



Regular Article

Perceptions of the COVID-19 pandemic in Japan with respect to cultural, information, disaster and social issues



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ABSTRACT

A questionnaire survey was distributed via the Internet to 600 respondents. Preliminary results revealed that most Japanese people regularly washed their hands and had low resistance to wearing masks even before the COVID-19 pandemic. Internet news was the most common source of information. Half of the respondents said they would “stay at home evacuation” if a disaster occurred during the COVID-19 pandemic, reflecting the strategy promoted to reduce crowding in evacuation shelters. If a state of emergency must be reinstated, one-third of respondents said they could bear it for a few months and another one-third for a few weeks.

1. Introduction

1.1. A brief timeline of the COVID-19 outbreak in Japan

Although news related to COVID-19 in China started to be broadcast in Japan in January, another critical news item was the cruise ship “Diamond Princess,” which reported positive cases of COVID-19 in February 2020 [1]. A total of 712 people (as of 17 March 2020) out of 3711 became infected [2]. The number of new positive cases subsequently started increasing due to tourists from China visiting Japan during the Chinese New Year holiday in February 2020 and Japanese people returning to Japan from countries with severe outbreaks in March 2020. The situation in Japan became so severe that the government decided to announce a state of emergency on 7 April 2020 in seven prefectures (Tokyo, Chiba, Saitama, Kanagawa, Osaka, Hyogo, and Fukuoka); this was expanded to the whole country on 16 April 2020 [3]. The first peak in newly confirmed cases was 708 on 10 April 2020 [3]. The state of emergency was canceled in 39 prefectures on 14 May 2020 and for the whole country on 25 May 2020 when the daily number of new confirmed cases dropped below 50–100 for several days

[3]. Many businesses gradually reopened, and the number of daily new confirmed cases increased until the second peak of 1595 on 7 August [3]. The third peak started at the beginning of November and reached 2508 cases per day on 21 November 2020 [3]. A summary of the number of daily new positive cases and the total number of severe cases in Japan is shown in Fig. 1, together with significant incidents. The second state of emergency was announced on 7 January 2021 in ten prefectures (Tokyo, Chiba, Saitama, Kanagawa, Gifu, Aichi, Osaka, Kyoto, Hyogo, and Fukuoka) when the daily number of new confirmed cases reached over 7000 cases per day.

1.2. Experiencing and living with disasters during the COVID-19 outbreak in Japan

Since March 2020, the global public opinion and press focused their attention on COVID-19, but this has not been the only crisis ongoing in the world. Countries such as Japan experienced the concurrence between the pandemic and other hazards, including the 2020 Kyushu floods that occurred on 4 July, causing more than 50 deaths [7]. The multiple events

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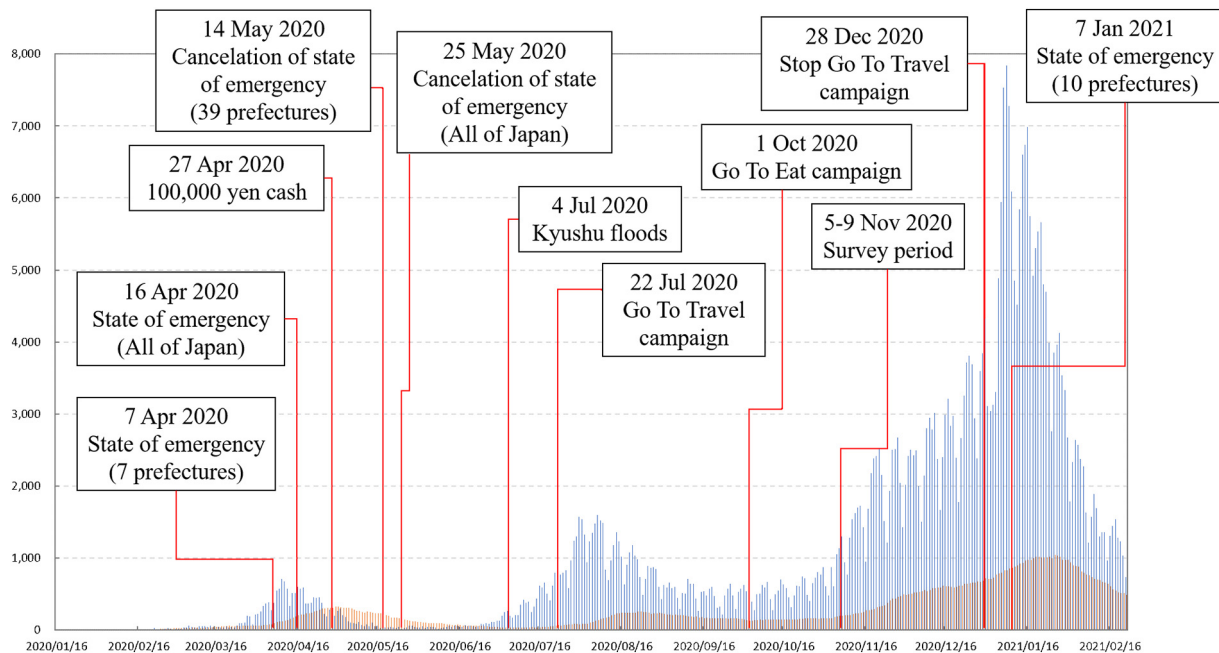


Fig. 1. Number of daily new positive cases (blue) and the total number of severe cases (red) in Japan [3] and significant incidents. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

happening at the same time created new challenges for emergency management, that were considered for developing the data collection of this research. The research followed the principle included in the last United Nations' Global Assessment Report on Disaster Risk Reduction, according to which "surprise is the new normal," and nonlinear events derive from series of shocks more than primary triggers alone [8]. Societal resilience to interacting, interconnected, and cascading risk begins with the identification of their common root causes and the cross-cutting aspects between their mitigation measures [9]. For example, in the early stage of the COVID-19 outbreak in Japan, academics and practitioners discussed how to improve the management of disaster warnings and disaster evacuation shelters considering emergency scenario where other hazards could have challenged the country during the pandemic [4–6]. This topic becomes an operational priority after the floods in July 2020. One of the main ideas was to reduce crowding in evacuation shelters and to encourage residents not to evacuate (stay at home evacuation) if they were actually safe (i.e., based on hazard maps) or to choose alternative evacuation destinations (i.e., friends' or relatives' houses, hotels, and department stores) [10]. Several guidelines for managing evacuation shelters have been published by both the central government [11] and local governments [12,13], and scientific articles and reports have also been produced [14,15]. The United Nations Office for Disaster Risk Reduction (UNDRR) and United Nations Development Programme (UNDP) developed guidelines for tsunami evacuation during the COVID-19 pandemic that reflected recent disasters, disaster drills, and evacuation guidelines in Japan [16]. However, it is essential to investigate and understand better how compound and interacting events could orient evacuation in the context of the future developments of COVID-19 pandemic waves.

1.3. Social and economic impacts of COVID-19 on Japan

Similar to other countries in the world, Japan is facing social impacts from the COVID-19 outbreak. The Japanese government decided to use the epidemic cluster-based approach because of the limited availability of testing, the impractical information of the technology-based tracing approach, and the economic system. Communities and individuals followed the government's request to adopt telework, flexible work schedules, and school closure and to reduce eating out. It should be noted that these restrictions during the stay home period under the state of emergency were not

accompanied by penalties, as in other countries. This helped prevent the serious spread of COVID-19 in Japan [17] but caused severe economic impacts and induced some social problems. The government implemented economic support campaigns, such as a 100,000 yen stimulus per person and cash support for restaurants and students to help them continue their studies, in late April 2020. One source [18] reported that the 100,000 yen cash support increased consumption expenditure to almost normal levels, but it had fallen again to – 10% by September 2020. Other economic impacts, such as reduced total sales from eating out and fewer numbers of tourists, have also been reported [18]. A series of "Go-To" campaigns were launched, such as "Go-To Travel," which started in July 2020 and provided discounts and subsidies of up to 50% on travel within Japan for Japanese citizens and foreign residents, and "Go To Eat," which began in October 2020 and provided a discount at restaurants. It was hoped that this campaign would support hotels, restaurants, and transportation businesses. Nevertheless, at least 713 companies declared bankruptcy (restaurants (108 cases), hotels (66 cases), apparel and miscellaneous goods stores (47 cases), and construction firms (46 cases)) [19]. In addition, transportation-related businesses were also seriously damaged. Regarding the household impact, one source [20] found that stress under the state of emergency increased anger, to a greater degree, for husbands than for wives. An increase in anger from staying indoors is thought to cause domestic violence. The stay-at-home measures prevented the spread of the infection but essentially kept victims (wives and children) trapped in situations of domestic violence. Such domestic violence may lead to divorce, and the 100,000 yen cash handout was meaningless for most victims of domestic violence, as the cash was sent to the head of the household [21]. A study [22] confirmed that this virus has led to the progression of dementia among elderly residents in care facilities, as they have been restricted from seeing their families prevent infection. Fortunately, in Japan, the rate of outbreaks in elderly care facilities has been minimal compared to that in Europe. However, the Ministry of Health announced that programs such as daycare services and elderly care must be discontinued to protect immunocompromised elderly people from infection [23].

1.4. Research objectives

Based on the abovementioned background, this research has the main objective of investigating the overall impact of COVID-19 on Japanese

society at the start of the 3rd wave of the outbreak from the following perspectives.

- 1) The COVID-19 pandemic in Japan and cultural perspectives on the outbreaks
- 2) COVID-19 information sources and types
- 3) Disaster evacuation under the COVID-19 pandemic
- 4) The impact of COVID-19 on daily life and other social considerations
- 5) Future perspectives on recovery and living with COVID-19

Preliminary results from this research will highlight recent research topics for further investigation, and more detailed consideration based on the social backgrounds of the respondents as well as disaggregated data will be performed in the future.

2. Data and method

Three study areas were selected in this research based on exposure to natural hazards. First, Miyagi and Iwate Prefectures are the two areas that were hit the hardest by the 2011 Great East Japan Earthquake and Tsunami. Fukushima Prefecture was not selected, as answers might also be influenced by the Fukushima Daiichi nuclear accident. Second, the capital area (i.e., Tokyo metropolitan area, Saitama Prefecture, Kanagawa Prefecture, and Chiba Prefecture) was selected as having less experience of recent disasters in Japan. Third, the Kyushu region was selected based on recent experience with the 2016 Kumamoto earthquake and the 2020 Kyushu floods during the COVID-19 pandemic. To quantitatively assess the current situation in Japan, a questionnaire survey was performed for speedy data collection and to control the attributes and quality of the answers. The survey was conducted by Rakuten Insight during 5–9 November 2020 among a total of 600 respondents, 200 for each study area. The ratio of male and female is 50%. The average age is 45.8 years old; is respectively 9.3% in their 20s, 22.3% in their 30s, 29.2% in their 40s, 25.7% in their 50s, and 13.5% in their 60s. Among them, we found that 48.7% graduated from university, 39.8% graduated from high school, 61.3% were employed, and the remaining 14.5% were housewives. Respondents received Rakuten points. All questions were presented in the Japanese language. The questionnaire has a total of 50 questions, including 15 questions on personal demographic information (i.e., age, gender, education level, and residence area). Some parts of the questionnaires (i.e., information, risk perception, and social impact) were based on a previously conducted questionnaire survey performed by the European Commission's Joint Research Centre (EU-JRC) and University College London (UCL) to facilitate international comparisons in the future. In the following section, the preliminary results (without consideration of detailed personal information) from three study areas will be shown and discussed based only on simple tabulation. Further detailed investigations will be performed using the same data in the future.

3. Results and discussion

3.1. The COVID-19 pandemic in Japan and cultural perspectives on the outbreaks

The questionnaire results show that the state of emergency (23%) and the cluster on the Diamond Princess were the two main things that raised emergency awareness. The increase in positive cases in Japan (15.8%) and in the respondents' prefecture (14.2%) had a more significant impact on emergency awareness than the outbreak in China (5.3%) or the outbreak on a global scale (4.7%). Regarding the reason for the prolonged spread of the virus in Japan, the results show that international travel (tourism and business) was thought to be the primary cause (60%), and less awareness (37.3%), the infectivity/death rates of the virus (37.2%) and improper measures for restricting going out (31.0%) were other presumed causes.

The situation in Japan has been much better than in Europe and the U.S. with regards to the number of new confirmed cases and the number of deaths. However, the comparison might be inaccurate due to the country's cluster-based approach and the reasons stated in section 1.3. The results

show that the habit of washing hands frequently (70.2%) and a greeting culture that does not involve kisses or hugs (68.5%) were the two most common reasons for this, but another cultural practice, the removal of shoes when entering the house (34.3%), was rated as highly, as shown in Fig. 2. Other health-related reasons (the nutritional balance of Japanese foods and the obesity rate) were also not important contributors from the Japanese respondents' point of view. Only less than 9% of respondents reported shaking hands or hugging when greeting others, which supported the previous answers. Japan has a very low mortality rate attributable to safe water, sanitation, and hygiene, which may be similar to other countries [24]. It was found that only 69% had a hand-washing habit before the COVID-19 outbreak, and 4.7% answered that they still had no such habit even at the time of answering the questionnaire. These results are comparable with the findings of a study in European countries where hand-wash habits range around 60–80% [25].

Japan is one of the few countries in the world in which wearing surgical masks (to protect the wearer from pollen, the common cold, or influenza or for women not wearing makeup) was common practice before the COVID-19 outbreak. Thirty-nine per cent of the respondents said that they did not mind wearing surgical masks for the whole day, 46.8% said that they had no problem wearing surgical masks for a certain period, and 14.2% said they were still uncomfortable wearing masks. The same study in India [26] reported that 89% of respondents wore masks outside. It can be interpreted that wearing surgical masks is now becoming common even in countries that, unlike Japan, had no prior mask-wearing culture. Such cultural issues can be further investigated by comparing the responses to the same questions of people in other countries to see if they genuinely influence the COVID-19 outbreak level.

3.2. COVID-19 information sources and types

Yahoo! News was the most popular source of information (64%), followed by NHK (42.2%) and other TV news outlets (45.5%). A freeware application for instant communication on electronic devices called "LINE" was the most popular application used in Japan, outpacing similar applications, such as "WhatsApp," that are popular in other countries. LINE news was also a popular information source (25.0%), and official surveys related to COVID-19 were also conducted via LINE. Unsurprisingly, the Internet (89%) was the most common method of obtaining information, followed by TV (66.8%) and newspapers (27.7%), as shown in Fig. 3. Although social media is a valuable source of information for investigating trends in COVID-19 perception [27] and has been identified in many studies as a potential disaster communication tool [28], social media was not the primary source of information in this sample.

Regarding the quality and balance of the news and information related to COVID-19, respondents felt that there was irrelevant news for advisories and physical happiness and security for children and other vulnerable persons but sufficient information on countermeasures for stopping the spread of the virus (physical distancing, wearing a surgical mask and hand-washing). Other news and information (i.e., number of new positive cases, social event restrictions, the status of daily services, and economic support) were evaluated as somewhat sufficient. The most critical information was news related to the business hours of supermarkets and pharmacies (49.2%), followed by interruptions to public transportation (34.0%) and information on protection goods (i.e., surgical masks and gloves) (31.3%).

3.3. Disaster evacuation in the context of the COVID-19 pandemic

Approximately 45% of the respondents had experienced a disaster (earthquakes (91.1%), typhoons (38.4%), tsunamis (19.2%), and floods (13.7%)) before the COVID-19 outbreak. Of these, 49.8% decided to evacuate, and evacuation on foot was the most common (65.2%), followed by evacuation via a personal vehicle (27.4%). Their evacuation goals were schools (34.1%), other (31.1%), community centers (11.9%), and private facilities (11.1%). Regardless of past disaster experience, 63.8% reported

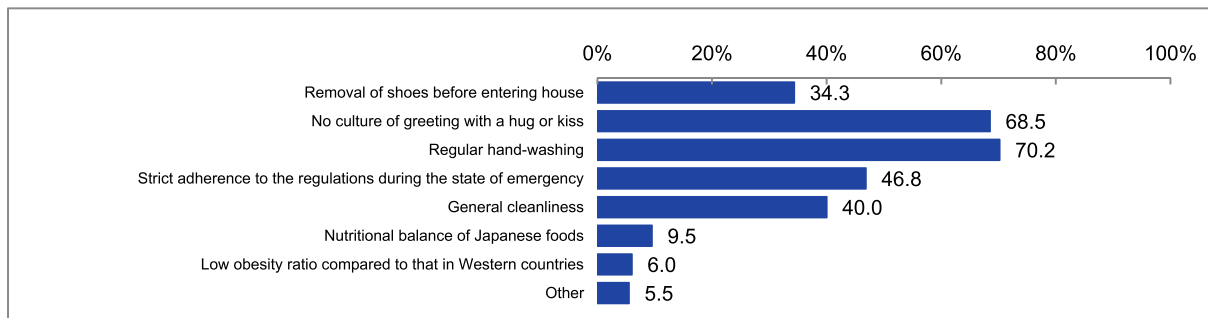


Fig. 2. Reasons why the spread of COVID-19 in Japan is not as severe as in Europe or the U.S.

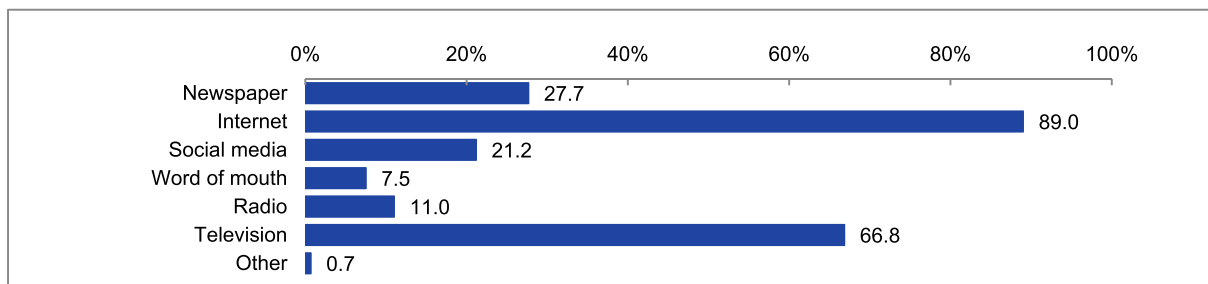


Fig. 3. Sources of COVID-19-related information.

that they would evacuate on foot and 30.3% by private car if a disaster occurred during the COVID-19 pandemic. These numbers are not significantly different from those reported for disasters that occurred before the COVID-19 outbreak. In addition, schools (29.7%), community centers (12.8%), and private facilities (9.0%) were still preferred evacuation destinations, but 51.7% of respondents said they would “stay at home evacuation,” as shown in Fig. 4. These results indicate that we must ensure that residents know whether they are truly safe from each type of disaster and understand that evacuation to save one’s life has a higher priority than staying at home if one is at risk during a disaster. The preparation of infection prevention equipment (63.3%) was the most significant concern when deciding on the evacuation method and goal, followed by the shelter space (58.2%), the availability of private space at the shelter (49.5%), and the safety of the shelter (46.3%). In other words, it is essential to test the information needed for scenarios of concurrent hazards to address the typical organizational and behavioral vulnerabilities acting as escalating factors during a complex crisis.

Only 37.8% of respondents thought that past disaster experiences helped them better prepare for a disaster during COVID-19. Based on Table 1, the same trend can be seen in the capital area, Kyushu region, and Iwate Prefecture. Only respondents from Miyagi Prefecture believed that their past disaster experience was helpful (52% for men

Table 1

Answers to the question regarding whether past disasters are useful for disaster response during the COVID-19 pandemic.

Gender/Residence area	No. of samples	Yes (%)	No (%)	Others (%)
Men/Capital area	100	34.0	66.0	0.0
Men/Miyagi Prefecture	50	52.0	48.0	0.0
Men/Iwate Prefecture	50	26.0	72.0	2.0
Men/Kyushu Region	100	41.0	58.0	1.0
Women/Capital area	100	26.0	74.0	0.0
Women/Miyagi Prefecture	50	60.0	40.0	0.0
Women/Iwate Prefecture	50	30.0	68.0	2.0
Women/Kyushu Region	100	42.0	58.0	0.0

and 60% for women). Although Miyagi and Iwate Prefectures were hardly hit by the 2011 Great East Japan Earthquake and Tsunami, perceptions from these two prefectures differed. In addition, the first confirmed positive case in Iwate Prefecture occurred as late as 29 July 2020. Therefore, the impact of disaster experience should be investigated in more detail in future studies. Similarly, there was no significant difference in preparation for floods/electric blackouts or preparation for other emergencies based on the experience of a state of emergency. Therefore, there must be other influencing factors, in addition to the

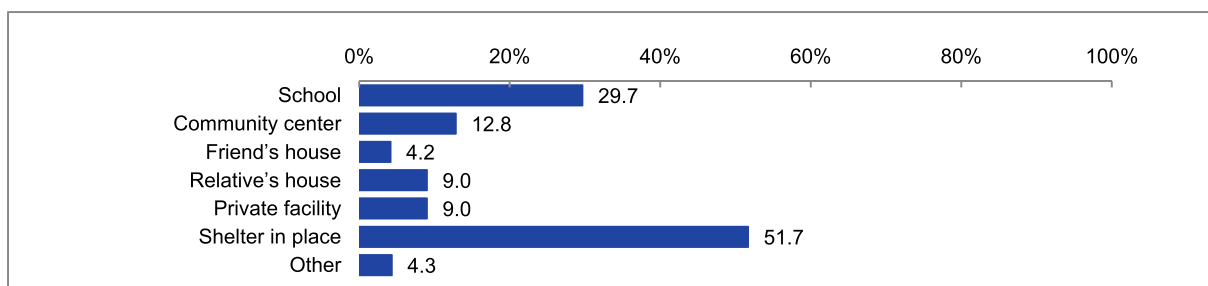


Fig. 4. Evacuation goals during COVID-19 pandemic.

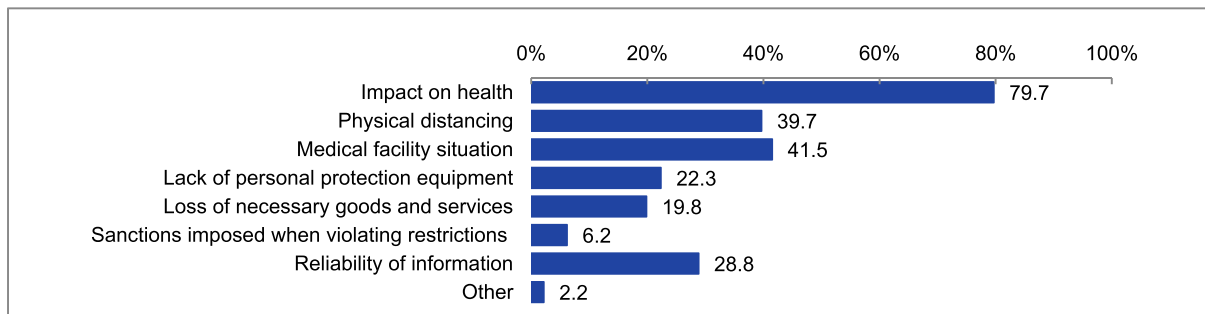


Fig. 5. The issues of most significant concern during the peak of COVID-19.

fact that the characteristics of natural hazards and infectious diseases are different.

3.4. The impact of COVID-19 on daily life and other social and economic considerations

Levels of satisfaction with work, mental health, and the economy decreased, but satisfaction with family increased (12% good and very good), likely because people tended to stay at home more. One percent of the respondents experienced domestic violence during the state of emergency, and most of them (85.7%) could not seek help. During the state of emergency, as expected, the usage of food and utilities (water, electricity, and gas) and communication technology (phone and the Internet) increased, and the usage of public transportation (45.5%), private transportation (41.5%), medical services (35.5%) and financial services (20.7%) decreased. Respondents were mainly concerned about the impact on their health (79.7%), the situation of medical facilities (41.5%), and the difficulty of maintaining physical distance, as shown in Fig. 5.

3.5. Future perspectives on recovery and living with COVID-19

At present, the most significant concern is the next wave of infection (52.5%), which has since occurred, as the 3rd wave emerged in the middle of November. If the state of emergency has to be reinstated, 34% of the respondents said they could accept it for a few months, whereas 36.2% could accept it for only a few weeks. Most preferred resuming activities step by step with COVID-19 countermeasures (44.2%) rather than waiting until the end of the outbreak (26.0%) and resuming activities as early as possible, even under the risk of disease spread (16.2%). Most respondents thought that recovery priority should be given to education and working conditions (43.8%), access to economic support systems (35.5%), and access to social/cultural/entertainment facilities (34.5%). Especially for social and economic support systems, the respondents believed that support for basic needs (i.e., goods and other

utilities) should be prioritized (74.8%), followed by support for low-income persons (52.7%) and support for persons who own their own business (39.5%), as shown in Fig. 6.

4. Conclusions and recommendations

A questionnaire survey of 600 persons in Japan was performed via the Internet to quantitatively assess the situation just before the 3rd wave of the COVID-19 outbreak in Japan. Several main conclusions and recommendations for future research can be proposed based on preliminary results obtained from a simple tabulation.

- New cases from the Diamond Princess cruise ship and the state of emergency were the two factors that most increased awareness of COVID-19 in Japan.
- Approximately 70% of Japanese regularly washed their hands before the COVID-19 pandemic, and less than 9% of respondents shake hands or hug as a form of greeting. This issue is worth clarifying as a cultural reason for the lower level of infection in Japan compared to those in countries in Europe and the U.S.
- The Internet and TV were the two primary sources of information. Surprisingly, social media was not a significant information source. The most important information was news related to the operation of supermarkets and pharmacies during the state of emergency.
- Approximately 50% of respondents said they would stay at home if the next disaster occurred during the COVID-19 pandemic. Thus, the government must ensure that residents know whether they are truly safe from each type of disaster and understand that evacuation to safety has a higher priority than staying at home (if they are at risk during a disaster). Further work is urgently needed to understand scenarios of concurrent hazards, identifying the common behavioral vulnerabilities, and prioritizing the information needed in case of emergency.
- Only approximately 40% thought that the experience of past disasters helped them better prepare for disasters during the COVID-19

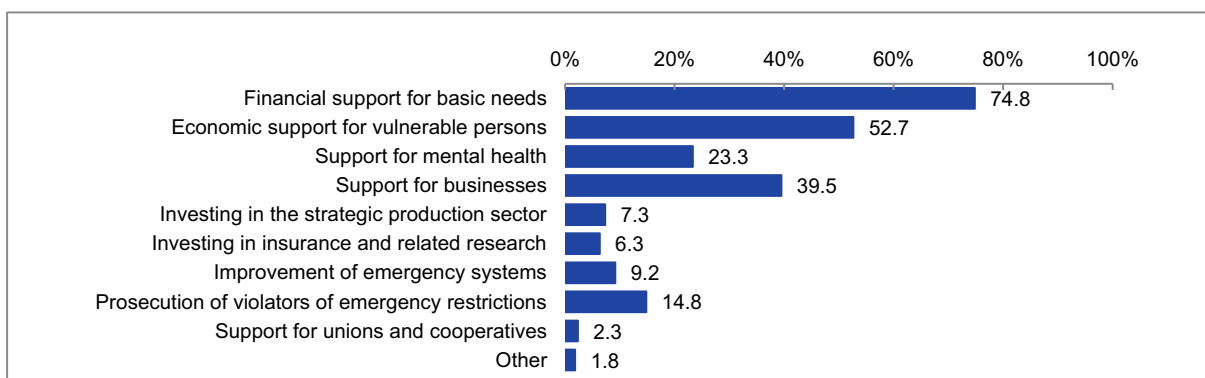


Fig. 6. Measures that should be prioritized for social and economic support.

pandemic. Surprisingly, Iwate Prefecture had no confirmed cases for many months, but 70% of respondents from Iwate believed that past disaster experience would not be helpful. However, approximately 50–60% of people in Miyagi did believe that past disaster experience would be beneficial. Future research could focus on the difference between the two prefectures and explore the reason for this difference and the months-long lack of confirmed cases in Iwate Prefecture.

- Levels of satisfaction with work, mental health, and the economy decreased, but satisfaction with family increased, probably because of a greater tendency to stay at home.
- The use of many facilities, including hospitals, declined. It is therefore vital to keep monitoring long-term health situations, as the finding of the number of infected cases could be delayed because of medical check avoidance.
- If a state of emergency has to be issued again, 34% of respondents said they could handle it for a few months, and another 36% said they could handle it for a few weeks.
- Recovery priority should give to education and working conditions, social/cultural/entertainment facilities, and social and economic support systems.

CRedit authorship contribution statement

Anawat Suppasri: Conceptualization, Methodology, Formal analysis, Investigation, Writing - original draft, Writing - review & editing, Visualization, Funding acquisition. **Miwako Kitamura:** Conceptualization, Methodology, Writing - original draft. **Haruka Tsukuda:** Conceptualization, Methodology, Writing - original draft. **Sebastien P. Boret:** Conceptualization, Writing - original draft, Writing - review & editing. **Gianluca Pescaroli:** Supervision, Writing - original draft, Writing - review & editing. **Yasuaki Onoda:** Supervision. **Fumihiko Imamura:** Supervision. **David Alexander:** Supervision. **Natt Leelawat:** Supervision. **Syamsidik:** Supervision.

Declaration of Competing Interest

The authors would like to declare that this research has no competing interest.

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References

- [1] Shaw R, Kim Y, Hua J. Governance, technology and citizen behavior in a pandemic: lessons from COVID-19 in East Asia. *Prog Disaster Sci.* 2020;6:100090.
- [2] Jimi H, Hashimoto G. Challenges of COVID-19 outbreak on the cruise ship diamond princess docked at Yokohama, Japan: a real-world story. *Global Health Med.* 2020;2(2):63–5.
- [3] Ministry of Health, Labour and Welfare. COVID-19 open data. (in Japanese). Available at: <https://www.mhlw.go.jp/stf/covid-19/open-data.html/>; 2020. (Accessed date 24 February 2021).
- [4] Ishiwatari M, Koike T, Hiroki K, Toda T, Katsube T. Managing disasters amid COVID-19 pandemic: approaches of response to flood disasters. *Prog Disaster Sci.* 2020;6:100096.
- [5] UNESCO-IOC. How to Respond to Tsunami in Times of Physical Distancing? Available at: [http://www.ioc-tsunami.org/index.php?option=com_content&view=article&id=458:guidelines-covid19&catid=20&lang=en&Itemid=68](http://www.ioc-tsunami.org/index.php?option=com_content&view=article&id=458:guidelines-covid19&catid=20&lang=en&Itemid=68;); 2020. (2020, Accessed date 5 November 2020).
- [6] Fearnley CJ, Dixon D. Editorial: early warning systems for pandemics: lessons learned from natural hazards. *Int J Disaster Risk Reduction.* 2020;49:101674.
- [7] The Japan Times. At least 53 died as torrential rains and floodwaters hit Kyushu. Available at <https://www.japantimes.co.jp/news/2020/07/07/national/rain-floods-kyushu/>. (2020, Accessed date 19 November 2020).
- [8] United Nations Office for Disaster Risk Reduction. GAR-global assessment report on disaster risk reduction. Geneva: United Nations; 2019 Available from: <https://gar.unisdr.org> (Accessed date 5 December 2020).
- [9] Pescaroli G, Alexander D. Understanding compound, interconnected, interacting, and cascading risks: a holistic framework. *Risk Anal.* 2018;38(11):2245–57.
- [10] NHK. Special site for the New Coronavirus: New Coronavirus and disaster evacuation (in Japanese). Available at: <https://www3.nhk.or.jp/news/special/coronavirus/disaster/>; 2020 (Accessed date 19 November 2020).
- [11] Cabinet Office of Japan. Guidelines for the management of evacuation shelters during the new Coronavirus infection; 2020 26 pages (In Japanese). Available at: http://www.bousai.go.jp/pdf/hinanjyo_covid19_01.pdf; (2020, Accessed date 5 November 2020).
- [12] Sendai City. Evacuation shelter management manual: Additional measures for the new Coronavirus; 2020 16 pages (In Japanese). Available at: <http://www.city.sendai.jp/kekaku/kurashi/enzen/saigaitaisaku/hinanjo/documents/200608-corona-taisaku.pdf>; (2020, Accessed date 5 November 2020).
- [13] Kumamoto Prefecture. Strategies to respond to Coronavirus infection in evacuation shelters; 2020 21 pages (In Japanese). Available at: https://www.pref.kumamoto.jp/common/UploadFileOutput.ashx?c_id=3&id=33307&sub_id=1&flid=235475; (2020, Accessed date 5 November 2020).
- [14] Sakamoto M, Sasaki D, Ono Y, Makino Y, Kodama E. Implementation of evacuation measures during natural disasters under conditions of the novel coronavirus (COVID-19) pandemic based on a review of previous responses to complex disasters in Japan. *Prog Disaster Sci.* 2020;8:100127.
- [15] Koyama M, Kanbara S, Minamisawa O. A guideline for the creation of countermeasures against flood disasters during a pandemic situation (COVID-19); 2020 (41 pages).
- [16] UNDRR, UNDP. Tsunami Evacuation during COVID-19: A Guide for School Administrators. Available at <https://www.undrr.org/publication/tsunami-evacuation-during-covid-19-guide-school-administrators>; 2020. (2020, Accessed date 5 November 2020).
- [17] Djalante R, Shaw R, DeWit A. Building resilience against biological hazards and pandemics: COVID-19 and its implications for the Sendai framework. *Prog Disaster Sci.* 2020;6:100080.
- [18] NHK. Special site for the New Coronavirus: Economic data at a half year of COVID-19 outbreak (in Japanese). Available at: https://www3.nhk.or.jp/news/special/coronavirus/economic-indicators/detail/detail_01.html; 2020 (Accessed date 19 November 2020).
- [19] Teikoku Databank. New Coronavirus Related Bankrupt. Available at: <https://www.tdb.co.jp/toson/covid19/index.html>; 2020. (Accessed date 19 November 2020).
- [20] Yamamura E, Tsutsui Y. COVID-19, Mental Health, and Domestic Violence: Evidence from Japan. Available at: <https://voxeu.org/article/covid-19-mental-health-and-domestic-violence>; 2020.
- [21] Ando R. Domestic Violence and Japan's COVID-19 pandemic. *Asia-Pacific J Focus.* 2020;18(18) (Number 7, Article ID 5475).
- [22] WASH. Mortality rate attributable to unsafe water, sanitation, and hygiene; 2016 Available at: <https://www.statista.com/chart/4111/do-europeans-wash-their-hands-after-using-the-toilet/>; (2020, Accessed date 23 February 2021).
- [23] McCarthy N. Where Europeans Wash Their Hands After Using The Toilet. Available at: <https://ourworldindata.org/grapher/mortality-rate-attributable-to-wash>; 2020.
- [24] Wang H, Li TL, Barbarino P. Dementia care during COVID-19. *Lancet.* 2020;395:10231.
- [25] Ministry of Health, Labor and Welfare. Summary of Temporary Treatment of Personnel Standards in Care Service Establishments for Infectious Diseases Caused by the New Coronavirus. Available from: <https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/000045312/matome.html>; 2020. (Accessed date, 26 November 2020).
- [26] Chatterjee R, Bajwa S, Dwivedi D, Kanji R, Ahammed M, Shaw R. COVID-19 risk assessment tool: dual application of risk communication and risk governance. *Prog Disaster Sci.* 2020;7:100109.
- [27] Leelawat N, Tang J, Saengtattim K, Laosunthara A. Trends of tweets on the coronavirus disease-2019 (COVID-19) Pandemic. *J Disaster Res.* 2020;15(4):530–3.
- [28] Meechang K, Leelawat N, Tang J, Kodaka A, Chintanapakdee C. The acceptance of using information technology for disaster risk management: a systematic review. *Eng J.* 2020;24(4):111–32.