4. Nutritional relief: general food distribution, mass and supplementary feeding

There are four ways in which food relief may be organized:

1. *General food distribution.* Dry food is distributed to people who are able to prepare their own meals.
2. *Mass feeding.* Prepared meals from a central kitchen are served to the population.
3. *Supplementary feeding.* In addition to the ration (dry foods or meals) for the whole family, vulnerable groups receive an *extra* meal or ration to meet their particular needs.
4. Intensive or therapeutic feeding of PEM cases (Chapter 5).

Food must be nutritionally valuable as well as acceptable to the local population. Remember that foods that are *not* consumed have no nutritional value!

Average rations must be calculated to provide at least 6.3 MJ (1500 $kcal_{th}$)/person/day for a few weeks and 7.5 MJ (1800 $kcal_{th}$)/person/day for longer periods.

Organization and planning (ration cards, distribution schedule) are the keys to the success or failure of a relief programme.

There are four ways in which food relief may be distributed:

1. general food distribution (dry rations);
2. mass feeding (cooked meals);
3. supplementary feeding of vulnerable groups;
4. therapeutic feeding (see Chapter 5).

The type of food distribution employed will depend entirely upon local circumstances. A refugee camp, where individuals have cooking facilities, may be adequately served by the distribution of dry rations alone, possibly with supplementary food for the vulnerable groups. Where a large rural population is affected but can find a proportion of its food locally, a range of programmes will be needed, e.g., some people with full rations, some with partial rations and selected groups with supplementary rations.

- Wherever possible, assist people at their homes and avoid setting up refugee camps, though the latter step may sometimes be unavoidable (in the case of flood victims, refugees from conflicts, etc.). Camps are very difficult to disperse. Do not create camps just because they are administratively more convenient.
- Distributing food to nomadic groups is difficult, and no easy way of doing so has been found. Points at which people congregate (e.g., water sources) may be selected as the best places at which to distribute food; alternatively, large amounts of food may be given out (100 kg) at each distribution if this avoids setting up refugee camps.

The distribution of centrally prepared meals may be indicated when:

— people do not have basic cooking equipment;

— not enough fuel (e.g., firewood) is available for individual cooking;

— it is necessary to check who is eating the food, as in supervised supplementary feeding.

Providing cooked food on a mass scale requires a high level of organization if the number of people is greater than, say, 2000 or if they are scattered over large areas.

The supplementary feeding of vulnerable groups consists in providing food to supplement the deficiencies in calories and/or nutrients of the basic diet consumed.

Basic considerations in selecting foods

The food must:

(*a*) correspond to the nutritional needs and food habits of the beneficiaries;

(*b*) fulfil special logistic requirements, i.e., be easy to transport, store, and distribute; and

(*c*) be available in sufficient quantities.

General food distribution

Specific requirements in selecting foods

— In addition to the general concepts stressed above, foods should be as few in number as possible.

— Unfamiliar types of food are often given as aid. If these are useful nutritionally but unacceptable to the population, it may help if those in charge arrange a public demonstration at which they explain what the foods are and, in the presence of local leaders, sample them themselves.

— Where a population is entirely dependent upon relief, include items like tea, sugar, and spices as part of the ration. In this case especially, it is essential that food be given against some kind of return from the recipient whenever possible.

Calculating dry rations

This is best done on a *family*—rather than an individual—basis, since in this way the number of people attending distributions will be reduced and administration simplified. Distribution is also made easier if rations are calculated on the following scale rather than based on the exact age distribution of the family: up to 5 members, 5–8 members, 9 or more members, etc.; and/or if two levels of ration are provided—e.g., under 10 years old (or height under 130 cm), 5.4 MJ (1300 $kcal_{th}$); over 10 years old, 8.4 MJ (2000 $kcal_{th}$) (this corresponds to an overall average of 7.5 MJ (1800 $kcal_{th}$) per day per person).

If the amount of relief food available for distribution is insufficient, a lower energy intake may have to be set for the assisted population, for instance, 6.3 MJ (1500 $kcal_{th}$)/person/day, or even less. The ideal or recommended intake of 9.8 MJ (2350 $kcal_{th}$) (Annex 1) is often impossible to achieve in times of acute food shortage. It may also be considered inappropriate to provide this amount to the part of the population assisted by the relief programme, while those who are not eligible for assistance have to make do with their usual very low level of energy intake.

"Reduced ration" can be used when people are able to provide some of the staple food,[1] e.g., cereals, for themselves or in the phasing-out period

[1] A staple food is one that is normally consumed in a country or community and from which a substantial portion of the total energy intake is derived, especially among the poorer sectors of the population and in times of food shortage.

of a programme. Note the nutritional composition of the reduced ration: two reduced rations may or may *not* be equal to one full ration. Examples:

	Full ration			Reduced ration		
Cereal	400 g	5.9 MJ (1 400 $kcal_{th}$)	40 g protein	100 g	1.5 MJ (350 $kcal_{th}$)	10 g protein
Oil	50 g	1.8 MJ (440 $kcal_{th}$)	0 g protein	50 g	1 8 MJ (440 $kcal_{th}$)	0 g protein
DSM [a]	30 g	0 5 MJ (110 $kcal_{th}$)	11 g protein	50 g	0.7 MJ (180 $kcal_{th}$)	18 g protein
Total	480 g	8 2 MJ (1 950 $kcal_{th}$)	51 g protein	200 g	4.0 MJ (980 $kcal_{th}$)	28 g protein

[a] Dried skim milk.

Organizing a distribution

The key to running a successful food distribution programme is to be well organized. If rations are to be given out to, say, 5000 people, it is unrealistic to expect them to form a queue quietly and take food from openly exposed sacks—chaos would result.

The participation of the community in the relief programme and in decision-making will help towards an orderly distribution. Holding public meetings and keeping the population informed through administrative and natural leaders is essential. However, responsible posts (storekeeping, administration) must be given to reliable individuals outside the community to rule out personal bias, preferences, or vulnerability to pressure.

People should be lined up for distribution and be called—e.g., four at a time—by the guards (villages) or have to pass check-points (camps). If the ground is dry, they should *be seated* in lines. This will prevent pushing and is much less tiring than standing for hours, perhaps in the sun.

(*a*) *Distribution to villages, refugee camps and to nomads*

Always inform people well in advance that a food distribution is to occur on a certain day. *Regular* distribution on a fixed day is best and causes least confusion.

A distribution each week or fortnight is recommended because hungry people have difficulty in economizing their food. Also, displaced persons have limited possibilities for storing supplies. Where long journeys are involved, as in the case of nomads, monthly distribution may be indicated.

A reserve supply of empty bags, tins, etc. should be kept for people who are completely destitute, but as a rule people should bring their own receptacles. Bottles and baskets for cereals are usually easily found by the population.

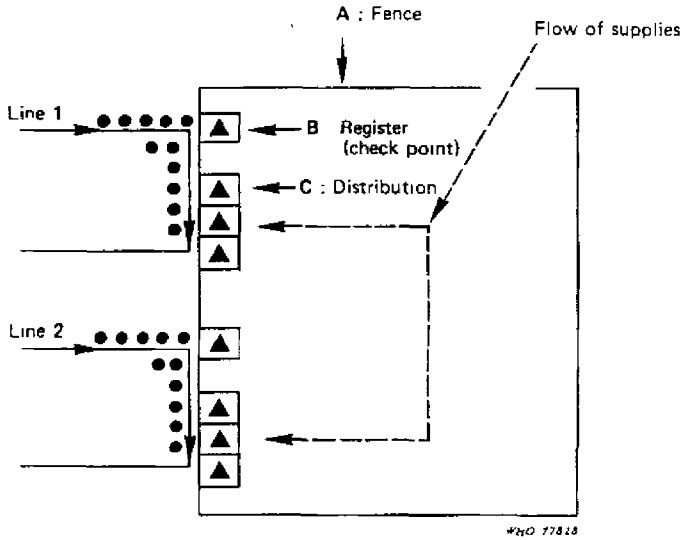
The recipients should always be aware of the amounts they are entitled to: standard measures for cereals and other items should be cut from oil tins (for example), and the weight checked on the scales, and demonstrated in public—if necessary, several times. This will give people a chance to see that there is no cheating and will be economical from the standpoint of control. *Remember to recheck the measures with each new arrival of grain.*

In villages, relief can be distributed through local authorities—village elders, etc.—at a fenced-off spot away from the market place. Family rations should be given, and the distribution based on village registers or official knowledge about families belonging to the village. A simple list can be used; ration cards are not necessary.

A group of villages may have a central store (for food storage, see Chapter 6). Depending on the distance and the transport facilities, village representatives can come in on set days and fetch the rations. Traditional transport—donkeys, camels, boats—should be used if possible.

In a camp, the distribution area should be located near the store and fenced off. People should be served from several lines simultaneously (as many as necessary), each with a check-point for ration cards (Fig. 12). If the camp has, for example, 10 sectors, take sectors 1 and 2 on Monday, 3 and 4 on Tuesday, and so on.

FIG 12. PLAN FOR DISTRIBUTION OF DRY FOOD



A. Fence of mats, bamboo, wire, or rope depending on resources and needs. Narrowing aisles for line-ups might also be necessary

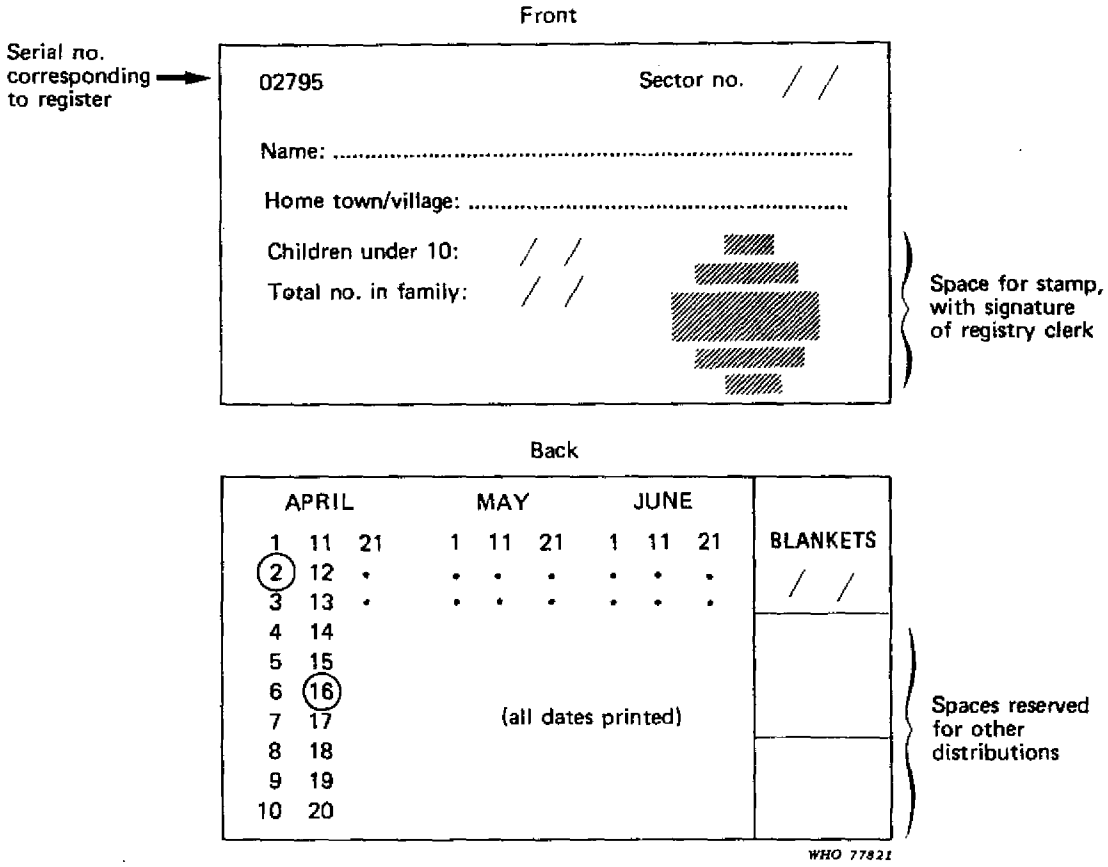
B. Check point for cards. Sheltered by roof (or umbrella) The number of rations is called out clearly to distributors at C

C Distribution point. Several bags at a time can be emptied on to a tarpaulin for quicker distribution

The distribution will be completed in 5 days, allowing 2 days to arrange the store and get new supplies. With a camp twice as big, distribute to sectors 1-5 one week and 6–10 the next. When sudden rains or delayed lorries ruin your plans, inform people *in time*.

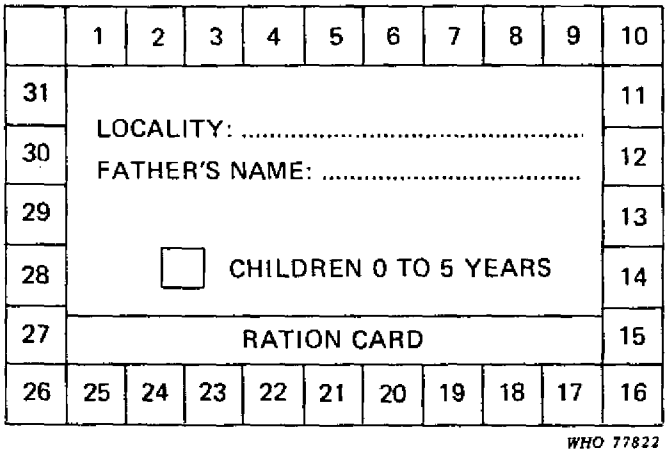
FIG. 13. RATION CARD

Example No. 1



N.B. If another item such as, for instance, soap is issued regularly on this card, the relevant dates can be *crossed out*, as well as or instead of being circled in.

Example No. 2 (adapted from Haitian Red Cross Society ration card).



Nomads may be served near the waterholes where they take their animals. Information must be spread early to give them time to come in on the appointed day. An average food ration for each family, or a certain number of bags of cereals, etc. can be issued for distribution within the group, if the nomads are well organized, with accepted leaders.

(*b*) *Identifying individuals—ration cards*

To ensure that each individual receives only one ration, some form of identification must be used. In small communities this can be done from names, village lists, etc. With larger numbers of people ration cards must be given out. To ensure that each family receives only one card, distribute these on a house-to-house basis, or at a single distribution attended by the entire population.

A typical ration card is shown in Fig. 13. It should include:

— sector number
— name of head of family and home town/village
— total number of family members
— number of children under 5 (or other suitable age limit)

and on the back, a system for marking rations received, blankets, etc. (Fig. 13, Example 1).

Exchange these cards for new ones every third month: There will always be people who pretend they have "lost" their card, but even if it is a rule never to give a new one, some cases may be found to be genuine and new cards given.

Recording beneficiaries' names and addresses in registers is often time-consuming and ineffective in preventing abuses of the system by the feeding-centre personnel. A simpler system is to use a feeding card with a counterfoil that can be torn off when the ration is received. The number of rations distributed (number of counterfoils) should be compared with the amount of the food actually taken from the store.

Responsibility for the issue of ration cards should be in the hands of a single person. This will save other staff from being bothered when the person in charge is not available.

All ration cards should be marked with a stamp that cannot be forged and is kept by the supervisor. Casual checks should be made at the village market to ascertain whether rations are being sold there.

(*c*) *Food supplies*

Order supplies in time.

The following quantities are required for *1000 people*, based on the the examples above). The amounts are given in tonnes (t)—1 t = 1000 kg.

Full ration: 15 t per month per 1000 persons

Reduced ration: 6.3 t per month per 1000 persons.

(d) Staffing and equipment

For each distribution line (see Fig. 12):

1 clerk, 1 person to distribute each food item, at least 2 crowd controllers;
ration cards, rubber stamps, receptacles (half petrol-drums, tarpaulins, etc.) for food, standard measures (tins and cans), tables and benches.

Mass feeding (cooked meals)

Mass feeding is usually limited to institutions and refugee camps.

Choice of food

As for dry food distribution.

Every effort should be made to give the normal local diet and, wherever possible, prepare it from foods obtained locally.

The diet should be composed of a staple food (cereal or root), oil or fat (20–40%), legumes and/or animal proteins (DSM), and some vegetables or fruits.

Under ideal circumstances, of each 10 MJ of food served:

— 2–4 MJ should come from fats/oils

— 1 MJ should come from proteins.

If nontraditional food items have to be used, they should be prepared and served in a form as close as possible to local foods (gruel, soup, tortillas, chapatis, etc.).

Spices can increase the acceptability of the food. They are usually cheap and easily available. Use spices in the local fashion whenever possible.

If meat is available, serve it occasionally (e.g., on feast days): this is good for morale.

Calculating food rations

As for the dry food distribution, the *average* daily ration can be between 6.3 MJ or 1500 $kcal_{th}$, (energy minimum, Table 1) and 9.5 MJ or 2350 $kcal_{th}$ (recommended or ideal energy intake, Annex 1).

The quantity to be served is first calculated in terms of dry food (see food composition table in Annex 2) and then in terms of servings (meals). If three meals are served, the total amount of food would normally be broken up in proportions of about 1:2:2 for each meal. For example, if 8.4 MJ (2000 $kcal_{th}$) are given to each individual each day, then 1.7 MJ (400 $kcal_{th}$) would be served for breakfast and 3.3 MJ (800 $kcal_{th}$) for each of the other two meals.

If different servings are prepared for adults and children under 10 years, calculate the amounts of raw food on the basis of 6.3 MJ (1500 $kcal_{th}$) for those under 10 years and 9.2 MJ (2200 $kcal_{th}$) for those over 10 years (overall average = 7.5 MJ (1800 $kcal_{th}$). Children need three meals a day, while two may be sufficient for adults.

If people are able to provide and prepare some food for themselves, reduce the number of daily meals for adults (e.g., one service per day).

Organization of cooking facilities

First, a few questions have to be answered:

1. How many meals are to be prepared at a time?
2. How long in advance can each type of food be prepared?
3. Can the staple food be prepared in a single large batch (e.g., boiled rice), or does it have to be prepared in individual form (e.g., chapatis, tortillas, bread, etc.)?

(*a*) *Kitchens*

Kitchens should be set up inside buildings wherever possible. It is often possible to construct a suitable shelter cheaply in the form of either a "lean-to" against some other building or consisting of a roof of thatch or corrugated iron supported on uprights. Except where kitchens are very small, the area should be fenced off to prevent access by the general public. It is always advisable to have as much space as possible for water storage, the washing and cleaning of food, any initial preparation that is required, cooking, the short-term storage of prepared food, and washing up. In a large camp, one kitchen should be set up for each 200–300 families or 1000–1500 people.

(*b*) *Personnel and equipment*

Personnel should include cooks (the number would depend on the type and amount of food), cooks' assistants (for cleaning vegetables, making fires, carrying water, etc.), cleaners, and people to wash up. Employ residents of the camps as much as possible (see camp administration, Chapter 8).

Methods of cooking a given staple food usually vary according to the country and even within countries. Local methods and suitable equipment should be employed.

Clearly, foods that can be cooked in bulk will require large receptacles; where large amounts of staple foods have to be baked or fried in individual portions, a larger number of smaller utensils and more personnel will be required.

1. When the food is to be prepared in individual portions, it is necessary first to determine how long each one takes to prepare. This can be done by timing the preparation of, say, 10 portions by a local cook and then calculating from this the number of cooks, utensils, and cooking points required as follows:

number of portions required for three meals	= 1000 × 3 = 3000
number cooked by one cook in one hour	= 100
number of cook hours required	= 30
time available for preparation	= 6 h
number of cooks required	= 5 + 2 (for rest periods) = 7

2. When a food is prepared in bulk, calculate as in the following example:

individual (dry) quantity of food	= 100 g per meal
maximum volume when cooked	= 250 ml
number of people to be fed at one meal assuming that the food must be freshly prepared for each meal, then total volume to be prepared twice daily	= 1000 = 250 l

This in practice means that at least two cooking pots about the size of a cut-down petrol drum (200 l) (Fig. 14) and two cooks would be required.

Additional utensils are required for:

— Cooking soup (calculate in the same way as for staple food in bulk)
— mixing, serving, or cleaning ingredients prior to cooking
— fermentation (for example, injera, yoghurt, curd) where this is required
— mixing and serving implements.

At the outset, make a rough calculation of the other utensils required and add to these as experience is gained.

(*c*) *Fires and fuel*

If local fuels are being used, e.g., wood or cow dung, then the local system of fire-making is usually the best and should be adopted. If firewood is difficult to obtain, each person or family should be asked to bring one piece to each meal.

(*d*) *Hygiene and food storage*

The kitchen and its surroundings must be kept clean. Adequate facilities for the disposal of waste must be provided. It is usually best to employ one or more full-time cleaners and to make them personally responsible for this.

Avoid storing cooked food for any length of time, particularly if the food involved contains meat or other animal products. Some types of local staple foods can be kept safely in an edible condition for several days. Cold-mixed foods, e.g., dried skim milk, should always be made up freshly before use, ideally with boiled cooled water and should never be kept standing or in an uncovered container for more than a few minutes.

Organization of meal distribution

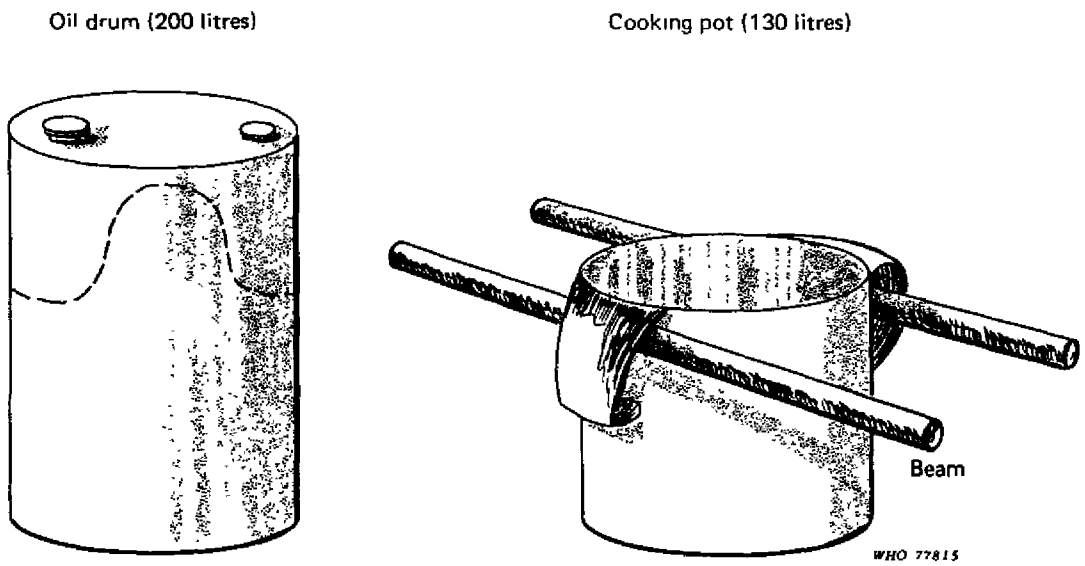
(*a*) *Distribution of cooked meals to families*

The registration of families who are to receive cooked rations is similar to the registration procedure for dry ration distribution.

A representative of each family presents a card indicating the number of people to be fed in the family. The ration for the family is measured into a suitable container and the card marked to indicate that the ration has been allocated. It should be remembered that the ration of grain per person will increase in both weight and volume after boiling and the ration should be adjusted accordingly.

In a large community or camp where there are several kitchens and distribution centres, it is important for recipients to know which kitchen they are to attend for feeding. The feeding supervisor should keep a register of all those to be fed from his kitchen. Should a control be necessary, the information in the register should correspond to that on the family feeding card. The card should be marked or, preferably, stamped with the kitchen number. Kitchens should have the number clearly displayed.

FIG 14. HOW TO USE AN OIL DRUM AS A COOKING UTENSIL



(*a*) Cut the drum following the dotted line, and bend the two sides outwards to permit easy transport with two strong pieces of wood or metal.
(*b*) Alternatively, cut the drum in half to form two 100-l cooking pots.

(*b*) *Distribution of cooked meals to individuals*

Food distributed to individuals should be eaten in an enclosed area under supervision. This is to ensure that all members of the family (particularly the children) eat an adequate ration. This procedure is only praticable in smaller shelters or communities where no more than a few hundred people are to be fed.

A large enclosed area should be constructed, where all the people can assemble at set times each day; alternatively a school-hall or some other suitable building could be used.

If the entire population of the camp or community is to be fed in an enclosed area, no registration card system should be necessary, although those attending should be counted each day.

Only where selective feeding is to be carried out should cards be issued to those in need of feeding.

At well-controlled institutions or camps, plates might be given to each person individually. Either arrange for these to be washed centrally or provide facilities for each person to wash his own.

Supplementary feeding

The purpose of supplementary feeding is to supplement deficiencies in energy and/or nutrients, especially protein, in the basic diet of those more vulnerable to malnutrition: children under 5, pregnant or lactating women, medical cases, old people, children selected by a screening method.

Supplementary feeding can take two forms:

— distribution of a dry ration to vulnerable groups in addition to the general ration given to the whole family ("carry-home" system)

— "On-the-spot" feeding of an additional meal to ensure that the right food reaches only the selected group.

Choice of foods and beneficiaries

Foods are selected for their particular nutritional value. An appropriate ration is, *for example:*

- 40 g dry skim milk (0.7 MJ or 160 $kcal_{th}$) plus
  50 g cereal-based special food (Chapter 6) or rolled oats (0.8 MJ or 200 $kcal_{th}$)

or

- 100 g rolled oats or cereal based special food (1.7 MJ or 400 $kcal_{th}$)

or

- 40 g dry skim milk plus 20 g oil (total: 1.4 MJ or 340 $kcal_{th}$).

As a guideline: around 1.5 MJ (350 $kcal_{th}$) and 15 g protein constitute a usual supplement in relief programme.

Vulnerable groups are the target of any supplementary programme. While all children under 5 years old are vulnerable, special attention should be given to the age group 0–2 years.

Breast-feeding. Mothers need sufficient food to maintain or resume their milk production. If the child cannot get its mother's milk, a substitute should be sought. Any woman who has recently breast-fed can reinstitute her milk production simply by letting the infant suck at her breast very frequently (approximately 10 times a day, some minutes at each side every time) for several days. If a "substitute mother" is not found, artificial feeding should be given, preferably by cup and spoon. *Bottle-feeding must be reserved for exceptional cases* (e.g., where there is a very young child and complete failure of lactation) and be administered under the close supervision of relief personnel. Under *no* circumstances must artificial feeds be prepared in advance and left at room temperature.

From the fourth to sixth month onwards, the infant needs some foods *in addition to the mother's milk.*

Supplementary feeding must be given both to lactating mothers (for milk production) and to children above 4 months of age (to meet their increasing requirements).

Organization of a "carry-home" system

This is similar to a general ration distribution. The education of the mothers and the regular measurement of the nutritional status of the children will increase children's chances of receiving the food meant for them. Whenever possible (e.g., in camps), mothers should bring along all their children when fetching supplementary rations so that they can be examined. Almost inevitably there will be some sharing within the family, so that it might be necessary to increase the ration.

Organization of "on-the-spot" feeding

Here, vulnerable groups attend regularly (usually daily) to receive a meal (perhaps a simple supplement of, say, DSM) which must be eaten on the spot and not carried home. The supplementary meal is given in *addition* to the normal meals given in the family. Inform the parents so that the children still get their normal share of family meals.

Choose a time for food distribution that does not coincide with normal family mealtimes.

The object of on-the-spot feeding is to ensure that particular individuals receive the food and that it is not subdivided within the family.

Individual ration cards

In a "carry-home" system, ration cards are necessary (see Fig. 13 and 15).

In a programme of supplementary meals for *all* children in a camp, cards should be avoided as they damage easily. Instead, each child could

get a number marked on a piece of metal, cloth, or other resistant material, the numbers being crossed off a stencilled list (or blackboard) during the distribution. Feeding points should be within walking distance for small children and the individual numbers referred to each point by different colours or other symbols. No register is necessary if all children under a certain age (or height) are included.

FIG 15 SUPPLEMENTARY FEEDING CARD[a]

NAME ..... No. ..... SECTOR ☐

AGE..... SEX F M

FATHER'S NAME .....

MOTHER'S NAME .....

APRIL	MAY	JUNE
1 11 21 2 12 22 3 13 23 4 14 24 5 15 25 6 16 26 7 17 27 8 18 28 9 19 29 10 20 30		

WHO 77823

[a] For reverse side, see Fig. 11 (simplified growth chart) or indicate: date, weight, height, % weight-for-height, remarks (treatment, dry food supplement, etc.).

In supplementary feeding programmes for selected groups of children, the point of checking is not to prevent children from being served twice, but to ascertain their regular attendance at meals.

These children should have individual cards and be listed in a register by camp sector, so that helpers can easily find them if they fail to show up. As children in this category are normally taken to meals by their mothers or elder sisters or brothers, their cards should suffer less in handling. It is useful to have a combined card for feeding and follow-up (Fig. 15).

5. Therapeutic feeding

PEM is treated by giving food of high nutritional value. Give 0.6–0.8 MJ (150–200 $kcal_{th}$) and 2–3 g of protein per kg body weight. Reduced feeding is recommended for the first few days.

For the first few days, close supervision and feedings every three hours on a 24-hour basis are necessary. Mothers should cooperate and feed their sick children themselves.

Medical treatment and drug administration must be limited to essential items.

Infection and dehydration are the major causes of death, which often occurs within the first four days. Antibiotic treatment of infections and close supervision are essential. Immunization against measles is recommended.

Criteria of recovery are:

oedema loss, weight gain and improvement of general condition.

Failure is mainly due to faulty feeding or to infection.

This chapter presents the *basic concepts of therapeutic feeding* in severe cases of protein-energy malnutrition (PEM). Therapeutic feeding is required to reduce deaths among infants and young children with severe PEM.

Criteria for admission

- Severe marasmus or oedema (kwashiorkor), or
- Weight-for-height less than 70% of the reference (or AC-for-height less than 75%, or arm circumference (AC) less than 12 cm).

When facilities are very limited, the weight-for-height standard may be lowered to 65% or even to 60% and uncomplicated cases can be treated at home, if seen daily.

Day-care centres; residential centres

There are two types of therapeutic feeding, depending on the setting.

At residential centres: feeding on a 24-hour basis (inpatient). Mothers must be admitted, that is, accommodated and fed with children suffering from severe malnutrition and, *if necessary*, they should be allowed to bring along other children.

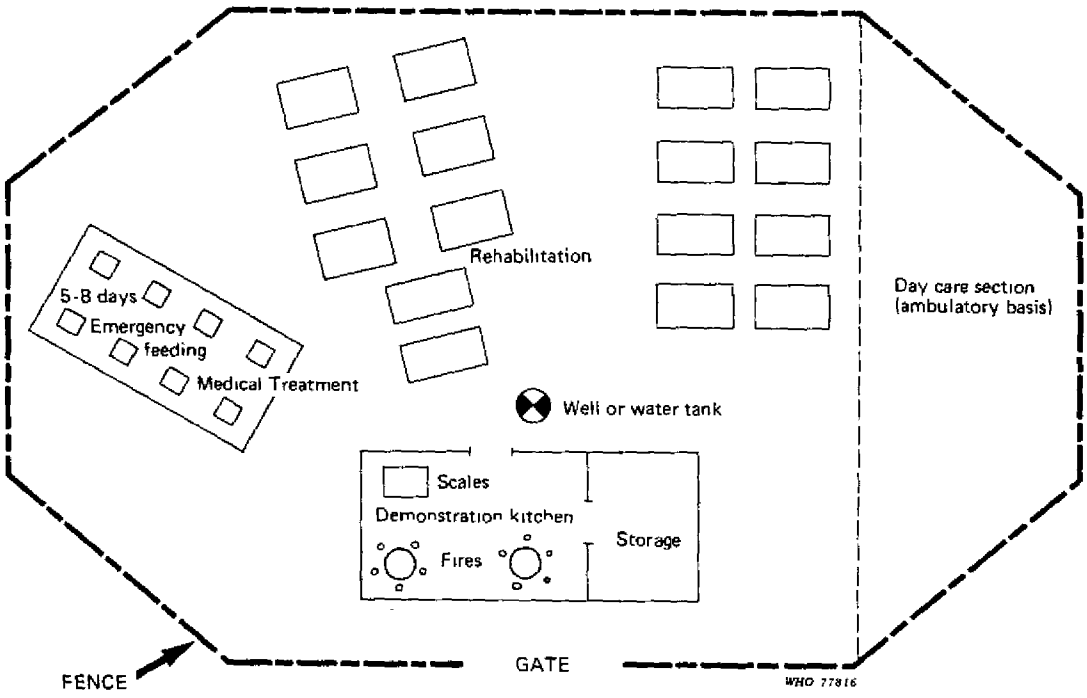
At day-care centres: four meals a day on an ambulatory (outpatient) basis.

Severe cases of PEM can be admitted to an improvised centre, where results are better and cost is lower than in non-specialized hospitals. Intensive feeding *day and night* is essential in the first stage of treatment.

Lay-out of a residential feeding centre (30 children)

Local material (e.g., mud, wooden huts, tents, etc.) or existing buildings (schools, etc.) should be used. Accommodation should, if possible, conform to traditional local standards. Fig. 16 shows a residential therapeutic feeding centre with a day-care section. The actual layout can be simplified if local circumstances require it. In practice, any large building or facility can be converted into a feeding centre.

FIG. 16. RESIDENTIAL FEEDING CENTRE WITH DAY-CARE SECTION



Emergency section (8–10 children)

The children (and mothers) are accommodated in one single large hut or ward (class-room). Close supervision by qualified personnel—nurses, for instance—is required on a full-time basis.

As soon as a child no longer requires constant supervision, he is transferred to the section "rehabilitation with special attention" (5–8 days after admission).

Rehabilitation (20–25 children)

Separate local accommodation is provided for the children and accompanying relatives. Feeding is provided *by the mothers* under the supervision of auxiliaries. Qualified supervision is required on a periodic basis (detection and prevention of complications). Local foods in semiliquid form are introduced, and the frequency of feedings decreased (4–6 meals a day).

Therapeutic feeding

The child must be weighed on admission, daily for one week, and every week thereafter.

During the first week, the child cannot assimilate a full ration; it is recommended to give 0.4 MJ (100 $kcal_{th}$) and 2 g of high-quality protein per kg of body weight divided into 8 meals (every 3 hours). As soon as the child's general condition permits (generally after 5–7 days), 0.6–0.8 MJ (150–200 $kcal_{th}$) and about 3 g protein (depending on the quality) are required per kg of body weight to achieve the most rapid rate of recovery. When a patient does not tolerate an increase in the size of the portion, it is best to return to a more dilute formula and/or reduce the volume.

While increased energy intake will speed up recovery, there is little benefit in increasing the intake of protein above the levels indicated.

Standard preparations should contain approximately 4.2 MJ/l (1 $kcal_{th}$/ml), and 20–25 ml per kg of weight should be given at each meal. Any preparation of high nutritional value can be used for the treatment of PEM.

In severe cases, the patient should be fed on a high-protein and high-energy liquid diet every three hours (day and night) in the first week of treatment.

Suitable preparations

Milk-based diet. To prepare, carefully mix together 80 g of dried skim milk (DSM), 40 g sugar, and 50 g edible oil. Boiled cooled water is added slowly to make one litre; stir constantly. The mixture contains about 30 g protein and 3.7 MJ (900 $kcal_{th}$) per litre. This type of preparation is readily available.

K Mix II. This is a standard UNICEF formula made of calcium caseinate 17 g, DSM 28 g, and sugar 55 g, with the required daily allowance of vitamin A. It has the advantage of a low lactose content but is poor in iron and some vitamins. First, 100 g of K Mix II and 60 g edible oil are mixed well together (the oil is absolutely essential). Boiled warm water is added to make one litre. Stir well. The mixture contains about 30 g protein and about 3.7 MJ (900 $kcal_{th}$) per litre. K Mix II should *only* be used *to initiate the treatment* as it is very expensive.

In general:

Any food preparation can be used if containing no less than 20 g good-quality protein and 3.7 MJ (900 $kcal_{th}$)/l; 20–40 % of the calorie intake should be provided by oil.

Sugar can be partly replaced by thoroughly cooked, dried, and finely pounded cereals.

Oil provides "compact" calories (37.6 MJ/kg or 9 $kcal_{th}$/g). Between 40 and 60 g can be used for one litre of liquid food. Red palm oil is rich in provitamin A but does not mix well.

Depending on the local climate and the quality of the oil, a *dry* mixture (oil included) can be prepared several days in advance.

Liquid preparations must not be kept for more than 6 hours.

Administration of food

The feeding of sick children demands great patience.

- Use a cup and/or spoon (avoid bottle-feeding in tropical countries).
- After 3–5 days, semi-solid food can be given instead of liquid food. A milk-based diet or special foods (Chapter 6) should progressively replace K Mix II, which is not a complete food and should be reserved for the initial treatment of PEM.
- Feeding should be attempted even in the presence of occasional vomiting.
- A nasogastric tube can be used for up to 4 days. Indications are: no appetite, vomiting, lack of cooperation by the mother, failure to gain weight. However, it is an emergency measure which should not be used unless really necessary.

A moistened tube (internal diameter 2 mm, length 50 cm) is introduced by a nurse into the nose and fed down the throat and into the stomach. The passage of the tube into the oesophagus is easiest if the patient swallows. It is essential to check that the tube is in the stomach and not in the lungs. This can be done by removing a small amount of clear fluid from the tube by a syringe. Alternatively, inject a few cm^3 of air into the tube; if the tube is in the stomach, a loud bubbling noise will be heard in the child's abdomen. The tube should be secured to the temple or cheek with sticking plaster. After carefully checking that the tube is in the stomach, the normal volume of liquid food can be fed slowly down the tube by means of a large syringe (50 cm^3). After the feed, the tube is rinsed through with a few cm^3 of clean water and can then be left or else removed and replaced at the next feed. Oral medicines can also be given through a nasogastric tube.

Medical care and medicines

Food is the specific drug against PEM

Medical care is dealt with more fully in Chapter 7.

The following points may be helpful to those responsible for therapeutic feeding centres.

- No drugs should be given unless they are absolutely essential. Observation has shown that staff may waste considerable time in giving inessential and expensive medicines instead of supervising intensive feeding.

- Treatment by antibiotics must be limited to treatment of identified infections. Infection is often masked in malnourished children, and hypothermia rather than fever may be present. Procaine penicillin is the first drug of choice.

- Anthelmintics can be administered routinely after 5–7 days of emergency feeding.

- A measles outbreak in a feeding centre can be disastrous. The immunization of patients with severe PEM against measles is a priority as soon as their condition has started to improve.

- Administration of a high dose of vitamin A (see Chapter 2) should be a routine procedure if dietary vitamin A deficiency is suspected in the area.

● The daily administration of iron with folic acid (UNICEF tablets) is recommended.

● Multivitamin preparations can be of some assistance. It is, however, preferable to prevent, or give specific treatment for, the mineral or vitamin deficiencies prevalent in the area.

● If available, potassium chloride should be added to each feeding, especially in the case of diarrhoea (which is frequent during the first days). A bulk solution can be prepared with 7.5 g in 100 ml of water; 5 ml/kg of body weight are given daily in divided doses.

Signs of recovery and criterion for discharge

Oedema loss (kwashiorkor). Usually after 5–10 days. Oedema loss is accompanied by a loss of weight due to elimination of water.

Weight gain. Children with PEM (kwashiorkor patients after the oedema loss) should show *a weight gain of 8–10 g per kg every day.* (The standard weight gain for a normal 1-year-old child is 1 g per kg per day.)

Improvement in general condition. Increasing appetite, alert behaviour, normal stools. Progress must be assessed daily if possible or at least every 2–3 days. Weights should be measured at least each week and recorded on a chart for each child; mothers should be given a careful explanation of the meaning of the chart. The patient can be discharged when he reaches 90% of the weight of a reference child of the same *height* (90% weight-for-height).

Complications

Death occurs in 10–20% of cases and usually takes place within the first 4 days. Infection and dehydration are the major causes.

Other possible complications are:

— Failure to gain weight

— Hypothermia (the temperature of the body is lower than normal—i.e., under 36°C)

— Severe anaemia

— Lactose intolerance (intolerance to the sugar of non-human milks)

— Hypoglycaemia (lack of sugar in the blood)

— Relapses.

Failure to gain weight

With high-energy feeding, most malnourished children recover after 4–5 weeks, i.e., they reach 90% or more of the reference weight for their height. Sometimes children fail to respond to treatment and do not gain weight satisfactorily. Here there are two possibilities: (1) there is some problem with the actual feeds (generally they are not prepared properly or else they are inadequate in quantity or frequency); (2) there is a medical problem (e.g., an infection, worm infestation, tuberculosis, etc.). Medical examination and/or nasogastric feeding are indicated if there is no oedema loss or weight gain after one week. In areas where tuberculosis is common, any malnourished child who does not gain weight satisfactorily despite a good dietary intake should be suspected of and treated for tuberculosis.

Hypothermia

Malnourished children, particularly marasmic ones, tend to have a low body temperature, especially at night. Care should be taken to ensure that the children are warm at night, even though the air temperature may seem uncomfortably high to the staff. Mothers should be encouraged to hold their children close to their bodies at night.

Severe anaemia

Anaemia is often severe and can deteriorate even after treatment for PEM has been given for 1 or 2 weeks. In severe cases, blood transfusion is recommended. Routine administration of iron with folic acid is recommended for the duration of the stay in the centre to prevent acute deterioration (ferrous sulfate solution or tablets: 150 mg + 100 μg of folic acid per day in two doses).

Lactose intolerance

Profuse diarrhoea can, in some regions, be attributed to a lower tolerance to cow's milk sugar (lactose). Most diarrhoeas, however, are caused not by lactose intolerance but by infection. If lactose intolerance is suspected, confirmation should be obtained by withholding milk from the feeds; should the condition be present, diarrhoea will stop within 12 hours and start again after milk is reintroduced.

If lactose intolerance is confirmed, a low-lactose diet can be given (K Mix II, sour milk, yoghurt, nonmilk diets). If lactose intolerance is not confirmed, there is no contraindication to giving the milk-based diet as recommended, or two-hourly feedings of 20 ml/kg of half-strength milk-based diet for a few days.

Hypoglycaemia (low blood glucose)

This is less common when feedings are given at regular intervals during the night. Oral (or, if necessary, intravenous) administration of a strong sugar (glucose, dextrose, or sucrose) solution will be effective almost immediately. This *must* be followed by frequent oral feeds of sugar, or relapse may occur.

Relapses

Relapses after discharge from the feeding centre are very frequent (up to 75% of cases) unless the mother is admitted with the child and has taken over the feeding of the child herself. Failure to educate the mother can make intensive feeding meaningless.

Hygiene

Children suffering from PEM are very vulnerable to all infections.

- Safe boiled water should be available in large quantities (at least 20 litres per person). Clean cooking utensils, measures, and containers with warm antiseptic (chlorine) or detergent solution should also be available.
- Do not reconstitute feeds in advance. Protect them from flies, insects, and dust.
- Mothers should clean the child's feeding plate and utensils every day.
- Hand-washing with soap is essential before feeding the child.
- Latrine facilities should be provided for patients and staff.

Facilities and equipment

These should be as simple and inexpensive as possible (use local material).

Facilities should be isolated by a fence (e.g., bamboo, tarpaulin); there should be one or two wards (total 40 m^2) for emergency feeding, individual traditional shelters measuring 2 × 12 m (for child, mother, and other children if necessary). Water (well or large tank), one demonstration kitchen (30 m^2 with traditional stoves and fuel) plus one storage room (15 m^2 with a lock), and latrines for the staff and patients. Accommodation and eating place for staff, if necessary.

Equipment needs for 30 children are:

— 35 beds. Young children can sleep with the mother unless on a drip or nasogastric feeding. Tarpaulins and mats for the floor are useful.

— Blankets, safe places for the mothers' belongings.

— 25 lanterns (with fuel) for staff and mothers (night-feeding).

— 5 pots (with covers), 1 griddle, stoves and fuel (to prepare food for emergency feeding six times a day).

— 5 buckets, 5 stirrers, 5 measuring-cups.

— 100 feeding-cups and spoons (mothers should be encouraged to bring their own utensils).

— 25 nasogastric tubes with adhesive tape, 25 plastic syringes (50 cm^3) for feeding (if glass syringes are used, more will be needed).

— 2 accurate beam-balances (one in the emergency section, one in the demonstration kitchen) plus one spare, an adequate supply of growth charts, forms, pencils, pens, paper, measuring sticks, and baby-boards.
— Minimum standardized medical equipment and drugs for *paediatric* use (see Chapter 7).

Staffing

For the recommended number of about 30 resident children, reasonable staffing is required to maintain day-and-night emergency feeding:

— 1 experienced nurse (or medical student) full-time
— 1 nursing aid (for the emergency ward)
— 2 health workers to train mothers and supervise feeding
— labourers or helpers.

A medical officer can visit up to 10 centres (for overall supervision, as well as medical examination of problem cases) if travelling distances are small. Personnel should be recruited from the population affected. Labourers should be trained to perform specific, well-defined tasks. Accommodation must be provided for night-duty personnel. Feeding and handling of the children must be left to the mothers.