

Original Research

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

Current Situation of Disaster Preparedness for Effective Response in Japanese Special Needs Schools

Hiromi Kawasaki PhD , Zhengai Cui PhD , Mina Kurokawa MSc and Kei Sonai MSc

Graduate School of Biomedical and Health Sciences, Hiroshima University, Hiroshima, Japan

Abstract

Objective: Schools may serve as shelters in the event of a disaster, but little is known about the requirements of children with disabilities in such situations. This study, therefore, aimed to investigate disaster preparedness in Japanese special needs schools depending on the designation of welfare shelters.

Methods: A questionnaire was distributed to schools nationwide. The respondents (authorities from 531 schools) answered questions about their jobs, disaster experiences, the school type, its students' disabilities, its designation as a welfare shelter, its evacuation readiness, and the items of a disaster prevention awareness scale. Differences in preparedness among schools and the relationship between preparedness and designation as a welfare shelter were determined.

Results: Most respondents had never experienced a natural disaster. Schools had insufficient resources to cope with disasters. While the majority (68.2%) had resources for children to stay overnight, a substantial minority of schools (31.8%) did not. No differences were found in preparedness among schools with different types of children with disabilities. Schools designated as welfare shelters were significantly better prepared than others.

Conclusions: Special needs schools in Japan have limited disaster preparedness. The designation of schools as welfare shelters may increase their preparedness for disasters.

While disasters are commonly occurring phenomena, their frequency has been increasing since the beginning of the 20th century. Disasters are derived from a combination of 2 factors, the first of which is natural phenomena capable of causing physical damage and the loss of human lives and capital, whereas the second consists of the vulnerability of individuals and human settlements.¹

School facilities may serve as shelters in the event of a natural disaster.² Hence, school disaster preparedness is considered part of the community's disaster preparedness plan.³ The literature has highlighted the importance of education within the Sendai Disaster Prevention Framework.^{4,5} The function of local schools in disaster response has also been documented and considered a comprehensive indicator of school safety.⁶

Since children with special needs are highly vulnerable in the event of a disaster, a previous study investigated the necessary conditions for disaster mitigation education in Indonesia, a country that is highly vulnerable to disasters.⁷ The change and adjustment of the learning environment and disaster risk reduction directed toward children with special needs as well as the empowerment of children and the perception of school management have also been the topics of previous research.⁸ However, empowerment through education alone cannot protect children. It is necessary to prepare for the environment according to the disabilities of children.

In times of disaster, residents, including children, are evacuated to an evacuation center, a designated place where residents at risk of disaster are sheltered until the danger is eliminated. These evacuation centers are designated by the municipality. Deciding upon safe locations for such centers is the main focus when establishing them.

Special schools should possess special resources because children with disabilities may face additional challenges during emergencies compared to children without disabilities.⁹ Unfortunately, teachers often have little or no experience in disaster prevention and management.¹⁰ Hence, it is difficult for them to have an accurate understanding of the risks that children are exposed to in the event of a disaster. For example, they may have difficulties moving from one place to another, particularly if they use a wheelchair, as they may find themselves struggling with the width of their passageways and steps. It is therefore necessary to secure evacuation routes for wheelchairs.¹¹

In cases of movement restriction, securing the means for movement should be part of the emergency evacuation plan.¹² In relation to this, securing evacuation routes is a critical part of evacuation plans for children with neurodevelopmental disorders, and strategies in this regard

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have been designed based on the use of geographic information systems.¹³ Therefore, these strategies should also include personnel planning. In the case of parenteral nutrition-dependent children, emergency planning is necessary.¹⁴

Similarly, children with hearing impairment are reported to not have proper access to disaster information, which impairs their behavioral responses to disasters.¹⁰ This could be particularly relevant for children with disabilities, as they typically develop more negative psychological symptoms than children without disabilities.¹⁵ Further, children with autistic tendencies may become very anxious owing to excessive noise and must face the difficulty of having to coordinate with those around them.¹⁰

Different emergency response systems may be required for children with disabilities.¹⁵ This is because the risks of encountering difficulties depend on the disability of the children. Schools require preparation to manage children with different types of disorders. Japan has a system for setting up welfare shelters for people with special needs. These shelters are occupied by pregnant women, people with injuries, illnesses, internal disabilities, intractable diseases, people in need of medical care, and so forth. These special shelters were implemented under the consideration that people with disabilities would have trouble living in general shelters.¹⁶ They differ from general shelters in that they have special items at their disposal and are called welfare shelters.

According to the Cabinet Office,¹⁶ welfare evacuation centers are places where people who require consideration are expected to stay, and they must meet the standards of the Cabinet Office regarding ensuring smooth use and a good living environment.

Special needs schools have particular facilities according to the characteristics of the enrolled children, for example, the installation of ramps and handrails and the elimination of steps in the toilet. Therefore, special needs schools are sometimes designated as welfare shelters as well.¹⁷ Children and adults with special needs have been reported to successfully gather in these shelters in the event of a disaster.^{18,19} However, the readiness of welfare shelters is still unclear.

Although it is clear that preparing for emergencies is critical to keep children safe and that following a protocol in the event of an emergency can keep children calm, less is known about the special requirements that children and young people with disabilities may have in this type of situation.²⁰ In addition, the preparation corresponding to special needs is also unknown. The purpose of this study was to investigate disaster preparedness in Japanese schools for children with special needs depending on the designation of welfare shelters.

Methods

Research Design

This study used a quantitative, correlative, and cross-sectional design.

Data Collection and Analysis Objects

This study was conducted between November 20, 2020, and December 18, 2020. All public special needs schools are listed. Schools that were established as branch schools were removed from analysis as part of the exclusion criteria.

Overall, the survey was sent to 1310 public special needs schools (1 survey per school) across the 47 prefectures of Japan. The number of collected responses was 604 (46.1%), with 531 (40.5%) valid responses. Only entries in which all questions were answered

Table 1. Status of the respondents and the schools where they work

Question	Variable	Frequency	Percent
Title	Principal	209	39.4
	Vice principal	196	36.9
	Teacher	119	22.4
	School health teacher	3	0.5
	Other	4	0.8
Have you ever been affected by a natural disaster?	No	339	63.8
	There was a disaster, but we did not evacuate.	125	23.5
	Temporarily evacuated to an evacuation center.	27	4.5
	I lived in a shelter.	6	1.1
	I've been involved in the management of shelters at the school.	36	6.8
Status of toddlers and students enrolled in the school where you currently work	Kindergarten	92 *	17.3
	Elementary school	452 *	85.1
	Junior high school	447 *	84.2
	High school	468 *	88.1
Types of disability that affect students enrolled in the school where you currently work	Visual impairment	59 *	11.1
	Hearing impairment	72 *	13.6
	Intellectual disability	367 *	69.1
	Physical disability	177 *	33.3
	Valetudinarian/physical weakness	84 *	15.8
Is it designated as a welfare shelter?	Other	2 *	0.4
	Yes	165	31.1
	No	366	68.9

Note: Number of respondents: 531.

were considered valid. The questionnaires were answered by a teacher or other school authorities.

Contents of the survey

The participants answered questions about their job positions at school, disaster experiences, school type, their children's type of disability, and the designation of welfare shelters (Table 1). Table 2 shows the questions pertaining to evacuation readiness, power supply, emergency toilets, and items in short supply when staying overnight.

Analysis Methods

For this study, responses regarding the type and situation of schools were used in the analysis. The survey was answered by teachers or other school authorities, and included questions about demographic and social characteristics, the school's disaster preparedness status, and the host community. Qualitative variables were reported using frequencies and percentages, and quantitative variables were reported using means and standard deviations (SDs).

The answers related to securing electric power and means of communication in preparation for power outages, securing toilets in the event of a water outage, securing fuel, and preparing for children to stay overnight were categorized as present ("yes") or absent ("no"/"I don't know") regardless of the type of preparation.

Table 2. Preparedness for disasters in relation to the designation of schools as welfare evacuation centers

Variables		Is it designated as a welfare shelter?		P value	
		Yes	No		
Is power secured in the event of a power outage?	Yes	Frequency	123	230	0.010*
		Percent	74.5%	62.8%	
	No	Frequency	42	136	
		Percent	25.5%	37.2%	
Is communication secured in the event of a communication failure?	Yes	Frequency	63	111	0.089
		Percent	38.2%	30.3%	
	No	Frequency	102	255	
		Percent	61.8%	69.7%	
Is the toilet secured in the event of a disaster?	Yes	Frequency	109	184	< 0.001**
		Percent	66.1%	50.3%	
	No	Frequency	56	182	
		Percent	33.9%	49.7%	
Are resources secured that can be used in the event of a disaster, such as LP gas?	Yes	Frequency	99	167	0.003**
		Percent	60.0%	45.6%	
	No	Frequency	66	199	
		Percent	40.0%	54.4%	
In the event of a power outage, water outage, or communication (telephone/Internet) breakdown, can the children stay overnight (from after school until breakfast the next day) at the school?	Yes	Frequency	118	244	0.314
		Percent	71.5%	66.7%	
	No	Frequency	47	122	
		Percent	28.5%	33.3%	

Note: χ^2 test, ** $P < 0.01$, * $P < 0.05$.

The lack of necessary resources was examined by marking the items that respondents believed were missing.

Differences in preparedness among children with disabilities and preparation for designation as welfare shelters were analyzed using the chi-square suitability test. The significance level was set at 0.05. All statistical analyses were performed using SPSS version 25.0 (IBM Corp, Armonk, NY).

Ethical Approval/Informed Consent

This study was approved by the Ethical Committee for Epidemiology of Hiroshima University (approval number: E-2224). The participants provided informed consent by agreeing to participate in the survey.

Results

Demographic and Socioeconomic Characteristics of Respondents

The demographic and social characteristics of the respondents are presented in Table 1. The average experience of the teachers was 29.1 years (SD = 29.36), and they worked in special needs schools for an average of 21.0 years (SD = 11.09). In addition, 76.3% of the respondents were already at the managerial level (principal or vice principal). In addition, 63.8% of respondents declared that they had never experienced a natural disaster. The schools that responded to the questionnaire included high schools (88.1%), elementary schools (85.1%), and junior high schools (84.2%). It should be noted that, in Japan, there may be more than 1 type of school for children with special needs in the same facility. Among the teachers who responded to the survey, 69.1% taught students

with intellectual disabilities. The percentage of schools designated as welfare shelters by the government is 31.1%.

Drinking Water

Drinking water was secured in several ways and multiple answers were allowed. The main methods used were stockpiled plastic bottles of drinking water (475; 89.5%) and purified water wells (41; 7.7%).

Electric Power

Of 531 schools, 347 (65.3%) were equipped with in-house power generation. Six schools (1.1%) agreed that they would preferentially use generators, and 178 (33.5%) schools did not have access to electricity in an emergency.

Communication Devices

Of the 531 schools, 140 (26.4%) had access to communication devices. Thirty-four schools (6.4%) had 1-way communication equipment and 357 schools (67.2%) lacked proper means of communication in an emergency.

Toilets

When a disaster occurs, toilets often cannot be flushed because broken pipes may cut the water supply. Preparation is required to deal with the possibility of water interruption affecting toilet flushing. Simple toilets were available in 240 (45.2%) of 531 schools. Manhole toilets were available at 24 schools (4.5%). Toilets

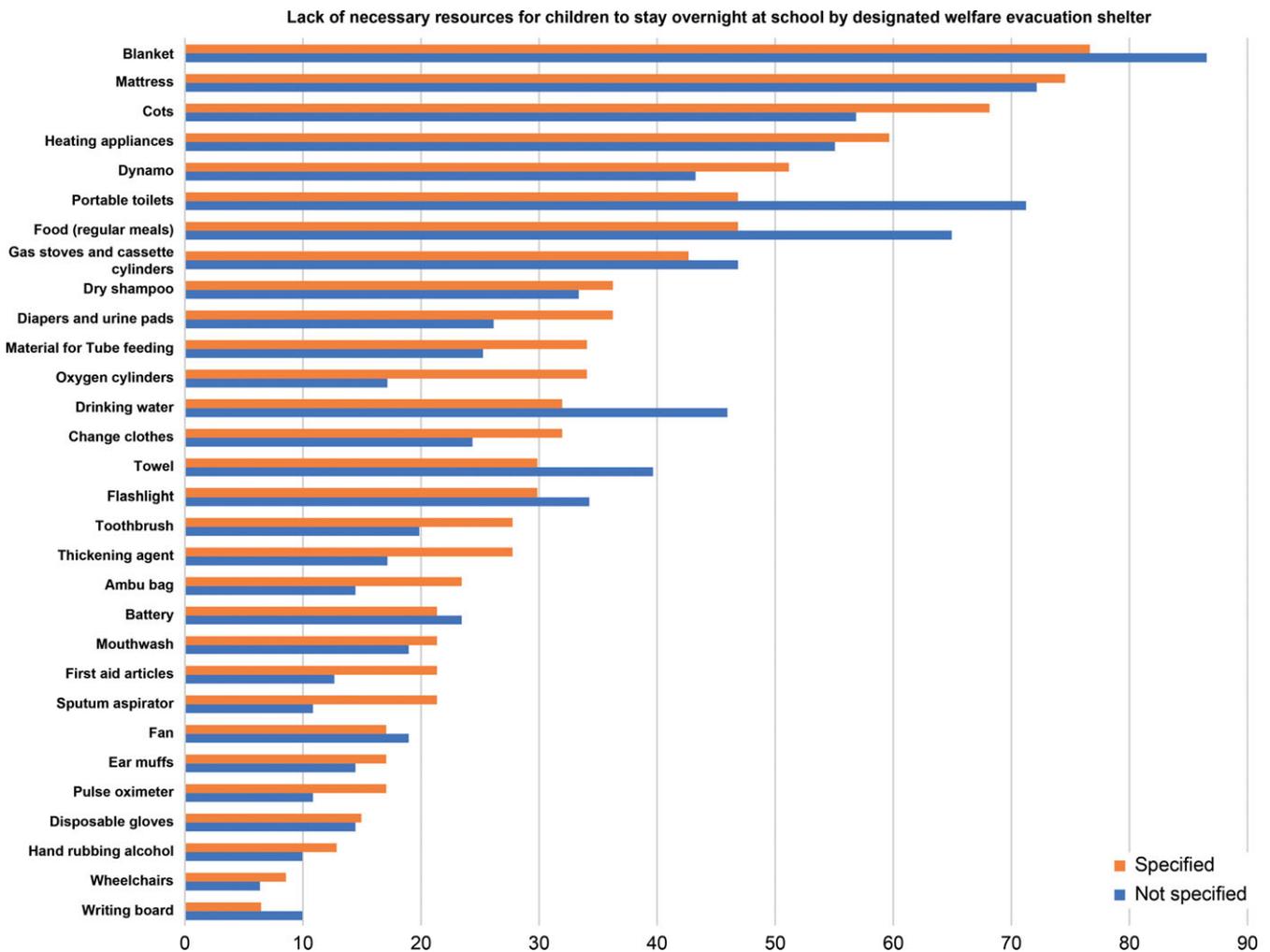


Figure 1. Graph of common items reported by the respondents to be in short supply. A total of 169 schools (31.8% of all schools surveyed) responded that they did not have a stockpile of items for children to stay. As the figure shows, mattresses, cots, and heating appliances were the most common missing items for children to stay overnight, while a few respondents mentioned wheelchairs, writing boards, and disposable gloves as missing items.

with pool water or rainwater were found in 29 schools (5.5%) and 238 schools (44.8%) were not prepared.

Fuel

Fuel to be used in the event of a disaster was stockpiled in 266 schools (50.1%), whereas in 265 (49.9%) of the 531 schools, it was not.

Preparations to Stay Overnight

There were 362 schools (68.2%) with resources for children to stay overnight, whereas 169 (31.8%) did not offer this possibility (see Table 2). The missing resources or items are shown in Figure 1. The most commonly missing items were blankets and futons. Diapers, bag valve masks, and aspirators used to help children breathe were also in short supply.

Disability and Preparedness in Enrolled Children

We examined the relationship between the type of disability and the preparedness of the enrolled children. The types of impairments considered were visual impairment, hearing impairment, intellectual disability, physical disability, valetudinarian, and

physical weakness (see Supplementary Table 1), among others. Differences in preparation by school type were examined using a χ^2 test. Answers related to securing electric power and means of communication as a preparation for power outages, toilets in the event of a water outage, and fuel, as well as providing the necessary resources for children to stay overnight, were categorized as present or absent, regardless of the type of preparation. Electricity for power outages was secured significantly better in schools for children with physical disabilities than in other schools. There were 177 schools for children with physical disabilities and 131 (74.0%) had electricity for power outages. There were 354 schools for other types of disorders. Two hundred and twenty-two schools (62.7%) had access to electricity ($P = 0.01$). There were no significant differences other than electricity use among schools with children with different types of disabilities (Supplementary Table 1).

Designation of Welfare Shelters and Readiness

We examined the relationship between the designation of schools as welfare shelters and preparedness (see Table 2). Of the 165 schools designated as welfare shelters, 123 (74.5%) reported having secured electricity, whereas 230 (62.8%) of the 366 schools not specified as welfare shelters had secured electricity. The difference

between the groups was significant ($P=0.01$). There were 63 (38.2%) schools designated as welfare shelters with secure means of communication, whereas 111 schools (30.3%) not designated as welfare shelters had secure means of communication. Regarding the availability of functional toilets in the event of a water outage, 109 schools had secured toilets (66.1%), 124 (33.9%) toilets in schools designated as shelters, and 184 (50.3%) in schools without this designation ($P<0.001$). Ninety-nine (60.0%) designated schools and 167 (45.6%) schools that were not designated as shelters had fuel reserves ($P=0.003$). There was a significant difference in the number of items that were in short supply, such as portable toilets, for children to stay overnight, depending on the designation of welfare shelters ($P=0.006$). There were no differences in other items (see [Figure 1](#)).

Discussion

We investigated the implementation of disaster preparedness in schools for children with special needs in Japan, and the results indicated that there was insufficient preparedness for disasters in the schools, as indicated by the fact that most schools reported insufficient resources to deal with these events efficiently. It was suggested that the designation of schools as welfare shelters was associated with better disaster preparedness.

The results of the study are in line with previous findings indicating that families with disabled children are no longer prepared for disasters than the general population, despite their special health care needs.²¹ Even common items were not available in sufficient quantity, including beds for those who were not able to return home. The results revealed a shortage of supplies needed to care for children with special needs. This may be in part due to the fact that the children themselves bring what they need during their time at school. Although the level of preparation should depend on the disability, there was no significant difference between the schools, and the level of preparation was insufficient. This study observed a significant difference in preparedness of facilities between schools designated as welfare shelters and schools without this designation.

The results of the study showed that, when a school is utilized as a welfare shelter, the development of the school is promoted, and children with special needs may receive generous support. If a special needs school is designated as a welfare shelter, preparations are expected to proceed because barrier-free facilities are required to meet the specified standards.

One reason why preparations are not progressing even with the designation is thought to be the school management ministry. The management of schools and local residents in Japan differs from that in other countries. School-age students are managed by the Ministry of Education, whereas local residents fall under the scope of the Ministry of Health, Labor, and Welfare.²² Thus, strong initiatives involving both parties are needed to contend with this challenge.

The school budget was used for education. Disaster management is primarily handled by the Ministry of Health, Labor, and Welfare; the Ministry of Internal Affairs and Communications; and the Fire and Disaster Management Agency. Disaster preparedness requires spending from other agencies, such as the Ministry of Health, Labor, and Welfare and the Fire and Disaster Management Agency. The law specifies that the designation of evacuation centers is carried out by municipalities. In municipalities, maintenance is handled by departments other than education. Municipalities do not have a sufficient budget to prepare

evacuation shelters. After the Great East Japan Earthquake, the national government decided to provide support to municipalities that could not afford the disaster. Hence, the designation of a school as a welfare shelter allows it to use its budget and labor power.¹⁶ However, it was suggested that such welfare centers were not well maintained. One reason may be that the ministries and agencies in charge of disaster preparedness are not clear on this matter, and the application method is not easy.

The welfare shelter and enrichment of goods for children to stay overnight were not related to the designation. As already established, children in special needs schools have unique requirements. When it is not possible to hand supplies over to parents, the goods and food supplies should be properly prepared by the school itself. Yet, preparations other than the equipment are not subsidized by the government and depend on individuals.

It is not always beneficial for schools to be designated as welfare shelters. The designation as a welfare shelter is, in many ways, a burden for schools, as it increases the exposure of children to strangers along with the risks involved. Evacuees may be surprised by the unpredictable behavior of autistic children.²³ Complaints may be filed with the teachers who run the shelters, which can interfere with care.²⁴ Residents need to understand the children and how they respond.²⁵ Therefore, teachers' awareness of disaster prevention and concerns about disaster preparedness are critical for the well-being of students and staff.²⁶

The burden on schools may be very large, depending on the location of the school. There is a need to increase awareness that disasters can have more severe effects and lead to higher levels of mortality in less developed countries. For example, a 6.5 earthquake in central California in 2003 took 2 lives and injured 40 people, whereas a 6.6 earthquake in Iran, 4 days later, had a death toll of over 40 000 people. Both events took place in areas with high population density.²⁷ Therefore, evacuation of special needs schools poses challenges for personnel caring for children, particularly in poor countries. To address this problem and reduce risks, in addition to taking responsibility for the security of the children enrolled, special needs schools designated as shelters need to establish communication with local disaster relief workers, stockpile necessary supplies and equipment, and secure specialized human resources and means of transportation.

Unfortunately, this study did not investigate the locations of schools. As the number of special needs schools is quite small, we were concerned about the decline in response rates owing to the fact that the schools were revealed. Regional aspects must also be considered.

The role of education in the face of disasters cannot be overemphasized. A systematic review and thematic analysis of this topic revealed 8 major categories of disaster risk reduction and educational strategies: raising knowledge, educational needs assessment, educational planning, educational approaches, educational content, educational tools, involved organizations, and educational learning barriers and challenges.²⁸ The results of this study suggest that, in order to reduce disaster risk, it is necessary to evaluate the appropriateness of materials and equipment, in addition to educational strategies.

Limitations

The current study had several limitations, including its cross-sectional design and the use of self-reported data. The survey covered Japan, where disasters frequently occur. The survey is treated as Japan as a whole and does not examine the geographical

differences within the country. This information may be related to the vulnerability of sites to disasters. Future studies should investigate the relationship between the frequency of disasters and geographic characteristics.

Nevertheless, to the best of the authors' knowledge, this study is one of the few valuable surveys developed from the standpoint of school education. However, it is necessary to investigate the position of the government office that designates welfare shelters. The role of teachers' experiences in the implementation of schools as welfare shelters should also be investigated. Moreover, administrative requirements for welfare shelters should be determined.

Conclusions

The results of this study indicate that special needs schools have limited disaster preparedness. Special needs schools designated as welfare shelters were also poorly supplied with equipment and so on. Even in such a situation, special needs schools designated as welfare shelters were significantly more prepared than schools that were not designated. In the future, increasing the schools designated as welfare shelters may lead to progress in enhancing disaster preparedness for children with disabilities.

Supplementary material. The supplementary material for this article can be found at <https://doi.org/10.1017/dmp.2023.98>.

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Author contribution. HK: conceptualization, data curation, formal analysis, investigation, methodology, project administration, validation, writing—original draft; ZC: data curation, formal analysis, validation, visualization; MK: investigation; KS: formal analysis, funding acquisition, resources, software, visualization, review.

Competing interests. None declared.

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