Chapter 47

NUTRITIONAL ASSESSMENT AND NUTRITIONAL NEEDS OF REFUGEE OR DISPLACED POPULATIONS

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INTRODUCTION

Over 30 million persons are refugees or displaced due to war, civil strife, natural disasters, and other similar events.[1,2] Such social disruptions have the potential to increase morbidity and mortality and, in many cases, require varied relief programs to provide public health assistance.[2] A critical public health issue encountered during such disturbances is a food shortage. Food shortages during conflicts can result from deliberate targeting of local food production and distribution, manipulation of relief supplies, interference by political groups, inadequate organizational controls, destruction of food sources, and other such actions.[3,4] In almost all cases, a direct consequence of food shortages is malnutrition among the targeted population, and children are among the most susceptible to malnutrition and nutritional insults.[1,5–7] All of these issues must be considered when nutritional support is to be provided.

Physicians, epidemiologists, preventive medicine and public health specialists, and nutritionists and dietitians routinely participate in peacetime and war-related humanitarian relief efforts worldwide. Integrated teams of health care providers are required to ensure efficient assessments and rapid implementation of assistance programs. In addition, registered dietitians and nutritionists are key players in humanitarian missions and disaster relief efforts, particularly when an assessment of available food resources and malnutrition prevalence is needed.[8–12]

The US military has both the integrated teams and the experience to assist displaced populations during social disruptions. The military is increasingly called on to render assistance and humanitarian aid during disaster situations, international crises, regional conflicts, and civic assistance programs.[8,9,12–14] Recent efforts by the US military have included disaster assistance after hurricanes and humanitarian aid in Haiti, Panama, Somalia, Bosnia, the Kwajalein Atoll in the Pacific Ocean, the Kurdish homelands in northern Iraq, and Kosovo.[7,8,14–17] For example, following hurricane Marilyn in St. Thomas, Virgin Islands, US servicemembers were deployed for disaster assistance to reestablish patient and personnel feeding in hospitals.[18] In many international humanitarian assistance missions, military personnel have been involved with conducting baseline evaluations and nutritional screenings and assessments, developing emergency food plans, monitoring plans that have been implemented, and monitoring changes in mortality through follow-up surveillance.[8,9] In virtually all assistance efforts, nutritional support has been a major focus, and lessons learned from those efforts can develop into new approaches for future humanitarian missions.

The main objective of nutritional support for refugee or displaced populations is to supply sufficient energy so they can maintain adequate levels of the essential nutrients to sustain life. Timely introduction of nutritional support can make the difference between success and failure of such specialized missions. Humanitarian nutrition-assistance responses are determined by the type and complexity of the emergency and based on an understanding of the resources, socioeconomic characteristics, and specific needs of the population.[19,20] Table 47-1 describes four types of emergencies or conditions wherein nutritional support or assistance may be needed and the characteristics of each.

One of the key reasons for providing nutritional assistance during these emergency situations is the association between nutritional status and mortality.[21] The inseparable link between malnutrition and mortality reflects a nutritionally induced decrease in host resistance that leads to an increased susceptibility to infectious diseases among malnourished individuals. Other factors that may contribute to increased mortality among displaced populations include poor sanitation, poor water quality, increased transmission of infectious disease through crowding, and unexpected environmental changes.[22,23]

When possible, an assessment of the nutritional needs, food habits, and dietary practices of the population is recommended before introducing nutritional support. In all cases, careful planning of how relief activities and nutritional support might be implemented is critical. Despite differences in food choices and dietary practices, which vary throughout the world, the basic nutritional needs of populations are quite similar. Differences in the amounts of specific nutrients needed are primarily due to age, sex, size, physical activity, and physiology. Thus, basic needs as well as specific nutritional needs must be considered when assessing the overall condition in a deployed setting. Initial assessments of the population, to include their nutritional status and the availability of food, are important so that timely interventions can be started. The objective of this chapter is to present an overview of how to assess the nutritional status of a population under conditions of deployment and determine the type and extent of nutritional support required.

TABLE 47-1

CHARACTERISTICS, RESPONSES AND MODES OF RESPONSE FOR FOUR TYPES OF EMERGENCIES.*

Emergency Type	Characteristics	Action Needed	Intervention Mode
Rapid Onset	Triggered by a natural event (eg, flood, earthquake, epidemic) or high-intensity war; predictable in some cases; can affect both stable and displaced populations; mass temporary displacement; destruction of public utilities and infrastructure	Meet basic needs (food, water, shelter, and health); reduce mortality and morbidity; control health problems; best done by local governments but may need military assistance	Rapid assessment of acute situation; prioritization of health and nutrition needs; definition of options for intervention; support to health services; establishment of best possible surveillance system to monitor progress
Slow Onset	Triggered by natural disaster (eg, drought, livestock loss from drought) and lasts several years; effect is widespread and variable depending on vulnerability; leads to disposal of assets; migration; increased nutrition and disease burdens on humans and livestock	Meet basic needs (food, water, shelter, and health); reduce impact on production and income losses; improve food security; reestablish livelihood systems, including employment-based safety nets	Assessment of and responses to declining resource base and food insecurity; rapid assessment approaches; prioritization of health and nutrition needs; definition of options; establishment of surveillance to prioritize needs; cross-sectional surveys to establish needs
Permanent Emergencies	Most common; due to socioeconomic structural problems that cause poverty; characterized by hunger, environmental stress, and social unrest; migrations; increased nutrition and disease burdens on humans and livestock	Meet basic needs (food, water, shelter, and health); reestablish livelihood systems, including employment-based safety nets	Assessment of and responses to declining resource base and food insecurity; rapid assessment approaches; prioritization of health and nutrition needs; definition of options; establishment of surveillance to prioritize needs; cross-sectional surveys to establish needs
Complex Emergencies	Combination of the above but with an emphasis on civil strife or insecurity that affects the local population, displaced persons, and groups responding to the emergency; affects large populations over large areas; populations may be internally displaced or refugees	Security; basic needs (food, water, shelter, and health); reestablish livelihood systems; human capital development; community capacity building; conflict mediation	Assessment of and responses to declining resource base and food insecurity; rapid assessment approaches; prioritization of health and nutrition needs; definition of options; establishment of surveillance to prioritize needs; cross-sectional surveys to establish needs

*In all emergencies, military personnel should seek all available information, get access to nongovernmental organizations, local structures, and government resources; be impartial and work with local experienced staff where possible; provide logistical capacity, communications, and simple standardized epidemiologic procedures; and work to decentralize power. In rapid onset emergencies, personnel must also be ready to provide flexible and short-term planning perspectives.
Adapted from Dept of the Army. *Army Medical Field Feeding Operations*. Washington, DC: DA. FM 8-505. In press.

NUTRITIONAL ASSESSMENT

The nutritional status of a previously well-fed population is likely to remain within normal limits during the first 1 to 2 weeks following an acute food disruption. In situations where conditions continue to deteriorate, a nutritional assessment of the population may be necessary. A general nutritional as-

sessment of the population at risk serves to establish the degree and type of malnutrition present and the requirements for other resources, such as water and sanitation, to relieve the situation. The initial assessment also establishes a baseline for the affected population that can be used for comparison over time in the evaluation process, not only for the nutritional status of the population but also for the impact of various relief efforts. Special attention should be paid to vulnerable groups, including children younger than 5 years of age, pregnant and lactating women, the elderly, and members of specific ethnic or religious groups. These vulnerable groups can also be evaluated over time to determine the impact of various interventions. For example, the United Nations Children's Fund conducted a 3-year prospective study to assess the effects of war and economic sanctions on the nutritional status of children in Baghdad.[1] The percentage of children with mild-to-severe malnutrition increased following the imposition of sanctions before the Persian Gulf War (from 21% pre-war with no sanctions to 29% pre-war with sanctions), and the proportion increased markedly during the war with sanctions (to 43%).

In addition to evaluating specifics of the population, assessing the environment and infrastructure in which the affected population lives is important for identifying underlying problems. Such assessments are useful for determining the origin (if unknown) and severity of the nutritional crises. Identifying social or community institutions and governmental and nongovernmental organizations that may be available to help reestablish the infrastructure is invaluable for establishing assistance responses. Although a nutritional assessment can provide valuable information about the health status of a displaced population, a watchful eye and careful management of potentially disruptive events should be considered, whenever possible, to avert an emergency food crisis.[23]

Both overall and nutritional assessments consist of a two-phase information gathering process that uses interviews, group discussions, observation, and surveys.[5] The first phase is a general evaluation to obtain a global picture of the problem and the need for rapid intervention. This includes determining the reasons for the specific crisis (eg, war, famine, natural disaster), the size and general status of the population, the environmental conditions, the existence and organization of food distribution activities, a crude estimate of available food and resources, and the activities of local or international organizations that can provide assistance. The second phase encompasses four basic activities: data collection, problem analysis, reporting, and follow-up.[24] Onsite data collection should take place, as well as the collection of background data from officials in the local government, United Nations (UN) agency officials, or relief personnel from other humanitarian agencies. Background data include

- Population demographics, in particular the total refugee or displaced population by age and sex, average family or household size, and at-risk groups (eg, children younger than 5 years of age, pregnant and lactating women, disabled or wounded persons, the sick, the elderly),
- Geographical features of the area,
- Weather and climate patterns,
- Agricultural and economic conditions,
- Health conditions and infectious diseases endemic to the area,
- Ethnic or tribal conflicts
- Types of assistance available from other organizations, and
- Logistical support.[5,21,25]

This information can provide a more comprehensive overview of the situation. Once background information has been gathered, a sample survey should be conducted to determine the specific and immediate nutritional needs of the population. Such a field assessment may be the single most important step in assessing the overall situation; simply observing selected families will not provide a fair estimate. Data collection from field site visits should include the following information: nutritional status of the population; culturally acceptable foods; availability and type of foods consumed; mortality rates and causes; availability of water; availability of wood, cooking utensils, and other necessities for food preparation; shelter; and logistics.

Selecting the Sample and Collecting Data

When a survey is to be conducted and data collected for an estimate of malnutrition, the population must be clearly defined. The data collected during the survey can provide a reasonable estimate of the health and nutritional status of the population of interest. Typically, a survey involves obtaining anthropometric measures on children (usually between 6 and 59.9 months of age) from a sample of families because measures on this age group have been shown to be reflective of the whole population.[24,26] The anthropometric measures obtained can

then be compared to a reference or cutoff value to define the degree of malnutrition within the population. If the population is relatively small, with only 400 to 500 children, all children should be evaluated. For larger populations, various sampling procedures can be used. These procedures include simple random sampling, systematic random sampling, and cluster sampling.[27] Random sampling and systematic sampling procedures require a sampling base—either a list of individuals or a geographical organization—that allows each individual or family an equal chance of being surveyed. Cluster sampling is used in larger populations for which only estimates of the number of people are available so the other two methods cannot be used. For cluster sampling, the population is grouped into identifiable units from which a sample estimate may be obtained. For example, clusters could be individual villages or camps. Within each cluster, a predetermined number of children is selected and they are then surveyed. Because children within a cluster tend to have similar nutritional status, the size of the cluster sample must be large enough to override this inherent bias. This is usually accounted for by using a sample size twice that of the systematic random sampling.[5,27] In all cases, the choice of sampling will be determined by the conditions in the field. An example of a data collection form for a cluster sample survey is presented in Figure 47-1.

Although there are many ways to conduct sample surveys, the World Health Organization and Medecins Sans Frontieres have published detailed guidelines for rapid nutritional assessment in the field.[27,28] These publications provide appropriate standards for assorted measures, examples of sampling and sample size determination, approaches to data analysis and interpretation, and discussions on other issues critical to nutritional assessments and humanitarian assistance endeavors. The primary steps include determining the following:

- Basic information on demography, geography, and population to be assessed,
- Index measure to be assessed and whether specific groups need to be evaluated,
- Sampling methods to be used,
- Age groups to be included,
- Sample size,
- Indicators to be used,
- Personnel, equipment, and resources needed,
- Number of people to be evaluated per day,
- Training status of field workers and supervisory controls,
- Standards to be used and data analysis procedures, and
- Responsibility for logistics.

Before conducting an assessment, it should be recognized that anthropometric data alone can be misleading, especially when malnutrition levels are high due to infection or low due to death or emigration. If many of the severely malnourished children have already died or if families with very sick children have been able to leave the area, then the prevalence of acute malnutrition will be underestimated. These are important issues to consider. Certain high-risk groups are more vulnerable to malnutrition and micronutrient deficiencies,[29] so questions should be asked to determine recent changes within these vulnerable subgroups. Familiarity with the clinical diagnosis of classic nutrition-related illness, such as kwashiorkor (a severe form of protein-energy malnutrition), marasmus (wasting from lack of food and protein), xerophthalmia (night blindness caused by vitamin A deficiency), scurvy (vitamin C deficiency), beri-beri (thiamine deficiency), is helpful in determining the duration of a nutritional program. Factors such as the amount and type of foods and animals available and supplies of water and fuel should also be noted. If there have been food shortages for an extended period, many people may already be malnourished and special foods or food programs will be needed to refeed them.

Nutritional Indicators

Children between 6 and 59.9 months of age are the ones on whom anthropometric measures should be obtained for nutritional assessments because of their extreme vulnerability to nutritional insults.[5,27,28] A variety of different anthropometric indexes can be used, but each one has inherent limitations. The most commonly used index for acute malnutrition and recent weight loss in nutritional assessments is the weight-for-height ratio.[15,21,23,26,30,31] Based on numerous population surveys, the weight-for-height measure is the most reliable index of acute malnutrition for famine and emergency situations. The weight-for-height index is indicative of current status, is a good predictor of immediate mortality risk, is sensitive to rapid changes, and can be used for monitoring the course of recovery from malnutrition.[5,15,23,27] However, if edema (the clinical sign of kwashiorkor) is present in a child, then the weight-for-height index should not be used. Edema, typically pitting edema on the upper surface of the foot,

CLUSTER DATA FORM

Cluster N^0:_____ Village/Section:_____

Date of Survey: ____/_____/____ Team Number:_____

First birth date to be included: ____/_____/____

Last birth date to be included: ____/_____/____

Birth date after which children should be measured standing:____/_____/____

N^0	Birth date	Age in months	Sex 1 = M 0 = F	Weight in kg or g	Height in cm or mm	Edema 1 = Yes 0 = No	MUAC	Other	Other
1	/ /								
2	/ /								
3	/ /								
4	/ /								
5	/ /								
6	/ /								
7	/ /								
8	/ /								
9	/ /								
10	/ /								
11	/ /								
12	/ /								
13	/ /								
14	/ /								
15	/ /								
16	/ /								
17	/ /								
18	/ /								
19	/ /								
20	/ /								

MUAC = mid–upper arm circumference

Fig. 47-1. A Data Collection Form for a Cluster Sample.
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is a major risk factor for mortality in children and is always indicative of severe, acute malnutrition.[32] Thus, the presence of edema should be carefully noted. Basic equipment for gathering weight-for-height index measurements includes a length board, non-stretch tape measures, a 25-kg hanging spring scale, rope, weighing pants, a standard weight (10 kg) to calibrate and check the scale, questionnaires,

EXHIBIT 47-1

PROCEDURES FOR EVALUATING MID–UPPER ARM CIRCUMFERENCE

1. Seat the child comfortably in the mother's lap
2. Select the child's bare right arm for measurement
3. If the child is not in a shortsleeved shirt, roll the sleeve up; do not measure arm circumference over clothing
4. Let the child's arm hang down loosely with the arm bent at the elbow in a 90° angle
5. Make a mark at a point halfway between the tip of the shoulder (acromial process of the scapula) and the tip of the elbow (olecranon process of the ulna)
6. Draw a horizontal line on the back of the arm 1 cm (0.5 in.) above the midpoint; use a felt-tipped marker
7. Let the child's arm hang down loosely, circle the tape measure around the arm, and pull it snugly but not too tightly
8. Read arm circumference to the nearest 0.1 cm and record reading on the survey form (see Table 47-2)

Adapted from: Intertect. *Assessment Manual for Refugee Emergencies*. Washington, DC: Bureau for Refugee Programs, Dept of State; 1985.

data sheets, clipboards, tables, a calculator, a computer, and pencils.[20,27,28] The general method for weighing is to zero the scale daily, place weighing pants on the child, attach the pants to the scale, and suspend the child in the pants from the scales. To measure length, shoes are removed and a child younger than 2 years of age is placed face up on the board with feet flat against the fixed board and head near the movable measuring piece. Children older than 2 years are measured standing, using vertical measuring equipment.[27]

Another index, which has been used frequently when measures of height and weight are not possible, is the mid–upper arm circumference (MUAC). This is the most simple measure and provides a rapid indicator of wasting.[15,21,26,28,30,31] The accessories needed for determining MUAC are a tape measure, data sheets, clipboards, and pencils. Exhibit 47-1 provides a detailed, step-by-step procedure for measuring MUAC. The MUAC is often used when rapid assessments are needed, such as when large numbers of children need to be screened for feeding programs.[15] Although it has been suggested that there is minimal change in the normal arm circumference of children between 6 and 59.9 months of age, the common cutoff (12.5 or 13 cm) can result in an age bias.[23] As such there is not yet agreement on what the definitive cutoff value should be.[15,26,30,31] For this reason and because of the inherent measurement error with MUAC, this measure may have limited use in determining the prevalence of malnutrition.

Other measures include the weight-for-age index, which is an index of both chronic and acute malnutrition depending on the age of the child, and the height-for-age index, which reflects chronic malnutrition.[21,26,30,31] With all of these measures, differences between individual measurers can be considerable and these differences can bias the data.

Mortality Information

When possible, crude mortality rates should be calculated because they are critical indicators of health status. The Centers for Disease Control and Prevention recommends calculating a crude mortality rate over a short period of time, usually less than a month.[2,21] If the number of deaths over a given number of days can be determined and the size of the population is known, then a daily crude mortality rate can be estimated. Deaths per 10,000 per day or deaths per 1,000 per month are the preferred rates. Ideally, they are age-, sex-, and cause-specific rates because such measures indicate the need for interventions for specific subgroups. Even a crude estimate can prove helpful. The appropriate denominator must be used, however, and this requires an understanding and accounting of the

population dynamics.[15] During a survey, a log of all deaths should be maintained whenever possible, and surveillance systems should be set up in the community to record both recent and new deaths. Death rates are also used as criteria for nutritional interventions by relief agencies, and crude mortality rates are very helpful for tracking changes over time.

Mortality rates for refugees and displaced populations during various stages of a crisis have been reported to have ranged from 2.8 to 21.3 for the Kurds in northern Iraq,[7] from 7.3 to 67.1 in Somalia,[15–17] from 10 to 59 in Rwanda,[33] and from 5.4 to 8.0 in Sudan (all ranges are per 10,000 per day).[2] A crude mortality rate of 0.5 per 10,000 per day is not unusual in African countries during nonemergency times. As such, a crude mortality rate of more than 1 per 10,000 per day or a mortality rate of more than 4 per 10,000 per day in children younger than 5 years old has been suggested to be of extreme concern. When the crude rate falls below 1 per 10,000 per day, this is an indication that the emergency phase is over.[21] Whenever possible, the overall and infant expected (or baseline) crude mortality rates for the area should be obtained.

Data and Problem Analysis

Once the survey form has been completed, the data need to be evaluated, expressed in a standardized format, and compared to reference tables. Most data can be analyzed with simply a pen, paper, and calculator, but portable computers can be very helpful. In particular, *Epi Info*,[34] a word processing, database, and statistics system for personal computers, can be extremely useful for analyzing data in the field. It contains specific programs for nutritional anthropometry and a questionnaire that can be modified to suit specific needs. The anthropometric data collected can be compared to growth reference curves recommended by the World Health Organization (WHO) for international use. Thus the proportion of children with malnutrition can be determined, as well as the trends in mortality, morbidity, and nutritional status.

Data can be expressed in many ways, but the most common are as a percentile, a Z-score, and a percent of the median relative to reference tables.[28] (One exception is the MUAC: the actual values are used and no calculations are required.) When data are expressed as a percentile, the 50th percentile is the weight that divides the population into two equal parts and represents the median. Similarly, 10% of the children would fall below the weight designated by the 10th percentile. Given the percentiles of the reference population, one can compare the distribution of weights from the survey and the proportion below a given percentile. For example, if the cutoff point is the 5th percentile, then one would determine the proportion of children in the sample population whose weight is below the cutoff point for the 5th percentile.

Although percentiles are used in many countries, the WHO and other organizations recommend using the Z-scores.[27,28] The weight-for-height index of a child expressed in a Z-score represents the difference between the observed weight and the median weight of the reference population in standard deviation units:

$$\text{Weight-for-Height Index} = (\text{Observed Weight} - \text{Median Weight}) \div \text{Standard Deviation}$$

For example, if a child measured 9.2 kg and 80 cm and the reference tables give a median weight of 10.8 kg and a standard deviation of 0.87 kg for a child of that height, then the weight-for-height index expressed in a Z-score for this child would be

$$(9.2 - 10.8) \div 0.87 = -1.84.$$

Once critical indicators have been expressed in a standardized format, the data can then be used to determine the percent of children with malnutrition. Also needed are an estimate of the total population and the number of children under 5 years of age as a percent of the total. Table 47-2 presents the cutoff points typically used when the anthropometric data of children are being analyzed, and Figure 47-2 provides a sample form for calculating the degree of malnutrition. These should be used as guidelines and should be based on the population being evaluated. However, the global acute malnutrition rate, which combines moderate and severe malnutrition, and the severe acute rates are critical markers for deciding on the need for or type of intervention.[5,28] A weight-for-height value 2 standard deviations below the mean or 80% of weight-for-height by the National Center for Health Statistics standards are typically considered indicators of wasting or acute malnutrition[23]; a value 3 standard deviations below would indicate severe wasting.[15,23,32] During non-emergency conditions, 3% to 6% of children worldwide have low weight-for-height values, and although prevalence rates of 5%

TABLE 47-2

CUTOFF POINTS MOST OFTEN USED TO DEFINE ACUTE MALNUTRITION BY VARIOUS INDICATORS*

Nutritional Status (level of malnutrition)	W/H Z Score	W/H% of Median	MUAC
Moderate Acute	-3 < W/H < -2	70% < W/H% < 80%	110 mm < MUAC < 125 mm
Severe Acute	W/H < -3 or edema	W/H% < 70% or edema	MUAC < 110 mm or edema
Global Acute	W/H < -2 or edema	W/H% < 80% or edema	MUAC < 125 mm or edema

*W/H: weight-to-height ratio; MUAC: mid–upper arm circumference
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to 10% can indicate increased malnutrition,[23] such prevalence rates are not unusual in African populations.[32] For MUAC measurements, values between 110 and 125 mm are usually equivalent to 2 standard deviations below the mean and less than 110 mm is consistent with 3 standard deviations below the mean.[28] Given these references, a 20% prevalence of wasting or a MUAC of less than 125 mm would be a high prevalence and indicate a serious situation.[32] Although additional information should be carefully examined and the data gathered should be compared with data obtained by other health staff in the area, nutritional assistance programs are usually implemented when a prevalence above 20% has been noted.

Other pertinent information to be gathered includes the number of cases of nutritionally related illnesses, specifically kwashiorkor and marasmus. If the presence of specific vitamin- or mineral-deficiency illnesses is suspected, this should be documented by medical personnel during the assessment.[28] Additionally, the amount, types, and location of available food, the implementation of supplemental feeding programs (to be discussed later), and the level of physical activity must all be determined.

Reporting of Results and Follow-Up Activities

A formal report should be prepared soon after completion of the survey. The report should include stated objectives, a description of the survey methodology, the sampling frame and types of data collected, a presentation and interpretation of the results, and recommendations. A clear description of the sample and the distribution of its characteristics should be included. The data can be presented in tables—if possible with appropriate confidence intervals—according to specific population characteristics (eg, age, sex), but the data should also be compared with other groups for an interpretive analysis. For example, malnutrition rates from previous surveys can be compared so that trends can be inferred. It is imperative that the report have a set of recommendations and realistic actions that can be taken to alleviate the problems, because only then can various actions be considered and appropriate ones implemented. Documentation of ongoing health issues is critical for demonstrating program effectiveness and efficacy and program effects on the displaced population. Such efforts are critical for modifying less-than-effective procedures in future efforts.

FOOD ASSISTANCE PROGRAMS FOR EMERGENCY SITUATIONS

States of emergency resulting from natural disasters or outbreaks of hostilities commonly cause a disruption of food supplies and acute food shortages in civilian communities that had been adequately nourished. Interruption of civilian markets and food supply channels may cause food shortages in any community, even ones with adequate overall food stockpiles. And when families and individuals have been forced to leave their usual food sources, finding food becomes a matter of survival. In fact, Hansch[35] found that the major activities of all refugee populations involved some aspect of food. In a survival setting, providing adequate energy to minimize wasting of body mass is the prime consideration. From a psychological perspective, though, the knowledge that food is available, no matter how limited the quantities, is important.[19]

The military, in conjunction with other governmental agencies and possibly nonprofit organizations as well, will often be called on to provide nutritional

Location _____ Site _____ Date _____

Total Refugee Population at Site _____

Total Number of Children From Whom Random Sample was Taken _____

Surveyor's Name/Organization _____

Normal (A)	B	C	D
No Edema and Index > -2 Z-Scores	Edema*	Index < -2 Z-Scores	Index < -3 Z-Scores
Record the number of cases above. These numbers are used below for statistical purposes.			
Total Sample =	A + B + C + D		
% Malnutrition =	(B + C + D) x 100 / (A + B + C + D)		
% Global Acute Malnutrition =	(C + D) x 100 / (A + B + C + D)		
% Severe Malnutrition =	(B + D) x 100 / (A + B + C + D)		
Other Observations			

Index = Weight-for-height index
*Children with edema should not be included in Z-Score columns.

Fig. 47-2. A Form for Quantifying Malnutrition from the Weight-for-Height Index and Edema. Adapted with permission from Arbelot A, ed. *Nutrition Guidelines*. Paris: Medecins Sans Frontieres; 1995.

assistance during emergency situations. These occasions may arise when local government officials seek aid from local commanders or when a state of martial law is declared and the military is directed to assume civil functions. Military activities can range from providing medical, technical, and administrative advice to setting up and managing mass feeding programs. This can mean determining the kinds, amounts, and sources of foods and fuel needed, as well as providing the personnel and equipment necessary for food preparation and distribution.[20] The duration of this type of assistance is usually short, and emphasis is placed on maintaining nutritional status through adequate energy and protein intakes, on ensuring availability of potable water, and on boosting morale.

Food assistance programs vary, depending on the needs of the population, the military mission, the resources, and the current emergency situation. The assessment of the population should show a clearly

demonstrated need for nutritional assistance, and the overall objectives of a food assistance program should also be clear before action is taken.[36] Food assistance can be provided in several ways, including onsite mass feeding programs, general food distributions, and selective feeding programs.

Onsite mass feeding programs are usually for those whose homes have been destroyed, for relief workers, or for transients. Military personnel may become involved in this type of program when they work with camp personnel to provide nutritional support for refugee camps. This type of feeding is often the first approach in emergencies of short duration and is meant to be an interim measure only.

General food distributions are also designed to provide food to refugees or displaced populations for survival over the short term, but the food is provided to the families to take home. The overriding objective is to make food available and accessible through the provision of a ration that meets the basic nutrient requirements and suits the cultural customs of the affected population.[20]

Selective feeding programs can be of several types, including therapeutic and supplemental. Therapeutic feeding programs are always designed to reduce the mortality of severely malnourished children younger than 5 years of age and other vulnerable populations; when possible, such programs should be located near a health facility. These programs can be labor intensive: the first phase requires medical diagnoses and a 24-hour care unit to ensure nutritional and medical treatment of those identified at highest risk. The second phase, which commences when complicated cases are brought under control, still provides nutritional rehabilitation but fewer meals are provided and those meals are more calorically dense and consist of local foods. Vitamin supplements are provided during this phase if needed. A therapeutic feeding program is an effective treatment for severe protein energy malnutrition, but such programs require specific resources and a medically trained staff to be optimally successful.[5,28]

In contrast to the therapeutic feeding program, the supplemental feeding program is designed to provide high-quality foods, usually in the form of a ration, as a supplement to the daily diet.[5] There are two types of supplemental programs: targeted and blanket.[5,28] Targeted supplementary programs are designed to provide medical follow-up and reduce the percentage of children (primarily those younger than 5 years of age) who are moderately malnourished. Many of the children will be coming out of a therapeutic program. The blanket supplementary feeding program is designed to prevent further deterioration of malnutrition and mortality by providing all vulnerable groups with a food supplement. The vulnerable groups include children younger than 5 years of age, pregnant and lactating women, the elderly, and individuals with specific medical needs.[28] As the objective of blanket programs is to minimize the prevalence of malnutrition and mortality rates, a large proportion of the population may qualify for assistance. This program is considered only a temporary measure, however, and should be suspended when the area's general food supply is restored.[5]

Supplemental rations for feeding programs can be provided in one of two forms: wet and dry.[5,28,36] The distribution of rations is typically determined by the type of ration appropriate for the particular situation. Wet rations refer to food that is prepared and distributed at designated sites once or twice a day. This type of ration program is often used for highly vulnerable populations, when fuel and cooking utensils are scarce, or when there are security issues involved in getting rations to the homes intact. Dry rations refer to food that is distributed in bulk without prior cooking; preparation and consumption are off-site, usually in the home. The assumption is that the food will be shared by all family members. Dry ration feeding programs are generally easier to coordinate, and they keep the responsibility for food preparation and feeding in the home.

The seriousness of the situation will dictate the type of food assistance program (See Figure 47-3). For more detailed descriptions of feeding programs and supplemental rations, *Nutrition Guidelines*[28] and *Refuge Health: An Approach to Emergency Situations*,[5] both published by Medecins Sans Frontieres, should be consulted.

Energy Requirements

Although limited information on the level of energy and protein required to sustain life in developing countries is available, the WHO and other governing bodies have developed guidelines. The guidelines are for planning purposes and are used with groups based on age, height, and physiological state (eg, activity level, pregnancy, lactation). Currently two levels of support have been identified: (1) the emergency subsistence level—an energy level of 1,500 kcal per day for the average person, which is expected to maintain survival for several weeks, but lower levels may result in starvation and death and (2) the temporary maintenance level—an energy level of 1,800 kcal per day for the average

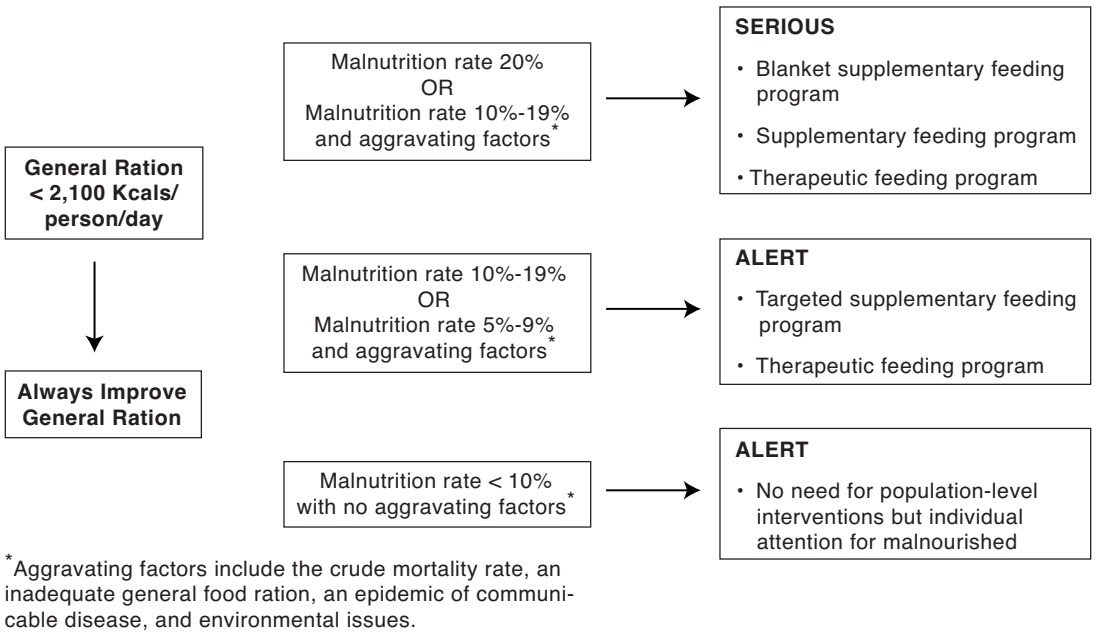

Fig. 47-3. General Guidelines for Implementing Nutritional Assistance Programs. Reprinted with permission from Arbelot A, ed. *Nutrition Guidelines*. Paris: Medecins Sans Frontieres; 1995.

person, which should sustain work for several months but may result in weight loss.

These guidelines have been useful, but in 1995 the Committee on International Nutrition, responding to a request by the US Agency for International Development, developed an estimated mean per capita energy requirement (EMPCER) that could be used to expedite food relief when information on the population was limited. Such an estimate would be useful in planning the food energy requirements in emergency situations.[37] On careful review of the available scientific and technical literature and after discussions among experts in the field, the committee presented methods for estimating the energy requirements of refugees and displaced populations. The committee, composed of members of the WHO, the UN High Commission for Refugees, the UN Children's Fund, and the World Food Programme, recommended the EMPCER be set at 2,100 kcal per day, with modifications depending on sex, weight, height, and energy expenditure.[37]

Many international agencies have been using a value of 1,900 kcal per day and other relief organizations may have different standards, but the Committee on International Nutrition believed that 1,900 kcal per day, based on biological principles, was too low. It was also acknowledged that various factors would influence this estimate, with physical activity exerting the greatest impact. If the population is known to engage in more than light activity, the total energy recommendation increases by 100 kcal per day for moderate activity and 400 kcal per day for heavy activity. Other factors the committee considered important include recovery from malnutrition, environmental temperatures, and adult body size. If the average height and weight of the adults is greater than the averages set forth in the assumptions, a higher energy intake value should be used. In cold weather, the energy recommendation increases as mean temperature decreases so, for example, the EMPCER increases by 100 kcal per day at 15°C, 200 kcal at 10°C, and 300 kcal at 5°C.[37]

Humanitarian Rations

Humanitarian rations are available for refugee populations, and guidelines and sample food rations have been prepared by the World Food Programme and the Office of the UN High Commissioner for Refugees. The rations are intended to supplement local food products or, when necessary, meet all the basic nutritional requirements. Food rations may be provided by a variety of sources, including host governments, nongovernmental organizations, and the international community at large. The World Food Programme publishes guidelines for calculating food rations for refugees, which can be found at their website: www.wfp.org/OP/

TABLE 47-3

LEVELS OF ENERGY-PROVIDING NUTRIENTS IN HUMANITARIAN RATIONS

Nutrient	Grams	Energy (kcal)	Percentage of Total Energy
Fat	40-75	360-675	10-30
Protein	50-70	200-280	10-15
Carbohydrate	≥ 345	≥ 1380	≥ 60

index.htm.

Suitability of the rations is a critical issue. The chosen ration should provide a variety of basic food items, with the staple food being one the target population is accustomed to. Basic food items include cereals, flours or grains, oil, and a source of protein; the source of protein must be familiar. Complementary food items, such as fresh meat or fish, vegetables, fruit, fortified cereal blends, sugar, condiments, salt, and spices may be included as well, if available. If humanitarian assistance rations are required, both basic and complementary foods should be provided at a minimum level of 2,100 kcal per person per day,[37] unless a more accurate estimate of the population's specific energy needs can be obtained.

Within the US Government, the Office of the Assistant Secretary of Defense, Humanitarian and Refugee Affairs, saw a need for ways to feed large groups of refugees or displaced persons. The result was the development of Humanitarian Rations, rations packaged to tolerate environmental extremes and designed to meet the nutritional requirements of any specific cultural group. As of 1999, two specific humanitarian rations had been developed: the Humanitarian Daily Ration (HDR) and the Humanitarian Pouched Meal (HPM). These rations are available through the US Government and have been used in humanitarian missions. Tables 47-3 and 47-4 present the amounts of energy-providing nutrients, vitamins, and minerals required in the HDR.

The HDR is similar in concept to the military's Meal, Ready-to-Eat in that it was designed as one day's complete food supply; it has a minimum of two entrees, which can be eaten either cold or hot (warming the meal is preferable). The components of the HDR have been carefully chosen so that the various rations do not contain items prohibited for cultural or religious reasons but do provide the nutritional requirements established for moderately malnourished individuals. Prohibited products, which include beef, pork, poultry, fish, other animal products and by-products, and ethyl alcohol, cannot be included or used in preparing or processing the ration components. Although dairy products can be used, they are permitted only in amounts that are easily digested by lactose-intolerant individuals.[36] Exhibit 47-2 presents the contents of one HDR menu: each day's menu provides no fewer than 2,200 kcal, with 10% to 13% of calories from protein, 27% to 30% from fat, and no less than 60% from carbohydrate. An accessory packet is provided with each meal. The shelf life of the HDR is 36 months from the time of placement in the meal bag when stored at 80°F. As of 1999, five different menus are available, but they are updated regularly based on customer responses and situational or cultural demands.

The HPM is similar to the HDR in that it is ready to eat, cold or hot, but it contains only one entree with complementary components and so provides

TABLE 47-4

LEVELS OF VITAMINS AND MINERALS NECESSARY TO MEET THE REQUIREMENTS FOR HUMANITARIAN RATIONS

Micronutrient	Amount	Micronutrient	Amount	Micronutrient	Amount
Vitamin A	750 μg RE*	Folate	150 μg	Phosphate	1,000 mg
Vitamin C	60 mg	Vitamin B_6	2 mg	Magnesium	300 mg
Vitamin D	10 μg	Vitamin B_{12}	6 μg	Zinc	15 mg
Thiamin	1.5 mg	Iron	25 mg	Calcium/Phosphorous	1:1
Riboflavin	1.7 mg	Calcium	1,000 mg	Iodine	0.5 mg
Niacin	5.5 mg/1,000 kcal				

*retinol equivalents

EXHIBIT 47-2

ONE DAY'S SAMPLE MENU FOR THE HUMANITARIAN DAILY RATION

A	B	C
Lentils and Vegetables	Lentil Stew	Lentil Stew
Beans with Potatoes	Peas in Tomato Sauce	Red Beans and Rice
Crackers	Vegetable Biscuits	Biscuits
Flat Bread	Jam	Vegetable Crackers
Peanut Butter	Peanut Butter	Peanut Butter
Raisins	Fruit Bar	Strawberry Jam
Apple Fruit Bar	Fruit Pastry	Fruit Bar
Accessory Packet*	Shortbread Cookies	Fruit Pastry
	Accessory Packet*	Shortbread
		Accessory Packet*

*Accessory Packet contents: red pepper, pepper, salt, sugar, spoon, matches, towelette (alcohol-free), and napkin

Source: Defense Supply Center Philadelphia website: www.dscp.dla.mil/subs/rations/rations.htm

only 967 kcal; the same percentage of calories is derived from protein, fat, and carbohydrate as the HDR. This particular ration was designed to be a supplement to ongoing food programs that are unable to provide adequate nutrients and calories. The shelf life of the HPM is 12 months at 80°F. Further information on humanitarian rations can be found at the website www.dscp.dla.mil/subs/rations/rations.htm.

Issues with Food Assistance Programs

Food assistance programs require considerable effort in terms of personnel, organization, logistics, and resources. For these programs to be organized and effective, a number of issues should be considered: the total number of beneficiaries, the duration of feeding programs, the kind and amount of food and fuel required, the degree to which food can be provided from indigenous sources, and the level of military support required to accomplish the mission.

Specific considerations include finding willing donors, ensuring well-planned organization of the food acquisition and distribution process, formulating an equitable distribution system, determining and registering those families entitled to or requiring rations, and organizing a regular monitoring system.[5] Once these issues have all been considered and decisions have been made, the appropriate food items and supplies need to be made available.

When the program is in place, a surveillance system to monitor and document program efficiency and effectiveness should be initiated. Procedures for monitoring selective feeding programs and general food distribution programs will differ, but individuals with specific needs should be followed up, no matter which program they are in.[20] Specific issues to consider in selective feeding programs include registration, attendance indicators, health indicators (eg, weight, growth charting, edema evaluation, food needs and intake), mortality rates, and malnutrition prevalence. Children should be remeasured after a month to document changes in anthropometric indexes, and recipients should be queried about the availability, quality, and quantity of the food. Such information will allow for an evaluation of the program's implementation and its impact.

There are a variety of factors that can compromise the efficiency and effectiveness of general food distribution programs. Monitoring at some level needs to be done for these potential problems: food diversion, gaps in the supply of food, food losses during distribution, inadequacy of ration nutrient content, poor organization, failure to coordinate logistics adequately, and problems with food preparation.[5]

Since food aid has value, food diversion is common. Households may exchange part of the ration

for essential items such as shelter or firewood. Another type of food diversion occurs when groups in power inequitably control distribution and access to food. Food distribution sites should be inspected, since this allows the methods and timing of distribution to be assessed and ensures that food is actually being distributed equitably, both during and after the emergency phase. Additional assessments of food supplies, including food production, exports, imports, and storage and usage rates, should be conducted before and after the intervention. If the infrastructure of the country or region has been affected, movement of food and supplies to the affected population areas may be restricted. An example of this occurred in Iraq during the Persian Gulf War when the country's normal food distribution system collapsed, resulting in restricted access to necessary food items.[1] Finally, rationing of food under extreme situations may be necessary to minimize overconsumption and ensure that food supplies will last over prolonged periods. Despite the wide range of potential problems, food distribution programs continue to serve refugee and displaced populations and meet their needs in times of distress.

In addition to the feeding programs, Yip and colleagues[7] note that a safe water supply, sanitation measures, and a diarrhea-control program are often critical aspects of any relief mission. Thus, personnel experienced in various aspects of public health should be consulted. Military dietitians and nutritionists should be included in planning and implementing nutrition relief efforts so that logistical decisions can be coupled with the nutritional assessment.

This is an ever-expanding field with world events determining what the best approaches to nutritional assessments and feeding programs are. The military has served and will continue to serve a critical role. Integrated teams who understand the science, social science, public health, and cultural issues will be needed to deal with the urgent crises faced by the increasing numbers of natural and political emergencies. Fortunately, excellent resources for humanitarian assistance nutrition programs and other public health issues during emergency situations are available.[1,5,23,28]

SUMMARY

There are a myriad of factors that must be considered and addressed during humanitarian assistance or disaster relief missions due to war, civil strife, natural disasters, and other such events. In many cases, assessment and analysis of the emergency situation, using information on increased morbidity and mortality rates, indicate that nutritional support programs are critical. Nutritional support in the form of population screening efforts, assessments, surveys, and nutritional interventions is a critical element of any type of relief mission. Such activities are often combined efforts between military units and national and international relief organizations because diverse skills are required to provide for those in need. Military personnel are uniquely qualified to support humanitarian efforts; they have been involved in such operations throughout history and have the public health specialists, clinical dietitians, epidemiologists, medical professionals, and logistical and support services necessary for both advance planning and day-to-day operations. In particular, dietitians and nutrition care personnel, in conjunction with other health care providers, have the expertise to identify and implement nutrition programs that will interrupt the course of malnutrition, disease, and death. Victims of any crisis must have food to obtain energy, not only to survive but also to rebuild.

REFERENCES

1. Levy BS, Sidel VW, eds. *War and Public Health*. New York: Oxford University Press; 1997.

2. Toole MJ, Waldman RJ. Prevention of excess mortality in refugee and displaced populations in developing countries. *JAMA*. 1990;263:3296–3302.

3. Cobey JC, Flanagin A, Foege WH. Effective humanitarian aid: our only hope for intervention in civil war. *JAMA*. 1993;270:632–634.

4. Macrae J, Zwi AB. Food as an instrument of war in contemporary African famines: a review of the evidence. *Disasters*. 1992;16:299–321.

5. Medecins Sans Frontieres. *Refugee Health: An Approach to Emergency Situations*. London: MacMillan; 1997.

6. Toole MJ, Waldman RJ. Refugees and displaced persons: war, hunger, and public health. *JAMA*. 1993;270:600–605.

7. Yip R, Sharp TW. Acute malnutrition and high childhood mortality related to diarrhea: lessons from the 1991 Kurdish refugee crisis. *JAMA*. 1993;270:587–590.

8. Cashman TM, Hassell LH, Barker AJ, Funderburk LK. Operation Tropic Refuge: the East Wood Rescue. *Mil Med*. 1994;159:723–729.

9. Craig MJ, Morgan WA. The Army dietitian in Panama: military hospital feeding and humanitarian efforts during Operation Just Cause. *Mil Med*. 1996;161:723–725.

10. Hodges PA, Lyon JM. Perspectives on history: Army dietetics in southwest Asia during Operation Desert Shield / Desert Storm. *J Am Diet Assoc*. 1996;96:595–597.

11. Hodges PA. Perspectives on history: Army dietetics in the European, North African, and Mediterranean theaters of operation in World War II. *J Am Diet Assoc*. 1996;96:598–601.

12. Kemmer T, Podojil R, Sweet LE. US Army dietitians deploy in support of Cobra Gold: a humanitarian mission. *Mil Med*. 1999;164:488–494.

13. Outram Q. Cruel wars and safe havens: humanitarian aid in Liberia 1989-1996. *Disasters*. 1997;21:189–205.

14. Rumbaugh JR. Operation Pacific Haven: humanitarian medical support for Kurdish evacuees. *Mil Med*. 1998;163:269–271.

15. Boss LP, Toole MJ, Yip R. Assessments of mortality, morbidity, and nutritional status in Somalia during the 1991-1992 famine: recommendations for standardization of methods. *JAMA*. 1994;272:371–376.

16. Manoncourt S, Doppler B, Enten F, et al. Public health consequences of the civil war in Somalia, April, 1992. *Lancet*. 1992;340:176–177.

17. Moore PS, Marfin AA, Quenemoen LE, et al. Mortality rates in displaced and resident populations of central Somalia during 1992 famine. *Lancet*. 1993;341:935–938.

18. Thomas CT. Personal Communication, 1995.

19. Davis A. What is emergency public health? MSF-Holland. March 1995. Mimeo draft. Cited by Cogill B. Nutrition in emergency situations. Presented at Nutrition Support for Combat Casualties and Humanitarian Missions Course; January 1997; San Antonio, Tex.

20. Dept of the Army. *Army Medical Field Feeding Operations*. Washington, DC: DA. FM 8-505. In press.

21. Centers for Disease Control and Prevention. Famine-affected, refugee, and displaced populations: recommendations for public health issues. *MMWR*. 1991;41(RR13).

22. Shears P. Epidemiology and infection in famine and disasters. *Epidemiol Infect*. 1991;107:241–251.

23. Yip R. Famine. In: Noji EK, ed. *The Public Health Consequences of Disasters*. New York: Oxford University Press; 1997.

24. Intertect. *Assessment Manual for Refugee Emergencies*. Washington, DC: Bureau for Refugee Programs, Dept of State; 1985.

25. Food and nutrition. In: UN High Commissioner for Refugees. *Handbook for Emergencies. Part One: Field Operations*. Geneva: UNHCR; 1982: Chap 8.

26. Simmonds S, Vaughan P, Gunn SW, eds. *Refugee Community Health Care*. New York: Oxford University Press; 1983.

27. World Health Organization Regional Office for the Eastern Mediterranean. *Field Guide on Rapid Nutritional Assessment in Emergencies*. Geneva: WHO; 1995

28. Arbelot A, ed. *Nutrition Guidelines*. Paris: Medecins Sans Frontieres; 1995.

29. Toole MJ. Micronutrient deficiencies in refugees. *Lancet*. 1992;339:1214–1216.

30. Quinn VJ. User's Manual for Conducting Child Nutrition Surveys in Developing Countries. Ithaca, NY: Cornell Food and Nutrition Policy Program; 1992.

31. Centers for Disease Control. *A Manual for the Basic Assessment of Nutrition Status in Potential Crisis Situations*. 2nd ed. Atlanta: CDC; March 1981.

32. World Health Organization. *Report on the Nutrition Situations of Refugee and Displaced Populations*. Geneva: WHO; 1996. ACC/SCN No. 18.

33. Dowell SF, Toko A, Sita C, Piarroux R, Duerr A, Woodruff BA. Health and nutrition in centers for unaccompanied refugee children: experience from the 1994 Rwandan refugee crisis. *JAMA*. 1995;273:1802–1806.

34. Epi Info. Version 6. Atlanta: Centers for Disease Control and Prevention; 1994.

35. Hansch S. Diet and ration use in Central American refugee camps. *J Refugee Studies*. 1992;5:300–312.

36. Sanghvi TG. *Supplement on Emergency Rations: Commodities Reference Guide*. Draft. Washington, DC: US Agency for International Development; 1993.

37. Allen LH, Howson CP, eds. *Estimated Mean Per Capita Energy Requirements for Planning Emergency Food Aid Rations*. Washington, DC: Institute of Medicine, National Academy Press; 1995.