Ethics Committee of the School of Public Health, Zhejiang University. All participants were informed of the background, aims, anonymous nature and length of the survey. Participants were well informed that completing the questionnaire signified their informed consent.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analysed for the current study can be made available from the corresponding author on reasonable request.

Competing interests

The authors declare no conflict of interest.

Funding

This research study was supported by the National Social Science Fund of China (grant number 20VYJ063) and Zhejiang University Special Scientific Research Fund for COVID-19 Prevention and Control (grant number 2020XGZX045).

The funding body has no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Authors' contributions

XZ, XW, and HZ made substantial contributions to the study design and supervised the data collection. TJ, LL, YZ, and YP contributed to the data collection and interpretation. TJ wrote the substantial parts of manuscript. All authors critically revised, reviewed, and approved the final version the manuscript.

Acknowledgements

We would like to thank Jiayao Xu, Yiyi Zhou, Fangyuan Jiang, Yuling Wan for their great assistance to conduct this survey. We are grateful to data collectors for their work and all respondents for their participation in the study. We would like to thank Xianhong Huang for reviewing the data analysis.

Abbreviations

HIV: Human immunodeficiency virus; TB: Tuberculosis; SARS: Severe acute respiratory syndrome; USD: United States Dollar; CCTV: China Central Television

References

- [1] Henderson C, Evans-Lacko S, Thornicroft G. Mental illness stigma, help seeking, and public health programs. *Am J Public Health.* 2013;103(5):777-780.
- [2] Pescosolido BA. The public stigma of mental illness: what do we think; what do we know; what can we prove?. *J Health Soc Behav.* 2013;54(1):1-21.
- [3] Wang B, Li X, Stanton B, Fang X. The influence of social stigma and discriminatory experience on psychological distress and quality of life among rural-to-urban migrants in China. *Soc Sci Med.* 2010;71(1):84-92.
- [4] Elliot VL, Morgan D, Kosteniuk J, Froehlich Chow A, Bayly M. Health-related stigma of noncommunicable neurological disease in rural adult populations: A scoping review. *Health Soc Care Community.* 2019;27(4):e158-e188.
- [5] Schnyder N, Panczak R, Groth N, Schultze-Lutter F. Association between mental health-related stigma and active help-seeking: systematic review and meta-analysis. *Br J Psychiatry.* 2017;210(4):261-268.

- [6] Ren Z, Wang H, Feng B, Gu C, Ma Y, Chen H, et al. An exploratory cross-sectional study on the impact of education on perception of stigma by Chinese patients with schizophrenia. *BMC Health Serv Res*. 2016;16(1):210.
- [7] Balfour L, Corace K, Tasca GA, Best-Plummer W, Macpherson PA, Cameron DW. High HIV knowledge relates to low stigma in pharmacists and university health science students in Guyana, South America. *Int J Infect Dis*. 2010;14(10):e881-e887.
- [8] Zeng C, Li L, Hong YA, Zhang H, Babbitt AW, Liu C, et al. A structural equation model of perceived and internalized stigma, depression, and suicidal status among people living with HIV/AIDS. *BMC Public Health*. 2018;18(1):138.
- [9] Asamoah CK, Asamoah BO, Agardh A. A generation at risk: a cross-sectional study on HIV/AIDS knowledge, exposure to mass media, and stigmatizing behaviors among young women aged 15-24 years in Ghana. *Glob Health Action*. 2017;10(1):1331538.
- [10] Karim F, Chowdhury AM, Islam A, Weiss MG. Stigma, Gender, and their Impact on Patients with Tuberculosis in Rural Bangladesh. *Anthropol Med*. 2007;14(2):139-151.
- [11] Abebe G, Deribew A, Apers L, Woldemichael K, Shiffa J, Tesfaye M, et al. Knowledge, health seeking behavior and perceived stigma towards tuberculosis among tuberculosis suspects in a rural community in southwest Ethiopia. *PLoS One*. 2010;5(10):e13339.
- [12] Chang SH, Cataldo JK. A systematic review of global cultural variations in knowledge, attitudes and health responses to tuberculosis stigma. *Int J Tuberc Lung Dis*. 2014;18(2):168-173.
- [13] Lee S, Chan LY, Chau AM, Kwok KP, Kleinman A. The experience of SARS-related stigma at Amoy Gardens. *Soc Sci Med*. 2005;61(9):2038-2046.
- [14] Person B, Sy F, Holton K, Govert B, Liang A; National Center for Infectious Diseases/SARS Community Outreach Team. Fear and stigma: the epidemic within the SARS outbreak. *Emerg Infect Dis*. 2004;10(2):358-363.
- [15] Wong LP. Prevalence and factors associated with HIV/AIDS-related stigma and discriminatory attitudes: a cross-sectional nationwide study. *Prev Med*. 2013;57 Suppl:S60-S63.
- [16] Fischer LS, Mansergh G, Lynch J, Santibanez S. Addressing Disease-Related Stigma During Infectious Disease Outbreaks. *Disaster Med Public Health Prep*. 2019;13(5-6):989-994.
- [17] Berkman ND, Sheridan SL, Donahue KE, Halpern DJ, Crotty K. Low health literacy and health outcomes: an updated systematic review. *Ann Intern Med*. 2011;155(2):97-107.
- [18] Wei Y, McGrath PJ, Hayden J, Kutcher S. Mental health literacy measures evaluating knowledge, attitudes and help-seeking: a scoping review. *BMC Psychiatry*. 2015;15:291.

- [19] Nutbeam D. Health literacy as a public goal: a challenge for contemporary health education and communication strategies into the 21st century. *Health Promot Int.* 2000;15(3):259-267.
- [20] Johnco C, Rapee RM. Depression literacy and stigma influence how parents perceive and respond to adolescent depressive symptoms. *J Affect Disord.* 2018;241:599-607.
- [21] Mackert M, Donovan EE, Mabry A, Guadagno M, Stout PA. Stigma and health literacy: an agenda for advancing research and practice. *Am J Health Behav.* 2014;38(5):690-698.
- [22] Hoppe T. "Spanish Flu": When Infectious Disease Names Blur Origins and Stigmatize Those Infected. *Am J Public Health.* 2018;108(11):1462-1464.
- [23] Tian S, Hu N, Lou J, Chen K, Kang X, Xiang Z, et al. Characteristics of COVID-19 infection in Beijing. *J Infect.* 2020;80(4):401-406.
- [24] Datiko DG, Jerene D, Suarez P. Stigma matters in ending tuberculosis: Nationwide survey of stigma in Ethiopia. *BMC Public Health.* 2020;20(1):190.
- [25] Wang X, Zhou X, Leesa L, Mantwill S. The Effect of Vaccine Literacy on Parental Trust and Intention to Vaccinate after a Major Vaccine Scandal. *J Health Commun.* 2018;23(5):413-421.
- [26] Sørensen K, Van den Broucke S, Fullam J, Doyle G, Pelikan J, Slonska Z, et al. Health literacy and public health: a systematic review and integration of definitions and models. *BMC Public Health.* 2012;12:80.
- [27] Chowdhury MR, Rahman MS, Mondal MN, Sayem A, Billah B. Social Impact of Stigma Regarding Tuberculosis Hindering Adherence to Treatment: A Cross Sectional Study Involving Tuberculosis Patients in Rajshahi City, Bangladesh. *Jpn J Infect Dis.* 2015;68(6):461-466.
- [28] Michaels PJ, Corrigan PW. Measuring mental illness stigma with diminished social desirability effects. *J Ment Health.* 2013;22(3):218-226.
- [29] Latkin CA, Edwards C, Davey-Rothwell MA, Tobin KE. The relationship between social desirability bias and self-reports of health, substance use, and social network factors among urban substance users in Baltimore, Maryland. *Addict Behav.* 2017;73:133-136.
- [30] Singh R, Subedi M. COVID-19 and stigma: Social discrimination towards frontline healthcare providers and COVID-19 recovered patients in Nepal. *Asian J Psychiatr.* 2020;53:102222.
- [31] Svensson B, Hansson L. How mental health literacy and experience of mental illness relate to stigmatizing attitudes and social distance towards people with depression or psychosis: A cross-sectional study. *Nord J Psychiatry.* 2016;70(4):309-313.

[32] Lopez V, Sanchez K, Killian MO, Eghaneyan BH. Depression screening and education: an examination of mental health literacy and stigma in a sample of Hispanic women. BMC Public Health. 2018;18(1):646.

[33] Milin R, Kutcher S, Lewis SP, Walker S, Wei Y, Ferrill N, et al. Impact of a Mental Health Curriculum on Knowledge and Stigma Among High School Students: A Randomized Controlled Trial. J Am Acad Child Adolesc Psychiatry. 2016;55(5):383-391.e1.

[34] Balfour L, Corace K, Tasca GA, Best-Plummer W, Macpherson PA, Cameron DW. High HIV knowledge relates to low stigma in pharmacists and university health science students in Guyana, South America. Int J Infect Dis. 2010;14(10):e881-e887.

[35] Lee S, Chan LY, Chau AM, Kwok KP, Kleinman A. The experience of SARS-related stigma at Amoy Gardens. Soc Sci Med. 2005;61(9):2038-2046.

[36] Des Jarlais DC, Galea S, Tracy M, Tross S, Vlahov D. Stigmatization of newly emerging infectious diseases: AIDS and SARS. Am J Public Health. 2006;96(3):561-567.

[37] Peluso Ede T, Blay SL. Public stigma in relation to individuals with depression. J Affect Disord. 2009;115(1-2):201-206.

[38] Zhong BL, Luo W, Li HM, Zhang QQ, Liu XG, Li WT, et al. Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: a quick online cross-sectional survey. Int J Biol Sci. 2020;16(10):1745-1752.

Tables

Table 1 Sample characteristics (n=5,039)

Variables	N	%
Age		
≤20	774	15.4
21-30	1,914	38.0
31-40	885	17.6
41-50	959	19.0
≥51	507	10.1
Gender		
Male	2,090	41.5
Female	2,949	58.5
Education level		
Junior high school or less	668	13.3
Senior high school	2,528	50.2
College or above	1,843	36.6
Ethnicity		
Han	4,234	84.0
Minorities	805	16.0
Urbanicity		
Urban	2,492	49.5
Rural	2,547	50.5
Monthly household income (USD)		
¥422	846	16.8
422-704	1,485	29.5
705-1,407	1,422	28.2
1,408-2,815	858	17.0
¥2,815	428	8.5
Province by confirmed patients		
Low case area	1,374	27.3
Low-medium case area	1,386	27.5

Medium case area	1,681	33.4
High case area	598	11.9

Table 2 Stigma and health literacy during COVID-19 epidemic

Variables	N	%
Stigma toward COVID-19 patients (n=5,039)		
Statement closest to your feeling about people with COVID-19		
I feel compassion and desire to help	3,536	70.2
I feel compassion but tend to stay away from them	1,045	20.7
It is their problem and I don't want to get COVID-19 by trying to help them	29	0.6
I fear them because they may infect me	93	1.8
I have no particular feeling	336	6.7
How was COVID-19 patient usually regarded/treated in your community?		
Most people reject him/her	254	5.0
Most people are friendly, but they generally try to avoid	1,141	22.6
The community mostly supports and helps him/her	725	14.4
I don't have the experience	2,919	57.9
Stigma toward Wuhan people (n=4,628) *		
Statement closest to your feeling about Wuhan people		
I feel compassion and desire to help	3,323	71.8
I feel compassion but tend to stay away from them	883	19.1
It is their problem and I don't want to get COVID-19 by trying to help them	40	0.9
I fear them because they may infect me	74	1.6
I have no particular feeling	308	6.7
How was Wuhan people usually regarded/treated in your community?		
Most people reject him/her	475	10.3
Most people are friendly, but they generally try to avoid	1,784	38.6
The community mostly supports and helps him/her	2,097	45.3
I don't have the experience	272	5.9
Health literacy (n=5,039)		
It is difficult for me to find correct and comprehensive information about COVID-19		
Strongly disagree	218	4.3
Disagree	1,541	30.6

Neutral	1,679	33.3
Agree	1,230	24.4
Strongly agree	371	7.4
It is difficult for me to understand information I got about COVID-19		
Strongly disagree	348	6.9
Disagree	2,471	49.0
Neutral	1,461	29.0
Agree	587	11.6
Strongly agree	172	3.4

* 411 participants who lived in Wuhan were automatically exempted from stigma questions related to residents of Wuhan.

Table 3 Univariate analysis of individual stigma toward COVID-19 patients and Wuhan residents

	COVID-19 patients (n = 5,039)			Wuhan residents (n = 4,628) *		
Variables	Stigma	c ²	p-value	Stigma	c ²	p-value
Gender		3.742	0.062		12.25	0.001
Male	61(2.9)			66(3.4)		
Female	61(2.1)			48(1.8)		
Age		32.43	0.001		4.053	0.399
≤20	9(1.2)			11(1.5)		
21-30	34(1.8)			43(2.4)		
31-40	17(1.9)			20(2.6)		
41-50	36(3.8)			26(3.0)		
≥51	26(5.1)			14(3.0)		
Education level		9.216	0.010		2.606	0.272
Junior high school or less	27(4.0)			21(3.3)		
Senior high school	59(2.3)			59(2.5)		
College or above	36(2.0)			34(2.1)		
Ethnicity		5.660	0.024		1.174	0.279
Han	93(2.2)			90(2.4)		
Minorities	29(3.6)			24(3.0)		
Urbanicity		0.060	0.855		0.129	0.720
Urban	59(2.4)			51(2.4)		
Rural	63(2.5)			63(2.5)		
Monthly household Income (USD)		5.875	0.209		0.481	0.975
≤422	20(2.4)			20(2.4)		
422-704	47(3.2)			38(2.7)		
705-1407	27(1.9)			31(2.4)		
1408-2815	17(2.0)			17(2.3)		

2815	11(2.6)	8(2.2)		
Province by confirmed patients	4.169	0.244	2.374	0.498
Low case area	24(1.7)	30(2.2)		
Low-medium case area	38(2.7)	41(3.0)		
Medium case area	42(2.5)	39(2.3)		
High case area	18(3.0)	4(1.9)		
It is difficult for me to find correct and comprehensive information about COVID-19	19.21	χ^2 0.001	5.448	0.066
Disagree	24(1.4)	30(1.8)		
Neutral	39(2.3)	39(2.5)		
Agree	59(3.7)	45(3.1)		
It is difficult for me to understand information I got about COVID-19	25.87	χ^2 0.001	16.17	χ^2 0.001
Disagree	43(1.5)	46(1.8)		
Neutral	45(3.1)	37(2.8)		
Agree	34(4.5)	31(4.4)		

* 411 participants who lived in Wuhan were automatically exempted from stigma questions related to residents of Wuhan.

Table 4 Factors associated with COVID-19-related stigma

	Individual stigma toward COVID-19 patients (n = 5,039)		Individual stigma toward Wuhan residents (n = 4,628) ^a	
	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)
Gender (Ref: Male)				
Female	0.73(0.51-1.05)	0.79(0.55-1.15)	0.52 (0.36-0.76) **	0.55 (0.38-0.81) **
Age (Ref: ≤20)				
21-30	1.77(0.81-3.83)	1.67(0.77-3.64)	1.87 (0.93-3.77)	1.80 (0.89-3.64)
31-40	2.11(0.88-5.05)	2.08(0.87-5.01)	2.17 (0.97-4.87)	2.14 (0.95-4.81)
41-50	4.00(1.82-8.79) **	3.99(1.81-8.83) **	2.34 (1.09-5.04) *	2.34 (1.09-5.05) *
≥51	5.21(2.31-11.73) ***	5.28(2.34-11.94) ***	2.05 (0.88-4.76)	2.03 (0.87-4.74)
Educational level (Ref: Junior high school or less)				
Senior high school	0.85(0.51-1.42)	0.96(0.57-1.60)	0.94 (0.54-1.65)	1.06 (0.60-1.85)
College or above	0.67(0.37-1.22)	0.82(0.45-1.51)	0.64 (0.34-1.21)	0.76 (0.40-1.45)
Ethnicity (Ref: Han)				
Minorities	2.68(1.66-4.32) ***	2.71(1.67-4.38) ***	1.52 (0.93-2.50)	1.52 (0.93-2.50)
Urbanicity (Ref: Urban)				
Rural	0.86(0.58-1.28)	0.87(0.58-1.30)	0.97 (0.65-1.45)	0.96 (0.64-1.44)
Monthly household income (USD) (Ref:¥422)				

422-704	1.36(0.79-2.34)	1.52(0.88-2.63)	1.11(0.64-1.95)	1.18(0.67-2.07)
705-1407	0.82(0.44-1.52)	0.95(0.51-1.77)	1.01(0.56-1.83)	1.11(0.61-2.03)
1408-2815	0.92(0.45-1.88)	1.08(0.53-2.21)	1.02(0.51-2.06)	1.14(0.56-2.31)
2815	1.23(0.55-2.76)	1.55(0.68-3.50)	1.00(0.41-2.41)	1.15(0.48-2.80)
Province by confirmed patients (Ref: Low case area)				
Low-medium case area	1.77(1.04-3.00) *	1.74(1.02-2.96) *	1.44(0.88-2.34)	1.40(0.86-2.29)
Medium case area	1.64(0.96-2.79)	1.61(0.94-2.74)	1.10(0.67-1.81)	1.09(0.66-1.80)
High case area	2.15(1.12-4.13) *	2.03(1.05-3.92) *	0.78(0.26-2.29)	0.78(0.26-2.29)
It is difficult for me to find correct and comprehensive information about COVID-19 (Ref: Disagree)				
Neutral		1.49(0.85-2.62)		1.20(0.70-2.06)
Agree		1.91(1.08-3.37) *		1.12(0.64-1.98)
It is difficult for me to understand information I got about COVID-19 (Ref: Disagree)				
Neutral		1.62(1.01-2.61) *		1.40(0.86-2.29)
Agree		1.88(1.08-3.29) *		2.08(1.17-3.69) *

^a411 participants who lived in Wuhan were automatically exempted from stigma questions related to residents of Wuhan.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Figures

Figure 1

Number of confirmed COVID-19 cases by province. The location of Wuhan was marked with a solid circle symbol on the map. 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 2

Proportion of stigma reported toward COVID-19 patients by province (%). The location of Wuhan was marked with a solid circle symbol on the map. 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

Proportion of stigma reported toward Wuhan residents by province (%). The location of Wuhan was marked with a solid circle symbol on the map. 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.

Supplementary Files

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

- [Additionalfile1.docx](#)