

Human Journals

**Short Communication**

June 2022 Vol.:21, Issue:4

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## Is Meal Satisfaction Necessary in The Event of a Disaster?



**IJSRM**  
INTERNATIONAL JOURNAL OF SCIENCE AND RESEARCH METHODOLOGY  
An Official Publication of Human Journals



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**Submitted:** 22 May 2022  
**Accepted:** 27 May 2022  
**Published:** 30 June 2022

**Keywords:** nutrition during a disaster, disease prevention, meal satisfaction, individual meals

### ABSTRACT

In the event of a disaster, the quality of clothing, food, and housing tends to deteriorate. Of these factors, a continuous food source is required with the promptest response. Therefore, we summarize the conditions necessary for meals in the event of a disaster. To maintain physical health, it is necessary to consume a meal that takes calories and nutritional balance into consideration. In evacuation shelters, group life is required, and people who differ in age, gender, and chronic disease status must live together, even if only for a short time. Providing a variety of foods tailored to each individual can be difficult. We also consider whether meal satisfaction is a necessary factor, such as food provisions suited to individuals' daily diet and satisfying individual tastes.



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## INTRODUCTION

In the event of a disaster such as an earthquake, tsunami, typhoon, or heavy snow, the quality of clothing, food, and housing (clothing: Clothes and other items that help maintain body temperature; food: Meals/foods for ingesting nutrients; housing: Places that form the basis of daily life) that individuals need or wear is more likely to deteriorate than is common (the normal state before the disaster; in the case of clothing and food, this is also true for quantity). Restoring these to their original state at an early stage after a disaster is thought to help maintain the level of quality of life (QOL) and speed recovery.

Even if the home that constitutes “housing” collapses, it is unlikely that the resident will immediately die unless crushed in the collapse. Housing takes several months or more to rebuild, and it will be necessary to live elsewhere for that period. Many people do not usually prepare housing in advance for evacuations in the event of a disaster. After the disaster, the national and local governments will provide financial assistance to rebuild a home and temporary housing (at least in Japan). As for clothes, their condition does not necessarily deteriorate if they are worn continuously immediately after a disaster and thus do not impair physical condition (hygienically, of course, this condition is not desirable). After the situation has settled, one may dress in clothing from one’s home or donate clothing. It is not always possible to dress to suit one’s taste and size, but one can ensure appropriate body temperature regulation, which is the original purpose of clothing. Therefore, it is considered that the adverse impact on QOL, *etc.* is small.

Unlike housing and clothing, however, in the case of food, the promptest response is continuously required.<sup>1)</sup> Living things including humans cannot survive without ingesting nutrients.<sup>2)</sup> Moreover, the period during which one can go without is very short. Not only must one only need to eat once; continuous intake above a certain amount (the required calorie intake) is necessary. If possible, it is desirable to be able to eat every day as before the disaster. However, preparing a meal for disasters is much easier than preparing a spare home or clothing, and it is easier to do so daily.<sup>3)</sup> In this paper, we focus on meals in the event of a disaster, particularly the meals that should be prepared at evacuation shelters or in advance before the disaster, and analyze the necessary conditions. Food that individuals can prepare themselves

poses problems of money or storage space, but their type and amount can be adjusted as wished.<sup>3),4)</sup>We will mainly consider group meals that are served almost uniformly to a large number of people in shelters without the possibility of individual choice.

### *Necessities of meals in the event of a disaster*

We will focus on the dietary conditions that have long been considered to be the minimum necessary, primarily by nutritionists in recent years. Above all, each evacuee must ingest the required amount of the five major nutrients: carbohydrates (sugars), proteins, lipids, minerals (inorganic substances), and vitamins.<sup>1),3)</sup> From the viewpoint of ingredients, foods using grains, which are considered staple foods (for the Japanese, cooked rice or baked bread), main dishes such as meat and fish (cooking methods are various, such as raw, grilled, and fried), and side dishes using vegetables (various cooking methods) are at least necessary in daily life. Since each of these is rich in all five major nutrients, the nutritional intake is balanced to some extent. In the event of a disaster, there is also the problem of securing and cleaning tableware, so it may not be possible to prepare a large number of food items and divide them into multiple dishes such as main dishes and side dishes. In some cases, only foods that are integrated into and served as one dish, such as soup with many ingredients, will be distributed. If it is distributed to a large number of people, it is impossible to change the food individually.<sup>5)</sup> Meals are cooked at shelters and pre-made foods are distributed, but depending on the combination of ingredients and cooking methods, some people affected by the disaster may not be able to eat. For example, some foods may be cooked that individuals dislike or have allergies to. Alternatively, elderly people with dentures or weak jaws may not be able to eat something that hardens after baking.

Moreover, individuals may not be able to eat because of an aversion to the taste and aroma of the ingredients or the final dish. As a result, nutritional imbalances may occur when an individual cannot eat everything available. Since the amount of food distributed is often as small as necessary, it is difficult to ingest more food than necessary to obtain a feeling of fullness. As in the meals served in hospitals, the seasoning may be weak because of shortages or adjustments in the amount of salt for reasons of health, rendering the taste unsatisfactory. Nutrients may be calculated on the spot or in advance by a registered dietitian, and a well-balanced meal may be provided, but some situations do not permit flavor to be an overriding consideration.<sup>6)</sup> these

problems have not been solved even now. Indeed, it is difficult to provide foods to many victims suited to their individual preferences,<sup>5)</sup> and so it is often difficult to provide satisfactory meals under disaster conditions.

### *Necessities for future meals*

Now we turn to points that need improvement in the future (even if it is unclear how to resolve them; Table 1). In recent years, evacuation shelters have also considered providing special foods for the elderly and infants. It is difficult for the elderly to eat hard foods, as noted above, and similarly, infants may not be able to eat hard foods due to a lack of teeth. Moreover, children and adults have different food preferences, so they may not be able to eat the same meals. In addition, the types of diseases that must be given consideration are increasing (where consideration can be given). For the elderly, it is possible to provide nutritional support as well as treatment with pharmaceuticals for the diseases that they originally suffered from, such as diabetes and kidney disease to prevent aggravation of any health conditions. Moreover, uncommon situations such as living in a shelter may induce new diseases (Table 2), typical ones including constipation and heat stroke.<sup>7)</sup> Constipation is more likely to occur due to the inability to easily go to the bathroom as one wishes as at home, or to the stress of being placed in a shelter. Another cause is insufficient intake of water and fiber. Heat stroke is thought to be caused by insufficient air conditioning in gymnasiums and meetinghouses used as shelters, but it is also caused by the fact that it is often difficult to ingest sufficient water and salt, which have a preventive effect against heat stroke depending on the type and amount of food. In the case of long-term evacuation where there is no air conditioner in midsummer or where the individual has low control over the surroundings, it may be difficult to completely prevent heat stroke with just meals.

In addition, there is also the problem that not enough food is distributed at each shelter, including in Japan, in the event of a disaster.<sup>8)</sup> If only a biased selection of foods is offered, they may be consumed in excess. A previous study reported that grain-based food containing only carbohydrates was provided at the evacuation center of the Great Tohoku Earthquake in 2011.<sup>3),8)</sup> One common measure is to reheat meals to provide evacuees a satisfying meal.<sup>1)</sup> Unfortunately, it will be difficult even in the future to provide foods that are perfectly tailored to individual

wishes and preferences at shelters.<sup>5)</sup> It seems that the only way to make up for this is to prepare one's food and water capable of long-term storage, assuming that each person may evacuate due to a disaster.<sup>4)</sup> In this event, it is relatively easy to prepare one's usual food as suits one's tastes<sup>1)</sup> to supplement the food provided at the shelter. However, one's tastes may be nutritionally biased, and when living in a shelter with others, eating something different only for oneself may lead to trouble with others. Therefore, it may be necessary to consider where one eats and share it with others. It is difficult for the victims to secure all the meals they need for a long-term evacuation on their own, so it may be desirable to consider making snacks such as vegetable chips and dried potatoes available.

## CONCLUSION

Disasters are unusual and painful events for many people. Of course, one should avoid disasters, but people do not know when a natural disaster will occur and it is not possible to prevent natural disasters from occurring. Thus, there is no choice but to consider mitigation of damage and early recovery in the event of a natural disaster. It can be said that such preparations are necessary not only for local governments but also for individuals. When it comes to preparing meals, individuals cannot cover everything, and there are certainly limits to what can be done. However, to ensure a quick recovery after a disaster, it is important not only to prevent physical illness and maintain good health but also to raise mental awareness (a strong will to live). We believe that meal satisfaction and dietary enjoyment may be involved in this. At the time of a disaster, what individuals ate in their daily lives may make them happy.<sup>4)</sup> For example, just as hot meals bring joy, eating and drinking may be a driving force for people's motivation and recovery. That is why that consideration may be important.

It seems that the minimum amount of food is distributed at evacuation shelters, but in some cases, the amount is sufficient only on a calorie basis, so instead of relying solely on what is distributed, individuals should consider stockpiling their food.<sup>4)</sup> In case of a chronic illness such as allergies or restrictions on what one may eat, extra preparations are necessary. When stocking one's foods, it is a good idea to prepare and store the foods one is accustomed to eating regularly. Since long-term storage must be considered, it is better to pay particular attention to nutritional balance in addition to what is distributed to everyone at evacuation shelters. For example, dried

fruits are easy to store for a long time and can be supplemented with vitamins, minerals, and calcium.<sup>1)</sup>

In conclusion, satisfaction with meals in the event of a disaster may spur the motivation for reconstruction. So long as priority is given to avoiding the aggravation of original illness, avoidance of new ones, and the ingestion of necessary calories, dietary satisfaction can be considered later.

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Table 1 What is needed for disaster meals provided at shelters

Almost solved	Solved to some extent	Almost unsolved
<p>- Provide meals to everyone Treat the victims equally</p> <p>- Multiple types of food Sufficient intake and balance of the five major nutrients</p>	<p>- Providing a meal with the required calories Production of energy to move the body</p> <p>-Food with a good nutritional balance Menu providing all five major nutrients</p> <p>- Providing warmth and warm items Gives spiritual soothing</p> <p>- Considering the illness from which an individual is suffering Suppressing the progression of the disease as much as possible</p> <p>- Providing foods for the elderly and infants Improvement of cooking methods and food hardness</p> <p>-Foods and cooking methods for disease prevention Prevent constipation and heat stroke</p>	<p>- Consider individual preferences (make it possible to investigate and make choices) Have them eat all the balanced foods they have been given</p> <p>- Provided separately for staple foods and main dishes Securing and cleaning tableware</p> <p>- Eliminate differences in the amount of food for each shelter Disparities will occur depending on the location</p> <p>- Providing enough to make evacuees feel full Give a sense of satisfaction</p> <p>- The taste is too light Result of adjusting the salt content, but there are other means to this end.</p>

Based on reference 1).

Table 2 Requirements for disaster food in consideration of disease prevention

Type of disease	Necessary nutrients	Explanation	Ingredients and food examples
Cold / influenza	Vitamin A, Vitamin C, Vitamin E, Protein	<p>Increases body resistance (immune function)</p> <ul style="list-style-type: none"> <li>- Vitamins C and E have antioxidant effects and prevent active oxygen from lowering immune function</li> <li>- Vitamin A has the effect of protecting the mucous membranes</li> <li>- Protein produces muscles, organs, immune components, etc.</li> </ul>	<p>Canned meat and fish</p> <p>Soy food</p> <p>Vegetable/fruit juice</p> <p>vegetable soup</p> <p>Fruits (canned, dried fruits)</p> <p>Dried vegetables, vegetable chips</p>
Norovirus/mass diarrhea	Clean water	<p>Do not drink contaminated water and avoid dehydration if you have diarrhea</p>	<p>Onset period: Oral rehydration solution, sports drink</p> <p>Recovery period: Retort pouch porridge, tofu and udon noodles stored at room temperature, vegetable pottage</p>
Bronchitis	Vitamins, proteins	<p>Like a cold, it increases resistance</p> <ul style="list-style-type: none"> <li>- If you have a bad cough, it is difficult to eat, so it is easy to swallow because of the troma.</li> </ul>	<p>Retort pouch porridge/meal</p> <p>Arrowroot tea, amazake</p> <p>Tofu stored at room temperature</p>
Heatstroke	Moisture, salt (mineral)	<p>For prevention, you need to drink water diligently</p> <ul style="list-style-type: none"> <li>- It is effective to replenish salt</li> </ul>	<p>Oral rehydration solution, sports drinks</p> <p>Umeboshi, salted kelp,</p>



		<p>at the same time.</p> <p>- People who are not good at drinking salted water should take high salt water separately.</p>	<p>salted candy</p>
Constipation	<p>Dietary fiber (indigestible sugar), water</p>	<p>In evacuation life, constipation is likely to occur due to a lack of dietary fiber and water.</p> <p>There will be more difficulties to endure</p> <p>Severe constipation increases susceptibilities to infection</p>	<p>Dried sweet potatoes, dried vegetables,</p> <p>Green juice, soup</p>
Frail / disuse syndrome	<p>Three major nutrients (protein, lipid, sugar)</p>	<p>In the event of a disaster, the range of activity will be narrowed and the amount of activity will be significantly reduced, resulting in reduced muscle strength and flexibility.</p> <p>Incorporate enough energy sources to move</p> <p>Sweets such as snacks can soothe your mood</p>	<p>Retort pouch porridge, miso soup, canned meat, and fish</p> <p>Favorite snack</p>

Based on reference 7).