CHAPTER 3

SPECIAL NUTRITIONAL NEEDS IN REFUGEE CAMPS: A CROSS-DISCIPLINARY APPROACH

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Introduction

Conflict due to international, civil or tribal war, ethnic or religious persecution or other oppression is the most common reason why people flee from their homes and become refugees. A refugee is defined as a person who, by reason of real or imagined danger from such conflict, has left their home country or country of their nationality and is unwilling or unable to return, although any definition of the term 'refugee' is debated (see Black 2001). According to the office of the United Nations High Commissioner for Refugees (UNHCR), at the end of 2012 the number of people forcibly displaced worldwide had reached 45.2 million and of these 10.5 million were under the mandate of the UNHCR (www.unhcr.org/about us/key-facts-and-figures.html). At the time that figure broke down into a global total of 15.4 million refugees, 28.8 million internally displaced persons and a further 840,000 waiting to be given refugee status (www.unhcr.org.uk/about-us/key-facts-and-figures.html). Whereas refugee populations fell during the 1990s and early 2000s, the number of refugees has recently been rising again, and the number of forcibly displaced persons in 2012 was the highest figure since 1994 (United Nations High Commissioner for Refugees 2013).

There has been a massive escalation of those fleeing the civil war in Syria in 2013. For example, the report of the UNHCR of February 2014 refers to more than 2.4 million Syrian refugees now residing in neighbouring countries, including 932,000 in Lebanon, 613,000 in Turkey, 574,000 in Jordan, 223,000 in Iraq and 134,000 in Egypt (www.unhcr.org/53072f4f6.html). The refugee situation in parts of Sub-Saharan Africa has reached crisis proportions, particularly in the Sahel, where tens of thousands have fled the conflicts in Mali and the Central African Republic during 2013. The situation in Darfur has also deteriorated considerably in the past two years, creating new flows of refugees into Chad. The internal conflict in South Sudan, which started in late 2013, has led to people moving across its borders into Kenya, Ethiopia, Uganda and north into Sudan. Many other refugee situations exist around the world. The challenges faced by international agencies in managing refugee populations are compounded by the fact that 46 percent of refugees now recorded are under eighteen years of age (www.unhcr.org.uk/about-us/key-facts-and-figures.html).

The feeding and care of refugees is a major undertaking of several United Nations (UN) agencies, which provide food, clothing and shelter, most frequently but not always, in camps. Such camps for refugees may be within or near a zone of conflict, but are not necessarily so. Usually they are over some political border, generally in another nation state. While legally the welfare of refugees is the responsibility of each host nation's government (Lorenzo 2007), the reality is that the majority of refugee camps worldwide are in marginal areas where host governments themselves have few funds and the camps depend on the international community for resourcing. Four fifths (80 percent) of the world's refugees are now hosted in developing countries (www.unhcr.org.uk/about-us/key-facts-and-figures.htm).

The Office of the UNHCR was established in December 1950 by the UN General Assembly. The agency is mandated 'to lead and co-ordinate international action to protect refugees and resolve refugee problems worldwide. Its primary purpose is to safeguard the rights and well-being of refugees. It strives to ensure that everyone can exercise the right to seek asylum and find safe refuge in another state, with the option to return home voluntarily, integrate locally or to resettle in a third country. It also has a mandate to help stateless people' (www.unhcr.org/pages/49c3646c2.html). However, it is recognised that multiple UN and other national and non-governmental agencies, in addition to the UNHCR, work to improve the health and nutrition of refugees. Finances regularly fall short of requirements. In some situations, the refugees are able to disperse into the host populations (Harrell-Bond 2000), but this essay concerns the nutritional sustenance of those living in the abnormal circumstances of the refugee camps. Too frequently individuals and families may stay in a refugee camp for a considerable period of time (Toole *et al.* 1988).

As there are geographic differences in the foods available in different economic and ecological situations, there is also geographic, ecological and economic diversity in the areas around refugee camps, which, for one reason or another, affects what food supplies reach the camps. This may be due to local availability or scarcity, locally peaceful conditions or conflict, or local diversion of the foods to private sales or use. As a consequence there is geographic diversity in the nutritional deficiencies and diseases, and Schofield and Mason (1996) argued that refugee rations should be calculated according to each specific context. Nevertheless, acute malnutrition and micronutrient deficiencies are common in most refugee camps (e.g., Seaman and Rivers 1989; Moren *et al.* 1990; Toole 1992; Mears and Young 1998; Mason 2002) especially in those in Africa and parts of Asia. For example, Kemmer *et al.* (2003) showed that iron deficiency was unacceptably high in refugee children from Burma; Malfait *et al.* (1993) identified niacin deficiency in Mozambican refugees in Malawi; Seal *et al.* (2005) demonstrated iron and vitamin A deficiency in long-term refugees in African camps, while as recently as 2010 Khatib *et al.* (2010) showed vitamin A deficiency, iron deficiency and anaemia in Iraqi refugees in a border camp in eastern Jordan.

In general, wherever they are, rations for refugee camps tend to be cereal-based and insufficient in both quality and quantity. In the majority of cases, a refugee diet is based on a cereal, some pulses, vegetable oil and some salt and sugar (Henry and Seaman 1992). Confined to a camp, refugees are rarely able to supplement their rations nutritionally by obtaining work or money to buy more food. Cultivation is seldom possible. Hence, refugees must survive on only these rations, which are insufficient, leading to outbreaks of diseases such as scurvy, pellagra, beri beri and vitamin A deficiency, as exemplified above. Harrell-Bond *et al.* (1989) drew attention to the importance of fortifying the rations for refugees, and Henry (1995) further defended the case for this.

Refugee Rations

Refugee rations, particularly in developing countries, are usually composed of food aid commodities. Twenty years ago, Tomkins and Henry (1992) described a typical daily refugee ration as made up of 400–500 g of cereal, 10–20 g of oil and a small quantity of beans or lentils (30–40 g) and maybe 5 g of sugar. Although there was some variation in these rations, they were, and too often still are, more or less deficient in a range of essential nutrients, including vitamin A, vitamin C, some B vitamins, iron and zinc.

Table 3.1 shows the average vitamin and iron content of a typical refugee ration in 1992 and compares it with an average pet food in a developed nation. The refugee ration was not only deplete of vitamin C and A, it was also low in riboflavin, niacin, and iron.

In this example, the only vitamin provided for the refugees at any physiologically acceptable level was thiamine, and even that would have been inadequate if the cereals were milled inappropriately or there was too long a delay in delivery. By contrast, the pet food was not only balanced but also had an excellent micronutrient composition.

Demonstrating this comparison with pet food in a developed nation made the point about refugee nutrition dramatically two decades ago, and, although attention has been given to improving the situation, inadequacies remain. The resulting ill health from vitamin deficiencies within a camp population living on refugee rations has been reported and observed in other studies (e.g., Toole and Waldman 1997; Mason 2002). Experimental studies of dietary

Table 3.1 Comparison of vitamin and iron content in refugee rations[a] and pet food[b]

Food Item	Quantity (g)	Thiamine (mg)	Riboflavin (mg)	Niacin (mg)	Folic acid (μg)	Vitamin C (mg)	Vitamin A (μg)	Iron (mg)
Refugee ration								
Wheat flour	400	1.28	0.08	8.0	40	0	0	6.8
Kidney beans	30	0.16	0.05	1.6	39	0	0	2.0
Vegetable oil	20	0	0	0	0	0	0	0
Sugar	5	0	0	0	0	0	0	0
Total	455	1.44	0.13	9.6	79	0	0	8.8
Pet food[c]	455	1.07	0.62	22.5	52	0	1090	44
RNI[d]		1.1	1.3	17	200	40	700	14.8

[a]Based on food consumption tables; [b]typical analytical values; [c]comparable quantity (on a dry weight basis; [d]reference nutrient intake per day (values for adults 19–50 years). Dietary reference values for food, energy, and nutrients for the UK (Report on Health and Social Subjects no. 41, HM Stationery Office, London, 1991).

Source: Tomkins and Henry (1992).

deprivations in otherwise healthy adults have also been carried out, but the ill-effects of micronutrient deficiencies would occur far more swiftly in refugees who tend already to be in a very poor nutritional state before reaching any camp.

Protein-Energy Malnutrition in Children

Many of the studies about malnutrition in refugee camps refer to adults. However, a particular problem afflicts children; even when rations are available, their access to food may be limited (Godfrey 1986). In addition to micronutrient deficiencies, many children are underweight in refugee camps due to poor access to food. The term protein-energy malnutrition (PEM) was first introduced in relation to children, because children's protein-energy requirements are relatively higher than those for adults. Olwedo *et al.* (2008) showed a high prevalence of PEM in children in refugee camps in northern Uganda. As mentioned below, public attention from the outside world may be directed towards the children with PEM, especially in extreme emergency situations, but quite often children are resident in refugee camps for a considerable period of time and yet far less attention is paid to malnutrition amongst them.

Indeed, in urgent emergency feeding programmes, protein-energy supplementation generally should be the first priority, but for longer-term residents in refugee camps micronutrient deficiencies as well as protein-energy deficiency cause health problems. Yet, it tends to be primarily the sickest children with severe PEM who are shown in television news reports of drastic hunger in zones of conflict. There are two extreme conditions of PEM: kwashiorkor and marasmus. In the early 1930s, Cicely Williams, the first professional paediatrician to be appointed to the British Colonial Medical Service, introduced the term 'kwashiorkor'. Kwashiorkor in the Ga language of Ghana means 'the disease of the displaced child', which referred to the child displaced from the breast when the next sibling was born, but can equally well refer to the refugee child. Marasmus is a condition of severe muscle and fat wasting. For either of these diseases, remedial action is urgent. However, for longer-term residence in refugee camps, it is important also to consider micronutrient deficiencies as these too cause health problems – and can be fatal (LaMont-Gregory *et al.* 1995).

World Health Organization Guidelines

The World Health Organization (WHO) has developed guidelines for managing severe malnutrition (1999). These guidelines, which, with some adaptation to local conditions, have been used to reduce case fatality rates, state:

> Management of the child with severe malnutrition is divided into three phases. These are:
>
> - *Initial treatment*: life-threatening problems are identified and treated in a hospital or a residential care facility, specific deficiencies are corrected, metabolic abnormalities are reversed and feeding is begun.
> - *Rehabilitation*: intensive feeding is given to recover most of the lost weight, emotional and physical stimulation are increased, the mother or carer is trained to continue care at home, and preparations are made for discharge of the child.
> - *Follow-up*: after discharge, the child and the child's family are followed up to prevent relapse and assure the continued physical, mental and emotional development of the child (World Health Organization 1999: 2).

Much of the early feeding regimes used in the second phase were based on liquid-based beverages made from skimmed milk powder, sugar, oil and water, but increasingly the response has been to fortify the foods with micronutrients

(Young 2004). Therefore, the preferred response of the agencies concerned with providing food for refugee camps has been to use such fortified foods. There have been several studies of the effects of fortifying foods to boost nutritional benefits. For example, Bilukha *et al.* (2011) investigated the effectiveness of adding micronutrient powder into the feed of infants, while van den Briel *et al.* (2007) summarised results from Afghanistan, Angola and Zambia and pointed out that much of the food delivered by the World Food Programme (WFP) was now fortified with iron, vitamin A and other micronutrients before being shipped. However, the authors provide several reasons why it would be preferable to mill and fortify the food as close as possible to the recipients rather than before being shipped. In the following year, Seal *et al.* (2008) studied the effects of providing vitamin-fortified maize, while in 2012 Tappis *et al.* concluded that the increase in supplementary feeding programmes in camps in Kenya and Tanzania had succeeded in preventing severe malnutrition and recommended that such programmes continue.

Some high energy, high protein drinks are now available to be used to supplement nutrition in refugee camps, but most of these come in powdered form, to be mixed with local water. The lack of potable water and the microbial proliferation likely in the marginal places where refugees are frequently encamped can result in contamination by the vectors of waterborne diseases, leading to diarrhoea, especially serious in already malnourished subjects and so negating the theoretical benefits of such supplements. Cronin *et al.* (2008) undertook a study of water and sanitation in refugee camps and found that in many camps the standard of water cleanliness was acceptable but not in all. The health significance of poor standards of hygiene thus becomes relevant to the value of any nutritional supplement to be mixed with the local water. Another problem of dried foods is that they are easily taken to local markets to be sold on rather than used for the purposes for which they were donated. However, Shepler (personal communication) explained that private onward sales of aid foods were not limited to dried foods.

Ready to Use Therapeutic Food (RUTF)

To overcome this problem some products called 'ready to use therapeutic foods' (RUTF) were developed as alternatives to liquid-based therapies. RUTFs are energy dense vitamin/mineral enriched foods that were originally designed to treat severe acute malnutrition. They require no cooking, water or fuel for heating. This has been an area of research for a number of years.

The idea of developing local, low cost RUTFs, rich in protein, energy-dense and suitable for feeding to young children and other vulnerable groups, arose in the early 1950s (Waterlow 2006). The simplest recipe for a RUTF is one which has only two ingredients, for example a cereal or root crop mixed with a legume. However, other foods must be added to this basic mix in order to prepare a multimix that is nutritionally suitable for the treatment of acute malnutrition (Collins and Henry 2004). A nutritionally suitable multimix for RUTF has four basic ingredients:

1. A staple (carbohydrate rich) as the main ingredient – preferably a cereal.
2. A protein supplement from a plant or animal food – beans, groundnuts, milk, meat, chicken, fish, eggs, etc. To be practical such foods must be low-cost, and this requirement has pushed development towards legumes and oilseed as these are cheaper than products containing milk or other animal products.
3. A vitamin and mineral supplement – a vegetable and/or fruit.
4. An energy supplement – fat, oil or sugar to increase the energy concentration of the mix.

In addition, an ideal RUTF formulation must have the following attributes:

- Good nutritional quality (i.e., protein, energy and micronutrient content)
- Long shelf life
- Highly palatable with a good taste
- A consistency and texture suitable for feeding to children
- Require no additional processing prior to feeding
- Amino acid complementation for maximum protein quality
- Product stability
- Ingredients should be easily available in developing countries

Technologically, RUTFs possess a number of advantages over other foods, making them an excellent food product for local production since they have a low water activity (A_w), which makes them microbiologically safe. Unlike products such as high energy biscuits, RUTFs do not require protection against damage during transport. Even if they are contaminated (e.g., by children's dirty fingers), microbes cannot grow in such low A_w, making RUTFs a 'safe' product. The product can also be stored at ambient temperatures without the need for refrigeration, and the three to four month shelf-life at tropical temperatures is sufficient for RUTFs to be delivered to likely places of need (Henry 1990; Collins and Henry 2004).

An RUTF is eaten directly without cooking, or the need to use water, or be diluted with potentially contaminated water. Each packet has a standard amount of food. Moreover, most children can feed themselves from the package requiring little or no help from their mothers. Provided peanuts or other oil rich legumes are available, the manufacturing process for RUTFs uses simple technology, and requires a relatively low investment in equipment and facilities. The inherent microbiological safety also means that the level of control needed during processing and distribution is less rigorous than for many other protein-rich foods. Local RUTF production also offers the opportunity to stimulate agricultural production and widens the benefits to farmers in surrounding communities.

Product Development

In recent research numerous cereal, legume and oilseed mixtures were evaluated by Henry and his team (Collins and Henry 2004) on the basis of the above criteria. In particular, efforts were made to combine the various cereal, legume and oilseed mixtures to maximise the protein quality, attempting to offset any essential amino acid deficiencies in one ingredient by combining it with another ingredient that was high in that particular amino acid. This process led to a list of thirteen products that had reasonable theoretical properties. Following numerous product development trials, the list was reduced to three potential alternatives. The foods were prepared from roasted or processed ingredients with total exclusion of water. They had low dietary bulk, low potential for bacterial contamination and were ready to eat without cooking. Similarly, the commodities chosen had the most appropriate energy density and high biological value of protein. Moreover, the proposed foods had an optimal physical characteristic of being soft in consistency, easy to swallow and suitable for infant feeding. An example of a suitable recipe is given below.

Rice–Sesame RUTF

Ingredients used are roasted rice flour, roasted sesame seed paste, Soyamin 90, sunflower oil, icing sugar, vitamin and mineral premix. The quantities of these ingredients are listed in Table 3.2. Table 3.3 provides an analysis of Rice–Sesame RUTF, and Table 3.4 shows the mineral analysis.

Table 3.2 Quantities of ingredients for the Rice–Sesame RUTF as quantities (%).

Ingredients	Quantities (%)
Roasted rice flour	20.0%
Soyamin90	8.0%
Roasted sesame seeds paste	29.0%
Sunflower oil	19.4%
Icing sugar	22.0%
Premix	1.6%
Total	**100.0%**

Table 3.3 Nutritional composition of Rice–Sesame RUTF per 100 g and percentage contribution to energy.

Nutrients	Data
Energy*	551 kcal
Energy	2307 kJ
Protein	13.8 g
Carbohydrate**	43 g
Fat	36 g
Ash	4.3 g
Moisture	2.9 g

* The energy has been calculated using Atwater factors.
** Carbohydrate is by difference assuming protein to be nitrogen (N) times 6.25.

Table 3.4 Mineral analysis for Rice–Sesame RUTF.

Mineral	mg/kg
Copper (Cu)	2.1
Zinc (Zn)	10.9
Calcium (Ca)	338.1
Sodium (Na)	256.5
Magnesium (Mg)	118.4
Iron (Fe)	5.6

Note: The water activity of Rice–Sesame RUTF is 0.290.

Future Developments

As mentioned, these new RUTFs can be eaten uncooked and have a low water content. This makes them suitable vehicles to deliver not only vitamins/antioxidants, but also probiotics and prebiotics.

The future challenge is to develop RUTFs using locally available staple cereals and legumes. This will enable low cost development of high energy-protein products with long shelf-life in localities at or close to where they are needed and will be used. This initiative will have a great impact on the treatment and management of malnutrition in the refugee camps in less developed countries.

Conclusion

The need for experts from different disciplines to cooperate on topics of common interest is demonstrated throughout this volume and in this example.

These formulations reflect research by specialist nutritionists working in a laboratory. Such laboratory-based studies need to be translated into what is appropriate in practice. Cross-disciplinary cooperation is necessary in order to add value to the work, through studies such as acceptability trials (Mears and Young 1998), local agricultural and production feasibility studies and research into the economic, social and political outcomes of any projects which finance local production of the ingredients of the most appropriate formulation for any given area. These are relevant issues for those involved in the provision of food for refugee camps. Local production of such foods will not only provide easier access and less time for deterioration, but, due to its lower cost, have wider appeal, with hopefully beneficial effects on the economy of the locality in which the camp is situated. These broader questions cannot be answered adequately in a nutrition laboratory, nor solely by the organisations running the refugee camps. In our view the questions to be answered would benefit from a holistic approach involving experts drawn from different disciplines interested in applied human science. To us, the study of humanity concerns many disciplines and sciences, all interested in understanding the human condition. So, in concordance with the ideals of the International Commission on the Anthropology of Food and Nutrition (ICAF) and of this volume, this topic about how to improve the nutritional status of refugees in camps exemplifies well the need for analysis by different specialists and cross-disciplinary cooperation and discussion.

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