

Supplementary Materials

Study Design

We conducted a retrospective survey at the end of the COVID-19 outbreak in Beijing (in early August 2020), which was designed to effectively capture participants' accurate recall on their response to the compounded risks. In this retrospective survey, we repeated the investigation on individual risk perception and COVID-19 prevention behaviors in heatwave and non-heatwave periods to compare the variances of participant responses in the two periods. Based on the consideration of safety and effectiveness in this specific period, we applied an online survey supported by the ZHONGYAN Technology Company, which is the leading professional online survey high-tech enterprise in China covering over 400 million population samples distributed from the county-to-city-level regions across China.

Data Collection

Study population

A representative population aged over 18 years old was randomly selected from the online survey sample pool in Beijing. The questionnaire link was posted on the online survey platform, and each question was set as mandatory to avoid missing information. The participants answered the questionnaire using mobile phones or computers. Written informed consent of each respondent was received online before answering the questions. We obtained 1,000 valid responses in total.

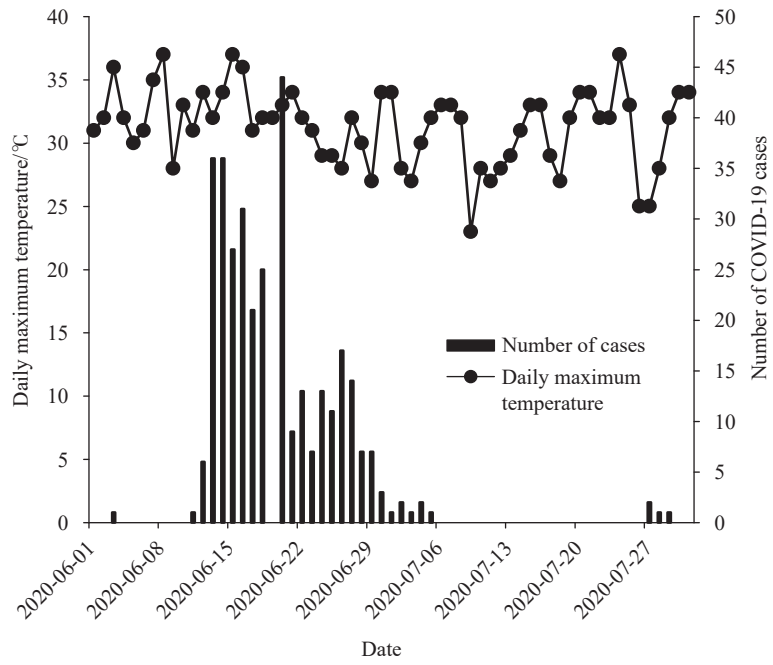
A three-step data quality control procedure was conducted to validate survey data. In the pre-control step ahead of the survey, the platform checked whether the participants were active users, and the questionnaire link could only be accessed once by the same ID to avoid duplicate answers from the same person; in the process-control step during the survey, the platform notified participants who gave an answer too quickly or continued duplicate selections in related questions; in the post-control step after the survey, a combination of artificial checks and computer checks was adopted to clean the data, and the platform would prepare an additional 5% of participants in addition to our required sample size as backup data to replace deleted study samples that did not meet requirements.

The questionnaire

The online questionnaire consisted of 3 parts: 1) demographic characteristics including gender, age, education level, income level, and occupation (Table 1); 2) individual risk perception on COVID-19 and heatwaves; and 3) individual COVID-19 prevention behaviors. The second and third parts were repeated in the investigations for heatwave and non-heatwave periods. Questions of risk perception and prevention behaviors were listed in Supplementary Table S1.

SUPPLEMENTARY TABLE S1. Questions of risk perception and prevention behaviors applied in the survey.

| Variables | Questions |
|---|---|
| Risk perceptions | |
| Perceived concern | In your opinion, are you concerned about the risk in this period? From 1 = Not concerned at all to 5 = Very concerned |
| Perceived knowledge | In your opinion, how aware are you of the risk in this period? From 1 = Unknown to 5 = High level of knowledge |
| Perceived severity | In your opinion, is the risk serious to you in this period? From 1 = Not serious at all to 5 = Very serious |
| Perceived controllability | In your opinion, can you avoid the risk in this period? From 1 = Not controllable at all to 5 = Very controllable |
| Prevention behaviors | |
| Mask wearing | Do you keep wearing masks in this period? 1=Continuously wearing, 2=Sometimes wearing, 3=Never wearing. |
| Taking well-ventilated public transportations | Do you keep taking well-ventilated public transportations in this period? 1=Continuously ventilating, 2=Sometimes ventilating, 3=Never ventilating, 4=Ignore this issue |



SUPPLEMENTARY FIGURE S1. Daily maximum temperature and number of cases in Beijing during June to July, 2020.