IDPAS # 816

1. Rationale for food supplementation

The overall aim of a supplementary feeding programme (SFP) is to enhance not replace general rations. Supplementary feeding is meant to increase energy and nutrients that may be lacking in the habitual diet or rations provided to persons living in refugee settings. Supplementary feeding programmes can be divided into two categories, targeted SFP's and blanket SFP's. Targeted SFP's are designed to reach a specific group of vulnerable persons who meet selected criteria, such as pregnant women with anaemia or stunted children. Blanket SFP's are designed to prevent malnutrition within a larger group, and would for example include all children under five years of age or all pregnant women. The size of the population, severity of malnutrition and available resources should be taken into account when deciding which type of SFP to implement. In situations where therapeutic feeding centres for treating the severely malnourished have been established, a targeted SFP can be used to monitor and support rehabilitation of those discharged from this type of intensive care.

Food-based supplementation strategies can be employed either during periods of chronic or acute food shortage. Refugee populations often face acute problems at the beginning of resettlement, which can turn into chronic food supply problems depending on the duration of the conflict. In a persistent

micronutrient deficiencies and chronic malnutrition. In designing the beneficiary ration, expert assessment should reveal to what extent target beneficiaries can obtain adequate quantities of fresh fruits and vegetables from their own production or from the local market by purchase or barter. In the absence of these opportunities, however, rations should be adjusted by addressing fortification and supplementation strategies in order to meet specific micronutrient needs.

After deciding upon the beneficiary group for a SFP, programme planners must choose between on-site or take-home implementation strategies. An on-site supplementation approach requires beneficiaries to come to a central location once or twice a day and consume the supplement on the premises. A take-home approach allows for the supplement to be distributed to beneficiaries or their care-takers, on a weekly or two-weekly basis. There are advantages and weaknesses to both distribution strategies. On-site supplementation is advantageous for monitoring beneficiary compliance and limiting supplement sharing among other family members. The on-site approach is also required where home conditions do not allow for hygienic preparation of the supplement. Take-home supplementation is generally more acceptable to caretakers, as it involves much less transit time and a more flexible delivery at home.

> "Nutrient density
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> When choosing a vehicle for food supplementation for undernourished populations, the percent of dietary energy supplied by fat should be high and the food should be tailored to the developmental age of the recipients."

2. Types of foods used for supplementation

Typically, children under the age of two receive a type of blended food, which can be made into porridge by mixing the flour with boiled water. A blended food contains a mixture of ingredients, usually consisting of a type of cereal (wheat, rice, corn) mixed with an additional source of protein such as soy, pulses or milk powder. Oil and sugar are also commonly added to enhance the energy content. Most blended foods are fortified with extra vitamins and minerals and many are used as complementary foods. Examples of blended foods suitable for young children are Corn-Soy Blend (CSB) and UNIMIX. CSB is composed of corn, full fat soy flour and a vitamin and mineral mixture. Several new blended foods have recently come on the market, including UNILITO, a wheat, corn, soy blend made in Nepal and Famix, a corn, soy, sugar blend made in Ethiopia (WFP, 1999). As will be discussed in greater detail in the following section, the use of supplementary foods manufactured locally rather than imported,

> "Palatability
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> Enrichment of foods with minerals often reduces the palatability of the food. The food vehicle chosen should ideally have some unique flavour or other characteristic which can mask the mineral taste."

Older children and adults are able to eat a larger variety of foods, making it possible to provide a wider range of supplements for these groups. Drink mixes and high-energy biscuits have traditionally been used as supplementary foods for these populations. Pregnant and lactating women are often selected to receive additional take-home rations of blended foods, beans, oil, sugar or flour to cover their higher physiological requirements.

3. Technical aspects of food technology

Several components go into the formulation of a good vehicle to be used as a food supplement. Nutrient density, palatability, storage, preparation, cost, convenience and cultural acceptability should all be taken into account. Young children are the most common beneficiaries of SFP. The supplementary food provided must be nutritionally adequate as well as tailored towards the developmental stage of the child. To ensure that the supplementary food is consumed it must be palatable. With the preparation of porridges, these should be rich in energy and nutrients but low in bulk, as the stomach of the average one year-old baby can only hold 200 ml per meal.

Nutrient density

The energy, protein, fat and micronutrient composition of a supplementary food needs to be appropriately balanced and tailored to the specific nutrient deficiencies of the targeted beneficiary group. Current recommendations for refugee populations suggest 10-12% of the energy supplied by the supplementary food should be in the form of protein and 25-55% as a lipid, while specific vitamin and mineral contents are also essential (Golden, *et al.* 1995). Population dietary intolerance, such as gluten and lactose intolerance, should be identified and taken into account when selecting the ingredients for the supplementary food.

Palatability

The palatability of a supplementary food can be affected by its vitamin and mineral content. Generally, supplements fortified with higher levels of minerals are less palatable and risk not being well tolerated. The use of foods with a greater ability to mask the mineral taste of supplements is currently being tested. Developing palatable infant porridges is more difficult than food supplements for older age groups due to the limited range of foods suitable for feeding younger children. The palatability of the more

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Storage and preparation

Supplementary food programmes generally take place in refugee settings and other areas where environmental conditions are not optimal. Extreme temperatures, lack of refrigeration, unprotected storage facilities and a shortage of cooking fuel are aspects which must be considered in the delivery of a food supplement. The supplement must be able to withstand excessive heat without spoiling and be packaged so that it is protected from insects and rodents. Additionally, the supplement should not require much cooking, due to the lack of cooking fuel in these environments. Most blended foods are pre-cooked, having the advantage of being quickly prepared. Ideally, the supplement will be packaged as a single serving to avoid measurement errors in preparation.

Cost and acceptability

The type of food used is preferably a food traditionally consumed by the population and a locally grown crop. Reasons for this are twofold, involving issues of cost and cultural acceptability. Typically, food supplements are imported during periods of crisis, the high costs involved with the import of supplementary foods are initially supported by international aid organisations. However, the costs of importing supplements on a long-term basis is generally prohibitive, leading to abandonment of the programme altogether or the imposition of strict selection criteria. If the supplement provided is based on a food familiar to the population, it will be more readily accepted and less costly than one which is made of foreign ingredients.

Sustainability

An attempt should be made to introduce technologies that can be reproduced by the population. This provides an aspect of programme sustainability and reduces the cost of local production at both the community and national level. Over time, mothers can be taught how to prepare supplementary foods for their children using available ingredients rather than relying on external assistance. Governments and private businesses should be encouraged to produce supplements using locally available ingredients. Fortification of foods with micronutrients is an inexpensive and sustainable strategy to increase the nutritional adequacy of the diet of the poorest populations. However, its implementation requires a strong commitment from local governments, food industries and donor agencies who do not always perceive the economic benefits of this approach.

Clearly, the task of developing food supplements is not easy. Achieving a balance between palatability, nutritional adequacy and costs is challenging. The additional environmental and cultural constraints make the challenge even greater. Recently, a new supplementary food has been developed which merits discussion.

Food supplementation strategies have generally not been as effective as expected. The risk of bacterial contamination is often high, as many of the products promoted are milk based, require mixing with water or are stored in conditions which promote bacterial growth. When the water or utensils used for preparation of the supplement are not clean, bacterial pathogens can be introduced. When prepared food is stored unrefrigerated for long periods of time bacteria rapidly proliferate. For this reason, the practice of preparing large amounts of food and storing part of the prepared food for later consumption should be discouraged.

Often when there is a high risk of improper food preparation and storage, infants receiving the supplementary food are only provided the supplement at special feeding centres where food preparation, attendance and intake can be monitored. Controlled feeding centres are expensive to maintain, inconvenient for families and not practical for providing supplementation to large segments of the population. Recently, a new supplement with decreased potential for bacterial contamination that can be easily consumed at home has been introduced.

A highly nutrient-dense spread (HNDS) is being promoted as an alternative to the traditional cereal/soy based supplements used in treating malnourished populations. The HNDS provides moderately malnourished children adequate amounts of micronutrients in the form of an energy dense, high fat spread. The approach of using a spread to feed children was first tested on severely malnourished children admitted to a therapeutic feeding centre. Several advantages of spreads were noted during this preliminary trial and the spread has since been adapted for use in larger population settings (Briend, 1999).

HNDS is a blended spread made from peanut butter, vegetable oil and soy flour, fortified with vitamins and minerals. A by weight comparison of HNDS with blended flours typically used for supplementation is

The use of ready-to-eat individual servings of supplementary foods is a rapid and efficient means of delivering extra micronutrients to at-risk population groups. However, the costs of this type of delivery may be prohibitive for long-term supplementation.

Locally available ingredients should always be chosen over imported foods when designing a food supplement.

In refugee settings, a wide range of factors can influence the use and acceptability of supplementary foods including the familiarity, the perceived quality and resale value of the product, the access and relationship with markets, the quality of health and nutrition services and the level of donor commitment. The balance of influencing factors shifts with local circumstances, range of opportunities and prevailing preferences.

Adapting the supplementary food to local conditions will ensure an element of programme sustainability.

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and blended flours usually given in supplementary feeding programmes.

	Proteins	Carbohydrates	Lipids
Blended Foods	14	70	7
HNDS	11	18	57

From Briend (2001)

HNDS offer a new potential approach to delivering multiple micronutrients to high-risk groups. There are no major technological constraints for a local production of this fortified supplementary food. Feasibility of this approach is currently being tested.

presented in Table 1.

Energy density

HNDS has an energy dense high fat composition which seems to be ideal for growing children, while several of the blended food products are high protein, high fibre, low fat foods. A composition commonly recommended for obese persons needing to lose weight. These differences in composition translate into a much higher energy density for HNDS when compared to blended foods. HNDS has an energy density over 500 Kcals/100 g while blended foods only provide 100 Kcals/100 g after the addition of water.

Bacteriological safety

HNDS has several physical properties that make it suitable for use in sub-optimal conditions. The low water content in HNDS prohibits the growth of bacteria and infestation by insects. During storage flour based products often become infested with insects, this does not occur with HNDS. Secondly, the high viscosity of HNDS prohibits sedimentation of mineral salts, a common problem in liquid–based supplements.

Palatability

Palatability of the supplement designed for the treatment of severe malnutrition was found to be as good or better than that of the World Health Organisation F100 milk-based supplement (Briend, 1999). This is believed to be due primarily to a preference for high energy density foods and, secondly, to the ability of the peanut butter spread to mask the unpleasant taste of some of the vitamins and minerals.

Convenience

Perhaps the greatest advantage of HNDS is the fact that it comes ready-to-eat with no preparation required. There is no need for cooking fuel nor water and no mixing of ingredients or utensils is required for feeding. In addition, groundnut-based supplement is a very appropriate food vehicle for many parts of Africa where groundnuts are a traditional food source. In areas where groundnuts are not a traditional food, a similar fat based supplement could be used, such as hazelnuts, almonds, soybeans or cocoa.

Cost and sustainability

Supplementary food products with high fat content, like HNDS, are a new potential approach to delivering multiple micronutrients to high-risk groups. However, cost and sustainability are issues yet to be evaluated. HNDS offer in theory the possibility to lower the price of a balanced dietary ration. Recently, a linear programming analysis has shown the economic impact of two possible food aid programmes in Chad comparing two food supplements, a traditional blended flour and a nutrient dense spread (Briend, *et al.* 2001). The current production system of HNDS does not yet represent a sustainable option as the product is still new and must be imported. However, there are no major technological constraints for a local production of this supplementary food. At the present stage, this approach has not yet been explored, although its feasibility is currently being tested in an African context.

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lly given in supplementary feeding programmes.

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