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# The characteristic features of emergency food in national level natural disaster response programs: A qualitative study

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## Abstract:

**INTRODUCTION:** One of the most important responsibilities of governments and relief agencies after each natural disaster is to provide the victims with emergency food items. This is an inevitable measure to save the lives of injured and the ones who are rescued. This is due to inadequacy and unreliability of household and local food supplies. Selection of the type of food is a concern of managers of the response management programs. The purpose of this study was to investigate the characteristics of emergency food items provided after natural disasters in Iran from the key informants' viewpoints.

**MATERIALS AND METHODS:** To conduct this qualitative study, we interviewed 26 experts in the field of nutrition and response management in natural disasters through semi-structured interviews. Participants were selected using purposive sampling. The qualitative content analysis method was further applied to analyze the collected data.

**RESULTS:** Analysis of interviews showed that the characteristics of emergency food provided after natural disasters should be investigated in two categories: (1) nutritional considerations and (2) functional characteristics. Nutritional considerations category comprised subcategories, namely, formulas and special foods for emergencies, food diversity, nutritional needs of different groups, food health and safety, and functional characteristics included subcategories of packaging, cultural norms, and final price.

**CONCLUSION:** Managers, in relation to the emergency food items used after natural disasters, should consider features including emergency formulas and food, food diversification, food health and safety, packaging certificates, cultural norms, and final prices in response plans.

## Keywords:

Disaster management, emergency food, food safety, natural disaster

## Introduction

Natural disasters, such as floods, earthquakes, and inappropriate weather patterns, are part of the inevitable experiences of human civilizations and usually have similar effects on different food systems. They often affect the food security of the victims by reducing short-term or long-term access.<sup>[1,2]</sup> Providing a diverse diet, including micronutrients, after a natural

disaster has been a response challenge in the management measures of natural disasters. Throughout human history, the rural and agricultural communities have stored food such as cereals, legumes, nuts, meat, and dried fruits, and meats to survive during emergencies.<sup>[3,4]</sup>

Household supplies are totally unreliable due to the dependence of modern lifestyles on refrigerators, freezers, and electricity as well as the likelihood of power outages in emergencies after the natural

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disasters.<sup>[5]</sup> Golem and Byrd-Bredbenner in a study in New Jersey (USA) showed usually the household food supplies are insufficient and threatened the households food security in the postdisaster emergency situation. Hence, governments and relief agencies should have plans to store and deliver emergency and ready-to-eat food items after each natural disaster, when people do not have access to enough food and equipment.<sup>[6,7]</sup>

Nekouie Moghadam *et al.* revealed the absence of a distribution program for emergency food and lack of food diversification up to several weeks following the Bam earthquake.<sup>[8]</sup> In a study after the Great East Japan Earthquake, Inoue *et al.* showed most food aid received, such as rice balls or bread, was carbohydrate-based, possibly because of easy provision and abundance in emergency food pantries. They reported decreased food intake 1 month after the earthquake, loss weight, gastrointestinal symptoms, including constipation, appetite loss, vomiting, and nausea in survivors.<sup>[9]</sup> In another study of the same earthquake, Nakazawa and Beppu reported the insufficiency of food supplies and highlighted the need to store required amounts of appropriate food items in the preparation stages and categorized the emergency food items according to differences in their ease of consumption. They also put forward the idea of shifting the conventional concept of emergency food to one of “disaster preparation food” that is based on appropriate ways for providing public stockpiles.<sup>[7]</sup>

Wien and Sabaté showed that handling properties, preparation ease, cultural acceptance, and individual tolerance are the important food selection criteria in disaster response planning. They consider using a plant-based approach and suggest food items including dried grains, dried cereals, dried fruits, and nuts as the most suitable diet for emergencies.<sup>[3]</sup>

Some researchers such as Zahra *et al.* in Pakistan and Sheibani *et al.* in Iran have also put forward some ideas for the production of micronutrient-rich formulas in the form of powder, biscuits, and chocolates.<sup>[10,11]</sup> These formulations have attracted many attentions as they have low volume, high energy, long shelf life, and they are rich in micronutrients.<sup>[12]</sup> However, Scott-Smith in an analysis mentioned the serious challenge of formulas against their overall acceptance is their unfavorable taste.<sup>[13]</sup>

Iran is located in the Middle East and due to the geographical characteristics, is subjected to various natural hazards such as earthquakes, floods, storms, and inappropriate weather conditions (such as heavy rain, snow, and erratic weather patterns).<sup>[14]</sup> In most cases, after the occurrence of these natural disasters, providing ready-to-eat foods by the government and relief

organizations to save the lives of victims and relief forces becomes indispensable. While postdisaster nutritional problems are focused in some studies, few researchers have studied the multidimensional characteristic of foods that can be consumed in emergency conditions during the early stages after natural disasters. The problems following every disaster are unique; therefore, the qualitative aim of this study is to explore the Iranian experiences with the emergency foods delivered and to reveal some aspects in this field. We believe that the results can be used in the development of knowledge in this area and designing an appropriate disaster management planning for the selection, production, and storage of emergency foods that can be consumed in emergencies.

## Materials and Methods

In this qualitative study, the characteristics of emergency food provided to the affected people, rescuers, relief workers, and other stakeholders in the early stages of postdisaster response in Iran were studied. We used content analysis method to identify the challenges and characteristics of the emergency food provided after natural disasters in Iran.

To collect data, a semi-structured interactive interview was conducted with 26 key informants and experienced experts in the field of nutrition and the management of natural disasters. We selected participants through the objective-based purposeful sampling. All participants had expertise, experience in food assistance, nutrition responses in natural disasters, willingness to participate in the study, and were available throughout the study. Table 1 presents their composition in terms of occupational and administrative position.

Interviews were conducted from June 2016 to March 2017, and the average time spent for each interview was 55 min.

**Table 1: Executive position of the participants in study**

Institution	Administrative position	
	Experts	Administrators
The Ministry of Health and Medical Education	2	2
Iranian Red Crescent Society	2	4
Military (health and education departments)	4	
National Disaster Management Organization Of Iran		3
Supportive Organizations	1	1
Correspondent (Natural Disaster Reporter)	2	
The Ministry of Agricultural Jihad	3	2
Total		26

The interview usually began with an open question, for example, tell me what kind of food is delivered to people after a disaster? Or can you share your own experiences of foods distributing among the people after a disaster? And then, what foods would you find more suitable for emergencies? Complementary probe questions were added when needed.

The interviews were recorded. However, for some participants, who were reluctant to have their voices recorded, the ideas were transcribed. We continued the data collection up to data saturation. Immediately after each interview, its contents were transcribed, reviewed several times, and its basic codes were extracted. Later, the obtained codes were classified, based on their similarities, and the related contents were extracted from the data and concepts.<sup>[15]</sup> MAXQDA 10 software was then applied to codify and classify the information achieved from the interviews and the extracted concepts.

Trustworthiness in qualitative research is related to transparency in methodological approaches.<sup>[15]</sup> In this study, credibility was established through field notes and memos, prolonged engagement with the participants, and revisions by the participants. The use of a wide range of informants in different positions was one way of triangulating via data sources helped trustworthiness. Data validation was performed through in-depth prolonged engagement with the data. As an additional control for validity, a peer check on a sample of transcripts was made by two faculty members who were not part of the research team. To further promote the dependability of the study, discussions, and negotiations in the intermittent meetings of the research team members to reach an agreement on the differences and similarities, to categorize the codes, and to integrate their perspectives around the meaning units, primary codes, themes, and subthemes were done.<sup>[15-17]</sup>

Initially, the participants were asked to sign the written consent forms and then the interviews were conducted at their workplaces. We also provided the participants with detailed information about the voluntary nature of the interview and the fact that they had the right to withdraw from the interview at any point in time. Moreover, they were assured about the confidentiality of the gathered viewpoints. We excluded the data that led to the identification of the interviewees. This study was approved by the ethics committee of Iran University of Medical Science (Code: IR.IUMS.REC.1394.9211567205).

## Results

By analyzing the data collected through interviews, the characteristics of emergency food provided to the affected people, rescuers, relief workers, and other stakeholders

in the early stages of postdisaster response in Iran as shown in Table 2 and Figure 1, the two categories of (1) Nutritional considerations and (2) functional features, as well as the seven subcategories, were raised and identified.

### Nutritional considerations

Findings showed that the nutritional need of the affected people is the most important variable considered by governments and relief organizations while distributing ready-to-eat food during emergencies after natural disasters. The nutritional considerations for ready-to-eat foods were studied in four subgroups: (1) formulas and special foods for emergencies, (2) food diversity, (3) nutritional needs of different groups, and (4) food health and safety.

#### Formulas and special food for emergencies

The production and supply of nutritional food formulas fortified with key micronutrients such as minerals and vitamins in various forms, such as blended powders and different biscuits or chocolates, were considered by some participants. One of the experts from the Ministry of health said:

*“We had on our agenda to produce enriched biscuits required vitamins or minerals and to lengthen its shelf life”* (Participant number 1).

In fact, these nutritional formulas allow the nutrition managers of Iran to add the micronutrients to the nutritional formulas selectively. That is, according to the nutritional problems of victims in the damaged areas. However, in general, the other interviewees pointed out cases when the affected people did not welcome such formulas. They also mentioned the high production cost and uselessness of these food items when disasters do not occur. One of the participants mentioned that:

*“Some chocolates were distributed among people, the high-energy ones ... coated with cocoa, they had nutritional*

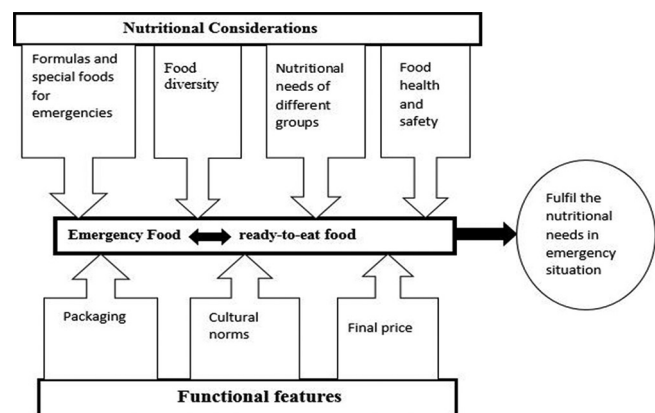


Figure 1: Characteristic features of emergency food in natural disaster response programs

**Table 2: The main and the subcategories related to characteristic features of emergency foods in natural disaster response programs**

Main category	Subcategory	Codes (examples)				
Nutritional considerations	Formulas and special foods for emergencies	Enriched formulations				
		Selected food formulas				
		Nonacceptance of formulas as food				
		Unpleasant taste				
		Lack of congruence to the people nutritional preferences				
		Different concepts of food				
		Acceptance of formulas as a nutritional supplement				
		Repetitious food items				
		Lack of dietary diversity/lack of dietary diversification				
		Digestive problems				
Functional features	Food diversity	Restrictions on the selection of food products				
		The possibility of meriting new technologies				
		Planning for producing suitable food products				
		Emphasis on common nutritional needs				
		Consideration the nutritional status and needs of the patients, elderly, children and other groups				
		Nutritional needs of different groups	Food health and safety	Health monitoring guidelines		
				Nutrition monitoring guidelines		
				Application of health and nutrition certificates		
				Packaging	Cultural norms	Simplicity of usage
						Packaging resistance against physical and chemical damage
Packing resistance against external influences						
Environmental considerations for packaging material						
Suitability of 2 years durability/shelf life						
Emphasis on common nutritional patterns						
Nutritional religious considerations						
Food native considerations						
Religious and cultural considerations of food products labeling						
Final price	Final price	Exponential increases in the cost due to shelf life increasing				
		The importance of prime cost				
		Pay attention to the cost - the benefits of products				
		The importance of limited financial resources for food storage				

*value but children did not like them, these did not have the taste of chocolate, children even did not take them as food, they were not consumed"* (Participant number 3).

It seems that the use of fortified food formulas is unacceptable, but they may be more acceptable as nutritional supplements.

### *Food diversification*

Ready-to-eat food items are provided to the victims of disasters and accidents. These food items usually include canned cereals and beans, canned tuna, different kinds of bread, biscuits, and dates. The time within which people are required to consume the emergency food may last for a few days from the time of the blizzard, severe snow, and storms, individuals trapped in roads and hard-to-reach places up to several weeks at the time of earthquake and flood. The interviewees referred to the uniformity and nondiversification of food products as a problem, especially when people were forced to consume them for several weeks. The participants mentioned the gastrointestinal disorders,

such as constipation, nausea, and loss of appetite as a serious challenge:

*"... We have many cases like this in the camp. The digestive problems that arise"* (Participant number 23).

Some interviewees emphasized the possibility of creating more variety in emergency food by production and process technologies of food products. These include the production of more varied cans using a mixture of different vegetables and meats, dairy production, fruit juices, cream, soy milk, yogurt, soups, and honey with ultra-high temperature packaging, nuts, and dried fruits. They also mentioned that coordination with food manufacturers in the private sector to produce more suitable products and to conduct further research is necessary:

*"We need to write memorandums to the food factories so that they produce the needed food items within the required time ... reduce the amount of salt. Add more vegetables to it"* (Participant number 7).



### Nutritional needs of different groups

The ready-to-eat food items prepared in emergencies are almost the same in all conditions and in all parts of the country. In other words, different age, ethnic, and religious groups are required to choose their proper food from a limited and not very satisfying list. Interviewees from the Red Crescent acknowledged that efforts are being made to store and provide food aids based on the common habits and dietary norms of various ethnic and religious groups. However, children and the elderly are faced with limited choices. Given that these food products are usually rich in salt and sugar, but poor in fiber, patients, and individuals with diabetes and hypertension have more serious problems for accessing the nutrients they need:

*“These canned dishes are salty, their every-day consumption is dangerous for health”* (Participant number 15). *“I saw that same food was distributed to all. Can an elderly really eat that food?”* (Participant number 8).

### Food health and safety

Health and safety of food products is an important variable in public health and in preventing foodborne diseases. The findings of the present study indicated that, in addition to continuous health monitoring, attention should be paid on the national food certificates and standards. Insertion of the symbols associated with the certificates and standards that have been met in food production along with the inclusion of nutritional facts on food packaging facilitate the continuous and accurate monitoring and checking of health issues. Observing the health hints and guidelines when using the food products and also after opening the packages requires prior skills and training. Participants in this study emphasized on the continuation of training and supervision in emergencies. They also indicated that any negligence in the field of food safety and health could lead to a new crisis:

*“Unofficial statistics announced that some people lost their lives as a result of botulism. To put a healthy person’s life in danger with indifference and create a crisis in the middle of a crisis. The word “awful” can be used for it”* (Participant number 21).

### Functional features

According to the findings of this study, other variables also exist in addition to the mentioned nutritional considerations. These variables influence the decision about planning, selection, storage, and delivery of ready-to-eat food products in emergencies. These functional features include (1) packaging features, (2) cultural norms, and (3) final price. In fact, each of these variables can put the emergent use of ready-to-eat

food items under serious constraints, which we examined here.

### Packaging

Emergency food products are often canned and dried. Modern packaging technologies provide suitable conditions to supply beverages such as enriched, fortified milk and juice, which are rich in micronutrients. However, findings of the current study suggested that the need for water and heat for the consumption of such products is still a functional challenge.

The type of containers and coatings used for packaging should be resistant against rupture, perforation, and deformation. They are also required to be impermeable during storage and transportation. On the other hand, according to interviewees, packaging design should be such that people do not need any extra equipment to open and consume these food items:

*“We had a problem in Bam; they gave people canned fish, but no opener. Hence, how can one open the canned fish? People did not know how to open the cans. They hurt their hands”* (Participant number 20).

Disposal of containers and packages after consumption was also one of the environmental concerns of the responding authorities. Consumption of a large amount of packaged foods in a short time needs prior planning for the collection and disposal of these containers. Environmental considerations should then be taken into account in the selection of the material used for making such containers.

### Cultural norms

Participants of this study believed that in emergencies after natural disasters, when the affected people are in an unfavorable psychological and mental state, unfamiliar packages are not welcomed. Package designs that do not match with individuals’ cultural and religious norms, for instance, the food aid provided from overseas resources make the situation more complicated:

*“With those psychological conditions that people were in, having the kind of food they had never eaten can put them into trouble, it even can cause digestive illnesses. There were food products that did not conform to the culture of that place. they were unfamiliar with such food products and never used them”* (Participant number 9).

Regarding various ethnic groups and religions in Iran, the interviewees emphasized the proper planning and storage of food products based on the common food habits among different ethnic groups and religions of the countries. They also suggested that more cautious should be exercised on monitoring of the content of foreign and domestic food aids sent to the affected areas.

### Final price

Although long-term shelf life is an important feature in choosing food products for storage and consumption in emergencies, the issue of the final price of these products is a crucial determinant factor for the governments and rescue organizations in response management. The technologies used to increase the shelf life of food products are usually expensive and lead to higher prices. When natural disasters do not occur, these stored food products remain unconsumed and thus, the responsible institutions incur a big financial loss. Comprehensive planning for updating and consuming food supplies before the expiry date in such conditions is necessary, for example, these supplies can be put in the food basket of the poor and the needy. In this regard, a 2 year shelf-life is necessary and sufficient from the viewpoints of the participants:

*“The shelf-life of products entering our warehouse is 2 years. When there is no crisis, the items that are about to expire within 6 months are used in the supportive plans prepared for the poor”* (Participant number 6).

## Discussion

After the natural disasters, emergency conditions arise, in which water and electricity are cut off, roads are closed, and food preparation equipment and tools are damaged. Therefore, provision of emergency food (as ready-to-eat food products) for the survival of the injured and relief workers, is crucial. This is usually done by governments and relief agencies and is necessary for the people who are trapped for several hours in roads and hard-to-reach places or for several weeks in bad weather conditions after the earthquake and floods.

Findings of this study suggested that nutritional considerations comprised, namely formulas and special foods for emergencies, food diversity, and nutritional needs of different groups, food health and safety are important characteristics of emergency food.

According to some researches, formulas and special foods for emergencies are one of the major options to feed the people in emergencies. For example, Brisske *et al.* believed that a prototype soy-based bar with corn syrup, granulated sugar, high fructose corn syrup, and/or crystalline fructose could be used as an emergency food product for refugees and displaced persons.<sup>[12]</sup> In one study, Sheibani *et al.* examined developing formulations a high-energy, nutrient-dense prototype of food products to meet a set of nutritional requirements to minimize the mortality rates of individuals affected by disasters.<sup>[11]</sup> In another study, Zahra *et al.* reported that a nutritional formula containing different concentrations of dried apricot paste, roasted black gram, and barley, puffed

rice, constant quantities of black pepper, cardamom, cinnamon, coconut, fennel, dried milk powder, and chocolate were found acceptable in Pakistan.<sup>[10]</sup>

While the present study showed that Nutritionally-fortified food formulations are not welcomed practically. This is because the concept of food is mixed with cultural values and psychological factors. Based on our finding, it seems a paradox in approaches to the concept of food exists in the nutrition response programs in the aftermath of natural disasters. This paradox is related to the concept of emergency food as the provider of basic nutritional needs for the survival of the victims. It is also related to the concept of food as a symbol of cultural, religious, and psychological norms for the people affected by the crisis.<sup>[13]</sup>

The finding of this study showed that a lack of diversity and uniformity of food items practically usable in emergencies is one of the nutritional challenges after the natural disasters. Especially when the ready-to-eat food products are consumed for a long period, lack of diversity along with the shortage of main micronutrients and fiber, as well as high amounts of salt and sugar contents can cause digestive disorders such as constipation, loss of appetite, and nausea in the affected people.

Nekouie Moghadam *et al.* reported the lack of food diversification up to several weeks following the Bam earthquake.<sup>[8]</sup> Furthermore, Inoue *et al.* showed most delivered food was carbohydrate-based, and they reported decreased food intake 1 month after the Great East Japan earthquake, loss weight, and gastrointestinal symptoms.<sup>[9]</sup> In the same event, Nakazawa and Beppu reported some problems with emergency foods. They pointed that hardtack biscuits, crackers, and regular biscuits were hard to swallow when eating without a drink, rice porridge, which was easy to swallow but had a low concentration of energy, pregelatinized rice and instant noodles could not be used without heat water.<sup>[7]</sup> These studies are consistent with our findings.

According to our findings, the other characteristics of emergency foods are functional features include packaging, cultural norms, and final price. The specific rules for packaging food products used in emergencies, including material, size, nutritional facts, and food standard certificates should be considered. In addition, monitoring and regular observation of health institutions should be facilitated to reduce the environmental concerns regarding the disposal of containers and package coatings. However, in the formulation of packaging rules—in addition to the nutritional and sanitary considerations—transportation, warehousing is also important and play a decisive role. In the study by

Nakazawa and Beppu has been shown emergency food must be easy to eat and if, In the case of food requiring the use of utensils during consumption, packaging should contain utensils.<sup>[7]</sup>

Our study showed the importance of cultural norms in providing emergency food. Wien and Sabaté after analyzing many food groups showed the appropriateness of plant-based foods such as nuts and dried fruit as emergency food. They pointed that these food items are universally acceptable and tolerated across cultures and religions.<sup>[3]</sup>

Although the long shelf-life is considered an important factor in choosing the right food products in emergencies, the limiting factor for these products is the final price. According to our findings, the following provide ways by which managers of natural disasters can manage the resources. having a shelf-life of 2 years for the food products, precise planning to update the warehouses, and the existence of an alternative program to consume the food products before the expiration date (in the case that disasters do not occur). In a survey conducted in Sendai City by Kawashima *et al.* mentioned that emergency foods, such as dried and canned foods, are expensive and emergency stockpiles consider as luxury goods.<sup>[18]</sup> Furthermore, Nakazawa and Beppu pointed that the average calorie cost of regular food with a shelf life of 1 year is 0.5 Japanese yen, but this cost increases fivefold when shelf life is doubled.<sup>[7]</sup>

## Conclusion

After the occurrence of the natural disasters, use of the emergency food products (as ready-to-eat food items) for a few hours to several weeks is inevitable for the survival of the injured people and relief forces. The purpose of this study was to identify the characteristic feature of emergency food according to the experience of Iranians. To the best of our knowledge, this study is the first attempt to assess the multidimensional characteristic of emergency food in Iran. This study showed that the characteristics of emergency food are the nutritional considerations comprised of namely formulas and special foods for emergencies, food diversity, nutritional needs of different groups, food health and safety and functional features included of packaging, cultural norms, and final price. We believe that the results can be used in disaster management plan for produce and delivered appropriate emergency food postdisaster. In addition, longitudinal studies of future events can be helpful for developing a special protocol for the formulation and produce to food production to meet the needs of all age groups including the elderly, children, and patients.

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## Conflicts of interest

There are no conflicts of interest.

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