Populations at Risk

A. Introduction

This unit provides *reference information* for dealing with populations that are at risk. This information is useful for Assessment Teams gathering information on the plight and condition of these people or by a DART which has been sent to assist in dealing with relief activities targeted at these individuals

Populations at risk are those groups of people adversely affected by a disaster (natural or manmade), who have been placed in situations where they are at an increased risk. They are at risk due to the disruption or loss of their normal community and social support systems that provide the critical elements of their survival: water, food, immunization, health care, shelter, and sanitation. The negative impacts on populations at risk increase the longer they are displaced from their homes. In some cases, these populations have also travelled great distances from their homes to escape long-term disasters such as famine, drought, and civil strife.

Tables located at the end of the unit provide additional reference information related to the issues discussed in the unit.

B. Immediate Response

1. Protection of displaced people

The immediate needs for displaced people are that they are in a secure location where their safety and human rights are ensured. It is difficult to begin an assistance program in an unsafe location or in an atmosphere of vulnerability.

The International Committee of the Red Cross (ICRC), the United Nations High Commissioner for Refugees (UNHCR), and United Nations Department of Humanitarian Affairs (DHA) often attempt to protect displaced populations from arbitrary actions of outsiders and to provide relief assistance. OFDA Assessment Teams and DART's should support the efforts of the ICRC, UNHCR, and DHA. However, Assessment Teams and DART's should not assume any responsibility for the protection of displaced people.

2. Organizational Considerations

Once the situation and needs have been assessed and the protection of individuals has been secured, the priority will be to provide vital immediate assistance to the displaced population. To do so, key organizational and planning decisions must be made, which may determine the future of the whole operation. These decisions involve the issues summarized below. If these issues are not addressed quickly and correctly, they will be difficult to resolve later.

- The location of the displaced people will have a major influence on all sectors of assistance. If the displaced people are not already concentrated in settlements, they should not be relocated to settlements unless compelling reasons exist for breaking their present pattern of spontaneous informal settlements. New arrivals should be diverted elsewhere. On the other hand, if they are already in settlements that are unsatisfactory, they must be moved. The difficulty in moving displaced people from an unsuitable site increases markedly with time.
- Reception or transit centers are generally recommended when an influx is likely to continue.
- Control at campsites: A determination of the optimum population should be made in advance to plan for new campsites accordingly. Careful control of the population in a camp should be exercised as people arrive, so that sections prepared in advance are filled in an orderly manner.
- Numbers and registration: An accurate estimate of numbers is a prerequisite for any effective assistance. Delivery of help to all in need will require at least family registration and a fair distribution system. The sooner this is established the better.

3. Material Assistance

The specific types and amounts of emergency assistance required will depend on standards established for each situation. These standards are:

- The general condition of the displaced population (people in extreme distress will need extraordinary measures).
- Immediately available resources (e.g., unfamiliar food may have to be used if there is nothing else).
- The normal customs of the displaced people and the local population.

The standards established for emergency assistance must be consistent with the aim of ensuring the survival and basic well-being of the displaced population, should be fairly applied to all, and must be respected by all involved.

The first priority in an emergency is to provide the organizational capacity required to meet the needs of the emergency. The local government and PVO's/NGO's/IO's must be mobilized within the framework of a plan for immediate action. The organization of the logistical capacity necessary to deliver the assistance will be of critical importance

Once the organizational capacity has been established, the immediate needs of the displaced population must be met. The following is a list of needs in the order of their importance.

Water
Protect existing water sources from pollution. Establish maximum storage capacity with the simplest available means. Transport water to the campsite if the need cannot otherwise be met.

Food
Ensure that at least the minimum need for energy is met. A full ration can follow. Set up special feeding programs if there are clear indications of malnutrition. Establish storage facilities.

Immunization for Measles
The first preventative health measure to be taken in any large displaced person situation is to institute a measles immunization program for all children between 6 months and 5 years of age, even when resources are scarce. If significant malnutrition is present, it is **absolutely essential** to implement a vaccination program as soon as possible! After diarrhea, measles is the highest cause of death among children under 5 years of age in displaced person situations.

Health Care
Provide the necessary organizational assistance, health personnel, basic drugs, and equipment in close consultation with national and local health authorities. Although the immediate need and demand may be for curative care, preventative and particularly environmental health measures should not be neglected.

After the primary needs have been addressed, the focus will be on providing secondary needs. They are:

Emergency shelter
Use local supplies and services, when possible, to meet shelter needs for roofing and other materials. Only request outside supplies (e.g., plastic sheeting, tents) if absolutely necessary.

Sanitation
Isolate human excreta from sources of water and shelter.

Promote self-sufficiency in the displaced population from the start. Involve the displaced in the planning for their welfare. This may be difficult, but if it is not done the effectiveness of the emergency assistance will be severely reduced, and an early opportunity to help the displaced population to start recovering from the psychological effects of their ordeal may be missed.

The remaining sections in this unit provide an in-depth review of the needs of a displaced population, focusing on: food, water, immunizations, health, sanitation issues, and emergency shelter.

C. Water

1. General

People can survive much longer without food than without water. Thus, *the provision of water demands immediate attention from the start of a displaced person emergency. The aim is to assure availability of enough fresh water to allow unrestricted distribution and safe drinking.*

Adequate storage capacity and backup systems for all water supplies must be assured, since interruptions in the supply may be disastrous. To avoid contamination, all sources of water used by displaced populations must be separated from sanitation facilities and other sources of contamination.

Availability will generally be the determining factor in organizing the supply of sufficient quantities of safe water. It may be necessary to make special arrangements for water extraction, storage, and distribution. Measures will be required to protect the water from contamination. In some circumstances, treatment will be required to ensure that the water is safe to drink. The safety of the water must be assured right through to consumption in the home.

Improvements in the existing water supply may take time, particularly if it is necessary to drill or dig wells. In many displaced person emergencies, only contaminated surface water (standing water, streams, or rivers) is initially available Immediate action must be taken to stop further pollution and reduce contamination of such water. If it becomes evident that available sources of water are inadequate, arrangements must be made to bring in water by truck. Where even the most basic need for water cannot safely be met from existing sources in the area, and when time is needed for further exploration and development of new sources, the displaced people should be moved to a more suitable location.

2. Assessment and Organization

An immediate on-the-spot assessment of water sources in relation to needs is essential. On-the-spot assessments can be done by the government's central and local water authorities and experts who can provide indispensable knowledge of the local terrain and conditions. Expertise from outside the country should be brought in only when clearly necessary.

Available water sources must be protected from pollution and contamination at once. Initially, rationing of scarce water may be needed. An influx of displaced people may overburden water resources used by the local population. Rationing will ensure survival of the weak and equity in distribution to the rest of the displaced population. The design, establishment, and function of a water supply and distribution system must be closely coordinated with the site planning and layout, and with health and environmental measures, particularly sanitation.

a. Assessment

Although estimating the need for water does not require special expertise, assessing different sources of supply does. Depending on the situation, sources of water may be identified by:

- the local population.
- the displaced people themselves.
- the lay of the land (ground water is often near the surface in the vicinity of rivers and in low places generally, or is indicated by richer vegetation).
- maps and surveys of water resources.
- national and expatriate experts (hydrologists).
- water diviners.

The assessment of these water sources is the basis for selecting an appropriate supply and distribution system and requires expertise in water engineering, sanitation (testing, purification), and in some cases, logistics.

Seasonal factors must be carefully considered. Supplies that are adequate in the rainy season may dry up at other times. Local knowledge will be essential.

b. Personnel and Material

Using local sources of information and expertise is recommended and may include central and local government departments (e.g., interior, public works, agriculture, water resources); the UN system, especially UNICEF; bilateral aid programs; PVO's/NGO's; and engineering consultants and contractors. If outside assistance is necessary, it should be provided when possible in support of local experts.

The water system must be developed with and operated by the displaced people from the start, to the extent possible. The displaced people, particularly those of rural background, may have relevant skills. For example, some individuals from rural communities may be experts at digging and maintaining wells. Others may be familiar with simple pumps or common pump motors. Such skills can and should be fully used in planning, developing, and operating the water system. Displaced people without prior experience should be trained as necessary.

Although special equipment may be required for ground water exploration or surface water purification, the material and equipment to establish a water supply and distribution system should be found locally. The technology should be kept simple, appropriate to the country, and draw on local experience. Where pumps and other mechanical equipment are unavoidable, supplies should be standardized, and repair expertise and fuel should be available locally.

For the water system to remain effective, both organizational and technical aspects of the complete water supply system need to be carefully monitored. Use of the system must be controlled; water wastage and contamination prevented; maintenance assured; and technical breakdowns quickly repaired. Basic public health education on such topics as the importance of avoiding polluting the water with excreta and the use of clean containers in the home is also essential. Where a water supply and distribution system has to be established with the help of expatriates and

mechanized technology, operation and maintenance by displaced people and other local personnel must be assured before the departure of the expatriates. If this is not done, even the best system will break down.

3. Needs

a. Quantity

Minimum water needs will vary with each situation but increase markedly with raised air temperature and physical activity. In general, the following amounts of water are desirable:

Individuals:	15-20 liters/person/day
Health centers:	0-60 liters/patient/day
Feeding centers:	20-30 liters/person/day

For individuals, the total amounts of water represents water used for drinking (3–4 liters), kitchen (2–3 liters), personal hygiene (5–7 liters), and laundry (4–6 liters). *A quick reference matrix for calculating the amount of water needed for displaced populations (1,000,000 liter increments), for various time periods is located in table 1 at the end of this chapter.*

Additional water may be needed for livestock, sanitation facilities, other community services, and irrigation. Cattle need approximately 30 liters of water daily and small stock require 5 liters. Water will also be a factor in deciding on a sanitation system. For example, one aquaprivy has a water tank volume of 1,000 liters, to which 5 liters per user must be added daily to maintain the water seal. The OXFAM sanitation unit requires up to 3,000 liters per day to serve 1,000 persons. Water is also necessary for the cultivation and irrigation of food by the displaced people. During the initial stages of an emergency, waste water may be the only type of water available, but it can suffice for small vegetable patches. Large-scale irrigation is a matter for expert advice and therefore not addressed here. If possible, however, water sources for large scale irrigations should be identified and reserved at an early stage.

Care should be taken to avoid pollution or depletion of scarce water sources by livestock. *The more convenient the supply, the higher the consumption.*

Reduction in the quantity of water available to individuals has many health consequences. Proper supplementary and therapeutic feeding programs will be impossible unless sufficient water is

available for preparation of food and basic hygiene. As supplies are reduced, clothes cannot be washed; personal hygiene suffers; cooking utensils cannot be properly cleaned; food cannot be adequately prepared; and most importantly, the direct intake becomes insufficient to replace moisture lost from the body. Water reduction is also reflected by increased incidence of parasitic, fungal, and other skin diseases, eye infections, diarrheal diseases, and often fatal dehydration associated with them. Even individuals who have traditionally lived on less than the normally recommended amount of water, such as nomads, will require more in a displaced person community due to crowding and other environmental factors.

Water will probably be of little use in controlling major fires on displaced person camps owing to a lack of sufficient quantity and pressure.

Plans for the size of a camp must be flexible enough to accommodate the possible arrival of additional displaced people.

b. Quality

Water must be safe to drink. Although it may look safe, it may be impure and contain microbiological organisms that cause diseases. "Water-borne" diseases are not usually as serious or widespread as "water-washed" diseases, such as skin and eye infections, which result from insufficient water for personal hygiene. *Nevertheless, a large quantity of reasonably safe water is preferable to a smaller amount of very pure water.* The most serious threat to the safety of a water supply is contamination by feces. Once contaminated, it is hard to purify water quickly under emergency conditions.

Where drinking water is scarce, brackish or even salt water, if available, may be used for domestic hygiene.

New water supplies should be tested before use. Existing supplies should be tested periodically, and immediately after an outbreak of any water-borne disease. The most useful and widely used tests detect and enumerate common fecal bacteria, such as fecal coliforms. Indicators of water quality are:

- Escherichia coli or fecal streptococci contamination will be indicated by the presence of fecal coliforms.
- Escherichia coli and fecal streptococci are subsets of fecal coliforms which are a subset of the total coliforms.
- Both the fecal coliform numbers given and the chlorination concentration mentioned are two primary water quality indicators.

The actual test will depend on the normal practice of local water laboratories and experience of local sanitarians. The presence of fecal coliform bacteria indicates that the water has been contaminated by feces of humans or other warm-blooded animals. Concentrations of fecal coliforms are usually expressed the fecal coliform count per 100 ml of water. As a rough guide:

Fecal Coliforms per 100 ml	Risk
0–10	Reasonable quality
10–100	Polluted
100–1000	Very polluted
Over 1000	Grossly polluted

In cases where water is disinfected by chlorination, it is easier and more appropriate to test for the presence of free chlorine than for bacteria. The presence of free chlorine at approximately 0.2 mg/l at the distribution point indicates that almost all bacteria and viruses have been killed, and the water is no longer heavily contaminated with fecal or other organic matter.

Water stored in tanks and tanker trucks should also be tested periodically. Domestic hygiene and environmental health measures should be taken to protect the water between collection and use.

4. Immediate Response

Measures to meet short-term water emergency needs are appropriate while a longer term supply system is being developed or pending the move of the displaced people to a more suitable site. If the locally available water supply is not sufficient to meet the minimum needs of the displaced, arrangements must be made to bring in water by truck. If this is not possible, the displaced population must be moved from the site without delay.

While the quantity of water available may meet initial minimum needs, the quality of the water may be the problem; it is likely to be contaminated. Efforts to control and manage the use of contaminated water should be arranged with the displaced community leaders. Otherwise, displaced people will use surface water or less often, ground water (well or spring), or whatever water is closest, regardless of quality for their immediate needs. Immediate steps should be taken to prevent pollution by excreta. If the water source is flowing, supplies must be drawn off upstream and a special area set aside for this. Then allocate an area for washing and finally, downstream of the settlement, allow any livestock to water.

Where the source is a well or spring, it must be fenced off, covered, and controlled. Prevent displaced people from drawing water with individual containers that may contaminate the source. If possible, make immediate arrangements to store water and to distribute it at collection points away from the source. Not only does this help avoid direct contamination but storage can make water safer.

From the start, families will need to carry and store their own water at the household level. Suitable containers (10–20 liters) are essential. If empty cooking oil containers or the like are unavailable, buckets or other containers must be supplied. They must be kept clean.

If immediately available supplies of water are insufficient, priority will be given to rationing supplies and ensuring equitable distribution. Rationing is difficult to organize. The first step is to control access to sources, using full-time watchmen if necessary. Uncontrolled distributions are open to abuse. Distribution at fixed times for different sections of the camp should be organized. Vulnerable groups may need special arrangements. Every effort must be made to increase the quantity of water available so that strict rationing is unnecessary.

5. Water Sources

There are three main sources of water: surface water (streams, rivers, lakes), ground water (underground or emerging from springs), and rainwater.

a. Surface Water

Surface water is collected directly from streams, rivers, ponds, lakes, dams, and reservoirs. Where such a source holds water year-round, the water table in the vicinity can be expected to be near the surface. However, it is rarely pure and is likely to require treatment measures for direct use. Direct access may also cause difficulties with the local population. It is preferable to use ground water that has passed through the natural filter of the soil than to collect water from the surface. However, if the ground is not sufficiently porous to allow extraction of enough water from wells, surface water may be the only option. In such circumstances, emergency treatment measures such as storage, sand filtration, or even chlorination are advised and control of its access is essential.

b. Ground Water

Springs are the ideal source of ground water. Spring water is usually pure at the source and can be piped to storage and distribution points. Spring water should be collected above the camp, if possible, and care should be taken to check the true source of spring water. Some springs may be nothing more than surface water that has seeped or flowed into the ground a short distance away. Once detected, the source of the spring water must be protected against pollution as it flows to a tank or collection point. Care must also be taken to prevent contamination above the takeoff point. The supply of water from a spring may vary widely with the seasons, being at its minimum at the end of the dry season.

If water requirements cannot be met by springs, the next best option is to raise ground water by means of tube wells, dug wells, or bore holes. Ground water, being naturally filtered as it flows underground, is usually microbiologically pure. The choice of method to raise ground water will depend on the depth of the water table, yield, soil conditions, and availability of expertise and equipment.

While wells are often used to access ground water, they have several disadvantages. Without good water resources surveys, preliminary test drilling, or clear local evidence from nearby existing wells, there is no guarantee that new wells will yield adequate supplies of water or of the right quality. Digging wells can also be expensive. A hydrogeological survey must be undertaken before starting any extensive drilling program. For these and other reasons, it is often better to attempt to improve an existing well with an inadequate yield rather than dig a new one.

Wells, bore holes, and pumps must be disinfected immediately after construction, repair, or installation, as they may have been polluted during work. *Wells must also be protected from pollution.* They should be located where surface water, seasonal rain, or flood water will drain away from the well head. *They should be located above and at least 15 to 30 meters away from any sanitation facilities and their discharge.*

c. Rainwater

Rainwater may be the major source of water in areas with adequate and reliable year-round rainfall. Reasonably pure rain water can be collected from the roofs of buildings or tents if clean and suitable. Collecting rainwater, however, is unreliable and requires suitable shelter as well as individual household storage

facilities, making it generally impractical for some displaced person emergencies. However, *every effort should be made to collect rainwater.* Small collection systems, such as using local earthenware pots under individual roofs and gutters, should be encouraged. Allow the first rain after a long dry spell to run off, thus cleaning the catchment of dust and sediment.

d. Sea Water

Sea water can be used for almost everything but drinking, and thus reduces fresh water requirements.

e. Water Source Considerations

Consider the following when selecting an appropriate water source:

- speed with which source can be made operational
- volume of supply.
- reliability of supply (taking into account seasonal variations and, if necessary, logistics).
- water purity, risk of contamination, and ease of treatment if necessary.
- rights and welfare of local population.
- simplicity of technology and ease of maintenance.
- cost.

Take careful account of systems and methods already in use locally. Adopting well-proven and familiar techniques, combined with efforts to improve protection against pollution, is often a sound solution.

In addition to organizational measures to protect the water supply, some form of treatment may be necessary. However, water sources that would require treatment should be avoided if at all possible The purification of unsafe water, particularly in remote areas, can be difficult and requires trained supervision.

6. Storage

All displaced person camps must be provided with facilities to store an adequate reserve of water as soon as possible. In nearly all systems it will be necessary to store water in covered tanks between the source and distribution points. Stored water provides an essential reserve and can greatly facilitate distribution, particularly when water is pumped up to elevated tanks. Sedimentation tanks should have the capacity to store an amount of water equal to a day's consumption, thus allowing sedimentation to take place overnight. The size of the reserve will depend on

the number of people, the nature of the water supply system and certain logistical aspects. Using internal dimensions and overflow pipe heights, capacities are calculated as follows:

(a) Rectangular tanks:
length x breadth x height (in meters) x 1,000 = capacity in liters;
(b) Cylindrical tanks:
height x radius squared (in meters) x 3140 = capacity in liters.

OFDA provides 3000 gallon collapsible water tanks to disaster victims from its stockpiles.

In areas with pronounced dry and rainy seasons where alternative sources of water are limited, the construction of a reservoir to collect water should be considered despite dangers of pollution and breeding mosquitoes. An erosion-protected overflow spillway should also be provided. Catchment tanks for the collection of surface water can also be considered in drier parts of the world. Pits can be dug into the ground to catch and hold water that runs off hard ground during heavy storms. Pits need special lining to hold water, and should be covered if possible.

Where the water table is very high and contamination cannot be otherwise avoided, above-ground tanks may be needed. A number of types of simple, air-portable, butyl rubber storage tanks are available. Some can be supplied together with a complete distribution system.

7. Distribution

Water distribution will be an important consideration in the layout of the camp as displaced people must have easy but controlled access to water. Experience shows that persons forced to fetch water from considerable distances tend not to fetch enough to limit water-washed diseases or collect water from closer but contaminated sources. Ideally, no dwelling should be located further than 100 meters or a few minutes' walk from a distribution point. Distribution points should not be located in low lying areas. The area around the point should be paved with stones or gravel or protected by boards, with a run-off to allow proper drainage.

Water can be distributed to individuals in a number of ways depending on local conditions. Uncontrolled access by individual consumers to primary water sources must be avoided. *A distribution system should have a sufficient number of sources*

and/or outlets relative to the size of the population to ensure that people do not wait for long periods to have access. Equity in the distribution of water is an extremely important consideration. Water for domestic use should flow between source/storage and distribution point in pipes to protect its quality. Pipes must be watertight; leaking pipes suck in pollution when the pressure drops or the system is turned off. Pipes may be made of metal, cement, plastic, or bamboo. Bamboo is unlikely to be suitable in the majority of emergencies. Plastic pipes are often the cheapest and easiest to lay. They are available in lengths of coiled, flexible pipe, and come in rigid lengths, commonly 3 meters. Pipes should be buried for protection and sections of the system should have isolated valves.

Standpipes and push taps are recommended where possible as outlets for water. Taps, however, are very vulnerable and often require spares that must be available. Where water supplies are limited and the camp is crowded, valve distribution points that can be chained shut may be the only effective solution. *There should be one tap per 200–250 displaced people. The more people using a single source or outlet of water, the greater the risk of pollution or damage.*

A certain amount of waste water will be generated in the community, both at the individual and communal service level. While it must be prevented from becoming a danger to public health, waste water may be reused for livestock, vegetable gardens, or to flush latrines.

8. Treatment

Water may contain pathogens, particularly certain viruses, bacteria, protozoal cysts, and worm eggs that are transmitted from feces to mouth. While water contamination by human feces is the major concern, animal feces in water may also transmit disease. Water contamination by urine is a significant threat only in areas where urinary schistosomiasis (*Schistosoma haematobium*) is endemic. By far the greatest risk associated with polluted drinking water is the spread of diarrhea, dysentery, cholera, and infectious hepatitis (hepatitis A). Diarrhea and dysentery are caused by a variety of viruses, bacteria, and protozoa. The numbers of viruses and protozoa in water will always decrease with time and most rapidly at warm temperatures. Bacteria behave similarly, but in exceptional circumstances, they may multiply in polluted water. The infectious dose

of viruses and protozoa is typically very low, whereas the dose of bacteria needed to establish an infection in the intestine may be high, or as in the case of cholera, very low.

If necessary, water treatment should be at a minimum to ensure acceptably safe water, using appropriate technology and a reliable method. Determining how to treat water on a large scale is best done by experts. If possible, professional engineering advice should be sought. However, simple and practical measures can be taken before such help is available. All methods require regular attention and maintenance.

In addition to protecting water at its source and initially disinfecting wells and boreholes (usually by chlorine), there are four basic methods of treatment: storage, filtration, chemical disinfection, and boiling. These can be used singly or in combination.

a. Storage

Leaving water undisturbed in containers, tanks, or reservoirs improves its quality. Storage kills some pathogens and settles any heavy matter in suspension (sedimentation). If water supplies cannot be assumed to be safe, immediate action must be taken to provide maximum water storage capacity. Storage of untreated surface water for 12 to 24 hours will considerably improve its quality. The longer the period of storage and the higher the temperature, the greater the improvement. The clarification of cloudy water can be greatly speeded up by the addition of aluminum sulphate. A two tank system is often used; the first tank being a settling tank with the second storing the clarified water. Treatment can be done in the second tank as well, and a third used for storage if necessary. While clear water may only require chlorination, turbid surface water will usually require sedimentation and/or filtration before chemical disinfection. Even so, greater doses of chlorine may be required.

Great care should be taken to prevent the pollution of stored water. This can be done by covering storage tanks. In addition, the storage area should be fenced off and guarded to prevent children playing or swimming in the water.

Long-term storage can help control schistosomiasis (bilharzia) by killing parasites that die if they do not reach the fresh water snail within 24 hours of excretion by an infected person, or a human or animal host within 48 hours of leaving infected snails. Thus 2 days' storage would provide an effective barrier to transmission of the disease, if snails do not enter the tank.

b. Sand Filtration

Sand filtration can also be an effective method of treatment. A proper slow sand filter works in two ways. First, the passage of the water through the sand physically filters out solids. Secondly, and more importantly, it causes a thin and very active layer of algae, plankton, bacteria, and other forms of life to develop on the surface of the sand bed. This organic matter is called the "schmutzdecke". The rate of filtration depends on the surface area, depth, and type of sand through which the water is passed, and the pressure of the water. The average range size of sand is 0.3–1mm. In general, the slower the rate of filtration, the higher the quality of treated water.

A packed drum filter can be used for sand filtration and is a good way of providing limited quantities of safe water quickly, for example, for a health center. If a packed drum filter is used, water should pass down through sand on a 5 cm layer of gravel and be drawn off at a rate not to exceed 60 liters per hour for a 200-liter drum. If a tap is used, unfiltered water equal to the amount drawn off should be added to the top. Other types of sand filters include the horizontal sand filter and river bed filter (suitable only where the bed is permeable). These can be used to treat larger amounts of water but are likely to be more difficult to set up quickly and effectively. To filter water from a river, a well may be dug close to the bank. Although, the water is river water, it will have been filtered through the bed and bank.

c. Chemical Disinfections

Chemical disinfection as a method of water treatment on a large scale is recommended only when storage and/or filtration cannot meet the need. It will be required to purify wells, sand filters, pumps, and piped water systems. Both iodine and various forms of chlorine can be used, although chlorine is more widely used, cheaper, and often more readily available. The most generally suitable form of chlorine for displaced person emergencies is calcium hypochlorite powder.

Expert advice is essential for large-scale chlorination. All systems require regular attention and will be of little value if not fully reliable. Chlorination should take place after any sedimentation or filtration process. It requires at least 30 minutes to act.

Care must be taken to ensure strict control of any chemical disinfection process. Water should be tested for chemical residual levels after each disinfection and before distribution.

After chlorination, at least 0.2 parts of "free active chlorine" per million should still exist in the water to kill bacteria and viruses The amount of chlorine required to achieve this is usually a broad indication of the level of pollution. If the amount of "free active chlorine" is above 0.5 parts per million, people may not want to drink the water. Over-chlorinated water tastes unpleasant and will be useless if people prefer untreated water. *Chlorine and iodine water purification tablets are available, but are rarely suitable to treat water for large populations.* Tablets, however, may be useful to treat water used in health or supplementary feeding centers.

d. Boiling

Boiling is the surest and perhaps simplest method of water sterilization. At low altitudes, bringing water to a boil will destroy all pathogens transmitted by drinking water. (Boiling should, however, be increased 1 minute for every 1,000 meters of altitude above sea level, as the boiling temperature reduces with altitude). Prolonged vigorous boiling is often recommended but not necessary to destroy the fecal-orally transmitted pathogens. In fact, prolonged boiling wastes fuel and increases the concentration of nitrates, which are dangerous for very young babies. In the longer term, domestic fuel supplies may be the determining factor, as boiling requires about 1 kg of wood per liter of water. However, if the displaced people have traditionally boiled their water, they should be encouraged to do so. This may make the need for other types of treatment less urgent.

D. Food and Nutrition

1. General

The type of feeding program(s) required to meet the needs of the displaced people will be determined by the initial needs assessment. Continuous monitoring will ensure adjustments to reflect changing conditions. Coordination of the feeding program(s) with health and other community services is essential.

Assistance must be culturally acceptable and appropriate to the nutritional needs of the displaced people. Foods prepared locally with local ingredients are preferable to imported foods. Infant feeding policies require particular attention.

Infants, children, pregnant and lactating women, the sick, and elderly are very vulnerable to malnutrition and have special needs. Since the population has already suffered a prolonged

food shortage, many will be malnourished by the time of the first assessment of their condition and needs.

If the displaced people are already suffering the effects of severe food shortages, immediate action must be taken to provide whatever food is available to them. *The first priority is to meet the energy requirements of the population, rather than protein needs. Supplying bulk cereal is the first objective of the general feeding program.*

Displaced people must be involved from the start in the organization and management of the feeding program(s). Special training for some displaced people may be necessary.

Simple nutrition education is important when unfamiliar foods or new methods of cooking and preparation have to be introduced to the population. This should be organized with other health education activities to provide guidance on proper infant feeding, feeding of sick children, treatment of diarrhea, basic food hygiene, and the preparation of available foods for maximum nutritional benefit.

Particular attention must be paid to the provision of cooking fuel. A lack of cooking fuel can quickly lead to destruction of the vegetation around the camp and friction with the local population. On average a family will use 5 kg of wood per day to cook on a simple wood stove.

2. Nutritional Assessment and Surveillance

Initial nutritional assessments should be completed by nutritional specialists if possible. If none are available, a survey can be completed by using information described in this section.

Follow-up surveillance of the population as a whole, should be done using the weight-for-height comparison method. This is done by weighing and measuring the height of a random sample of the child population at regular intervals. Children are the first to show signs of malnourishment during a food shortage. For this reason, a random sample of children less than 5 years of age (or less than 115 cm tall), should be measured regularly in a surveillance program. Their condition is an indicator of the amount and degree of malnutrition in the population as a whole. For a displaced population of under 10,000, a random sample of 200 children will provide a reasonably accurate estimate of overall child malnutrition. For a population of 10,000–20,000, however, a

sample size of at least 400 is required. Initially such surveys should be conducted every 2 months. When conditions have stabilized, a survey once every 3 to 6 months is sufficient. Any change or trend in nutritional status can thus be detected and adjustments made in the relevant feeding programs *A chart with "weight-for-height" comparisons and a chart with "weight and height-for-Age (0–60 months)" comparisons are located in tables 2 and 3 at the end of this chapter.*

If the initial assessment indicates a need for supplementary or therapeutic feeding, individuals with these requirements should be identified and registered for appropriate programs. Their individual progress should be monitored through more frequent weighing at feeding centers.

Conducting nutritional surveillance is a two-step process. First, the effectiveness of the food provided to the whole population (i.e., the general feeding program) should be determined by measuring a random sample of children. Second, the progress of vulnerable individuals and thereby the need for or effectiveness of selective feeding programs should be monitored.

a. Malnutrition

Malnutrition can be recognized by certain clinical signs (e g , marasmus, kwashiorkor, and marasmic-kwashiorkor) and body measurements (see end of this unit for definitions). Body measurements are required for the objective assessment of nutritional status and the comparison with regular surveillance data. The **weight-for-height** method, which is expressed either as a percentage of a reference median or as a **Z-Score**, is preferred for nutritional surveillance and for measuring individual progress in emergencies. If a **percentage** is used, it indicates the weight of the child expressed as a percentage of that of a well-nourished child of the same height as given in international reference tables. If a **Z-Score** is used, the **"Z"** represents the median for children and a **Z-Score** represents the **number of standard deviations above or below the median**. Children with less than 80 percent weight-for-height or with a Z-Score of less than -2, are classified as malnourished; those with less than 70 percent weight-for-height or with a Z-Score of less than -3, are considered severely malnourished. Without special feeding programs, these children will die.

Another method used when a rapid screening of young children is necessary is the mid-upper-arm circumference (MUAC) measurement. It is less sensitive than the weight-for-height method but

can be done more quickly. This measurement technique is described at the end of this section.

3. General Feeding Program

Every effort should be made to provide familiar foodstuffs and to maintain sound traditional food habits. Expert advice on the appropriate food ration is essential and should take full account of local availability. Staple foodstuffs should not be changed simply because unfamiliar substitutes are readily available. Unfamiliar foods often lead to wastage and malnutrition, and lower the morale of the population.

The amount and quality of food provided must satisfy energy and protein requirements. A **Survival Ration** should provide at least **1900 Kcal (and 50 g of protein)** per person per day. This is based on a population composed of 20 percent less than 5 years of age, 35 percent 5–14 years of age, 20 percent females 15–44 years of age, 10 percent males 15–44 years of age, and 15 percent of the population over 44 years of age. Active adults may require considerably higher energy intakes, especially if part of the relief plan includes a Food-for-Work Program. Although there is a marked difference between the needs of a young child and an active adult, *it is strongly recommended that a standard ration be provided for each displaced person without distinction.* A typical daily ration providing sufficient calories and protein should include:

- a staple food which provides the bulk of the energy and protein requirement (e.g., cereal 350-400g).
- an energy-rich food (e.g., oil 20-40g).
- a protein-rich food (e.g., beans 50g).

Examples of 1900 kcal daily rations and enhanced rations are located in tables 4 and 5 at the end of this chapter. Located in table 6 is a quick reference matrix for calculating the amount of food needed for displaced populations (500 grams per day), for various time periods.

If grains must be milled, the population will require an increased ration, because a portion must be given to the miller and because of loss during milling. Vitamin B is also lost in the milling process.

Other items such as vegetables, sugar, spices, condiments, fruits, and tea should be provided according to cultural and nutritional needs, if possible. However, absolute priority must be given to the delivery of the staple food. *The assured delivery of a few items is better than a complex ration, some of which may fail to arrive.*

Essential vitamin and mineral requirements must also be met. Where adequate quantities of certain nutrients cannot be provided in the diet, the inclusion of seasonally available vegetables will usually prevent vitamin and mineral deficiencies. When possible, the population should be encouraged to grow home gardens of vegetables for personal use. Local food markets should also be encouraged.

Particular attention must be paid to vitamin and mineral deficiencies prevalent in the local area. Two deficiencies are commonly seen among displaced people: vitamin A deficiency and anemia. *Vitamin A deficiency in malnourished populations, especially children, leads to blindness. Anemia is commonly associated with parasitic diseases or an insufficient intake of iron and folate.* In the most severe cases, it can lead to cardiac failure and death. Both are preventable with a proper diet. Efforts must be made to include food items which are rich in the needed nutrients. However, the distribution of multivitamin tablets to the entire population is a waste of time and money, since such tablets contain insufficient quantities of the vitamins required to correct deficiencies. Also, the logistics of distributing these tablets is labor-intensive. However, vitamin A should be given once every four months to all children under 5 years of age. Children from 1–4 years of age should receive the equivalent of 200,000 units (usually one capsule), and infants less than 12 months old should receive one-half of a capsule.

The need for a fair, efficient, and regular ration distribution cannot be overemphasized. Normally, rations are issued in 7 to 14 day intervals. Distribution intervals must be constantly reviewed based on continued assessment of the displaced population. An accurate census is needed and a monitoring system must be established to ensure that the food is actually reaching every person as intended. Some waste, diversion, and corruption is inevitable, but if these problems are severe they may lead to discontent and unnecessary suffering by the population.

a. Types of Food Distribution

There are two types of food distribution: dry rations and cooked or "wet" rations. Whichever is used, it is important that those distributing the food have exact instructions on the size of the rations. If scales are not available or become an inconvenient way to measure out food, cans or containers with a known weight/volume comparison for each commodity should be used. *The distribution of food as prepacked rations is an unsatisfactory solution and should be avoided.*