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.

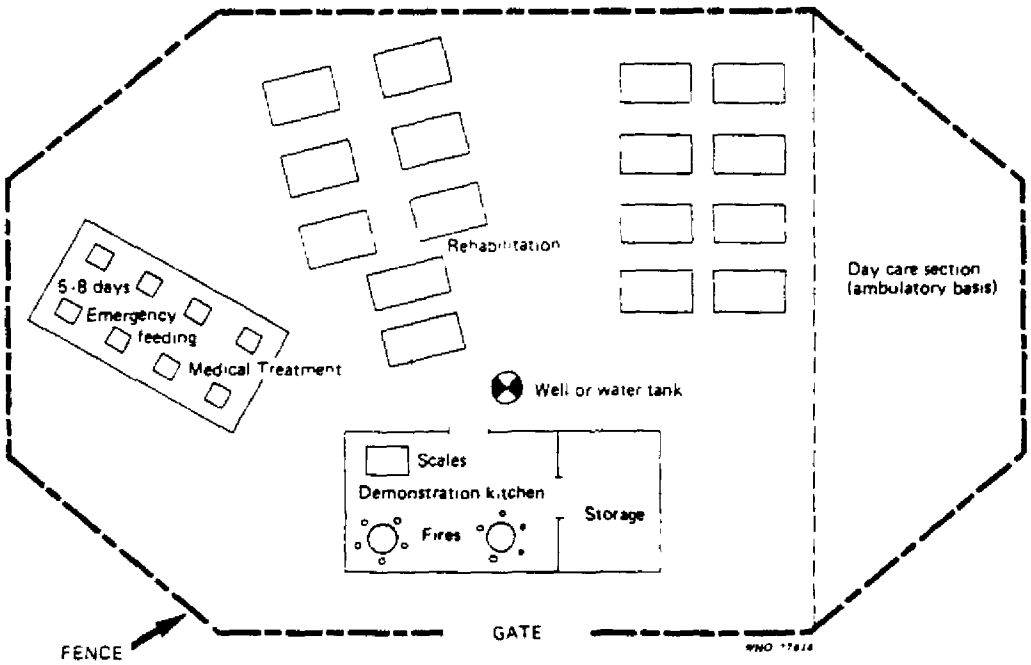
At day-care centres: four meals a day on an ambulatory (outpatient) basis.

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.

6. Special foods

Relief workers are often sent unfamiliar processed foods. Special foods are convenient but should supplement, not replace, the local diet.

In general, 100 g of special food provides approximately 1.5 MJ (360 $kcal_{th}$) and 20 g of protein. Vitamins are often added.

The most common of the special foods are the dried milks (skimmed, that is, with no vitamins A–D, unless fortified, or full-cream with vitamins A–D), the blends such as Corn-Soy Milk (CSM) and Wheat-Soy Blend (WSB), and the parboiled cereals (bulgur wheat).

Inappropriate foods must be returned or destroyed.

During emergencies, relief workers are often sent unfamiliar processed foods.

Foods prepared locally with local ingredients are preferable to imported special foods and are best adapted to the specific cultural conditions.[1]

Most special foods are intended for vulnerable groups as supplements to the local diet. They should not replace the traditional diet but supplement it. Processed foods are very convenient to distribute and prepare.

Special imported foods should be replaced as soon as possible by locally grown and prepared supplements of the same nutritional value.

Blended foods may not be familiar to the population. Prepare a demonstration in which all the ingredients are displayed separately. When given without an explanation or a demonstration of how to cook them, they may be thrown away.

[1] For recipes, see: CAMERON, M. & HOFVANDER, Y. *Manual on feeding infants and young children*. 2nd edition. New York, Protein-Calorie Advisory Group of the United Nations System, 1976

TABLE 4 SPECIAL PROCESSED FOODS

Type of food	Average nutritional values [a] per 100 g		Minimum cooking time (min) after adding to boiling water	Remarks
	MJ/kcal$_{th}$	Protein (g)		
Blends of cereals, legumes, and dry skim milk				
CSM (Corn-Soy Milk)	1.6/370	20	5–10	CSM and WSM are supplied in 22.5-kg multiwall paper bags (the outer wall is impregnated with insecticides and moderately resistant to moisture); dimensions 51 x 84 x 25.5 cm
Instant CSM	1.6/380	20	Instant CSM is fully pre-cooked (ready to mix)	
WSM (Wheat-Soy Milk)	1.5/360	20	5–10	
Superamine (Algeria only)	1.4/340	20	5–10	Vitamins and minerals added (except in the case of Faffa)
Faffa (Ethiopia only)	1.4/340	20	5–10	
Blends of cereals and legumes				
WSB (Wheat-Soy Blend)	1.5/360	20	5–10	These foods do not contain cow's milk
SF bul (Soy-Fortified bulgur)	1.5/350	17	20 less, if soaked over night	Vitamins and minerals added to WSB, SFCM, incaparina, balahar, and SWF
SFCM (Soy-Fortified Corn Meal)	1.6/390	13	15	SF bul is not a flour (cracked grains of bulgur wheat)
SFSG (Soy-Fortified Sorghum Grits)	1.5/360	16	15	
SFF1 12 % (Soy-Fortified Flour 12 %)	1.5/360	16	15–20	
SFRO (Soy-Fortified Rolled Oats)	1.6/370	21	5	
Incaparina (Central America)	1.6/370	28	5–10	
Balahar (India)	1.5/360	22	5–10	
Other blends				
SEF (supplement-enriched food wheat FPC, DSM, sugar)	1.7/400	20	5	Keep well for about 9 months
Semper I (cereals DSM FPC, oil)	2.0/480	15	Fully precooked	
Milks and fish-protein concentrates				
DSM (Dried skim milk)	1.5/350	35		Milks have a high lactose content DSM contains no vitamins A or D, unless this is mentioned on the bag Milks provided by UNICEF, USA and Canada are usually enriched
DFCM (Dried full-cream milk or whole milk)	2.1/500	25		
Sweetened condensed milk	1.3/320	13	Fully precooked	DFCM does not store well once a container has been opened (rancidity)
FPC (fish-protein concentrate)				FPC type A does not smell or taste of fish but is more expensive than type B
type A	1.5/360	75		
type B	1.4/340	65		
Cereals				
Bulgur wheat (whole grain)	1.5/350	11	20 (less, if soaked overnight)	

[a] Values in MJ rounded to one decimal place on conversion from kcal$_{th}$

Some foods sent as emergency relief are inappropriate for cultural reasons (religion, food habits, etc.), or because of unsuitable packaging (e g., 95 % of the weight of the small bottles of vegetable mash for infants is made up of water and glass) or low nutritional value (sweets, luxury foods, etc.). Do not waste fuel and effort in distributing food containing only minute amounts of proteins and calories. Give it away to a local institution. If it is not acceptable, return or destroy it. Always inform your supervisors and the donor's local representative if donated supplies are inappropriate. This will help to improve the quality of later consignments.

Nutrient content of some commonly used special foods

The composition of special foods, as indicated in Table 4, varies with the availability and cost of the ingredients. However, the nutrient content remains *approximately* constant. All cereal-based formulas have a variable protein content, and the values shown are the lowest which occur.

Dried skim milk (DSM) is used as a high-quality protein source in most formulas. When only small amounts of milk (e.g., 50 g of DSM) are given daily, lactose intolerance will *not* be a significant problem among the general population.

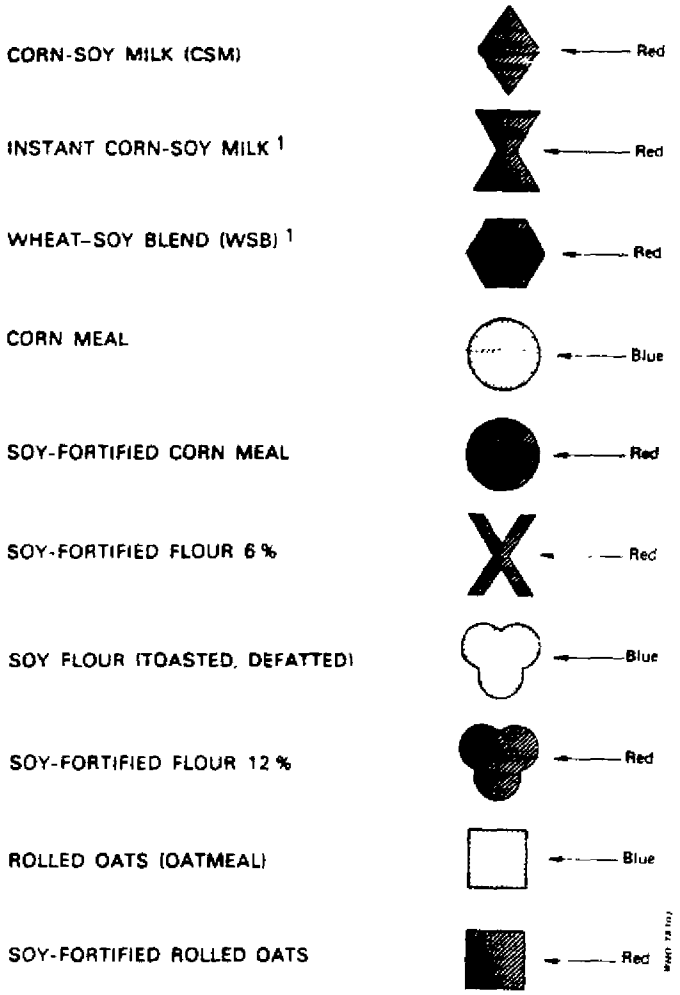
Vitamins and minerals are usually added to most (but not all) processed foods so that 100 g of dry product meet the daily recommended allowance. DSM contains no vitamins A–D unless they have been added during processing (a measure increasingly adopted by supplying countries).

Whole cereals (e.g., bulgur wheat and SF bul) retain a high amount of B vitamins (e.g., thiamine).

Most processed foods are partially precooked, some are *fully* precooked and are called instant or ready-to-mix foods (DSM, DFCM, Instant CSM, Semper I, etc.). Fully precooked foods are very convenient (since they can be cold-mixed) but they must be made up freshly *each time they are served,* especially if they are made up with unboiled water. Germs do multiply very quickly (within one to two hours) in a cold mixture of instant food and water, since there they find everything they need—water, sugar, proteins, etc.—at an ideal temperature A food mixture contaminated by unsafe water becomes after a while much more dangerous than the water itself.

Instant foods must be
- prepared just before meal-time with boiled water
- or added to a porridge (gruel, etc.) after its preparation
- or eaten in a dry form (DSM, FPC, etc.)
- or added to the normal diet (e.g., to soup).

To facilitate identification of the contents of the food bags, once they are piled up in the warehouse, a special colour code was recently devised Red is used for soy-fortified foods and blue for other commodities. The most usual symbols (printed on the sides of the bags) are as follows.



[1] Sweetened and flavoured instant-CSM and WSB are sometimes donated, they are identified by distinct symbols

Preparing special foods

Always try cooking a small sample yourself to make sure the recipe works.

Cereals

Bulgur wheat and SF bul are not in powder form but in cracked whole grains, precooked to reduce cooking time and increase storage stability.

Add sufficient water to cover the grains in the pot
Soak for a few hours (overnight).
Boil the cereals in the same water (B vitamins are present in this water) for 10–15 min (20, if no soaking).
Do not wash or rinse the grains after cooking.
If the cereal is not cooked long enough, it is poorly digested by children.
Pound finely (mash) for young children
Proportions are about 1 part bulgur, 2 or 3 parts water. The volume more than doubles in cooking

The same principles apply to most locally grown cereals.

Special blends (in powder form)

1. First mix one part of CSM or other blends with two parts of water (it is important, always to use *cold* water). *Slowly* add the special blend to the water *while stirring* If the mixture is lumpy, continue stirring until it is smooth.

To use in *porridge* form, pour the smooth mixture into an extra part of water Boil for 8–10 min, stirring all the time The porridge should be thick to provide enough proteins and energy per portion.

To enrich the usual meal, add the smooth mixture Keep cooking and boiling (while stirring) for 5–8 minutes

2 CSM and other blends can be used as dry ingredients partially replacing cereal flours in almost every local dish (breads, tortillas, chapatis, etc). Depending on local cereal availability and acceptability, the proportion can vary from 20% to 50%. Try locally with a sample (mixture time, as well as oil and water content, should sometimes be increased).

3. Instant foods, e.g., Instant CSM, can be added to *cold boiled* water and served immediately without cooking.

4 Whenever possible add 30–40 g of edible oil per 100 g of the *dry* blend to increase the energy content. Mix and stir thoroughly. The mixture (dry blend plus oil) can be stored for a few days in a dry place. After addition of water and cooking, consume within a few hours.

Dried milks (DSM, DFCM)

Reconstitute milk with one part of dry milk to 4 parts of water.

First take a small amount of *cold water* (1–2 parts), then slowly add DSM or DFCM and keep stirring until the solution is smooth. Add the remainder of the water (boil for 3–5 min if it is contaminated). If the DSM is in bulk, add milk powder to boiled cold water and whisk until powder is well dissolved.

Dried milk can be added directly to porridge during preparation or before serving. Stir well.

Dried skim milk (6 parts), oil (2 parts) and sugar (1 part) can be mixed together and stored for up to one week; 1 part of the mixture added to 4 parts of water gives a high-energy liquid food with 0.42 MJ (100 $kcal_{th}$) and about 4 g protein per 100 ml (see also Chapter 5)

Concentrated or condensed sweetened milk

The milk should be diluted because of the high sugar content (43%). Protein should be added because of the low content after dilution.

Use the tin as a measure. Mix three tins of water to the contents of one tin of concentrated sweetened milk. For a standard size tin (content 400 g) add 30 g of dry skim milk (three full teaspoons) to half a can of water. Mix together and stir well. Boil for 3 min if the water is not safe The final preparation (1350 ml) contains 0.48 MJ (115 $kcal_{th}$), 4.5 g protein, and 2.4 g fat per 100 ml and should be served without delay.

Condensed milk should not be confused with evaporated milk (unsweetened) which can be reconstituted by adding boiled water.

Fish-protein concentrates (FPC)

These can be added to traditional dishes or consumed without any preparation, even by infants. When accepted, they are a high-quality source of protein.

7. Communicable diseases: surveillance and treatment, immunization and sanitation

Surveillance of communicable diseases must be carried out as part of nutritional surveillance.

Treatment of the major acute diseases should be standardized.

Avoid expensive symptomatic treatment.

Prevention and treatment of dehydration in diarrhoeal diseases are the most important curative measures.

Drugs must be limited to a few basic items.

Food distributions may provide a good opportunity to immunize population groups. Mass measles immunization should be considered, wherever a cold chain (adequate refrigeration) can be maintained.

The provision of adequate latrines, a water supply, and washing facilities is a basic requirement in any camp. It is as important as the provision of basic medical care.

There is a close association between infectious disease and malnutrition, and the provision of basic medical care is an important part of a nutritional relief programme.

Where people are suffering badly from the effects of a food shortage, the provision of food is the first priority. Daily activities in the rural health services should be temporarily reoriented towards nutrition.

In most emergencies, some 75–90% of patients present with minor ailments (aches, pains, etc.). These patients divert medical attention and resources and should not be treated during emergencies.

Medical responsibility lies with the local health authorities. Expatriate medical relief workers should adapt themselves to local standards and procedures. Familiarity with the local culture, pattern of disease, and organization of medical services is as important as an advanced knowledge of medicine and medical techniques.

Surveillance

The surveillance of communicable diseases must be conducted as part of nutritional surveillance (Chapter 3). In addition to PEM, there are a number of important conditions that should be recorded regularly by dispensaries, clinics, maternal and child health centres, health workers, and field teams.

At the local level, symptoms suggestive of a disease should be recorded and reported even if the diagnosis is uncertain. For instance: fever without cough (malaria in endemic areas); diarrhoea (gastroenteritis, dysentry, severe diarrhoea with dehydration); cough with fever (respiratory infections—possibly tuberculosis, if lasting more than 2 weeks). The selection should be limited to diseases of major public health importance that are easy to treat or prevent.

Reports should give the age and sex of patients. No information (blank) is not equivalent to no disease The presence and absence of disease must be reported clearly in order to differentiate between lack of information and negative reporting (no cases).

Treatment of the most important diseases during emergencies

The following guidelines may be used wherever no standardized treatment scheme is recommended by the national health services.

When qualified personnel are scarce, patients cannot be given individual attention by a physician. A *standard* treatment should be given for the disease most likely to cause the patient's symptoms (presumptive treatment). For instance, in an area where malaria is common, any person with fever for which there is no obvious cause (abscess, respiratory infection, etc.) should be treated for malaria.

— Wherever possible, use single-dose treatments and avoid giving a patient a large supply of tablets

— Do not give mixtures of tablets. One drug is usually sufficient.

— Injections are very useful and often appreciated by patients. They are sometimes dangerous and almost always relatively expensive. Do not overuse them.

— Syrups and sugar-coated pills are no more active than tablets Their use should be avoided since they may be 5–10 times as expensive

TABLE 5 THE MOST IMPORTANT DRUGS DURING NUTRITIONAL EMERGENCIES [a, b]

Drug	Patients' age, height average weight: under 1 year, under 75 cm, 5 kg	1–4 years 110 cm, 10 kg	5–9 years, 110-140 cm, 15 kg	over 10 years, over 140 cm 45 kg	Frequency (divide total dose as shown in this column)
			Dosage		
procaine penicillin in oil [c]	0 8 ml	1 6 ml	2 5 ml	3 3 ml	1 dose × 5 days
benzathine benzylpenicillin [c]	180 mg	360 mg	450 mg	600 mg	single dose
tetracycline capsules, 250 mg [d]	250 mg	500 mg	750 mg	1 000 mg	4 divided doses × 3-5 days (no more than 5 days to children under 6)
chloramphenicol capsules, 250 mg	250 mg	500 mg	1 g	2 g	4 divided doses × 3-5 days
injections	250 mg	500 mg	1 g	2 g	4 divided doses × 3-5 days
sulfonamide 500 mg tablets (sulfadiazine + sulfamerazine + sulfadimidine)	750 mg	1 5 g	3 g	4 5 g	4 divided doses × 3-5 days
chloroquine (base) 100 150 300 mg tablets					
treatment	75 mg	150 mg	300 mg	450 mg	single dose
weekly prophylaxis	50 mg	100 mg	200 mg	300 mg	1 dose every week
bephenium hydroxynaphthoate (Alcopar) 5 g sachet	—	2 5 g	5 g	5 g	single dose (can be combined with tetrachloroethylene)
piperazine 500-mg tablets	1 g	2 g	4 g	4 g	single dose × 2 consecutive days
tetrachloroethylene	0 5 ml	1 ml	1 5 ml	2 ml	two divided doses 1 day
trabendazole (Mintezol)	250 mg	500 mg	750 mg	2 g	two divided doses × 2 days
benzyl benzoate 25 % (or DDT 10 % or BHC 2 %)	—	—	—	—	local application, 1 day repeat if necessary
acetylsalicylic acid, 500-mg tablets (aspirin tablets) [e]	150 mg	500 mg	750 mg	1 g	2-4 divided doses
1 % tetracycline ophthalmic ointment (Achromycin)	—	—	—	—	local application to the eye 1-3 times a day

[a] Iron, vitamins, etc., should be added to the list according to the specific deficiencies in the area
[b] Oral and intravenous rehydration fluids are mentioned earlier
[c] Doses of penicillin can be considerably increased if necessary. Aqueous injectable penicillin and oral penicillin are less convenient and should be administered at 6-hourly intervals
[d] Avoid repeated courses of tetracycline in children under 8 years as these may cause discoloration of the teeth
[e] Aspirin overdoses are very dangerous for infants

The number of drugs required is small. Often about 20 major drugs are sufficient for the most common diseases encountered in rural areas. Expatriate doctors and hospitals must not request expensive modern drugs. Table 5 lists some of the most useful drugs with daily recommended dose and duration of treatment. According to the local situation, other drugs can be added to the list.

Moderate diarrhoea without dehydration

Malnourished children get diarrhoea easily, and diarrhoea makes malnutrition worse. Children with diarrhoea must drink a lot. Dehydration is the major risk. Give a solution containing salt and sugar (*by mouth*). A glucose-salt standard solution is used for prevention as well as for the treatment of mild dehydration. In one litre of boiled cooled water:

sodium chloride (table salt)	3.5 g	(1 level teaspoon)[1]
glucose (or if not available: table sugar)	20.0 g	(8 level teaspoon)[1]
sodium bicarbonate (baking soda)	2.5 g	(1/2 level teaspoon)[1]
potassium chloride	1.5 g	(1/2 level teaspoon)[1]

The ingredients are commercially available in aluminium foil or polyethylene bags (e.g., UNICEF "oral rehydration salts"). If necessary, they can also be prepared locally in the dispensary. The products need not be chemically pure. Use cooled, boiled water, but do not boil the final solution. If sodium bicarbonate and potassium chloride are not available, give a solution with only salt and table sugar. For doses, see guide to rehydration in Table 7. Antibiotics should not be given in cases of moderate diarrhoea unless there is blood or mucus in the stools. *Very important:* a child with diarrhoea must continue to get food. If blood or mucus is present in the stools, the child should be brought back to the health services.

Diarrhoea with dehydration

The child usually dies from dehydration, not from the infectious process. *Adequate treatment of the dehydration is the life-saving measure.* Table 6 is a guide to whether dehydration is mild or severe; Table 7 is a guide to rehydration. If there has been blood or mucus in the stools for 2 days, antibiotics can be given for 5 days—tetracycline, sulfonamides, or chloramphenicol (see Table 5). Consult national authorities on the recommended standard treatment for diarrhoea.

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[1] The equivalents in "teaspoons" are, of course, very rough and ready, since teaspoons vary so much in capacity and the density and volume of the ingredients also vary considerably from batch to batch.

[2] For further details on rehydration, see WORLD HEALTH ORGANIZATION. *Treatment and prevention of dehydration in diarrhoeal diseases.* Geneva, 1976.

TABLE 6 HOW TO DECIDE WHETHER DEHYDRATION IS MILD OR SEVERE [a]

	Sign	Degree of dehydration	
		Mild	Severe
(1)	Patient s appearence	Alert or restless Thirsty	Limp or unconscious Too weak to drink well or to drink at all Cold skin (shock)
(2)	Skin elasticity	Normal or slightly less than normal	Poor
(3)	Radial pulse	Present	Weak or absent
(4)	Eyes, fontanelle	Normal or slightly sunken	Sunken
(5)	Urine flow (difficult to tell in children)	Usually normal	Little or none
(6)	Acute weight loss	Less than 5 %	More than 5 %

[a] Adapted from, World Health Organization, *Treatment and prevention of dehydration in diarrhoeal diseases* Geneva, 1976

TABLE 7 A GUIDE TO REHYDRATION [a]

Dehydration	What kind of fluid	How much to give	How quickly to give it
Mild			
(a) Patients who can drink	glucose-salt oral solution (continue with breast-feeding)	encourage patients to drink continuously until they refuse	within 4–6 hours (usually given at home)
(b) Patients who need a nasogastric tube	glucose-salt oral solution	120 ml/kg body weight	6 hours
Severe			
Patients who need intravenous fluid [b]	(a) Ringer s lactate or Hartman s solution (compound solution of sodium lactate)	100 ml/kg body weight	within 4–6 hours (or less in adults' half of the requirement to be given in the first hour [b]
	OR		
	(b) half-strength Darrow s solution (lactated potassic saline injection) with 2 5 % glucose (not so good for adults)	150 ml/kg body weight	6 hours (half of the requirement to be given in the first hour) [b]
	OR		
	(c) normal saline (if nothing else is available)	100 ml/kg body weight	6 hours (divided evenly) [b]

[a] Adapted from World Health Organization, *Treatment and prevention of dehydration in diarrhoeal diseases* Geneva 1976

[b] If given intraperitoneally 70 ml/kg body weight can be given in 10–20 minutes instead of 4–6 hours

The glucose-salt solution is given by mouth or with a nasogastric tube. Patients with severe dehydration and those who do not respond well to oral rehydration need intravenous fluids—either Ringer's lactate or Hartman's solution (compound solution of sodium lactate), or half-strength Darrow's solution (lactated potassium saline injection) with 2.5 % glucose. Normal saline is the poorest fluid, while glucose (dextrose) 5 % must not be used.

In emergency conditions, the fluids used for intravenous injection can be given intraperitoneally. This should be done by experienced health personnel:

Examine the abdomen carefully so as to avoid penetrating an enlarged liver, spleen, or bladder. Attach the sterile set to the bottle of sterile fluid, clean the skin, and push a 1 2-mm diameter (18-gauge) needle through the skin, just below the umbilicus Then open the clamp on the tubing of the set and push the needle straight into the peritoneal cavity: when the peritoneal cavity has been reached, the liquid will flow in a steady stream The full amount (70 ml/kg body weight) can be given in 10–20 minutes by allowing the fluid to flow as fast as possible. Remove the needle and place a dressing over the wound.

Do not give other drugs. Among the many medicines that are either no use or even dangerous in these emergency conditions are neomycin or streptomycin, purgatives, tincture of opium, paregoric or atropine, cardiotonics such as epinephrine or coramine, steroids, charcoal, kaolin, pectin, bismuth and Lomotil. Antibiotics need not be given unless there is blood or mucus in the stools or a definite clinical indication of bacterial infection.

Measles

Measles is usually easily diagnosed by the mother herself. The mortality is very high among malnourished children. The child must eat and drink even if he has no appetite, is vomiting, or has diarrhoea (taboos forbidding food for the sick child are not uncommon).

There is no specific treatment. If a severe cough develops (a slight cough is a normal part of the disease), this can be treated with an injection of long-acting penicillin. Watch for night blindness and xerosis: if in doubt, give 110 000 μg of water-miscible retinol palmitate (200 000 IU of vitamin A) intramuscularly. If a water-miscible preparation is not available, give the same amount orally in oil.

Malaria

In an area where malaria is common, all patients with fever should receive presumptive treatment against the disease; a single-dose treatment is used (see Table 5). If the fever does not subside within 12 hours of the first dose of chloroquine (and there is no possibility of chloroquine resistance), then the diagnosis is wrong.

Quinine injections are expensive and unnecessary unless there is local resistance to chloroquine. Chloroquine injections should as a rule be avoided.

Respiratory infections

The sick child must drink and eat to prevent malnutrition. Antibiotics should not be given in mild cases with slight fever and cough, but must be reserved for severe cases (penicillin or sulfonamides, preferably in combination, or tetracycline for 3 days). Long-acting penicillin injections are simplest since only one dose has to be given.

Tuberculosis

The disease must be treated for about one year, following the regimen used by the national tuberculosis programme. Do not initiate treatment unless it can be maintained for at least 6 months. The exception to this is in the case of severe PEM, since children who fail to respond to treatment with food for no apparent reason (e.g , diarrhoea, measles, etc.) may be suffering from tuberculosis, even though there are no clinical signs of the disease. The commencement of tuberculosis therapy may produce a rapid and dramatic nutritional improvement.

Cholera

Cholera causes sudden, severe diarrhoea with frequent watery stools. The treatment consists of correcting the dehydration; use the fluid described above, giving 50–70 ml/kg during the first hour and the same quantity during the next 3 hours. Patients who are severely dehydrated or cannot accept oral fluids must be rehydrated intravenously or through a nasogastric tube. Tetracycline may be given for three days.

Any suspected cases must be notified to the health authorities and, if possible, a sample of the stools (or a rectal swab) should be sent for laboratory examination. Strict quarantine is useless.

Scabies

The treatment consists in decrusting lesions with a 2 % copper sulfate solution and painting, under close supervision, all areas involved with DDT (10 %), BHC (2 %), or benzyl benzoate (20–25 %). Clothes should be boiled if possible and the whole family treated at the same time.

Worm infestations

Intestinal worms eat part of the child's food and contribute to malnutrition.

Two types of worm are particularly common.

1. *Ascaris (roundworms).* If the infestation is widespread, carry out mass treatment (all children) with piperazine citrate for 3 consecutive days

2. *Hookworms* If the infestation and anaemia are known to be common, give tetrachloroethylene, tiabendazole, or bephenium (safer but more expensive). If both hookworms and ascaris are present, treat first against ascariasis and then, on completion of the treatment, follow up with treatment for hookworm.

Immunization

Distributions of food to an otherwise scattered or nomadic population provide an excellent opportunity for improving the coverage of immunization campaigns.

Techniques

Doses and techniques differ with each vaccine and with each manufacturer. Follow the instructions of the manufacturer or the ministry of health

- The use of a *jet injector* (Ped-O-Jet) can greatly increase the speed of immunization (500–600 shots/hour) and prevents the transmission of viral hepatitis and/or tetanus.

The children must be organized into orderly queues The jet injector is most useful when several hundreds or thousands of children can be assembled for immunization at one session.

For each type of injection, a different nozzle is needed for the injector. Make sure that the appropriate nozzle is used before starting

The person using the injector must be trained to perform maintenance and small repairs (this training should take only one day)

- If *needles and syringes* are used, do not use the same needle (or syringe) for more than one person, unless it has been sterilized. Hepatitis can be spread in this way but does not develop until 2–4 months later. Boiling the material for a few minutes is *not* enough to kill the hepatitis virus When available, disposable plastic syringes are recommended

Measles immunization

Vaccination against measles (a disease closely associated with PEM) is highly effective in giving long-term protection.

However, measles vaccine is probably the most difficult vaccine to use under field conditions, since it is extremely sensitive to heat (room temperature) and to sunlight. One hour after reconstitution of the freeze-

dried vaccine, it can be almost completely inactivated without any visible change. In addition, it is rather expensive.

Mass campaigns are recommended *provided* a foolproof cold chain can be organized. This is usually possible in large refugee camps, but may be more difficult if the population is dispersed.

The vaccine must be:

— always kept cool (under 4°C, e.g., with ice) and protected from sunlight;

— reconstituted with *chilled* solvent and administered within one hour (destroy the partly used bottles at the end of the immunization session);

— administered *before* the seasonal outbreak of measles (do not vaccinate a camp or village because a severe outbreak has caused several deaths, since by then it is too late);

— administered to the age groups most likely to be victims of the next outbreak (where, for instance, measles usually affects children 2–3 years old, there is no point in immunizing those over 5 years old, most of whom will be naturally immunized);

— administered to severe cases of PEM before admission to a therapeutic feeding centre

DPT (diphtheria, pertussis [whooping cough], and tetanus) immunization

Diphtheria, whooping cough, and tetanus are serious childhood diseases. Neonatal tetanus (resulting from umbilical infection) and whooping cough contribute to the very high mortality in the first year of life. Outbreaks of whooping cough can be common in refugee camps. Two to three doses of DPT vaccine must be given at suitable intervals of time to obtain a useful level of protection. The immunization of expectant mothers against tetanus (after 6 months of pregnancy) has a protective effect against umbilical tetanus of the newborn.

BCG (tuberculosis)

A good and long-lasting (at least 10 years) protection is obtained when an effective vaccine is administered by intradermal injection (use non-leaking Mantoux syringes used for tuberculin testing).[1]

Vaccinate all groups at risk regardless of tuberculin status (positive or negative). No screening is necessary.

BCG vaccine is sensitive to heat and sunlight. Always store the freeze-dried vaccine in a cool, dark place. Use the reconstituted vaccine immediately and do not expose the bottle to direct sunlight.

[1] UNIPAC catalogue number 07 865 00

An ulcer develops at the site of BCG injection, resulting in a permanent scar The population should be warned in advance that this is normal.

TAB (typhoid and paratyphoid vaccine)

Mass immunization against typhoid fever is not recommended in nutritional emergencies.

Cholera vaccine

This vaccine is not very effective. *Emergency* mass immunization should be discouraged.

Sanitation

Good sanitation is a basic requirement in any camp, but one which is usually ignored.

Detailed procedures are described in: ASSAR, M. *Guide to sanitation in natural disasters.* Geneva, World Health Organization, 1971.

Water supplies

Quantity and quality are both very important.

	Average daily consumption
Clinics, field hospitals	40–60 litres per person
Feeding centres	20–30 litres per person
Camps	15–20 litres per person

Sources of water vary so widely in quality and type that it is difficult to lay down general rules, but:

— where a single exposed source is being used for drinking-water, protect it from contamination, e g , fence-in the area (radius 55 m) except at one point and employ a guard;

— where all available water is known to be contaminated it may be possible to provide clean drinking-water separately, e.g., brought in drums or by tanker from somewhere else;

— if it is likely that an emergency will continue for a long time, explore other solutions as soon as possible (piping, pumping and filtration equipment, bore holes or artesian wells)—discuss this with government or aid officials; funding and equipment may be available.

Water can be made safer by boiling it for 3–5 minutes or by chemical treatment. Chlorine and chlorine-liberating compounds are the most common disinfectants They are available in several forms.

— bleaching powder (25 % by weight of available chlorine when fresh), deteriorates quickly when stored in humid and warm places;
— calcium hypochlorite, more stable, contains 70 % by weight of available chlorine;
— sodium hypochlorite, usually sold as a solution of approximately 5 % strength;
— chlorine tablets.

The dose of chlorine must be carefully determined (for example: 50–100 mg of available chlorine per litre for 12 hours to disinfect wells and springs). Seek the advice of sanitation workers. When indiscriminately distributed to the population, the tablets are usually of very limited benefit and, if taken by mouth, can be dangerous.

Latrines

Latrines must be provided wherever large groups of people are living together. The most useful types are described below:

The shallow trench latrine is a trench dug with hand tools. The trench is 30 cm wide and 50–100 cm deep. The length depends on the number of users (3–3.5 m for every 100 people). The shallow trench lasts about 2–7 days, after which it is filled in and a new one is dug.

The deep trench latrine is intended for long-term camps (of several months' duration). The trench is 2–4 m deep and 75–90 cm wide. The length depends on the number of users (1 m for each place, 4–5 places for every 100 people). When digging deep trenches shoring is required, since trenches easily collapse. The top is covered by a fly-proof floor made of strong pieces of wood or bamboo, allowing a good (50 cm) overlap on each edge. The floor is plastered with mud leaving holes approximately 25 cm in diameter at intervals of a metre. Cover up with earth when the trench is filled to 30 cm below ground level.

The bore-hole latrine. Where the subsoil does not contain rocks, a hole (diameter 40 cm, depth 5–6 m) is made with the use of earth-augers. Plan one bore-hole for every 20 persons.

Septic tanks. Where trench latrines are impracticable (because of sandy or very wet soil), it may be necessary to provide drainage into septic tanks. There are normally gravity drained, and it is therefore necessary either to build an elevated platform for the latrines or to use suitably sloping terrain. Septic tanks are available in many countries at no great cost.[1] Installation is usually straightforward, but professional advice should be sought.

Wherever latrines are provided, they should be:

— easily accessible at night;
— cleaned at least daily (if necessary, full-time staff should be employed to do this, since people will not use filthy latrines);
— sited well away from sources of drinking-water (at least 30 m from any source and 1.5–3 m above the water table).

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[1] A complete prefabricated latrine and septic tank system (using butyl rubber tanks) is marketed by Oxfam, 24 Banbury Road, Oxford, England.

Washing facilities

If good water supplies are available, washing presents no problem. When the number of water points is limited, the provision of a special washing facility will save water and make the collection of water by individuals easier. Such a facility can easily be constructed with readily available materials, e.g., pierced drums for showers, etc.

If necessary and possible, provide facilities for boiling clothes—e.g., drums, firewood, and a changing and drying area for people with only a single set of clothing. Boiling clothes may be useful in the control of body lice (in combination with the use of insecticides, e.g., DDT, gamma BHC)[1] or of scabies (in combination with these insecticides or with the application of a tropical solution).

Sanitation as well as basic medical care and immunization are essential components of any relief programme to deal with nutritional emergencies.

[1] Widespread use of DDT and gamma BHC has led in some areas to the development of resistance to them by some insects—e.g., bedbugs, headlice, bodylice. Malathion and carbaryl are effective alternatives