Disaster Medicine and Public Health Preparedness

www.cambridge.org/dmp

Residents' Concerns Regarding Schools Designated as Evacuation Shelters

Hiromi Kawasaki PhD, Mika Takeuchi RN, Md Moshiur Rahman PhD and Kotomi Yamashita MSN

Division of Nursing Science, Graduate School of Biomedical and Health Sciences, Hiroshima University, Hiroshima, Japan

Original Research

Cite this article: Kawasaki H, Takeuchi M, Rahman MM, Yamashita K (2022) Residents' concerns regarding schools designated as evacuation shelters. *Disaster Med Public Health Prep* **16**: 1587–1593. doi: https://doi.org/10.1017/dmp.2021.192.

First published online: 19 August 2021

Keywords:
residents' concerns; evacuation shelter; natural disaster; evacuation behavior

Corresponding author:
Hiromi Kawasaki,
Email: khiromi@hiroshima-u.ac.jp

Abstract

Objective: The purpose of this study was to investigate the perceptions of residents who are knowledgeable about the schools used as shelters.

Methods: The target group was comprised of teachers and guardians of children enrolled in 4 schools, which were selected in the vicinity of District B, which was severely damaged by heavy rain in 2014. A qualitative descriptive study design was used.

Results: The number of surveys collected was 1702 (collection rate 62.2%). A total of 1017 clauses were entered, and 85 codes were generated for 7 categories. The guardians and teachers believed that there was a discrepancy between shelter capacity and the real situation; citing a lack of information, and ill preparedness of the schools for disasters as some of the problems. Based on the knowledge and experiences from previous disasters, they responded that there was inadequate management, and evacuees faced difficulty living comfortably in the shelters.

Conclusion: In order to use school facilities during any disaster, it is important for residents to recognize the need to solve problems, and to work with local governments to support improvements. This realization reveals a sense of ownership of emergency shelters and prevents confusion among residents. Also, this will help people to prepare for disasters and prevent disruption during evacuation.

Introduction

As the global climate changes, there are widespread changes in weather patterns associated with intensity and frequency that are causing massive damage and affecting human life. Japan is no exception to this global trend. In August 2014 and July 2018, Hiroshima prefecture recorded copious rainfall causing a disastrous landslide, which led to the deaths of many residents, and the destruction of buildings due to sediment-related disasters. According to the Director-General for Disaster Management of the Cabinet Office of Japan Central Government, an evacuation advisory was issued during the excessive rainfall that occurred in August 2014, and approximately 164000 people were evacuated from 68813 households.[1] There were 77 deaths reported and massive damage was caused by the landslide.[2] During the torrential rainfall in July 2018 which claimed 115 lives in the disaster areas as of July 30,[3] 384 evacuation shelters were opened to accommodate 4270 evacuees.[4] In each of the disasters, the delay in evacuation was considered to be an issue based on disaster prevention.[5] The government has been considering various measures to encourage the early and voluntary evacuation of residents who are likely to face such disasters. In 2019, the method of displaying the evacuation information was changed, and a system was established to communicate the same instructions to residents at an early stage.

A major reason why people do not evacuate is, as Morss states, the case of "hurricane fatigue."[6] This can occur in places such as Florida, which is often hit by many hurricanes in 1 season. People felt that the evacuation information simply disturbed their lives, and they became tired of leaving their homes. Some residents and business owners decided to stay behind to protect their properties, either from looters or the storm itself.[7] Residents' fatigue is not only caused by hurricanes; it has also been noted in the events of forest fires. The authorities fear that as these catastrophic wildfires become routine, residents are also likely to progressively ignore repeated calls for evacuation.[8] Fatigue occurs in all disasters, not only in hurricanes and wildfires. Hence, it is also reported as disaster fatigue. The evacuation behavior is furthermore affected by several factors such as gender, age, number of children, income, etc.[9] Some people do not evacuate their homes due to economic reasons or the time and effort required to pack their belongings.[10] The low frequency of natural disasters is 1 of the reasons for the delay in residents' evacuation.[11] In Hiroshima, residents usually do not evacuate due to the low frequency of disasters. A report on the heavy rain disaster that occurred in July 2018, indicated the existence of people who did not evacuate even after receiving the instruction.[12] This showed that it was difficult for inhabitants to prepare for unforeseen natural disasters.[13,14]

© The Author(s), 2021. Published by Cambridge University Press on behalf of Society for Disaster Medicine and Public Health, Inc. This is an Open Access article, distributed under the terms of the Creative Commons Attribution licence (http://creativecommons.org/licenses/by/4.0/), which permits unrestricted re-use, distribution, and reproduction in any medium, provided the original work is properly cited.

Children are most likely to evacuate during natural disasters. The evacuation plan was also related to evacuation guidelines and resources.[15] As schools are the center of the community, which provide an environment for children to study safely, these become evacuation shelters for local residents in the event of disasters.[16] In Japan, 94.9% of 28613 public elementary and junior high schools are designated as shelters.[17] During the Kumamoto Earthquake in April 2016, 366 of the 596 public schools in Kumamoto Prefecture were used as evacuation shelters, and these schools ensured a large proportion of the necessary supports.[18] People live in schools after a disaster because they have lost their homes, or to escape the damage of a secondary disaster. Another reason for extending the length of stay of evacuees is that basic emergency supplies are distributed free of charge to evacuation centers. Schools are primarily educational institutions and are designed according to the institutional guidelines; hence, causing various problems and inconveniences when used as temporary shelters.[19] As a result, it became difficult to carry out evacuation preparations in accordance with the standards described in the Sphere handbook.[20] The teachers of the schools used as evacuation centers who needed to continue children's education took on the management roles in the evacuation centers. After disasters, teachers also faced difficulties in performing their other regular duties such as ensuring the children's safety throughout the school days.[21,22] Teachers are involved in setting up shelters, and their roles are limited only to supporting administrative work.[23] They also endeavor to minimize disruptions and prepare the learning environment for children.[23] Teachers are also, not only responsible for managing the shelters, but also look after the waste disposal in case of dysfunctional toilets, and lead the fair distribution of food and water.[21] Requests concerning problems are directed to the teaching staff of the schools that becomes shelters, pushing them into managerial positions.[24] As a consequence, these additional responsibilities increase their burden and exhaustion.[25] There are few reports available that provide information about what life looks like in temporary shelters and the situations that the evacuees face or have to face.[26,27] Advance preparation could be arranged based on the awareness of evacuees. Residents' independent development of evacuation shelters to prepare for disasters will bring together the region, and provide the basis for reconstruction.[28] Residents' imagination of life after an evacuation is likely to predict the disaster itself and to promote evacuation. The purpose of this study is to clarify the concerns about schools becoming shelters so that the residents themselves can prepare by imagining life after a disaster.

Methods

Study Design

In this study, we conducted a qualitative descriptive study design.

Study Population and Site for Survey

The study population was comprised of teachers and guardians of children enrolled in 4 schools (2736 people as of February 2018) that were selected by the school board and principal in the vicinity of District B, City A, which was severely damaged by the landslide in August 2014. The survey was conducted in March 2018. Teachers and parents who refused to investigate were excluded.

Data Collection

A questionnaire survey was conducted with 2736 teachers and guardians in a total of 4 public elementary schools in City A. They cooperated in 2 surveys, 1 was a composite questionnaire by a municipal survey, and another was a survey of free text methods. In this study, the freely described responses were analyzed. Parents and teachers were free to write their opinions and concerns about the shelter.

Analytical Method

Each free response was divided into clauses by their meanings. Clauses were coded by their semantic content and categorized by a similar semantic content. The semantic contents underwent repeated discussion by 3 researchers who were familiar with qualitative research, and the contents of the analysis were confirmed until saturated. The researchers summarized the clauses into concept categories based on the semantic content in each phrase and provided their supervision to divide into categories.

Results

Outline of the Survey Population

Out of 255 teachers reached, 145 provided responses (56.9%). A set of survey forms was circulated to each household for parents and distributed to 2481 households. Survey return was 1557, and the return rate was 62.8%. A total of 1702 teachers and guardians were enrolled in this survey. Among the respondents, 91.0% were women, and 50% of them were in their 40s (49.9%). Few respondents (17.0%) have encountered natural disasters, and even fewer (8.7%) experienced natural disasters at the workplace. A small proportion of them (1.6%) had evacuated to shelters. The demographic characteristics of the study population are presented in Table 1.

Classification of the Responses of Subjects

There were 1017 clauses (raw responses) that were entered and among them, 61 clauses were written by the teachers. In total, 85 codes (separation of raw responses with a meaning), which were made by their semantic content, were generated for 7 categories. The clauses were classified into 37 subcategories according to their semantic content (Table 2). There was no subcategory consisting solely of the clauses written by the teachers. In particular, among the 7 categories, those with a large number of descriptive clauses are shown in detail. Categories are indicated by [ ], subcategories are indicated by < >, and clause quotations are indicated by "".

1) [Discrepancy between Shelter Capacity and the Perceived Need]

This category consists of the following 2 subcategories: <Many evacuees in shelters>, and <Insufficient facilities for the number of evacuees>.

1) <Many evacuees in shelters>

"Since it is a school with more than 1000 students, I think it would be difficult to function as a shelter."

"The school is small related to the population."

"Since there are so many residents, I think it will be very confusing if members of a child's family or local community evacuate."

"50% of people are in residents' associations, and I can see confusions occurring."

https://doi.org/10.1017/dmp.2021.192 Published online by Cambridge University Press

Table 1. Demographic characteristics of parents and teachers

		Parents		Teachers	
Variables	Criteria	N	%	N	%
Sex	Male	111	7.1	42	29.0
	Female	1445	92.8	103	71.0
	Unknown	1	0.1	0	0.0
Age	20s	21	1.3	30	20.7
	30s	691	44.4	26	17.9
	40s	816	52.4	33	22.8
	50s	24	1.5	43	29.7
	60s	3	0.2	13	9.0
	Unknown	2	0.1	0	0.0

2) <Insufficient facilities for the number of evacuees>

"Since there are so many residents, there will be a large number of evacuees and a lack of space."

"If everyone evacuates, wouldn't the space per person become equivalently smaller?"

"Since there are many residents and many elderly people, can enough space be secured by the school alone? The toilets are particularly of concern."

"Are there enough toilets? Definitely, there are not."

2) [Schools are Not Adapted for Disasters]

This category consisted of 4 subcategories: <Is the school suitable as a shelter?>, <Cannot evacuate to the designated shelter>, <Disaster infrastructure is not in place>, and <Schools cannot become shelters>.

1) <Is the school suitable as a shelter?>

"The school building is old," "Is the building durable enough?"

"I am worried about landslides on the mountain behind the school," "The school is built on low ground, and so it cannot be said to be safe."

"I am anxious about the durability of the elementary school itself," "The school gymnasium was repaired, but the gymnasium itself is old, so it might be safer at home, they say."

2) <Cannot evacuate to the designated shelter>

"I'm concerned that I won't be properly shown to another shelter if I can't get into the shelter."

"If there are a lot of people, what happens when you can't enter the shelter?"

3) <Disaster infrastructure is not in place>

"I heard (from the children) that the toilet was difficult to flush."

"Will mobile phones connect?"

"Are there charging facilities?"

4) <Schools cannot become shelters>

"I am worried because I heard that the school will not be a shelter."

"I think the school didn't become a shelter. We don't have a designated evacuation shelter nearby our home; I would pick up my child from school and get back home because it took a long time to go to the shelter in other areas."

3) [Life is Disrupted at Shelters]

This category consisted of 7 subcategories: <Unstable provision of daily necessities>, <Evacuation is difficult and affects human relations>, <Privacy cannot be ensured>, <Environment with a high mental burden>, <Children cannot continue studying>, <Want to evacuate with my pet>, and <Daily life of children is restricted>.

1) <Unstable provision of daily necessities>

"Since there is only 1 main road, what would we do for supplies when it is blocked by a disaster?"

"The shelter is on a mountain, so is food okay?"

2) < Evacuation is difficult and affects human relations >

"My children are noisy, and I'm worried about disturbing others."

"The evacuees might become frustrated and feel the voices of the children to be louder and harder to bear than usual."

"I don't want to fall out (with other evacuees)."

"The housing complex is small, so there will be new problems when we return to normal life if trouble occurs in the shelter."

"The most worrisome thing is the group being disturbed by a selfish individual."

3) <Privacy cannot be ensured>

"Ensuring privacy among lots of acquaintances."

"I don't know how long life without privacy will last, so I'd like my privacy to be ensured."

"Situation where there is no privacy among evacuees."

4) <Environment with a high mental burden>

"I would feel stressed by a large number of people in the shelter, so I don't want to go."

"If my child's elementary school became a shelter, it would be cramped, stuffy, and stressful."

"How do you relieve stress and anxiety while living in the shelter?"

5) <Children cannot continue studying>

"What happens to the children's education if the classrooms are also made open to evacuees?"

"I want to avoid sacrificing my child's learning and activities for a long period."

"I am worried about a decline in my child's academic ability and advancement to the next educational tier due to not being able to study."

6) <Want to evacuate with my pet>

"I didn't even think about my pet. I'm worried what to do about it."

"I want to take my pet to the shelter with me."

7) <Daily life of children is restricted>

"The gymnasium cannot be used (when the school becomes a shelter). The playing field is made into a parking lot, and the children cannot play outside. They cannot do physical activities or receive physical education."

https://doi.org/10.1017/dmp.2021.192 Published online by Cambridge University Press

Table 2. Description of the concerns and categories

Number of clauses	Number of codes	Subcategory	Category
267 (8)	3	1) Many evacuees in shelters	1. Discrepancy between shelter capacity and the perceived need
37 (4)	2	2) Insufficient facilities for the number of evacuees	
156 (3)	5	1) Is the school suitable as a shelter?	2. Schools are not adapted for disasters
33 (3)	4	2) Cannot evacuate to the designated shelter	
16 (3)	2	3) Disaster infrastructure is not in place	
6 (1)	1	4) Schools cannot become shelters	
66 (4)	4	1) Unstable provision of daily necessities	3. Life is disrupted at shelters
39 (2)	2	2) Evacuation is difficult and affects human relations	
37 (3)	1	3) Privacy cannot be ensured	
24 (1)	2	4) Environment with a high mental burden	
20 (3)	3	5) Children cannot continue studying	
11 (1)	2	6) Want to evacuate with my pet	
10 (1)	2	7) Daily life of children is restricted	
60 (3)	5	1) Environment is unhygienic	4. Insufficient management of shelter environment
21 (3)	4	2) Unclear management system	
17	3	3) Crime may occur	
15 (1)	2	4) Environment of the shelter is not suitable for daily life	
13 (3)	2	5) Insufficient consideration for those with special needs	
20	3	1) Means to confirm well-being is ambiguous	5. Information is lacking
16	2	2) Don't know where stockpiles are	
11	2	3) Means of transportation during an evacuation is unreliable	
8 (1)	2	4) Information will become unavailable	
7 (1)	1	5) Don't know how to live in a shelter	
4	2	6) Don't know about the residential area	
4	2	7) Location of home is a concern	
2	1	8) Concern for the daily lives of the schoolteachers	
2	1	9) Method of preparation for evacuation is unclear	
21 (1)	4	1) Insufficient consideration for the constitution of individuals	6. Cannot maintain health at a shelter
7 (1)	2	2) Difficult to manage physical condition	
6	1	3) Whether or not professional care can be received	
3	1	4) Cannot arrange medicine	
2	2	5) Animals will also come to the shelter	
29 (6)	4	1) Cannot think about anything to do with disasters	7. Situation after a disaster is unimaginable
22 (3)	3	2) Not thinking about disasters	
2	1	3) Our awareness of disaster prevention is low	
2	1	4) Don't see the value in going to a shelter	
1 (1)	1	5) Consider the impact on work	
1017 (61)	85		

Note: (n) indicates the number of clauses written by the teachers.
Subcategories, categories 1 to 4, and clauses, are listed for the examples in the main text.

"I think a school is the place to raise the spirits (of children) that have dropped (due to the disaster). I am worried that this venue will be unavailable for a long time."

4) [Insufficient Management of Shelter Environment]

This category consisted of 5 subcategories: <Environment is unsanitary>, <Unclear management system>, <Crime may occur>, <Environment of the shelter is not suitable for daily life>, and <Insufficient consideration for those with special needs>.

1) <u><Environment is unhygienic ></u>

"I can easily imagine the hygiene management issues and the environment getting worse."

"Will we have infectious diseases, etc.?"

"It's hard to have a bath."

https://doi.org/10.1017/dmp.2021.192 Published online by Cambridge University Press

2) <Unclear management system>

"Is there proper consideration for the elderly, children, and other socially vulnerable people such as pregnant women and wheelchair users?"

"Who will give information and instructions regarding facilities?"

3) <Crime may occur>

"Since strangers are coming and going, I'm worried about crime prevention."

"Where will we keep cash and valuables?"

"We can't be sure there are no suspicious people about, so we can't take our eyes off the children."

"A sexual assault may occur when a woman or girl is alone."

4) <Environment of the shelter is not suitable for daily life>

"The gymnasium (that is now the shelter) has insufficient temperature control."

"The shelter is hot in the summer and very cold in the winter, so I'm worried about what to do."

5) <Insufficient consideration for those with special needs>

"I have an allergic child, so I am worried about what to do if my child develops symptoms during evacuation."

"My child has a food allergy, so my child can't eat anything during an evacuation."

"My child is hard of hearing and hyperactive, so I am worried about disturbing others."

"Can my son with his developmental disabilities tolerate the change in environment and living in a large group?"

"I have a disabled mother. Is it possible for her to use the toilet in a wheelchair?"

Discussion

Based on the knowledge of school facilities and geography, including information from previous disasters such as news reports; guardians and teachers believe there is [insufficient management of shelter environment], that 1 [cannot maintain health at a shelter], and 1 [cannot live a normal life in a shelter]. There is a [discrepancy between shelter capacity and the real situation], and the [school is not adapted to disasters]. Teachers listed more clauses in this category compared to other categories. This category suggests that they are aware of the risks presented by disasters and are concerned about the quality of evacuation shelters. The recognition of the risk of disasters includes the factors of [the situation after a disaster being unimaginable] and [a lack of information]. The subjects cannot imagine what will happen after a disaster, the <means of transportation during an evacuation is unreliable>, the <means to confirm well-being is ambiguous>, and they have <concern for the daily lives of the schoolteachers>. Additionally, they <don't know about the residential area> and <location of the home is a concern>. The fact that they <don't know how to live in a shelter> and <don't know where the stockpiles are> leads them to feel the <method of preparation for evacuation is unclear>. Few people experienced the disaster. There was no difference between the description of the person who experienced the disaster and the person who had never experienced the disaster. This experience will help to establish a message that addresses unjustified fears and concerns regarding the use of shelters by clarifying the concerns of those who might be evacuated.

People's worry and awareness both determine the level of flood risk recognition. The preparation for evacuation begins by recognizing the risk. However, risk recognition is influenced by experience, knowledge, gender, and culture; therefore, the action for preparation is treated as a separate issue.[13] Risk recognition with respect to evacuation shelters considers whether or not the evacuees have information on the current capacity of the shelters, and the possibility that they might not have considered the capacity of roads.[29] The subjects of this study know the size of the classrooms and gymnasiums, the surrounding population, and the number of people the schools can accommodate. Their risks can be perceived, and their concerns are specific. However, since the means of obtaining information is not clear, they do not take further action to improve this situation. They point out the discrepancy between the number of evacuees and the capacity of the shelter. The local governments are responsible for developing shelters, and they must consider the capacity of the shelter buildings. When choosing a shelter, the capacity of the shelter and road is an important matter that the local government needs to look into. These issues are reflected in the decisions made by residents when choosing evacuation shelters. Local governments need to make estimates based on the number of residents, the number of people that the evacuation shelters can accommodate, and various conditions such as weekdays, holidays, daytime, and night-time.[29] Announcing the results will alleviate the concern that there is a [discrepancy between shelter capacity and the real situation].

Guardians and teachers point out that, [schools are not adapted for disasters]. The standards of evacuation shelters are shown in the UNHCR Emergency Handbook.[30] Compared to these standards, residents consider the school as an emergency evacuation shelter. On the other hand, they think [life is disrupted at shelters]. Confusion between emergency evacuation shelters and evacuation shelters can be recognized among residents. First of all, it is necessary to inform the residents about the individual roles of the aforementioned shelters. Schools are constructed mainly for educational purposes. Standards have been established to achieve education safely.[31] There are standards that are followed for an evacuation procedure during a fire, but there are no standards provided for disasters. If the residents are familiar with the role of the emergency shelter, the residents could voluntarily conduct a survey on whether schools are appropriate as emergency evacuation sites, and consequently, propose improvements to the local government. In making their evacuation shelters, a strong infrastructural plan is necessary to understand more about their neighbors, which can help to ease the process of evacuation,[32] and encourages them to evacuate.

The parents and teachers believe there is [insufficient management of shelter environments], that 1 [cannot maintain health at a shelter], and that 1 [cannot live a normal life in a shelter]. Many clauses comprise these categories and suggest that many people believe that living in evacuation shelters is uncomfortable and causes distress. The quality of evacuation shelters is a major cause of hesitation and deterrent of evacuation.[20] Schools are contributing adequately to support the lives of residents as shelters; however, the safer and more comfortable schools may attract people even though the risk of disaster is low. Guardians who have children with disabilities, particularly, describe their concerns regarding environmental management, and maintenance of health. Parents as well as teachers stated that "children cannot study." Children and people with disabilities are most affected by disasters.

https://doi.org/10.1017/dmp.2021.192 Published online by Cambridge University Press

Organizations working on social vulnerability and disasters often list children with disabilities as a group that is at particular risk when a disaster occurs.[33] Issues in evacuation shelters involving disabled children are predicted not only in Japan but also in every other country of the world.[34] This shows that no measures have been taken to accommodate these groups,[34] and the reason for this is attributed to the fact that the guardians of disabled children do not participate in deciding what measures ought to be taken to help them during such times.[33] Children with cognitive disabilities may not recognize signs of environmental hazards and imminent threats,[35] or may become anxious or confused in response to emergency signals.[36] This is consistent with the free response of the guardians in this study. Teachers also recognize these challenges. Therefore, the teachers need specialized training to deal with such situations that occur during disasters.[37] Guardians must reach out to the disaster management personnel to resolve this problem which has been highlighted through surveys. Teachers and guardians need to consider the measures for dealing with disasters during classes in order to reduce the resistance to evacuation.[37,38] The measures they considered suitable to implement should be publicly disseminated. Moreover, understanding the characteristics of children's daily lives deepens the cooperation among residents.

Limitations

The subjects in this study were teachers from elementary schools in a limited area and the guardians of the children who attended these elementary schools. Most of the respondents were female guardians. It is important to include a more diverse population, including elderly people, other family members, and a wider range of living categories. The residents' responses may be affected by the broadcast about shelters in the major disasters that have occurred so far. However, their places of residence are also close to the disaster area. Most of Japan is in, or near dangerous areas, and vulnerable to a variety of disasters. Therefore, the results might not be generalizable.

Conclusion

Parents and teachers of elementary schools are worried about the shelter's capacity, living environment, and robustness. Many of the subjects had not experienced the disaster and could not think of a specific situation. Clarifying the concerns of those who may be evacuated helps to establish a message that addresses unjustified fears and concerns about the use of shelters. Based on the knowledge of school facilities and geography gained from past disasters, parents and teachers need to work with the local government to resolve concerns. Resolving concerns may improve the quality of shelters and make residents feel closer to shelters.

Acknowledgments. The authors are deeply grateful to the guardians and teachers who cooperated in the completion of this survey.

Funding Statement. This study was supported by the Grants-in-Aid for Scientific Research Program (KAKENHI), Japan (No. 17H04467). The funder had no role in the design, collection, analysis and interpretation of data, writing of the report, or the decision to publish.

Ethical Standards. The study was approved by the ethics committee of Hiroshima University with which the investigators are affiliated (approval number E-1069-1). The questionnaire stated the details and purpose of the study, its privacy policy, that the responses would not be used for purposes other than research, and that the responses were given out of free will and were not mandatory. In the event that consent for cooperation in the study was obtained, the questionnaire was anonymously posted in a collection box. The survey forms and electronic data were stored in a locked cabinet at the researcher's office. US Bureau of the Census. *Statistical Abstract of the United States: 1993*. 113th ed. Washington, DC: US Bureau of the Census; 1993.

References

1. **Cabinet Office, Government of Japan**. Disaster management in Japan. https://www.cao.go.jp/en/doc/saigaipanf.pdf. Accessed September 30, 2019.
2. **International Federation of Red Cross and Red Crescent Societies**. Information bulletin Japan: Landslides in Hiroshima. https://www.ifrc.org/docs/Appeals/rpts14/IBJPls220814.pdf. Accessed January 6, 2021.
3. **Hashimoto R, Tsuchida T, Moriwaki T, Kano S**. Hiroshima Prefecture geo-disasters due to Western Japan Torrential rainfall in July 2018. *Soils and Foundations*. 2020;60:283-299.
4. **Bandaru S, Sano S, Shimizu Y, *et al.*** Impact of heavy rains of 2018 in western Japan: Disaster-induced health outcomes among the population of Innoshima Island. *Heliyon*. 2020;6(5):e03942.
5. **Cabinet Office, Government of Japan**. White Paper Disaster Management in Japan 2019. http://210.149.141.46/kaigirep/hakusho/pdf/R1_hakusho_english.pdf. Accessed January 18, 2021.
6. **Bostrom A, Morss RE, Lazo JK, Demuth JL, Lazrus H, Hudson R**. A Mental Models Study of Hurricane Forecast and Warning Production, Communication, and Decision-Making. *Weather Clim Soc*. 2016;8(2):111-129.
7. **Thompson A**. Why People Ignore Hurricane Evacuation Warnings. https://www.livescience.com/7574-people-ignore-hurricane-evacuation-warnings.html. Published September 15, 2008. Accessed September 21, 2019.
8. **The Guardian**. 'Evacuation fatigue': Danger after people flee wildfires five times in two years. https://www.theguardian.com/us-news/2018/nov/13/california-wildfires-evacuation-fatigue-paradise-camp-fire. Accessed September 21, 2019.
9. **Lim MB, Lim H Jr, Piantanakulchai M**. Factors affecting flood evacuation decision and its implication to transportation planning. *J East Asia Soc Transp Stud*. 2013;10:163-177.
10. **McKinnon M**. Don't Condemn People Who Don't Evacuate for Hurricane Florence: Many simply can't; packing up and leaving assumes a level of privilege many people probably don't think about. Scientific American. https://blogs.scientificamerican.com/observations/dont-condemn-people-who-dont-evacuate-for-hurricane-florence/. Published September 13, 2018. Accessed February 27, 2020.
11. **Shapira S, Aharonson-Daniel L, Bar-Dayan Y**. Anticipated behavioral response patterns to an earthquake: The role of personal and household characteristics, risk perception, previous experience and preparedness. *Int J Disaster Risk Reduct*. 2018;31:1-8.
12. **Ohtomo S, Kimura R, Kawata Y, Tamura K**. The Determinants of Residents' Evacuation Behavior in the Torrential Rain in Western Japan in 2018: Examination of Survey Data of Victims in Okayama Prefecture. *J Disaster Res*. 2020;15(7):1011-1024.
13. **Lechowska E**. What determines flood risk perception? A review of factors of flood risk perception and relations between its basic elements. *Nat Hazards*. 2018;94:1341-1366.
14. **Scolobig A, Marchi BD, Borga M**. The missing link between flood risk awareness and preparedness: findings from case studies in an Alpine Region. *Nat Hazards*. 2012;63:499-520.
15. **Thompson RR, Garfin DR, Silver RC**. Evacuation from natural disasters: A systematic review of the literature. *Risk Anal*. 2017;37(4):812-839.
16. **Kruger J, Brener N, Leeb R, Wolkin A, Avchen RN**. School district crisis preparedness, response, and recovery plans — United States, 2006, 2012, and 2016. *MMWR Morb Mortal Wkly Rep*. 2018;67(30):809-814.
17. **Ministry of Education, Culture, Sports, Science and Technology**. The results of the survey on the disaster prevention function of public school

facilities serving as evacuation centers. https://www.mext.go.jp/content/1420466_001_1.pdf. Accessed January 06, 2021.
18. **Sugawara M, Mizumura H, Suzuki T.** Management and environment maintenance issues of schools for special needs education used as temporary shelter in the 2016 Kumamoto earthquake –A case study of 2 prefectural schools for special needs education and a municipal mainstream school. *Japanese Association for an Inclusive Society, Fukushi-machidukuri kenkyu*. 2018; 20. DOI: 10.18975/jais.20.1_1. Accessed May 25, 2021. [in Japanese]
19. **Hashii S, Kochi International Association**. An information booklet for the international community in Kochi —Preparing for the Nankai earthquake, life in a shelter. http://www.kochi-kia.or.jp/earthquake/english/?ss=022. Accessed September 21, 2019.
20. **Sphere Association**. *The Sphere Handbook: Humanitarian charter and minimum standards in humanitarian response*. 4th eds. Geneva, Switzerland. Sphere; 2018. https://spherestandards.org/wp-content/uploads/Sphere-Handbook-2018-EN.pdf. Accessed October 2, 2019.
21. **Ishigaki A, Higashi H, Sakamoto T, Shibahara S**. The great East-Japan earthquake and devastating tsunami: An update and lessons from the past great earthquakes in Japan since 1923. *Tohoku J Exp Med*. 2013;229(4):287-299.
22. **Sato M, Isoda M**. The role of education for natural disasters: An extraction from the proceedings of the CRICED 10th anniversary symposium. http://www.criced.tsukuba.ac.jp/math/apec/ICME12/Lesson_Study_set/The_Role_of_Education_for_Natural_Disasters.pdf. Published May 8, 2012. Accessed October 19 2020.
23. **EARTH Handbook 2017.** Emergency and Rescue Team by school staff in Hyogo. http://www.hyogo-c.ed.jp/~kikaku-bo/EARTHhandbook/. Accessed October 19, 2020. [in Japanese]
24. **Hashimoto K, Ohmachi T, Inoue S**. Framework of schoolteachers' activities in the event of earthquake disaster. *Proceedings of the JSCE Earthquake Engineering Symposium*. 2005;28:1-5.
25. **The Japan Times**. Groups across Japan inspired by school staff disaster team set up after Kobe quake. https://www.japantimes.co.jp/news/2020/01/12/national/teachers-japan-disaster-relief-teams-1995-kobe-quake/. Accessed January 18, 2021.
26. **Teramoto C, Matsunaga A, Nagata S**. Cross-sectional study of social support and psychological distress among displaced earthquake survivors in Japan. *Jpn J Nurs Sci*. 2015;12(4):320-329.
27. **Teramoto C, Nagata S, Okamoto R, *et al.*** Identifying residents' health issues six weeks after the Great East Japan Earthquake. *Public Health Nurs*. 2015;32(6):654-661.
28. **Uscher-Pines L, Chandra A, Acosta J, Kellermann A**. Citizen preparedness for disasters: Are current assumptions valid?. *Disaster Med Public Health Prep*. 2012;6(2):170-173.
29. **Haghpanah F, Foroughi H**. Optimal shelter location-allocation during evacuation with uncertainties: A scenario-based approach. arXiv. https://arxiv.org/abs/1802.05775. Submitted February 15, 2018. Accessed September 21, 2019.
30. **The UN Refugee Agency (UNHCR)**. Emergency Handbook. https://emergency.unhcr.org/entry/36774/emergency-shelter-standard. Accessed September 21, 2019.
31. **An Roinn Oideachais Department of Education**. School Building & Design, Design Guidance. https://www.education.ie/en/School-Design/Design-Guidance/. Updated September 2019. Accessed June 22, 2020.
32. **Kakimoto R, Yamada F**. Factors in stimulating evacuation behavior during floods. 10th International Conference of the International Institute for Infrastructure Resilience and Reconstruction (I3R2), Purdue University, West Lafayette, Indiana, USA. https://docs.lib.purdue.edu/cgi/viewcontent.cgi?referer=https://www.google.co.jp/&httpsredir=1&article=1008&context=i3r2. Published May 2014. Accessed October 2, 2019.
33. **Fox MH, White GW, Rooney C, Rowland JL**. Disaster preparedness and response for persons with mobility impairments: Results from the University of Kansas nobody left behind study. *J Disabil Policy Stud*. 2007;17:196-205.
34. **Baker LR, Baker MD**. Disaster preparedness among families of children with special health care needs. *Disaster Med Public Health Prep*. 2010;4(3):240-245.
35. **Kailes JI, Enders A**. Moving beyond 'special needs': A function-based framework for emergency management and planning. *J Disabil Policy Stud*. 2017;17(4):230-237.
36. **Peek L, Stough LM**. Children with disabilities in the context of disaster: A social vulnerability perspective. *Child Dev*. 2010;81(4):1260-1270.
37. **Edmonds CO**. Designing Emergency Preparedness Resources for Children with Autism. *Intl J Disabil Dev Educ*. 2017;64:404-419.
38. **Finkelstein A, Finkelstein I**. Emergency preparedness - The perceptions and experiences of people with disabilities. *Disabil Rehabil*. 2020;42(14):2056-2066.

https://doi.org/10.1017/dmp.2021.192 Published online by Cambridge University Press