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Children's Diet and Nutrition in the Aftermath of the Torrential Rain Disaster in Western Japan: An Evaluation of Support Activities by Dietitians to Alleviate Mothers' Anxieties

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Brief Report

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Abstract

Objective: The purpose of this study was to clarify whether the support activities of dietitians during disasters were able to address the problems faced by mothers about their children's diet and nutrition.

Methods: Dietitians (7 in total) and mothers (8) were selected by the snowball sampling method. Semi-structured interviews were used to conduct focus group interviews about children's diet and nutrition. Verbatim data were generated, and an inductively qualitative descriptive analysis was conducted.

Results: Six categories were generated for each group. Dietitians responded to problems that mothers had regarding their children's diet and nutrition via 2 activities: [dealing with allergy food shortages] and [school lunch support].

Conclusion: It is important for dietitians to recommend stockpiling allergy-friendly foods to accommodate children with allergies and achieve early resumption of school lunches to meet children's nutritional needs.

Natural disasters caused by torrential rains are becoming more frequent around the world due to global warming; Kamath[1] states that more than 100 million children worldwide have been affected by man-made and natural disasters in the past 20 years. Since disasters also affect nutrition and education, policies need to include child-focused disaster risk reduction. Haq et al.[2] have stated that comprehensive policies on proper nutrition for families in affected areas need to be developed, as a proper diet is essential for the growth and development of children. In 2011, the Great East Japan Earthquake caused food shortages in approximately 80% of evacuation centers.[3] Food assistance for children, especially infants and toddlers, was inadequate in the immediate aftermath of the disaster.[4] In Japan, in the field of disaster nutrition support, the Japan Dietetic Association, Disaster Assistance Team (JDA-DAT) was established in 2012 in response to the 2011 Great East Japan Earthquake. In the support activities conducted by dietitians in the aftermath of the Great East Japan Earthquake and Kumamoto Earthquake regarding food and nutrition, issues such as shortages of powdered milk and foods for allergies were mentioned,[3] but it was unclear whether the support activities of dietitians addressed the problems faced by mothers regarding food and nutrition for their children. Few qualitative studies have analyzed the effects of dietitian support activities on mothers' concerns about their children's diet and nutrition during and after disasters. Therefore, it is necessary to examine whether the support activities of dietitians help alleviate the concerns of mothers.

This study investigated the support activities of dietitians and mothers' concerns related to their children's diet and nutrition in prefecture A, an area[5] affected by the July 2018 torrential rain disaster in western Japan. We identified important support activities for affected mothers that are required of dietitians working at multiple facilities in the disaster area.

Methods

Research Subjects

This study focused on dietitians working in the affected area and mothers living in the affected area of prefecture A, which was hit by a severe natural disaster caused by torrential rains.

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Selection criteria for subjects

Group of dietitians. Seven dietitians working in the affected area in prefecture A and from different workplaces.

Group of mothers. Nine mothers who live in the affected area in prefecture A and have children at different stages of growth and development.

Selection method

Participants were selected by snowball sampling, in which subjects introduced their acquaintances to increase the number of participants: The dietitian group was introduced by D2, a member of JDA-DAT, to recruit participants. The mothers' group was recruited through referrals from their acquaintances, M7.

Survey Methodology and Contents

Focus group interview (FGI) surveys to enhance the reliability and validity of qualitative research were based on a 32-item checklist included in the Consolidated Criteria for Reporting Qualitative Research (COREQ) standards.[6] FGI moderators were instructed 3 times in advance, using an interview script; the FGI time was 2 hours per group and was conducted at a local meeting place. Only the researcher was present to ensure the privacy of the subjects. As this study was conducted 15 months after the disaster, the period from immediately after the disaster to the date of the survey was defined as the mid- to long-term period. In this survey, the group of dietitians was asked about the status of support activities and issues related to children's diet and nutrition at their respective workplaces immediately after the disaster and in each of the medium- and long-term periods, and they were asked to speak freely. The mothers' group was asked about the problems that mothers had with their children's diet and nutrition immediately after the disaster and over the medium to long term, and they were asked to speak freely about these issues. The interview guide was mailed to the subjects in advance and was also explained to them before the start of the FGI. Repeat interviews were not conducted.

Analysis Method

Qualitative descriptive analysis

The FGI was recorded on a voice recorder, hereafter referred to as *IC recorder*, and transcribed verbatim. Each semantic content was extracted inductively as a single item "code." Common semantic content codes were abstracted and categorized as subcategories or categories. The support activities of dietitians responding to disasters were evaluated immediately after the disaster and over the medium to long term, and issues related to children's diet and nutrition were analyzed qualitatively and descriptively. To enhance the reliability and validity of the study, all ambiguous codes of interpretation were fed back to the subjects for confirmation. After discussion among the researchers, it was concluded that no new categories emerged, and data saturation was confirmed.

Ethical Considerations

The subjects of the study were informed that their participation was voluntary, that their narratives would be anonymized, and that the results of the study would be published. Informed consent was obtained using a consent form. After consent was obtained, the subjects' words were recorded verbatim after all personal information was removed from the IC recorder. This study was approved by the Research Ethics Review Committee of the National Institute of Biomedical Innovation (KenEi 112) and the Research Institute of Epidemiology, Hiroshima University (approval date: September 5, 2019; approval number: E-1744).

Table 1. Characteristics of each group

	No.	Dietitian's workplace and age of children (y)	Dietitian workplaces affected by the disaster in the region and evacuation centers for mothers
Dietitian	D1	Health care center	*A total of approximately 590 buildings totally or partially destroyed
	D2	Health care center	*A total of approximately 2100 buildings completely or partially destroyed
	D3	Health center	*Total of approximately 570 buildings, including those totally or partially destroyed
	D4	Nursery school	Flooded 35 cm above floor level, kitchen unusable, water cutoff, electricity cutoff
	D5	Elementary school	Water cutoff, road cutoff
	D6	School lunch center	The kitchen submerged under more than 2 meters of water, taking a year for school lunches to resume
	D7	Nonprofit organization	*A total of approximately 1870 buildings, including those totally or partially destroyed
Mother	M1	(PREGNANT)	One's home
	M2	0 y	Shelter
	M3	7 y	One's home
	M4	10 y, 7 y, 4 y	One's home
	M5	15 y	One's home
	M6	8 y, 4 y	Shelter
	M7	1 y, 4 y	Friend's house
	M8	3 y	Shelter

*Based on August 13, 2018: A Regional Disaster Task Force Summary.

Results

Summary of Participants

Subjects in the dietitian group and the mothers' group had their characteristics summarized based on information obtained from the FGI, except for the dietitians' workplaces and ages of their children (Table 1). Nine mothers were requested for the mothers' group, but 1 was absent on the day of the study.

Support for Dietitian Activities and Problems Faced by Mothers

As a result of the FGI, the dietitian group was organized into 69 codes, 19 subcategories, and 6 categories (shelter operations, school lunch preparation, dealing with allergy food shortages, school lunch support, disaster stockpile food and menu guide, and preparation for JDA-DAT activities). The mothers' group was organized into 121 codes, 16 subcategories, and 6 categories (food shortages immediately following a disaster, difficulty in cooking due to disruption of lifelines, dealing with allergic food shortages, responding to physical symptoms associated with eating,

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Table 2. Results of content analysis for each group

Category	Subcategory	Stage of disaster**
1. Support activities of dietitians		
Shelter operations (2)	Providing meals to evacuees in shelters (2)	Initial
School lunch preparation (7)	Kitchen sediment removal (1)	
	Preparation of children's school lunch (1)	
	Negotiated with vendor regarding provision of school lunches (3)	
	Sanitation of school lunch (2)	Medium to long term
Dealing with allergy food shortages (26)	Insufficient stockpiles of allergy milk (8)	Initial
	SOS from Mothers' Association for food shortage (2)	
	Continued procurement of necessary allergy foods (13)	Early stages of a disaster
	Lack of cooperation with departments in charge of disaster prevention (3)	Medium to long term
School lunch support (17)	Cold transport to prevent food poisoning (3)	Early stages of a disaster
	School lunch for allergic children (2)	Medium to long term
	Nutritional adjustment according to growth and developmental stage (11)	
	Calcium addition (1)	
Disaster stockpile food and menu guide (13)	Nutritional counseling for prevention of constipation (2)	Medium to long term
	Recipe introduction and cooking practice for elementary school students (3)	
	Spread disaster recipes to local children (2)	
	Nutritional guidance utilizing infant health checkups (6)	
Preparation for JDA-DAT activities (4)	Schedule of activities (3)	
	Poor relationships with mothers of allergic children (1)	
2. Problems faced by mothers regarding their children's diet and nutrition		
Food shortages immediately following a disaster (19)	No food stockpile at home (14)	Initial
	Pregnant women whose parents were affected by the disaster have no one to turn to (2).	
	Nursing mothers are undernourished in shelters (3).	
Difficulty in cooking due to disruption of lifelines (53)	Difficulty sterilizing baby bottles due to water outage (5)	Initial
	Difficulty in cooking due to water shortage caused by water cutoff (21)	Medium to long term
	Lack of information about water outages (17)	
	Roadblocks preventing food shopping (10)	
Dealing with allergic food shortages (20)	No allergy-friendly meals are provided at the shelter (5).	Initial
	Trouble running out of allergy food (4)	Medium to long term
	Insufficient stockpiles of allergy food (9)	
	Allergic food sorting (2)	
Responding to physical symptoms associated with eating (18)	Children with developmental disabilities experienced inconvenience to eat (16).	Initial
		Medium to long term
	Abdominal pain in shelters (2)	Initial
Lack of understanding of allergies (1)	People around me don't understand my allergies (1).	Medium to long term
School lunch support (10)	Harms of taking a year to resume school lunches (4)	Medium to long term
	School lunch is cold (6).	

**Defined as initial from 0 days to 1 month and medium-/long-term from 1 month to about 1 year and 3 months (until October 2019, the date of the FGI survey), referring to the food and nutrition support activities after the Great East Japan Earthquake.

lack of understanding of allergies, and school lunch support) (Table 2).

In Table 1, D7, a mother of a child with allergies sent an SOS via Group LINE®, asking for help because of a shortage of allergy food at the time of the disaster. D6: The school lunch service was suspended for 1 year owing to the kitchen being flooded by approximately 2 meters of water; thus, we negotiated with the vendor in the early stages of the disaster and continued to provide lunch boxes and 200 mL of milk as a mid- to long-term response.

One of the problems faced by the mothers was the lack of allergy food from the early to mid- to long-term stages of the disaster; some of the children with allergies (hereinafter referred to as *allergic children*) that D7 provided support activities for were in trouble in the early stages of the disaster, as the evacuation centers did not provide special meals for allergic children. One mother appealed, "I want parents other than allergic children to know how hard it is to live with allergies." A mid- to long-term student said, "As a parent, I am very grateful because I don't have to cook school lunches," since lunch boxes made by a vendor were provided as

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school lunches. However, "I was shocked to see children eating cold lunch boxes made by a vendor as school lunch on a winter visit," she said, and requested that "hot soup be added to school lunches."

Discussion

A qualitative descriptive analysis of support activities conducted by dietitians during the western Japan torrential rain disaster showed that 2 activities that addressed the problems faced by mothers were dealing with allergic food shortages and school lunch support. A 2018 survey of allergy food stockpiling across Japan found that only 20.9% of municipalities were stockpiling allergy foods.[7] This study also showed that stockpiling conducted by local governments is not widespread. Although mothers with allergic children who sent out an SOS (dealing with allergic food shortages) were addressed, not all allergic children were addressed. Dietitians, especially those working for local governments, need to ensure that the necessary amount of allergy food is stockpiled as soon as possible to save the lives of children suffering from allergies.

As part of the school lunch program, 200 mL of milk was served daily at school to meet the children's calcium[8] intake, an essential nutrient for growth and development and bone strengthening. According to the Dietary Reference Intakes for Japanese in 2020, the recommended amount of calcium is 650 mg/day for males ages 8–9 years and 1000 mg/day for males ages 12–14 years. Of note, 200 mL of school lunch milk provides approximately 200 mg of calcium, 1/3 to 1/5 of the daily calcium intake required. Therefore, for elementary school students, it is highly significant to provide milk in school lunches, especially in times of disaster. Furthermore, since mothers were willing to provide lunch boxes from vendors as school lunches, school lunches were found to be a form of support that mothers were strongly aware of. However, because it took approximately 1 year to upgrade the flooded kitchen, it was not possible to meet the need for hot soup to be served, especially in the winter. Essentially, elementary school lunches are provided equally to all children, regardless of parental income or other factors, and are highly nutritious. Therefore, it was suggested that school lunches, in particular, be a top priority in disaster recovery. In addition, providing protein-rich foods and vegetable-rich soups can supplement the nutritional requirements.[9] When vendor-prepared lunches are provided as school lunches during a disaster, their nutritional value should be similar to that of a regular lunch; children under the age of 5 years need support for disaster meals and nutrition.[10] A soup with many ingredients is considered nutritious and easy for children to eat.

Limitations and Future Development of This Study

One limitation of this study is that the survey was limited to 1 affected prefecture. Furthermore, although we sampled dietitians from multiple workplaces, what 1 dietitian told us was not representative of the workplace. In the future, it will be important to compare the status of support activities related to diet and nutrition based on reports from different regions.

Conclusion

Among the support activities by dietitians working in the areas affected by the torrential rain disaster in western Japan, 2 of the most common concerns raised by mothers regarding their children's diet and nutrition were dealing with the shortage of allergy-compatible foods and dealing with school lunches. Recommendations for stockpiling allergy-friendly foods and early resumption of school lunch programs will help save children's lives.

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Author contributions. YI, NT-K, and HN performed the study, discussed the results, and contributed to the final manuscript.

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Competing interests. None.

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