

The preparation of complementary food for breastmilk after the earthquake in Malampah, Pasaman Districts, West Sumatra Province in 2022

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Abstract. A seismic event of 6.2 magnitude occurred on February 25, 2022, causing significant earthquake in West Pasaman Regency and Pasaman Regency. It is evident that children under the age of five constitute the second biggest group of refugees. Toddlers who do not get fed properly and are in an environment with poor sanitation can be threatened by various diseases. Implementing regular supplemental feeding techniques in catastrophe settings is a crucial strategy for improving children's nutritional condition. This paper is based on several literature studies that refer to several literatures. Access to facilities and infrastructure influences disaster food assistance. Public kitchens were quickly created in West Pasaman, especially Pasaman District, after the earthquake. Lack of potable water and four-wheeled vehicle access restricted camp food production. Food from PERSAGI and contributors is distributed in Puskesmas Ladang Panjang Malampah. Even in emergencies, typical supplementary meals can be provided. In disasters, primary carers or parents require help governing complementary food provision based on clean water, convenient cooking facilities, diversified food items, or home-cooked, local-culture complementary meals. In addition to facility support, health workers must teach parents about standardised supplementary meals and give them confidence to offer them in emergencies

1 Introduction

There have been 5,402 catastrophe incidents in Indonesia as of December 31, 2021. Flooding is the most common type of natural catastrophe, followed by landslides and severe weather. In 2021, there have been 24 earthquakes, 1 mountain eruption, 579 forest fires, 15 drought incidents, 1,794 floods, 1,321 landslide cases, 1,577 extreme weather instances, 91 abrasion tidal wave cases, and 15 occurrences of flooding. 7,630,692 people were displaced by natural disasters, and 14,915 people were injured in addition to 728 fatalities and 87 missing persons [1].

A seismic event of 6.2 magnitude occurred on February 25, 2022, causing significant earthquake in West Pasaman Regency. As per the findings of the Meteorology, Climatology and Geophysics Agency (BMKG), this earthquake was caused by a right-lateral strike-slip fault on the Great Sumatra fault. According to the Singapore Earth Observatory, the fault rupture was limited to a short section, estimated to be around 10 km in length, with an average displacement of 10 cm. Prior to this, a seismic event of magnitude 5.2 took place [2].

According to statistics on the distribution of vulnerable categories among refugees in Pasaman Regency, it is evident that children under the age of five constitute the second biggest group of refugees, behind the elderly. There are a total of 8,457 refugees. The

population of elderly refugees amounted to 3,943 individuals, while there were 2,442 children under the age of five, 979 nursing mothers, 641 infants, 339 pregnant women, 80 postpartum women, and 3 individuals with disabilities [3].

The occurrence of disasters brings major changes to human life. These changes occur due to economic losses, infrastructure, and the emergence of health problems experienced by disaster survivors [4]. The impacts arising in terms of health problems such as physical injuries, various diseases due to poor environmental sanitation, and psychological trauma [5]. In addition, the availability of clean water and adequate food consumption is a major concern of every disaster situation [6].

One group that rarely gets attention especially about food and hygiene during disasters is infants and early childhood. For example, during the earthquake in Nepal in 2015, humanitarian agencies competed to provide large amounts of relief, rescue and recovery, but rarely paid attention to the feeding of infants and young children. In addition, based on information from disaster volunteers that in the 2020 flood disaster in Masamba, the public kitchen did not provide special food for infants and toddlers [7].

Toddlers who do not get fed properly and are in an environment with poor sanitation can be threatened by various diseases. The most common disease that can cause

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death in infants due to nutrition in disaster situations is diarrhea [8]. This can occur in the age group of infants who should be breastfed, but are not optimally supported for the breastfeeding process [6]. Various formula milk donations received during disasters make infants and toddlers given formula milk given through bottles or pacifiers [9]. The process of cleaning formula milk in disaster situations is often not optimal due to the availability of dirty water [10].

Effective intervention is necessary for addressing nutrition-related illnesses in child survivors. In disaster situations, ensuring proper nutrition for infants and children can be achieved through the implementation of various strategies. These include enhancing support for breastfeeding, implementing targeted interventions for infants who are not breastfed, promoting local complementary feeding practices in line with recommended guidelines, providing micronutrient supplementation, and reducing the reliance on artificial feeding methods to mitigate associated risks [11]. The provision of supplemental feeding in catastrophe scenarios is identical to that in normal settings, since both have the objective of guaranteeing that children between the ages of 6 and 24 months have access to suitable complementary meals [6].

Implementing regular supplemental feeding techniques in catastrophe settings is a crucial strategy for improving children's nutritional condition. This is evident from the 2015 earthquake in Nepal. Nepal successfully addressed the issue of supplemental feeding by instructing and deploying a workforce of 15,000 individuals to provide nutrition assessment and counseling for 90% of children aged 2 and below. This proactive measure significantly reduced the occurrence of malnutrition following the tragedy [6]. The implementation of localized supplemental feeding initiatives, aided by enriched oil and sugar, in refugee camps in Kenya and Tanzania, has demonstrated a positive impact on health promotion among children between the ages of 6 and 59 months [12].

Effective supplementary nutrition in emergency conditions can mitigate the risk of short-term and long-term illnesses in children between the ages of 6 and 24 months. Nevertheless, some refugee camps may not offer sufficient supplementary nourishment for children in this age group. The food provided to children of this age is comparable to that of adults in terms of both texture and quantity. Further research is required to investigate the underlying causes of inadequate nutrition provision for this specific age group during times of calamity. In light of the aforementioned issues, the authors want to do a literature review with the objective of ascertaining the methods employed in the preparation of supplemental foods during times of calamities [13].

2 Method

This paper is based on several literature studies that refer to several literatures.

3 Literature review

3.1 Definition of complimentary feeding

Complementary feeding refers to the introduction of food or drink, other than breast milk, that provides essential nutrients to newborns during the period when they are also receiving breast milk. The Global Strategy for Infant and Young Child Feeding 2002 specifies that supplemental feeding must fulfill the following criteria [14]:

1. **Timely:** Complementary feeding starts when energy and nutrient requirements exceed those obtained from breast milk.
2. **Adequate:** Solids should contain enough energy, protein and micronutrients.
3. **Safe:** Storage, preparation and feeding must be hygienic.
4. **Properly:** Complementary feeding is given in line with the baby's hunger and appetite signs, and the frequency and method of feeding are appropriate for the baby's age.

3.2 Definition of disaster

Disasters are occurrences or sequences of events that pose a hazard and disrupt the lives and means of subsistence of individuals, brought about by a combination of natural, non-natural, and human forces, leading to human fatalities, environmental harm, property damages, and psychological effects on humans.[15] Disasters are categorized as natural disasters, man-made disasters, and hybrid disasters, which involve a combination of both sorts [16].

3.3 Geographical situation of West Pasaman and Pasaman regencies

West Pasaman is a regency located in the province of West Sumatra. This region was created as a result of the enlargement of Pasaman Regency. West Pasaman Regency is situated within the geographical coordinates of 00° 33' North latitude to 00° 11' South latitude and 99° 10' to 100° 04' East longitude. It has a total area of 3,864.02 square kilometers. Generally, the West Pasaman Regency has a predominantly flat and gently rolling landscape, with hilly and mountainous regions limited to the Talamau and Gunung Tuleh Districts. The elevation of the region ranges from 0 to 913 meters above sea level. The terrain consists of four distinct types: flat areas with a slope ranging from 0-3%, gently rolling areas with a slope of 3-8%, uneven areas with a slope of 8-15%, and hilly regions with a slope above 15% [17].

Pasaman Regency is situated in the northern region of West Sumatra Province, covering an area of 4,447.63 square kilometers, which is approximately 10.44% of the total area of the province. Pasaman Regency is situated at the equator, spanning from 0-55' north latitude to 0-06' south latitude, and from 99-45' to 100-21' east longitude [18].

3.4 Impact of disasters in children

It is estimated that approximately 175 million children per year will be affected by natural disasters associated with climate change. Globally, children will be affected by 88% of climate change-related diseases, and the poorer the child, the greater the burden. The number of children seriously injured or killed by such disasters each year is unknown but estimated to be substantial. An estimated 5-43% of children affected by disasters will develop post-traumatic stress disorder (PTSD), and many will suffer from depression, anxiety or other mental health disorders. With climate change, the mental health burden on children and families is expected to increase [19].

Carolyn Kousky said that there are 3 impacts of disasters on children, especially long-term impacts, namely [20]:

1. Disasters can damage children's physical health: Children can be injured or even die. Children may also suffer from things such as malnutrition caused by food supply disruptions or diarrhea caused by contaminated water. In addition, disasters can cut off access to medical care, even for illnesses not related to the disaster [20].
2. Disasters can cause mental health problems: Not only is the disaster itself stressful and frightening, but children can suffer from psychological disorders due to the destruction of homes and property, migrating, the grief of losing loved ones, seeing parents or caregivers under stress, neglect and abuse, and the breakdown of social networks, the environment, and the local economy [20].
3. Disasters can disrupt children's education: This can occur because children lose their families, school facilities are destroyed, and children are forced to work to help the family economy [20].

3.5 Preparation of complimentary foods during disasters

3.5.1 Facilities and infrastructure related to complimentary foods

The availability of facilities and infrastructure at the time affects the provision of supplemental foods after a disaster. Examples include meal items and culinary utensils. Factors such as high food costs, costly sanitary equipment, blockades in the region, fuel shortage, restricted food supply, remote placement of public kitchens, and worsening socio-economic situations are expected to impede the provision of supplemental foods in refugee camps [7].

Following the earthquake catastrophe in West Pasaman, particularly in Pasaman District, public kitchens were promptly established at several locations. Nevertheless, the production of supplemental food in the camps was hindered owing to the scarcity of clean water and the challenging accessibility for four-wheeled vehicles. The food components from PERSAGI (Persatuan Ahli Gizi Indonesia) and donors are distributed at Puskesmas Ladang Panjang Malampah. The preparation of complementary

food is directly helped by 4 PERSAGI volunteers who alternate in determining the composition and kind of supplemental food.

a. Water Procurement

Water is an essential resource for all individuals worldwide, as it is required for drinking, cooking, and maintaining personal cleanliness. During a crisis, the availability of safe drinking water may be insufficient, making it crucial to prioritize the provision of potable water. Health issues associated with water can occur as a result of both inadequate availability and the contamination of water to varying degrees. The water supply needs are as follows [21]:

1. Water supply should be sufficient to provide at least 15 liters/person/day.
2. The volume of water flow in each source of at least 0.125 liters per second.
3. The distance of the farthest settlement from the water source is no more than 500 meters
4. 1 (one) water tap for 80-100 people.

In the aftermath of the West Pasaman earthquake in Pasaman Regency, the provision of clean water, particularly at the supplemental food production post, is being sourced from the PDAM water supply of the Puskesmas Ladang Panjang Malampah. This water source is currently abundant and free from contamination. This facilitates the development of supplementary meals.

b. Water Quality

Potable water must be available in adequate quantities to meet fundamental needs such as drinking, cooking, and maintaining personal and household cleanliness, while also being free from significant health concerns caused by diseases or chemical contamination [21].

1. In untreated water sources (not yet sterilized), the bacterial concentration from human fecal contamination is limited to a maximum of 10 coliform bacteria per 100 milliliters.
2. Water supplied to a population of over 10,000 individuals, or to any water sources where there is a possibility of diarrheal illness, must be treated with a disinfectant to meet certain criteria (namely, a chlorine residual of 0.2-0.5 mg/l at the water tap and a saturation level below 5 NTU).
3. Studies have shown that there is no notable detrimental effect on the health of those who utilize water contaminated with chemicals or from the use of water from the source within the intended timeframe. These studies also encompass investigations into the amounts of chemical residues employed to assess the water. Based on the evaluation of the scenario, it is unlikely that consuming the water would lead to any severe health issues.

c. Infrastructure and Equipment

1. Every household possesses a pair of water collectors, each capable of holding 10-20 liters, along with a water storage container that can accommodate 20 liters. This should be a vessel with a slender opening and a cover.
2. Each individual is allocated a monthly allowance of 250 grams of soap.
3. If public restroom facilities are to be made available,

they should be sufficiently spacious to accommodate all individuals for regular daily bathing at a designated time. It is necessary to have separate public toilets for females and males.

4. When establishing public washing facilities for clothing and household utensils, it is required that each water basin be utilized by a maximum of 100 individuals.

3.5.2 Raw materials of complementary food

Complementary feeding is produced using raw products that adhere to safety, quality, and nutritional standards. Cereals are often the primary raw materials used in the production of supplemental meals. Cereals refer to individual grains such as rice, maize, wheat, and similar crops. Furthermore, legumes, which are seeds enclosed in two shells, are frequently utilized as supplementary ingredients in cuisine, including green beans, kidney beans, and soybeans. Cereals are a rich source of complex carbohydrates, specifically starch, which may be broken down and used by the body to generate energy. Legumes, such as mung beans and kidney beans, have a significant amount of protein (20% or more) and certain legumes, like soybeans, also contain a notable amount of fat (about 20%) [14].



Fig. 1. Raw materials for making complementary food

Public kitchens were established at each evacuation post three days following the earthquake. However, the supplemental food station, located in Puskesmas Ladang Panjang Malampah, was established five days after the earthquake. Originally, the plan was to prepare complementary food at each evacuation post. However, due to challenges in distributing the food and the remote locations that are inaccessible by four-wheeled vehicles, the decision was made to centralize the preparation of complementary food at Puskesmas Ladang Panjang Malampah. The PERSAGI team conducted the production of this supplementary food using components provided by PERSAGI and numerous contributors. The supplemental diet included rice, two types of vegetables, one vegetable protein, and one animal protein. The meal was prepared for a duration of three days, namely from March 3rd to March 5th, 2023 (Fig.1).

The calamity involved the utilization of rice, potatoes, spinach, carrots, beans, tofu, tempeh, and poultry as raw

materials. The food raw ingredients were acquired via donors and PERSAGI. The food raw materials supplied by PERSAGI and donors are manufactured just once due to the absence of storage or refrigeration facilities for food ingredients. Every day, PERSAGI and donors provide food delivery.

3.5.3 Making complementary food

Ensuring the hygiene of hands and cooking equipment used in the preparation and serving of supplemental foods is essential. Thoroughly cleanse hands using fresh water and soap, cleanse cutlery using fresh water and soap, and cleanse food components using fresh water.[22]

Four individuals from PERSAGI, aided by volunteers, were responsible for the production of supplemental meals, as shown in Fig. 2. The supplemental meal was divided into two categories: strained porridge for infants aged 6-8 months and coarsely chopped porridge for infants aged 9-12 months. The supplementary energy needed from solid food for infants aged 6-8 months is 200 kilocalories per kilogram of body weight per day, whereas for infants aged 9-12 months, it is 300 kilocalories per kilogram of body weight per day [22].



Fig. 2. The making of complementary food

The PERSAGI staff and volunteers started food preparation at 08.00 in the morning, only providing gratis lunch meals. The components were finely chopped and simmered together in a single big pot. The only seasonings utilized were onion, garlic, bay leaf, a small amount of salt, oil, and chicken bone broth.

The procedure of preparing supplemental meals at the Ladang Panjang Malampah Community Health Center involves chopping the raw materials and thereafter boiling all the components. The initial preparation involves creating a coarse-textured porridge. Then, half of this porridge is transformed into a smoother and more liquid consistency by blending or filtering.

These supplementary meals are intended for infants between the ages of 6 and 12 months. For infants aged 9-

12 months, it is recommended to provide porridge with a coarse texture. For infants aged 6-8 months, it is recommended to provide porridge with a fine texture. The packaging of these supplemental foods utilizes plastic containers that are both safe and appropriately sized. The supplementary nourishment will thereafter be allocated to several regions like Cempaka, Pustu Malampah, Polindes Bungo Tanjung, Tanah Lapang Malampah, Kampung Fatimah, and Kampung Aur, by means of village midwives.

3.5.4 Food quality and safety during disasters



Fig. 3. The Packaging of complimentary food

The food provided to communities impacted by disasters is of high quality and is handled in a safe manner to ensure its suitability for consumption, as shown in Fig. 3. The specified prerequisites are as follows[21]:

1. The distribution of food does not contribute to the transmission of diseases.
2. There have been no grievances regarding the quality of the food supplied, either by either the recipients or the officials.
3. Food suppliers conduct frequent quality control procedures to ensure that the food they provide complies with official government regulations on packaging, labeling, expiration dates, and other relevant factors.
4. The local Food and Drug Administration (POM) conducts regular inspections on all food items delivered to the site.
5. All domestically sourced food products have a minimum shelf life of 6 months from the date of delivery, except perishable commodities such fresh vegetables and fruits.
6. It is necessary to deliver all of these food items prior to their expiration date.
7. The food storage infrastructure is sufficient and the processing procedures are correctly executed.
8. Relief personnel possess an appropriate level of understanding to effectively deal with any health problems that may arise from the distribution of food. These problems include dangers associated with improper processing, insufficient storage, and delayed delivery.

3.5.5 Receiving food products

The food given is suitable and satisfactory for the recipients [21].

1. Prior to finalizing the food items for distribution, it is important to engage in conversations with the recipient groups to verify that the food products fulfill their standards of eligibility and appropriateness, and are accepted by them.
2. The food provided is in accordance with local religious traditions and customs, taking into consideration any specific taboos or laws regarding the ingestion of pregnant and/or nursing women.
3. The staple meal provided should align with the typical dietary preferences of the receiving group.
4. The supplementary food provided for children under the age of five satisfies their taste preferences and is appropriate for their digestive capacities.
5. The community has access to specific food items that are seen as essential in their culture, such as chile and sugar.

3.5.6 Food handling and safety

Food is stored, processed and consumed safely and correctly, both at the household level and in the context of society in general. The requirements are as follows [21]:

1. There is no spread of diseases associated with food distribution locations (e.g. public kitchens) resulting from improper food processing.
2. Reports from the assisted community relating to difficulties in storing, cooking and consuming the distributed food are submitted by the group/team leader to the District Implementation Unit (SATLAK District).
3. Each household has at least one cooking pot, sufficient fuel for cooking, a 40-liter water storage container, and 250 grams of soap/person/month.
4. Individuals who cannot cook their own food or cannot consume food without assistance have access to someone who provides them with adequate food on a regular basis.
5. When food is distributed from soup kitchens (already cooked), implementers understand the health risks of inadequate food storage, processing and serving.
6. If necessary, food milling or processing infrastructure or other food processing is available as close as possible to the location or place of evacuation.

3.5.7 Distribution of assistance

The food aid program must employ an effective distribution methodology, taking into account several factors throughout its execution. Following the tragedy, the officer conducted an initial evaluation of the situation, taking into account the technique and calculation of distribution. Food assistance can be provided indiscriminately to the entire community or selectively to specific sectors or factions within the community, as shown in Fig. 4. Food assistance can be provided as an alternative to wages, or it might be sold to commercial

markets to address supply challenges [21].



Fig. 4. Distribution of complimentary food assisted by local residents

The distribution of food aid is equitable, environmentally viable, and practical, considering the specific circumstances of the receivers. Considering the specific circumstances in the area, individuals receiving food assistance should have access to information on the allocation of help that they are eligible for. The following preparations are necessary[21]:

1. The community comprehends the quantity and nature of the distribution to be allocated for each distribution.
2. The quantity and nature of food intended for distribution is identical to what will be received by the community.
3. The food distribution technique is equitable, conveniently located (in proximity to the population it serves), and efficient in terms of time and energy use.
4. The frequency of the food distribution (whether it will occur monthly or bi-monthly), The assistance recipient must demonstrate thoughtfulness, which may include the following: Twenty-two
 - a. The expense associated with transporting food from the distribution center.
 - b. Commute time to and from the distribution center.
 - c. Ensuring the safety of delivering the assistance and food supplies to the intended recipient.

3.6 Code of conduct for formula milk feeding

3.6.1 Indications for formula feeding

According to Minister of Health Regulation No. 39 of 2013, baby formula refers to a type of milk that is specially designed to be used as a replacement for breast milk for babies who are up to 6 months old. It is mandatory for every woman to exclusively breastfeed her newborn, unless certain conditions arise when the mother, family, medical staff, or other health workers may offer infant formula [23].

The determination of the presence of medical indications must be done by a physician. In the event that a doctor is not available, the procedure is performed by a midwife or nurse in compliance with the conditions outlined in laws and regulations [24].

1. Infants that are limited to consuming milk through specialized formulae, typically due to congenital metabolic problems. The number is 24.
2. Infants who necessitate other sustenance apart from breast milk for a temporary duration 24.
3. The mother has medical issues that prevent her from exclusively nursing because she has to undergo therapy according to medical service requirements.
4. If the mother has a medical condition with positive hepatitis B surface antigen (HBsAg) and the newborn has not received both passive and active hepatitis B immunization within 12 hours.
5. Mother is unavailable.
6. The mother and the infant are separated.

3.6.2 Formula milk feeding in emergency situations/disasters

Formula milk distribution during emergencies or catastrophes is in compliance with Regulation of the Minister of Health Number 39 of 2013:[23]

1. The distribution of infant formula and other baby products during emergencies and disasters should be done by the local district/city health office, which has coordinated with the Ministry of Health and follows the guidelines for infant and child feeding in emergency situations established by the Minister.
2. During emergency and/or crisis conditions, it is strictly forbidden for any maker of infant formula and other newborn goods to engage in any activities.

Health workers, operators of health service facilities, operators of education units, management of professional organizations in the health sector, as well as manufacturers and distributors of infant formula milk and/or other baby products who violate the provisions will face administrative sanctions [25].

4 Conclusion

Providing normal supplemental meals is possible in every scenario, even disasters. This is because standardized supplemental meals can provide all the nutritional demands of 6-23-month-olds, optimize development and growth, and avoid short and long-term disorders. Supplemental food is used in disasters the same way as usual. In disaster situations, primary caregivers or parents need special assistance to condition the provision of complementary foods according to standards like clean water, easy access to cooking facilities, varied food ingredients, or donations of home-cooked, local-culture complementary foods. In addition to facility assistance, health personnel must educate parents about the need of giving standardized supplemental foods and give them confidence to do so in disasters.

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