

## Letter to the Editor

## Social media WeChat infers the development trend of COVID-19



Dear editor,

Corona Virus Disease 2019 (COVID-19) caused by Severe Acute Respiratory Syndrome Corona Virus 2 (SARS-CoV-2) broke out in Wuhan city, Hubei province, China in December 2019.<sup>1,2</sup> As of March 24, 2020, there were a total of 81,773 confirmed cases in China. In most parts of China, the pandemic has been under control, while the number of cases outside China is on the rise.<sup>3,4</sup>

The official infectious diseases surveillance system in China is run by the Chinese Center for Disease Control and Prevention. However, its lag makes it difficult to timely catch the outbreak of epidemics. With the popularity of the Internet and smartphones, the focus of social media is often a sign of these major epidemic diseases.<sup>5</sup> Information and discussions on COVID-19 spread rapidly on social media, so the use of big data allows more people to pay attention to these situations earlier. WeChat is the largest social media in China, and the number of monthly active accounts has reached to 1.165 billion. The WeChat Index is an official WeChat mobile index based on the analysis of WeChat big data. It reflects the popularity of words in the past 7 days, 30 days, and even 90 days. It is often used to capture current hot events and monitor the trends of public opinion. Here, through the keyword query in the WeChat index, we analyzed the public attention and demand for the COVID-19 pandemic.

We have classified keywords from late December of 2019 to the present according to their relevance. These word groups have generated a high degree of popularity in social media at some stages. Since these hot spots are in a good correlation with the occurrence and progress of some major events in China, we capture these hot events and follow their tracks.

First of all, the hottest words in the pandemic are "Wuhan", "novel coronavirus" and "pneumonia" (Fig. 1A). Their rising and downward trends were similar. The heat of these words began to increase sharply on January 19, 2020. Among them, the heat of the word "pneumonia" reached 268,350,505 seven days later, about 35 times that of seven days ago, while the heat of the word "Wuhan" reached its peak on January 25. About 16 times what it was six days ago. The heat of "novel coronavirus" remained above 150M from January 25th to February 16th. Thus, during the period from the end of January to the beginning of February, the public attention focused on those words.

Secondly, we looked at some key figures appeared during the epidemic and regarded as national heroes (Fig. 1B). From the comparison chart of WeChat index, the heat of these heroes increased on January 20, 2020. Zhong Nanshan for the first time declared a human-to-human transmission phenomenon in COVID-19. At the same time, a large number of medical experts rushed to the front

line of Wuhan. The "whistler" Dr. Li Wenliang died on February 7, and his index reached an astonishing 179,575,130 on that day (Fig. 1B).

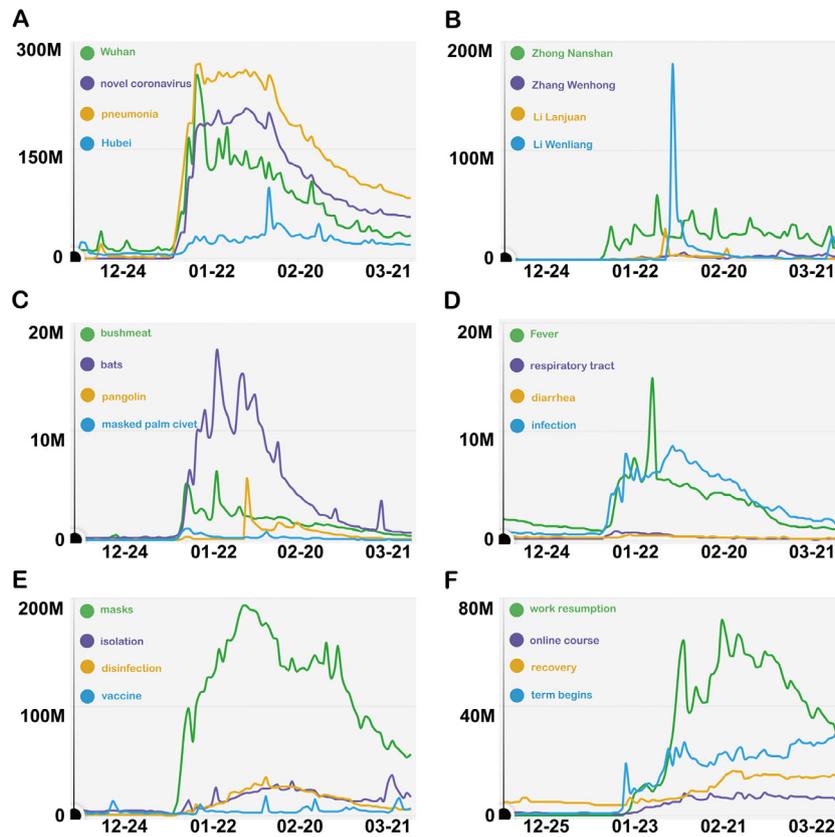
We also looked at the potential sources and hosts of this outbreak: "bushmeat", "bat", "pangolin" and "masked palm civet" (Fig. 1C). Those words began to increase on January 20, and the heat lasted until mid-February. During this period, scientists worked hard to find clues about the source of SARS-CoV-2. In the end, bats had the highest heat because they were identified as the original source of the SARS-CoV-2.<sup>6</sup>

COVID-19's symptoms are public concern, and we found that "fever" is the most concerned one (Fig. 1D). Studies have shown that COVID-19 caused a variety of symptoms, and fever is not a necessary factor for diagnosis. However, because of the understanding of conventional pneumonia symptoms and fever symptoms are more obvious, the public are still concerned about fever.

In addition, we paid attention to some daily words related to people's livelihood (Fig. 1E). The popularity of the word "mask" began to increase on January 19, peaked on February 6 and 7, and has remained at a high level ever since. We suspect that the highest popularity of masks is due to the fact that most people cannot buy masks, so the online booking system for the purchase of masks has been opened in many places throughout the country. Relief supplies from various countries and medical materials purchased domestically are in place in large quantities, providing strong support to front-line medical staff. The words "isolation" and "disinfection" are almost inseparable, so their trends are very consistent. "Vaccine" reached a small peak on January 26th, February 12th, February 25th and March 18th, respectively, because both researchers have announced the start of vaccine development or clinical trials of vaccines.

We also found that the entries for "starting school" and "resuming work" have been very hot since the beginning of February (Fig. 1F). This is probably due to the impact of the epidemic. Many enterprises have delayed returning to work, and students who were supposed to go to school have also begun to take classes online. In February, when the epidemic is more serious, the policy of reducing crowds and allowing people to be isolated at home has aroused extensive discussion.

By analyzing the hot words in WeChat, we found that there is a certain pattern in the development of COVID-19. At first, people will focus on which kind of pathogen the disease comes from, where the outbreak is located, what symptoms will appear. Then the public will begin to focus on the source of pathogens, the actions and self-protection of medical workers, as well as the needs of daily life. On the other hand, people will pay more attention to the epidemic situation in other places and the local control results. Through analysis of public concerns, we review the development trend of COVID-19, which will set up an example for future out-



**Fig. 1.** WeChat Index of six groups of popular words (from Dec 24, 2019 to March 22, 2020).

A. WeChat Index of COVID-19 outbreak place and the name of the disease/virus. B. WeChat Index of famous doctors and whistler. C. WeChat Index of potential hosts. D. WeChat Index of potential symptoms. E. WeChat Index of disease control terms. F. WeChat Index of back to school and back to work.

breaks of epidemic diseases. It is believed that public health authorities will rely more on these social medias in the future for monitoring the development of the epidemic or pandemic.

### Declaration of Completing Interest

The authors declare that there are no conflicts of interest.

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