

# Authorized, Clear and Timely Communication of Risk to Guide Public Perception and Action: Lessons of COVID-19 From China

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## Research

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# Abstract

**Backgrounds:** This study examined the dynamic association between risk communication and public's risk perception and action across the COVID-19 outbreak timeline in China.

**Methods:** Publicly available information on COVID-19 was collected by Parehub tool for official channels (e.g. government websites and official media), and by Zhongyun Big Data Platform for mainstream Chinese social media (e.g. TikTok, Weibo, etc.). Information was examined by its release channels, content and release time. An online survey was conducted via WeChat across 33 provinces and municipalities of China to assess changes in participants' risk perception and action against COVID-19. Information content and release-time trajectories were examined against the public's risk perception and actions over time.

**Results:** Altogether, 1,477 pieces of authorized information and 297,000 pieces of short videos on COVID-19 were retrieved from official channels and social media. Our online survey of 1,311 responds (25-60 years, 42% male) indicated that participants mainly relied on official channels to obtain information. Alongside the progress of the outbreak, there was a gradual rise in information quantity, publishing frequency, and content variation. Correspondingly, the public's risk perception that "take it seriously" rose from 13% to 80%, 87.1% of who took "multiple actions" compared to 25.9% initially.

**Conclusions:** Our findings indicated that insufficient information freely-accessible at the early stages of the outbreak may nevertheless lead to the lack of risk awareness and inadequate protective actions of the public. Given the current global situation of COVID-19, the study highlights authorized, transparent, and timely two-way risk communication is vital to guide public perception and actions.

## Background

The first case of pneumonia caused by a novel coronavirus was reported to the World Health Organization (WHO) from Wuhan (Hubei province) in China on 31 December 2019 [1]. On 11 March 2020, WHO officially declared the 2019 coronavirus epidemic (COVID-19) as a pandemic [1]. As a response to the pandemic, countries worldwide have been taking measures in preventing and controlling the pandemic in hopes of slowing the spread— governments imposed travel bans on an unprecedented scale to contain the transmission, closing their borders and implementing mandatory screening of citizens returning from heavily affected areas [2, 3]. Despite these measures, the numbers of COVID-19 cases and deaths continue to rise globally [2, 3]. Follow with reported daily new incidence cases from WHO, after 7 March 2020, the new incidence cases from foreign countries grow rapidly, even the increased trend was hard to control that growth repeatedly when has the decreased cases. However, Fig. 1 also expressed, as the first country impacted by COVID-19, China has had steady declines in the number of new cases since March, and confirmed internal cases are controlled, even close to zero [1, 7]. This achievement, as highlighted by the WHO, is not possible without the collective willpower of the public [8]. We examined the dynamic relationship between publicly- available information by its release channels, content and publish

time, and the Chinese public's risk perception and action across the outbreak timeline; aiming to provide the global community with firsthand evidence of effective risk communication to guide public risk perception and self- protection.

## Methods

Information on COVID-19 publicly- available was mainly released online through official channels (e.g. government websites and official media) and social media (e.g. TikTok, Weibo, etc.) in China [9]. In view of recent studies on social media's effects on risk communication [11, 12], we combined social media data from given publications via a scoping review method and these captured by Zhongyun Big Data Platform[10]. Information released by official channels was collected by the Parehub tool. We defined official channels as national and local health commissions websites, People's Daily Online News and CCTV news; and set the examination period from 8 December 2019 (the first reported pneumonia case) and 10 February 2020 (after the Chinese Lunar New Year). Using key terms "new coronavirus", "epidemic", and "pneumonia", we extracted information related to disease (epidemic profile of the outbreak), preventive behaviors (preventative and measurements guidance), and social welfare (logistical and transportation support, etc.). By matching these words from JavaScript and AJAX pages, we collected data in seconds. These data were all free-accessible, and thus did not require ethics approval.

To access the public reaction toward to COVID-19 over the same time period, we conducted an online survey via the Wenjuanxing platform (<https://www.wjx.cn/app/survey.aspx>). Participants were recruited through a snowball sampling method. The survey repeatedly assessed participants' trust in different sources of information, risk perceptions and prevent measures in four specific time periods denoted by significant events of the outbreak or two National Holidays (Fig. 2, line chart). Participants read and signed informed consent before participation.

We calculated the number of publications to estimate the changes in trends. We also evaluated the percentage of the public's perceived risk and measures taken versus their answered choices. Specifically, through comparing the percentage differences of each parameter under different periods, we were able to observe their changes in trends. Finally, we compared the changes in trends to that of published information, level of perceived risk and taken measures to observe the effects among them.

## Results

Altogether, 1477 pieces of authorized information on COVID-19 were retrieved from the national and local health commissions websites (n = 180, 12%), People's Daily Online News (n = 806, 55%) and CCTV news (n = 491, 33%) via the Parsehub tool. Over the same period, 297,000 pieces of short videos were found using the keyword "new coronavirus" and "suspected pneumonia," which were released by mainstream Chinese social media and had been played over 21.8 billion times [9]. These channels were also selected as primary information sources by the 1311 respondents of our online survey, who were between the age

of 25–60 years. 42% of these participants were males, and 68% had a bachelor degree or above (as shown in Table 1).

The survey results show that only 24% of responses chose to “obtain epidemic information” through TikTok, and only 4.8% believed that transmitted high credibility information. On the other hand, 85.76% of people choose to “obtain epidemic information” through “official news,” and 58.8% of participants tend to obtain the disease data through the “National Health Commission, Centers for Disease Control, and the official websites of hospitals.” Among them, 88.9% of the masses believe “official news” as a channel for obtaining highly credible information. Despite the high trust in authorized information released by official channels, the contrasting amount of information released by official channels versus social media heightens the possibility of information overload to the public.

We further analyzed the content and release time of authorized information by official channels against the public’s perceived risk and actions. During the window period, as a kind of special and new disease, the public’s knowledge about COVID-19 is low. There had less information publicly available to announce and promote the disease, so only two disease-related announcements were released by the Wuhan Municipal Health Commission. The rising period was during Chunyun, the World’s largest annual human migration. A gradual rise in COVID-19 disease-related information was most evident during this period, when the suspected and confirmed cases of COVID-19 had already accumulated to 830 and 1072 respectively, scattered over 29 cities across China. Information exploded over the white-hot period: 1338 pieces of data were released over 18 days; with 57 pieces of disease-related, 5 pieces of public prevention-related, and 13 pieces of social welfare-related information were released per day.

The public’s risk perception towards COVID-19 was dominated by “I do not know” (45%) and “be alert, but not enough attention” (73%) during the window period (Fig. 1, bar chart). Even at the rising period, 37% of respondents still responded, “be alert, but not enough attention” and only half of them started to “take it seriously”. Not until the white-hot period did the public start to pay attention to the epidemic. The public’s responses of “take it seriously” and “fear and panic” rose to 80% and 4%, while “be alert, but not enough attention” dropped to 13%, yet still ranked as the top two most prevalent responses. A similar lag in the public’s protective actions was also apparent (Fig. 2, bubble chart). Associated with the public’s low-risk perceptions, over two-thirds of the respondents chose to “take no actions” during the window period, which was about 2-2.5 times higher than those starting to take “multiple actions” (25%) (i.e. personal protection, self-isolation and family education). This ratio reversed in the rising period, where 65% of respondents took “multiple actions.” and “take no actions” responses dropped to 24%. By the white-hot period, respondents predominately took “multiple actions”, increased by 61% as compared to the initial period.

## Discussion

China, as the first country impacted by COVID-19, the success of containing this pandemic relies on the public’s high trust in, support of and cooperation with the government [13]. Further, the success on

controlling new incidence cases includes the collective willpower from the public built under the success risk communications. In reviewing the COVID-19 outbreak from the public's perspective, it is seen that insufficient information publicly available at the early stages of the outbreak made it more difficult to confine the virus with the least amount of costs. However, when faced with the new disease, China provided specific disease data to the WHO and the whole world for seeking more information and findings about COVID-19. As the WHO mentioned, although the initial stage is the window period in China, the publication of data and information is a contribution to the world, showing that the goal is to earn more time and more experiences on preventing the disease. Thus, our study highlights that timely release of information related to the epidemic, specific prevention instructions, and updates are imperative to prevent escalation of the epidemic.

Overall, our findings suggest the government should report the epidemic information logically and coherently, allowing the public, especially the elderly and other vulnerable populations, the time to be aware and to take appropriate protective actions as recommended. It is also noted that social media ever-increasingly becomes an important channel to disseminate and reinforce information to the public, which should also be properly utilized to provide accurate, non-contradictory, and easy-to-understand messages. Multiple information channels combined with modern technology may facilitate the delivery of a visualized and timely message [14].

This work has been developed in an iterative process and references the body of work that addresses the effects of public risk communications to the individual's perceived risk and preventive actions. It is acknowledged that our survey sample recruited online may mainly present participants prone to internet information, as most Internet-based questionnaire studies [15, 16]. While internet is ever-becoming the primary channel for rapid and timely dissemination and access to information [17, 18], our study provides vital evidence to understand people's trust of online information, thus to better guide their prevent behaviors via mass media. For the future study, the authors recommend more rounds of cognitive interviews or focus groups to ensure the survey items are accessible and understandable to a wide variety of individuals. Additionally, follow up interviews would flush out additional issues in the wording and structure of the survey. For the next step, it is necessary to confirm these relationships in the conceptual model through testing of the survey.

## Conclusions

Our study identified when facing the pandemic, countries worldwide need to formulate prevention and control strategies tailored to their own situation, culture and traditions. WHO has detailed Risk Communication and Community Engagement strategies according to countries' outbreak stages [19, 20, 21]: countries with no cases identified should communicate about preparedness measures and public health advice to manage uncertainty and misinformation; those with sporadic cases should establish and maintain trust with the public via ongoing two-way communication and provide guidance to encourage the adaptation of protective behaviors; while countries with clusters or community transmission should empower resilience in the public by ongoing risk communications and nimble support addressing

people's concerns and needs. The cornerstone of these responses is the same for all countries, which is to engage the public's responsive actions. Every disease outbreak is an opportunity for us to learn about giving timely warning, optimizing public health advice, and providing frank communications. Weathering the global pandemic of COVID-19, our study urges countries worldwide to communicate level of risk and prevention strategies to the public authoritatively, clearly and timely. As firmly announced from the National Health Commission of the People's Republic of China and the WHO: being first, being right, and being credible [14, 22].

## List Of Abbreviations

**WHO:** World Health Organization

**COVID-19:** the 2019 coronavirus epidemic

**CCTV:** China Central Television

## Declarations

### Ethics approval and consent to participate

All data used were collected by the online survey via using Wenjuanxing Platform. All of participants were be announced the informed context before starting the survey. Data were linked and analyzed only by authors who contribute writing the article.

**Ethics committee** Institutional Review Board(IRB) of the Anthropology Department at Sun Yat-sen University No: SYSUAD202003221.

**Consent for publication:** Not applicable.

### Availability of data and materials

The data of survey results were conducted via the Wenjuanxing platform (<https://www.wjx.cn/app/survey.aspx>). More detailed data on participants' reactions in different periods cannot be provided because of confidentiality policies of Wenjuanxing, and Anthropology Department at Sun Yat-sen University.

### Author contributions

JL, NG, MFZ, and DX contributed the idea for the review. JL and NG designed the study, conducted the review, and wrote the manuscript. XYJ and YDL collected primary data, analysis results and designed exhibits. MFZ, CY and DX contributed to the critical review of the manuscript. All authors reviewed and approved the final version.

### Competing interests

All authors declare no competing interests. The authors have completed the ICMJE United Competing Interest Form and declare no further competing interests.

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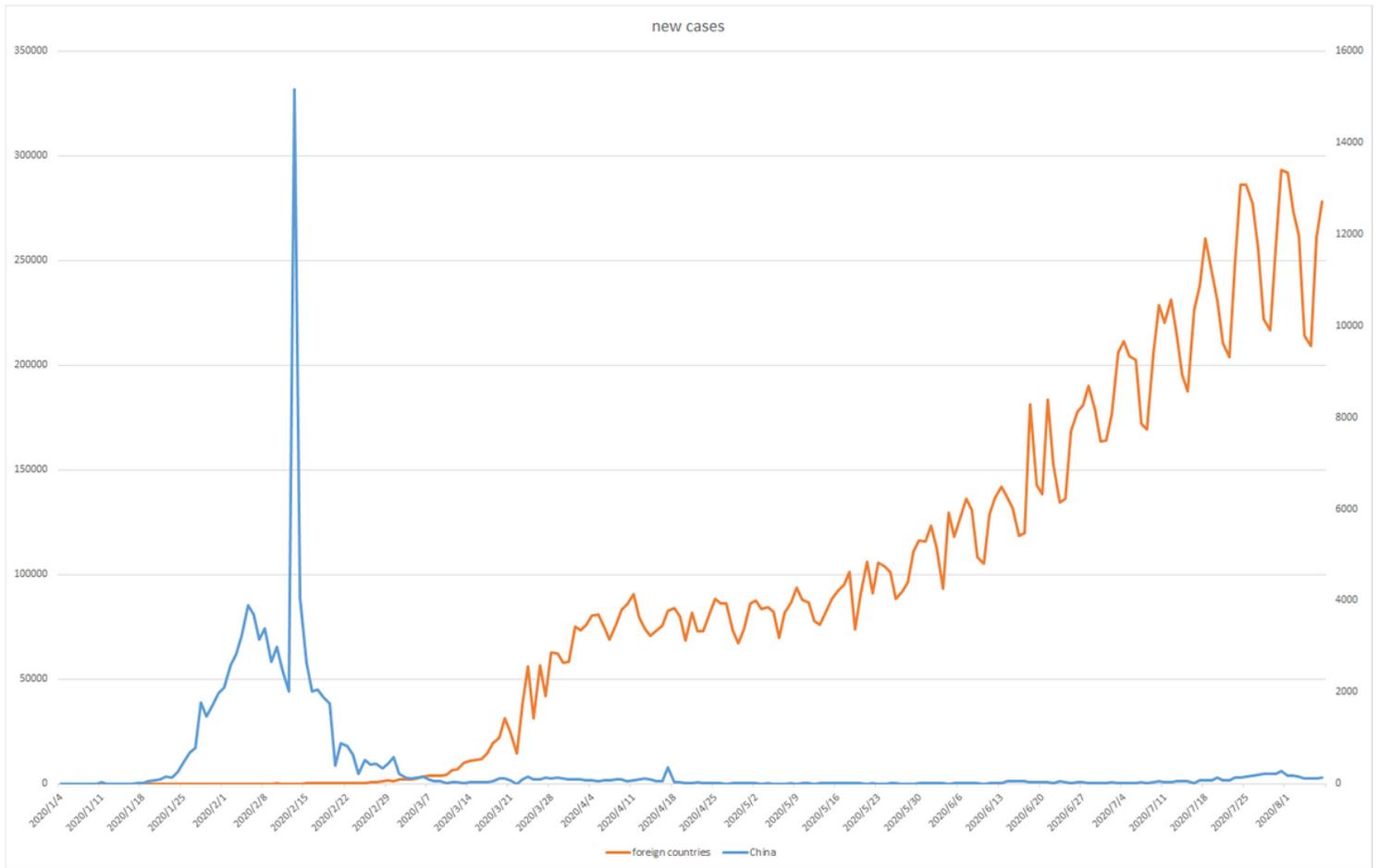
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## Tables

Due to technical limitations, table 1 is only available as a download in the Supplemental Files section.

## Figures



**Figure 1**

Using data released by the World Health Organization, the blue line represents new reported cases in China and the orange line represents new reported cases in other countries. The left axis measures the orange line, and the right axis measures the blue line. The whole chart is used to show the change in the number of new cases reported in China and other countries over time.

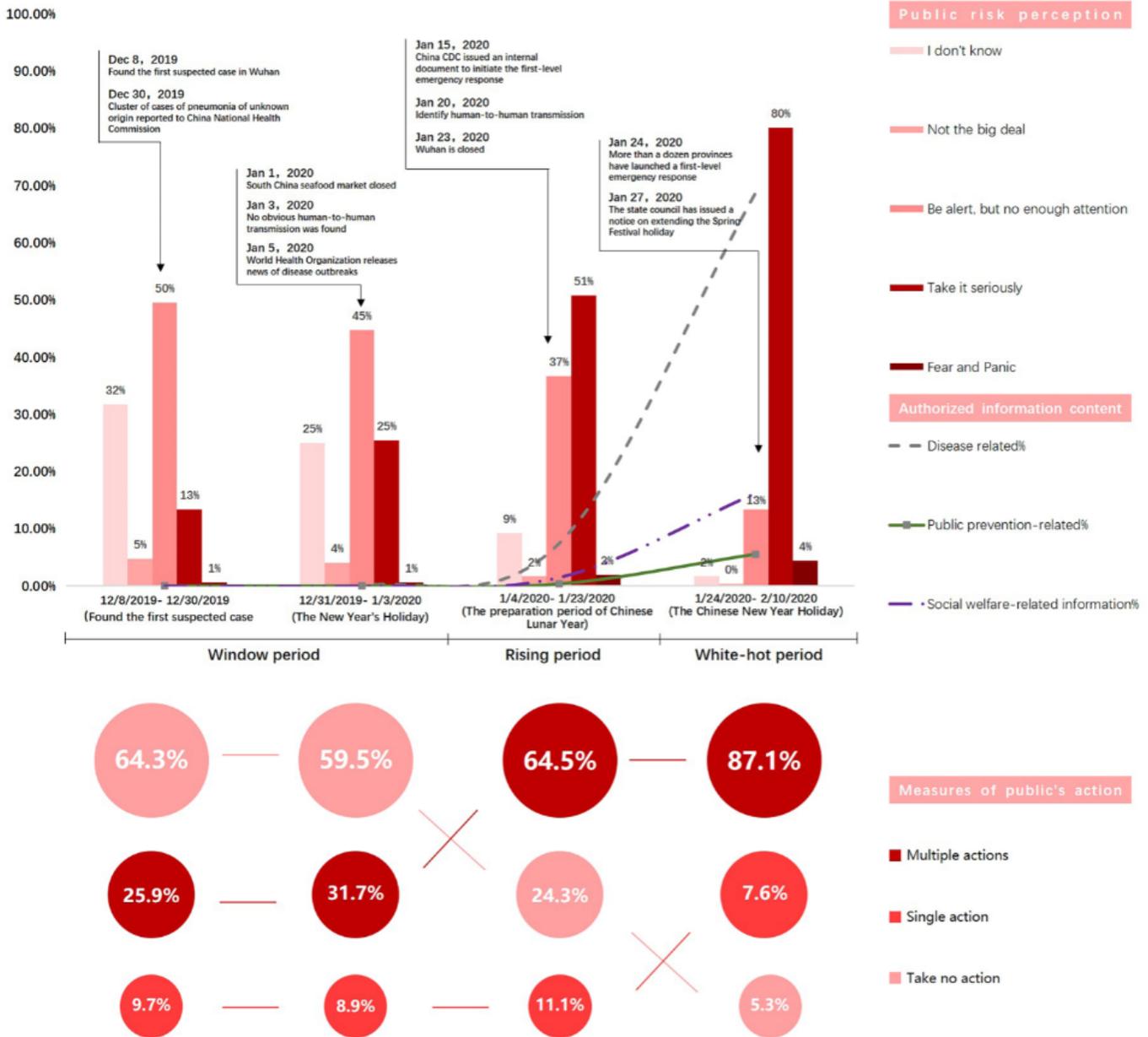


Figure 2

The broken line diagram in the upper part of this figure represents the change of the amount of different types of official information over time, while the bar diagram represents the change of the public's risk perception behavior over time and the amount of official information. The lower half represents the change in the number of measures taken by the public as the amount of official information changes over time. All graphs share a common abscissa.

## Supplementary Files

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

- [Table1.jpeg](#)