3. Assessment and surveillance of nutritional status

Suitable methods must be adopted for the rapid and objective measurement of the nutritional status:

- of individuals eligible for special food relief (individual screening),
- of communities, in order to detect changes with time and decide priorities in food distribution (nutritional surveillance).

Weight-for-height is the best indicator for the diagnosis of nutritional status, nutritional surveillance, and individual screening. Weight-for-age and arm circumference are less reliable for assessment and screening but can be used to measure changes with time. Oedema rates are a valuable indicator when kwashiorkor is the prevalent form of PEM in the area.

Results of surveys and surveillance must be interpreted with caution. They can be misleading unless the individuals measured are representative of the whole population and the technique is standardized and properly used.

Why measure malnutrition in emergencies?

During a nutritional emergency, the relief foods may be scarce and should be given to the people in greatest need. Since much of a population may be able to supply part or all of its own food, it is very useful to have an objective and quantifiable measure of nutritional status.

Measurement of nutritional status in emergencies relies mainly upon taking body measurements (anthropometry), particularly height, weight, and arm circumference. Valuable information may also be obtained from simpler methods, for example, monitoring clinic records or measuring the prevalence of oedema.

The commonest reasons for measuring malnutrition in a relief programme are:

Initial assessment. A rapid survey of the population should be done before initiating a relief programme, in order to identify the areas or groups that are most affected. Surveys of this type need to be carefully designed and conducted by an experienced team. They will not be considered further.[1]

Individual screening Body measurements may be used to select the malnourished individuals eligible for food relief for themselves or their whole family.

Nutritional surveillance of the population. The repeated measuring of entire communities gives an idea of differences among the various population groups and changes in nutritional status with time. It may be used to decide priorities in the distribution of relief and will also provide some information about the effectiveness of the relief programme. In nutritional surveillance one is not interested in monitoring the progress of a child, but in knowing whether the overall nutritional condition of *village (or camp) A* is good or bad, is better or worse than that of village B and C (and so requires more supplies and personnel), and whether it is improving or deteriorating with time Nutritional surveillance should not be confused with the "surveillance" or follow up of an *individual* child in nutrition centres or health services.

Indicators of malnutrition

Clinical signs of PEM or specific deficiencies

Clinical signs in this context are signs that can be rapidly assessed by touching or examining the child concerned rather than by instruments or tests

- *Oedema.* In extreme situations or where kwashiorkor is the prevalent type of malnutrition, simple surveys (or screening) for this sign may be sufficiently precise, without using body measurements (anthropometry). According to the local situation, oedema of the feet can be looked for in young children, lactating women, and possibly older people.

- *Clinical marasmus* (if a standard clinical definition is used).

- *Night blindness* (mothers should be questioned), *eye signs* of xerophthalmia (vitamin A deficiency)

- *Selected clinical signs* indicative of other vitamin or mineral (iron, etc.) deficiency of potential local importance, depending on the basic diet of the population.

In very severe famine with widespread advanced starvation, clinical signs are most useful as indicators and may be temporarily sufficient when resources are limited. The main problem lies in the fact that observations by different persons are not easily comparable and can hardly be standardized

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[1] Interested readers are referred to *Guide to food and health relief operations in disasters.* New York, Protein-Calorie Advisory Group of the United Nations System, 1977

Body measurements

Body measurements are used to detect malnutrition, but not food shortage, since malnutrition can also be caused by ignorance or faulty feeding habits in the presence of sufficient food. The results of body measurements can be misleading if considered in isolation.

Chronic undernutrition leads to a slowing in a child's rate of growth. A chronically malnourished child will be short for his age ("stunted") although he may be of otherwise normal proportions.

An *acute* episode of severe undernutrition results in a loss of muscle and fat which are used up to provide energy, and the individual becomes thinner without significant effect upon height ("wasting").

In an emergency what is important is the measurement of *acute* malnutrition, the effects of chronic malnutrition being of less concern. Because *both* stunting *and* wasting result in low weight-for-*age*, relating body measurements to age is not recommended. Two measurements are commonly used to assess acute malnutrition ("wasting"):

Weight-for-height. Here a child's weight is compared with the height of a "reference" (well-nourished) child of the same height. Results are expressed as "percentages of reference", e.g., 80% of standard weight-for-height or in relation to (above or below) a pre-selected cut-off point.[1]

Arm circumference (AC). Well-nourished children have a nearly constant arm circumference (about 16 cm) between 1 and 5 years. Undernourished children have a thinner upper arm and a smaller AC. Children can be classified as malnourished if their AC falls below an arbitrarily specified level. If ages are not known, AC can be related to height (arm-circumference-for-height).

Presence of diseases associated with PEM

These include measles, diarrhoea (defined for instance as three or more loose stools per day), whooping cough, etc.

Mortality data

PEM is associated with increased mortality among young children (e.g., from measles, etc.).

The data collected should be expressed as rates; for example, the rate per thousand of marasmus among infants (aged 0–1) in a refugee camp is:

$$\frac{\text{number of infants with marasmus in the camp}}{\text{total number of infants in the camp}} \times 1000$$

[1] Cut-off points at 2 or 3 standard deviations below the median reference values were recently recommended (See Annex 3)

Body measurements

N.B. A very great effort should be made to measure children accurately. Small errors (e.g., 2–3 cm in height) in the measurement of a younger child may lead to significant errors in the classification of the child's nutritional status

Select only one indicator:

- Weight-for-height, the recommended body measurement in times of emergency, is a sensitive indicator of acute malnutrition. It is fairly independent of sex, race, and age (up to about 10 years of age). It requires a sufficient number of robust scales and adequate training of personnel. Neither condition is easy to meet in an acute emergency situation.
- If ages are not known, arm-circumference-for-height is the best alternative. Measuring arm circumference instead of weight results in only a marginal saving of time compared to that required for travelling and assembling people. Several techniques such as the QUAC stick (Annex 5) have been devised to simplify field work and are useful for the screening of large numbers of children
- As a second alternative, measurement of arm circumference alone (without measurement of height) is acceptable in situations where resources are extremely limited. Considerable time is saved by not measuring height. The sensitivity of the measurement as an indicator is poor but is sufficient in situations where PEM is severe and widespread.

Techniques

(a) Weight measurement

- Check the scales daily with the *same* known weight (e.g., a piece of metal), having first set the scale at zero.
- Remove the child's shoes and at least *heavy* clothing (a standard routine should be followed). Infants can be weighed without clothing to give more accurate readings.
- If a beam balance with a tray is used, make sure that the child sits properly and is not holding his mother or the static part of the scales. Beam scales should lie on a stable and horizontal surface (e.g., a wide board or a table)
- Read weight to nearest 100 g.

Various types of scales can be used in field conditions. For example:

— UNICEF standard beam balance, accurate, robust, for fixed centres Frequent transportation on rough roads is not recommended
— Healthometer (Continental Scale Corporation, USA), a beam balance, accurate and robust, suitable for use by mobile teams

— Portable Salter scale (CMS Weighing Equipment, Ltd, England): the child is suspended from the scale which is hung from a branch or a tripod. Special "pants" are used to weigh babies (Fig. 5). Robust, cheap, and easy to carry, these scales should be replaced after one year because of stretching of the spring and inaccurate readings. The model with readings up to 25 kg (× 100 g) is recommended.
— Bar scales with platforms have been used in fixed centres. Their use requires training and caution. They may be too bulky and heavy for use by mobile teams.
— The Homs beam balance scale which is sturdy, accurate, and relatively easy to carry in a small car. It can be used for all age groups.

FIG 5 SALTER SCALE

Bathroom scales are not recommended.

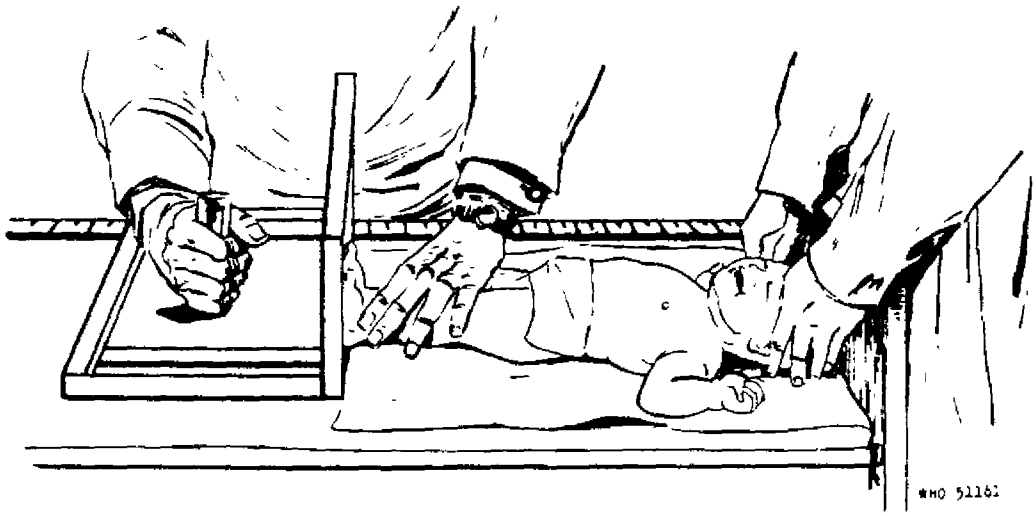
Most types of scales (especially beam scales) are sensitive to dust and mud.

(b) Height measurement

Use a baby-board (see Fig. 6) for children unable to stand up (under 2 years or less than 85 cm). Children should be quiet, relaxed (having a parent hold the child usually helps), and lying straight. Gentle pressure should be applied upon both knees with one hand and care taken to see that the slide is in contact with the whole surface of the soles of the child's feet, not just the toes. Measure to 1 cm (round off to the nearest cm. e.g., 90.0–90 4 cm = 90 cm, 90.5–90.9 cm = 91 cm).

When an upright measure is used the subject's heels should be together and touch the base of the upright, and the buttocks, the back of the heels, and the upper back should be in contact with the measuring stick (which can be locally made). Measurement is to the highest point of the head when the child is looking straight ahead. Shoes should be removed. On average, children are about 1 cm shorter when standing up than when lying down.

FIG 6 USING A BABY-BOARD TO MEASURE A CHILD



(c) Arm-circumference measurement

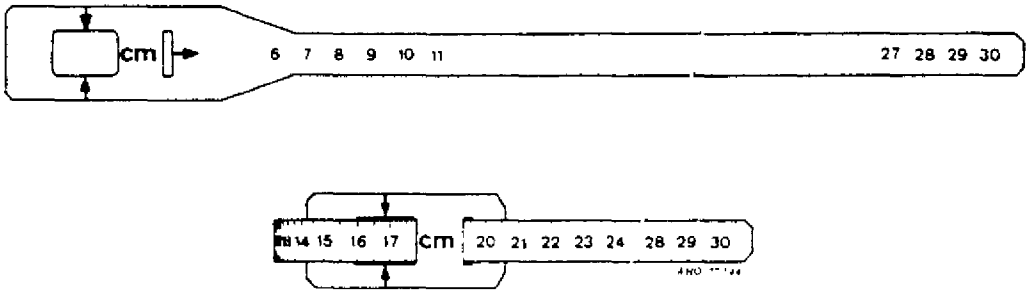
The circumference is measured on the left upper arm *half way* between the end of the shoulder (acromion) and the tip of the elbow (olecranon). To locate this point, the arm is flexed at a right angle. Then the arm is allowed to hang freely and a tape-measure (preferably of fibreglass) put firmly round it. Do not pull too tight (Fig 7)

FIG 7 MEASURING ARM CIRCUMFERENCE

Tapes or strips can be made locally from thin cardboard or X-ray films which are marked off in centimetres.[1] Special plastic tapes (insertion tapes) have been manufactured (Fig. 8)

Bangles, worn as arm ornaments in some countries, can be used for a rough screening of severely malnourished children. A bangle of standard diameter is passed up the arm in one straight push. If it goes above the elbow, the arm cir-

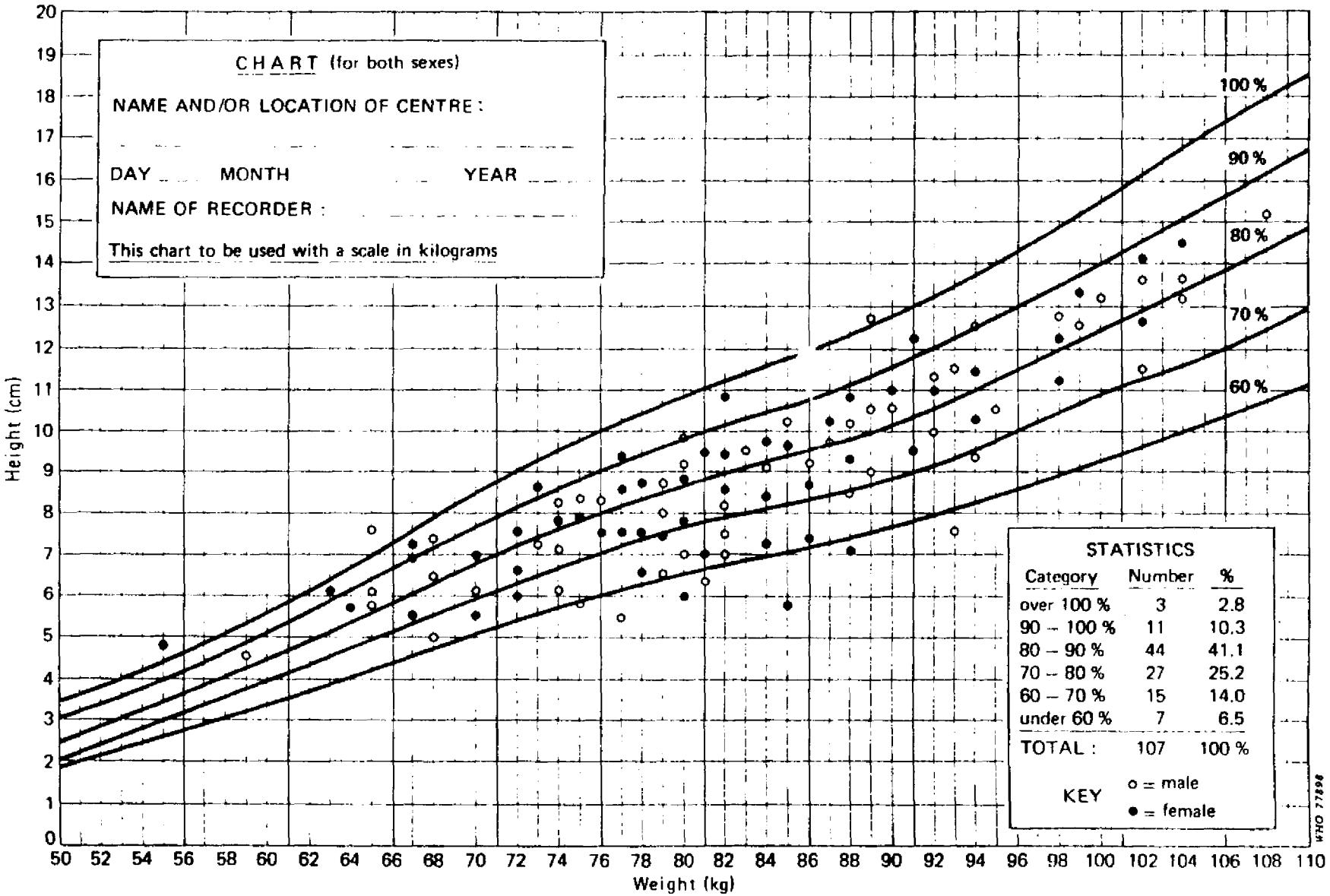
FIG 8 INSERTION TAPE



From Zerfas, A. J. *Am. J clin Nutr*, 28: 782–787 (1975).

[1] The cardboard tape or strips, X-ray films, or 8-mm cine films can be coloured according to the classification of the reading. (The X-ray film should first be scratched with a sharp point and then coloured with a spirit-based felt-tipped pen not quite up to the scratch line. Cut the film into 1-cm strips with scissors. About 40 strips can be made from one large X-ray film.)

FIG 9 NUTRITIONAL STATUS CHART*



* Adapted from: CAPONE, C. A growth surveillance system for food and nutrition programs. In: *Integrating Title II program with locally operated nutrition, socio-economic and humanitarian activities*. Catholic Relief Services, 1977 (mimeographed).

The basic data are the same as those used by WHO for a forthcoming publication which gives specifications for a model growth chart. The measurements for children being screened are plotted on the graph. At the end of the day, the chart gives the nutritional status of the community concerned at the time of the screening. The category for each child is easily determined from the chart. Measurements falling on a curve are included in the statistics for the category beneath the curve—e.g., a child ranked at 80 % will be included in the category 70-80 %.

cumference is too small and the child is regarded as malnourished. A bangle 4.0 cm in diameter passes up arms that are up to about 13.2 cm in circumference (the measurable circumference depends on the flexibility of the bangle). This technique is very simple and cheap, but of little accuracy because the bangle assesses the *maximum* arm circumference and not the circumference *halfway* between shoulder and elbow. It may be useful, however, when resources do not permit any other measurement to be made.

Calculating and tabulating the percentage of the reference value

The reference or "standard" values are shown in Annex 3 (weight-for-height) and Annex 4 (arm-circumference-height). To calculate the nutritional status of a child, compare the child's weight (or arm circumference) with the values given opposite his height in the relevant table.

This gives the percentage "rank" to which the child belongs, e.g., 70–80%. For most purposes it is not necessary to know the exact "percentage of reference" for each individual. Results are most conveniently recorded as shown in Fig. 9. They can readily be converted into percentages in accordance with the table in the lower right-hand corner of the figure.

Fig. 9 gives a "nutritional profile" indicating the distribution of nutritional status within the population measured. Without "normal" baseline figures it is not possible to say (unless the situation is extremely good or bad) whether or not a given set of findings is unusual for that population. Results can only be interpreted in this way, if much more information is available, e.g., crop statistics, mortality rates, etc.

The use of local standards of reference is not recommended unless these are based on well-nourished samples *in the same population* prior to the emergency. *Local standards do not permit international comparisons of value to relief organizations.*

The classification of malnutrition

Body measurements give reasonably accurate estimates of body wasting. Children below 70% of the reference standard (weight-for-height) can be said with some certainty to be severely malnourished, while those between 70% and 80% are moderately malnourished.

Table 3 shows two classifications using different cut-off points. In practice, the number and level of the cut-off points will have to be decided arbitrarily, taking two factors into account:

(1) The purpose of the measurement. If the object is to distinguish children with severe and moderate PEM from normal children for different types of feeding, two cut-off points will be needed. If a survey is contemplated, divisions by 10% of the reference standard might be used.

(2) The availability of food. In this case, the cut-off points may be decided (on the basis of a pilot survey) in such a way that the children are classified into groups according to the food available to feed them.

Different techniques give different rates of malnutrition. For instance, if a cut-off point of 80% arm-circumference-for-height is used, this will often give a higher "rate" for malnutrition than will 80% weight-for-height. (In many countries where chronic malnutrition is common, 90%, 80%, 70% weight-for-height are very roughly equivalent to 80%, 70%, 60% weight-for-age respectively.)

TABLE 3 EXAMPLES OF CLASSIFICATION

	Arm circumference (AC) [a] (cm)	AC-for-height (% of reference standard)	Weight-for-height [b] (% of reference standard)
A Three categories			
Well nourished and mild PEM	13.5 or more	85 % or more	80 % or more
Moderate PEM	12.5–13.5	70–85 %	70–80 %
Severe PEM	under 12.5	under 70 %	under 70 %
B Two categories			
Well nourished and mild PEM	13 or more	75 % or more	80 % or more
Clearly malnourished	less than 13	under 75 %	less than 80 %

[a] Arm circumference might be used alone for children under 5, although this is not recommended. A child would be classified as malnourished if the AC was less than a minimum acceptable value (cut-off point).
[b] Cut-off points 2 or 3 standard deviations below the reference median have recently been recommended (see Annex 3).

Organization of individual screening

Objectives

First decide what criteria (e.g., weight-for-height, arm-circumference-for-height, QUAC stick measurements, oedema) are to be used for the screening. When body measurements are used and the choice is between four courses of action (e.g., no assistance, weekly ration, daily ration, and intensive supervised feeding), four categories of classification should be established.

There is, for instance, very little point in selecting a large number of malnourished children unless facilities are available and organized for them. Obtain a rough estimate of the proportion of malnourished children in a large population by quickly measuring 200 children (see Annex 6).

Decide which population is to be screened. This will depend upon the local situation, but remember that people attending relief centres are not necessarily the worst off. Malnourished individuals may remain at home, because they are unable to walk, live in relatively inaccessible areas, or, in the case of marasmic children, are not regarded by their parents as being in need of help.

Procedure

Inform the community through local leaders at least 24 hours in advance to allow them to arrange for all eligible people to attend. Choose a time that is convenient for the community.

When large numbers of people are to be screened, make sure that they are well organized and, if at all possible, sitting down out of the sun. Convert existing buildings, wherever possible, into temporary screening locations.

Select the severely malnourished first, by clinical examination. If people are well organized, this can be done very quickly by walking along rows. Do not keep severely ill people waiting for long periods of time.

Use a system of individual identification, i.e., date-stamp the feeding card or mark the individual's finger nail with a 10% silver nitrate solution.

Use clearly defined criteria for selection, e.g., pregnant and lactating women, the very old, and/or all children shorter than some designated height—105 cm is the approximate average height of a 5-year-old.

Make sure each individual understands what is being done. Food may be distributed immediately as the direct result of a screening. In this case, the individual should be shown to the appropriate distribution point.

Screening may be done on each occasion that food is distributed or intermittently, in which case each individual (or family) is given a card that entitles him to food at several subsequent distributions.

If whole communities are being screened, *record* the results. These can be useful for making comparisons with future measurements. *Record* the results of other observations, e.g., oedema (Fig 10)

Staff and equipment

A team of six workers given one day's training can screen from 500 to 2000 persons a day. Efficiency decreases in sparsely populated areas. It is quicker to use the QUAC stick (AC-for-height) than weight-for-height.

The equipment needs for each measuring team are:

2 tape-measures (ideally of fibreglass or locally made), if AC is to be measured

1 scale with an adequate support (table or tripod) and 1 spare

1 measuring stick and a baby-board to measure height (or length)

a known weight to check the accuracy of the scales (e.g., a piece of metal or solid rock)

ration cards, special ration entitlements, etc.

2 rubber date-stamps, one official stamp to validate the ration card (important for preventing abuses), a table, and a chair

tally forms for recording oedema or other signs (Fig 10) and the number of children falling into different nutritional categories. Lactating or pregnant women should not be classified with females of 10-54 years but in a special category. The tabulation is completed at the end of the day and the percentage of oedema per age group and sex is entered on a special form.

FIG 10 OEDEMA TALLY FORM

Group	Height (cm)	Male		Female	
		No oedema	Oedema	No oedema	Oedema
Unable to walk (0 – 1 years)	under 75	IIII	I	III	I
Preschool children (1–4 years)	75 - 105	𝍸	IIII	𝍸 II	IIII
School children (5–9 years)	105 - 136	IIII	II	III	II
Active population[b] (10–54 years)	over 136	𝍸 I		𝍸	
55 years or more		𝍸 III	I	𝍸 𝍸 I	
Lactating women				𝍸	II
Pregnant women				III	I
TOTAL		27	8	37	10

WHO 77817

[a] 𝍸 = 5
[b] Excluding lactating or pregnant women

Organization of nutritional surveillance[1]

Under most circumstances the nutritional status of preschool children can be taken to reflect the nutritional status of the whole community. However, adults also suffer from food shortages and in cultures where the feeding of children has precedence over that of the parents, it may be the adults who are most affected by starvation.

Weight-for-height is a suitable measurement for adults between 15 and 50 years old. However, the range of values which can be regarded as normal is much wider for this age group than for young children (see Annex 3).

To measure changes in the nutritional status of a large population accurately over a period of time requires exacting sampling standards and techniques (see Annex 6).

However, some useful information can be obtained by relatively simple methods.

[1] The surveillance of communicable diseases is dealt with in Chapter 7.

(*a*) *Where vulnerable groups are periodically screened for food distribution, using body measurement or other indicators*

Data collected during screenings can be recorded and comparisons made between measurements. Results of anthropometric measurements should be arranged by 10% groupings (see Fig. 9), and converted to percentages. This gives "nutritional profiles" of the community on two or more occasions. These can be compared directly to see if the proportion of the malnourished is changing, and in what way.

If part of the population is being screened *and* having food distributed to it, this group is obviously not representative of the population at large. The required information can only be obtained by sample surveys (see Annex 6).

Comparisons between two measurements taken from the same community should be interpreted with caution. The fact that the death rate for malnourished children is generally very high may lead to a false impression of improvement. For example:

	First measurement			*Second measurement*	
Number over 80 % of reference standard	36		1 death . .	35	
Number under 80 % of reference standard	12	(25 %)	6 deaths . .	6	(15 %)

Here, there seems to have been an improvement whereas in fact the situation may have deteriorated.

N.B. A real improvement might be caused by climatic or economic factors *in spite* of an inefficient food relief programme.

Even small differences in the procedure used during a screening may cause a different group of people to attend. If the first screening is held early in the morning the group measured will be different from that measured at a second screening held at midday, when people are at work. The differences introduced by such variations can be very large and lead to false conclusions.

Indicators other than body measurements can be used for screening, either singly or in combination. Since organization and travelling take up so much working time, several indicators should be estimated on the same occasion, e g., oedema, specific signs of vitamin deficiency.

(*b*) *Where vulnerable groups are not regularly screened*

Data collected weekly at fixed health facilities and maternal and child health centres can give some idea of changes, e.g., number and complaints of individuals attending for health care or nutritional relief. Data of this kind should be used with caution because they do not give a picture of the whole population but only of those who

— feel that they need *medical* attention, whatever the reason

— can physically attend the health facilities (e.g., live within walking distance, etc.).

Local auxiliaries can be temporarily recruited and trained to carry out the surveillance of simple symptoms and signs of malnutrition at the camp or village level.

The training can, for instance, be organized as follows:

1 day: major signs of PEM (wasting, oedema)
investigation of night blindness
diagnosis of major eye lesions due to vitamin A deficiency
clinical signs of other vitamin deficiencies

1 day: drill in measuring weight (or arm circumference) and height reporting system

1 day: field test

Visiting schedules for auxiliaries must be carefully prepared by a census of the dwellings (houses, tents) involved. Conclusions based on a poorly organized and supervised surveillance system are not valid.

On completing a regular cycle of visits, the auxiliary will report the total number of families and children visited as well as the number of persons presenting the selected signs, by age and sex. Rates should be calculated centrally.

Other indicators for evaluation of relief programmes

The following indicators can be useful in evaluating a relief programme:

- Age distribution of children attending relief centres compared with the age distribution from census data.

- Monthly attendance rate of children registered. This is obtained by dividing the monthly average number of those attending by the total number of children registered.

- Malnutrition rates in people attending relief centres compared with similar rates obtained by an occasional survey of random samples and house-to-house visits in the same area. This indicator is essential in confirming that the programme is really reaching the target groups.

The following data can be obtained from analysis of a random sample of registration cards or growth charts:

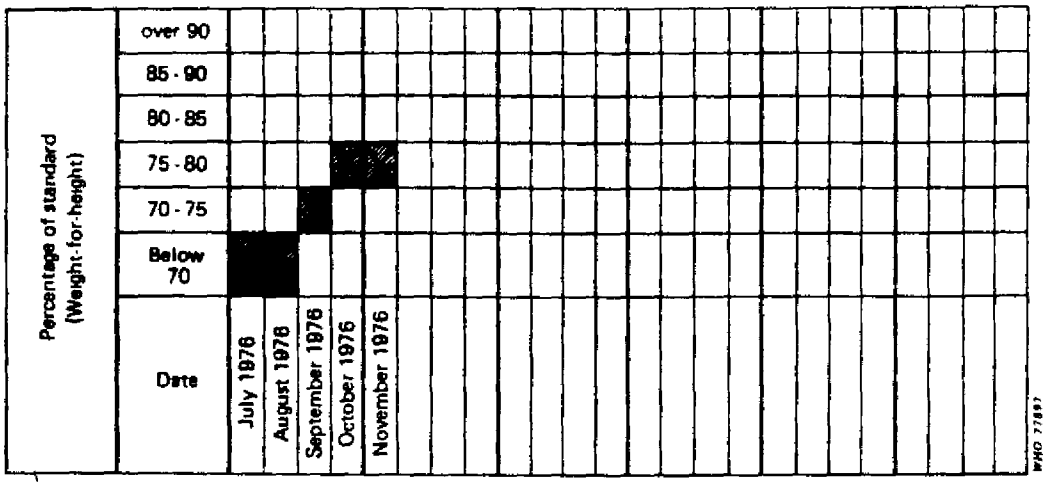
- Percentage of children losing weight over 1 month. Weight gain over a long period of time is no proof of a successful programme. Undernourished children may gain some weight and still fall into a lower nutritional category.
- Percentage of children shifting to another nutritional category in a given period of time (e.g., from 70–80% weight-for-height up to 80–90% or down to 60–70%). This information can easily be taken from the simplified growth chart (Fig. 11).
- Weight gain processed as weight gain ÷ last weight, the results being expressed as g/kg

The daily weight gain in "normal" reference children between 1 and 5 years old is about 1 g/kg. In malnourished children, the gain must be higher to indicate recovery

FIG 11 SIMPLIFIED GROWTH CHART[a]

NAME..... FATHER'S NAME.....

VILLAGE ..... DATE FIRST SEEN..... .....Estimated age: .....



[a] Adapted from: CAPONE, C. A growth surveillance system for food and nutrition programs. In *Integrating Title II program with locally operated nutrition, socio-economic and humanitarian activities*. Catholic Relief Services, 1977 (mimeographed)

This chart is to be used in conjunction with the nutritional status chart (Fig. 9). Kept by the mother, it can be printed on the reverse side of a ration card. The information is recorded weekly or monthly.

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.

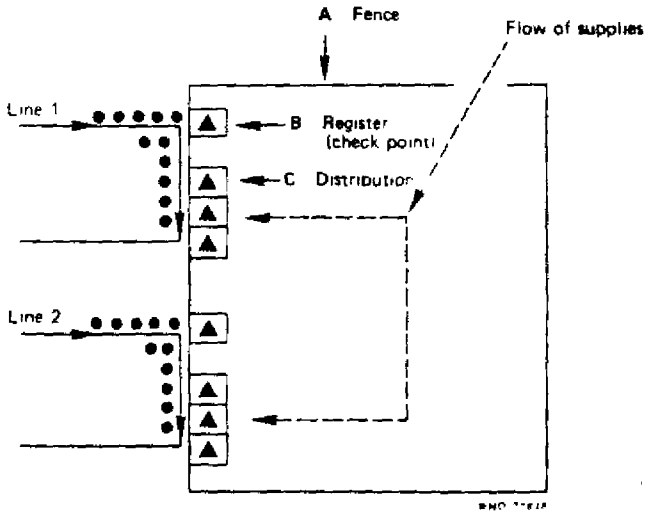
The recipients should always be aware of the amounts they are entitled to: standard measures for cereals and other items should be cut from oil tins (for example), and the weight checked on the scales, and demonstrated in public—if necessary, several times. This will give people a chance to see that 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.

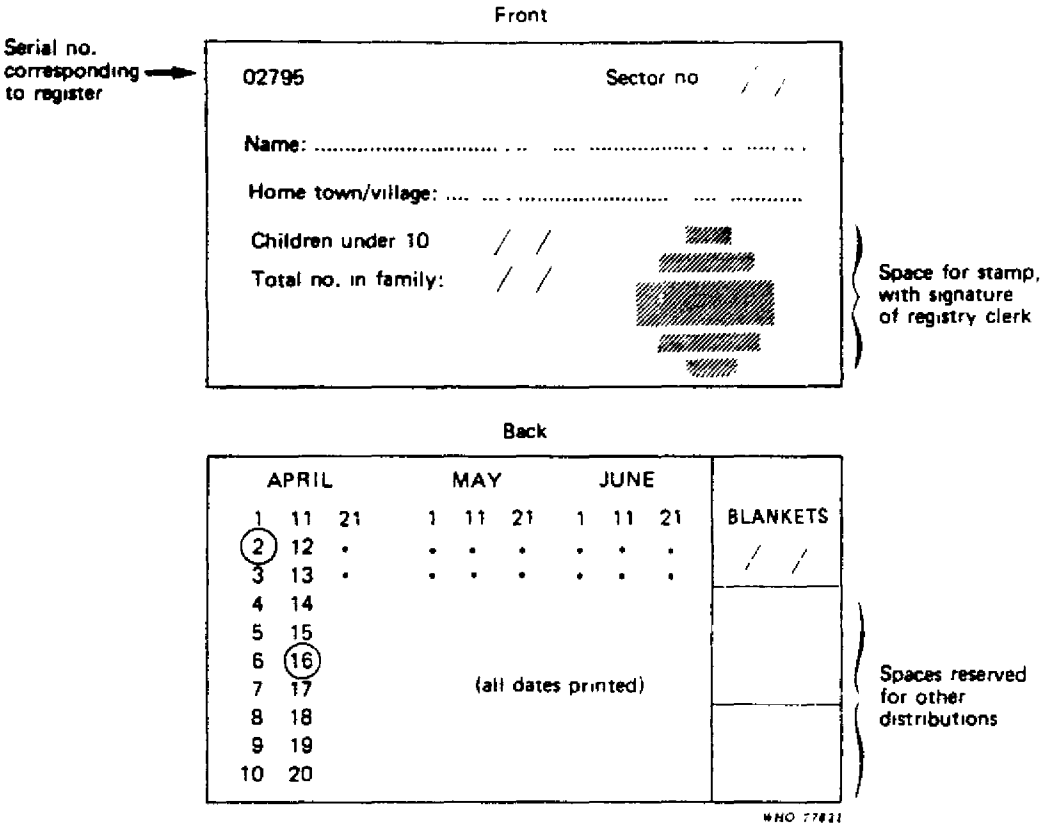
B Check point for cards. Sheltered by roof (or umbrella). The number of rations is called out clearly to distributors at C.

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*.

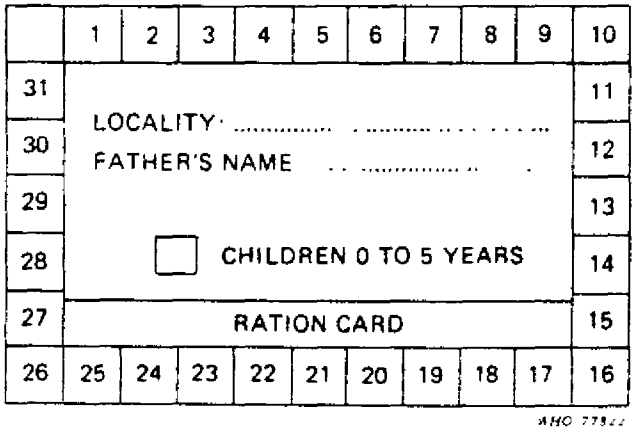
FIG 13 RATION CARD

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	= 1000
assuming that the food must be freshly prepared for each meal, then total volume to be prepared twice daily	= 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

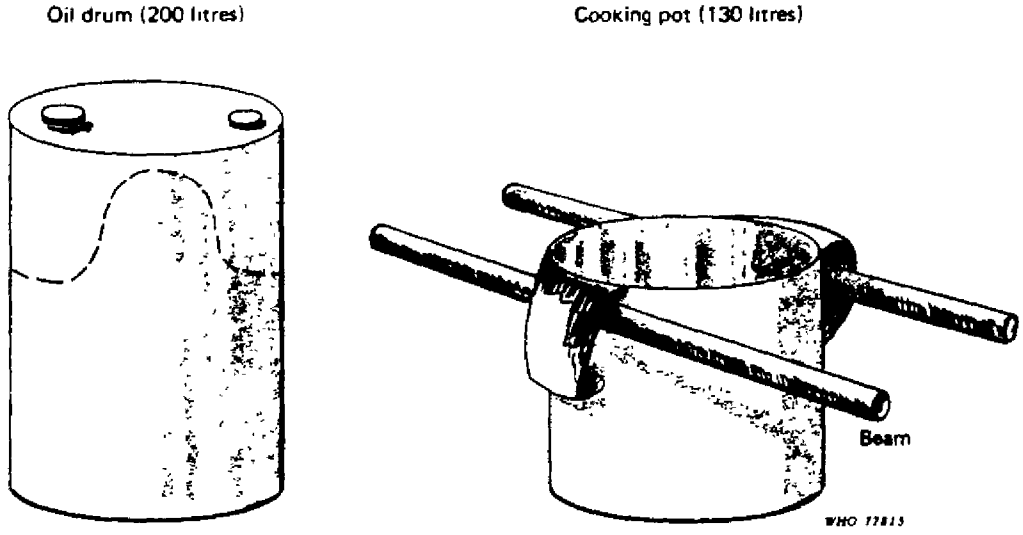
(a) Distribution of cooked meals to families

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		

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[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).