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Ten Minutes to Learn About Nutrition Programming

Table of Contents

Volume 1

WFP United Nations World Food Programme

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Strategic Objectives:

1. Save lives and protect livelihoods in emergencies
3. Restore and rebuild lives and livelihoods in post-conflict, post-disaster or transition situations
4. Reduce chronic hunger and undernutrition

UNITED NATIONS WORLD FOOD PROGRAMME

Via Giulio Cesare Viola 68/70
00148 Rome, Italy
Phone: + 39-066513-2919
Fax: +39-066513-2873

Nutrition and HIV/AIDS Policy Division

David Stevenson
Steven Were Omamo
Martin Bloem
Saskia de Pee

Programme Design Division Nutrition, HIV/AIDS, Maternal and Child Health

Valerie Guarnieri
Al Kehler
Tina van den Briel

Private Donor Partnership Division

Monica Marshall
Marco Selva

Ten Minutes to Learn About...

Improving the Nutritional Quality of WFP's Food Basket –

An Overview of Nutrition Issues, Commodity Options and Programming Choices

Volume 1, Number 1 **October 2008**

To achieve the Millennium Development Goals, undernutrition needs to be addressed urgently and effectively. The development of ready-to-use therapeutic foods (RUTF) have revolutionized the treatment of severe acute malnutrition (severe wasting), and catalyzed the development of other food-based commodities for treating and preventing less severe as well as other forms of undernutrition.

For WFP, after having focused on ensuring that energy and protein needs are met and stepping up the fortification of processed commodities with micronutrients, the latest developments are directed toward meeting the nutritional needs of specific target groups. This includes children younger than two years of age, moderately malnourished individuals, pregnant and lactating women, populations suffering from micronutrient deficiencies, and the chronically ill (people suffering from HIV/AIDS and TB). To effectively prevent or treat the different forms of undernutrition among these groups, it is important that the underlying causes and consequences are understood, appropriate food commodities are selected, and realistic and effective programming options are developed.

This focus on better addressing the nutritional needs of specific target groups and the concurrent increase of the availability of specially-formulated foods mean that WFP will be in a better position to save even more lives, and do a better job in improving the growth, development, health and future well-being of its beneficiaries. This is also of utmost importance to WFP in achieving its Strategic Objectives. The choice of solutions increases in variety and complexity, with regard to both appropriate food commodities as well as programming approaches. New commodities and programming approaches should be used in combination with interventions that focus on water and sanitation, promotion of appropriate (breast)feeding practices, and preventive health services. This brief provides an overview of the current options and considerations, and is accompanied by briefs that look at each topic or category of commodities in greater detail (see **Box 1**).

1. Important target groups

Different groups within a population have different nutritional needs, depending on their age and physiological status (i.e. malnourished, chronically ill, and pregnant/lactating). The following main groups can be distinguished:

Box 1: Accompanying briefs with more detail per topic or commodity

No. 1. Improving the Nutrional Quality of WFP's Food Basket, this brief
No. 2. Why WFP Operations Should have a Strong Focus on Children Aged 0–24 Months
No. 3. Improving Existing Recommendations on Treatment of Moderate Malnutrition in Children Under 5
No. 4. Improving Corn Soya Blend and other Fortified Blended Foods, Why and How
No. 5. Ready-to-Use Foods (RUFs) and WFP's Approach to Treating and Preventing Malnutrition
No. 6. Micronutrient Powder for Home Fortification, also Known as MixMe™ or Sprinkles™

WFP/UNICEF Issue Brief. Increased Food Prices – Interventions required to prevent deterioration of health and nutritional status

a) Children younger than two years of age. The most important group to consider is children younger than two years of age because preventing undernutrition in this age group will benefit them, as well as society as a whole, for the rest of their lives. Stunting or chronic malnutrition due to poor fetal growth and poor growth during the first two years of life results in reduced mental development, leading to poorer school performance, and reduced adult income earning potential. It also leads to short adult stature and, in women, to low birth weight of their babies. Poor growth is the result of inadequate nutrition, i.e. insufficient intake of appropriate foods, frequent infections, and suboptimal caring practices. The first two years of life are most critical in this regard because nutrient needs are high due to rapid growth and frequent illness, and children's bodies need to adjust to the transition from frequent breastfeeding to fewer, largely plant-based, meals per day. Furthermore, it is difficult to catch up on poor growth and reduced mental development accumulated during early life unless circumstances (diet and environment) change drastically (see **Brief No. 2** for further information).

b) Moderately malnourished children. Moderate malnutrition encompasses two different conditions, wasting (acute malnutrition) and stunting (chronic malnutrition), both of which also present as underweight (low weight for age). In most populations, the greater proportion of underweight is due to stunting resulting from accumulated undernutrition and infections during the first few years of life. Wasting is also known as acute malnutrition because it generally results from weight loss due to illness or reduced food intake. Many wasted children also suffer from some degree of stunting. Moderately malnourished children have an increased risk of dying because of increased vulnerability to infections as well as the risk of developing severe acute malnutrition, which is immediately life threatening. WFP is partnering with other UN agencies, NGOs, and private sector groups, particulary DSM,[1] to enhance and expand its strategy and programming on this topic (for further details, see **Brief No. 3**)

c) The chronically ill, i.e. people suffering from TB and/or HIV/AIDS. For these individuals, medical treatment should be combined with good nutrition and the safeguarding of food security among themselves and their family mem-

[1] DSM is a Dutch Life and Materials Sciences Company that develops and produces nutritional, specialty food and pharmaceutical products, performance materials, polymer intermediates, and base chemicals and materials.

bers. In a broader framework, measures that mitigate poverty by ensuring food security in populations with a high prevalence of HIV infections may reduce the spread of the infection by reducing the likelihood of risk behaviour, such as sex work and transactional sex.

d) Micronutrient malnutrition among people of all ages. Micronutrient deficiencies are very widespread. Where few animal-source foods and fortified foods are consumed, micronutrient deficiencies can be assumed to be present, particularly among groups with high needs, such as young children, and pregnant and lactating women (see **Brief No. 6**). In these same populations, stunting is usually widely prevalent as well. Thus, different nutrition issues generally co-occur in the same populations and often in the same individuals because they originate from nutritionally inadequate diets that usually lack diversity.

e) Pregnant and lactating women. Pregnant and lactating women have higher nutritional needs because of the growth and development of the fetus, and to provide breast milk for their infant. Many women start pregnancy with a suboptimal nutritional status and therefore need nutritional support both for themselves as well as for their baby.

2. Commodities

Foods consumed should provide the nutrients required to prevent or recover from undernutrition for each of the above-mentioned target groups. For example, foods provided to children suffering from moderate acute malnutrition should provide nutrients required for growth of muscle, skeletal and skin tissue and fat mass, energy for physical activity, and adequate vitamins and minerals to allow for good health and mental development.

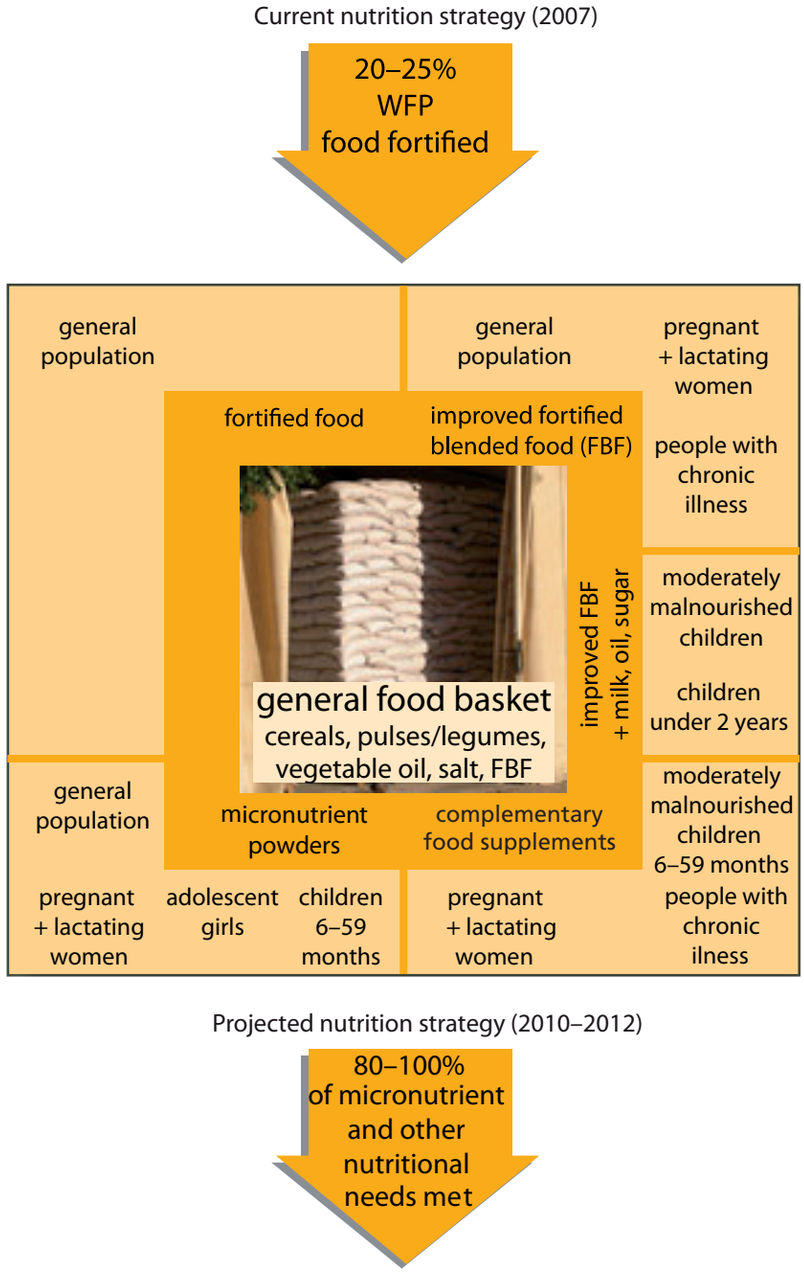
For the past 30 years, fortified blended foods (FBFs, such as Corn Soy Blend or Wheat Soy Blend) have been provided to any group with higher nutritional needs, such as the moderately malnourished, and pregnant and lactating women. It was also provided as a reasonably good source of micronutrients to the general population. The rationale for this was that its content of relatively good quality protein – due to the addition of soy, which has a very high protein quality value (i.e. soy contains all the essential amino acids in almost the right amounts) in addition to carbohydrates – and the fact that it was fortified with vitamins and minerals. Furthermore, it was affordable and its cost was not very much higher than the price of other commodities in the food basket.

However, selecting the right mix of foods to promote good growth and development is a complex matter because it involves translating nutrient needs to a diet consisting of a mix of foods, some of which are self-acquired and some of which could be provided through food assistance programs. Also, the choice of ingredients is critical as one food, for example soy can not easily replace another, such as milk. The difficulty is due to the fact that foods do not only contain nutrients (protein, vitamins, minerals, etc.), but also anti-nutrients (phytate, polyphenols, α-amylase inhibitors, etc.), that negatively impact di-

gestion and the utilization of food consumed. Thus, foods with a comparable protein profile, such as soy and milk, may still have very different growth and health promoting properties, due to their different content of specific nutrients, active compounds, and anti-nutrients. In the case of soy, using special soy protein isolates rather than flour prepared from whole soy reduces anti-nutrient content.

The commodities that are provided to prevent and treat undernutrition, including micronutrient deficiencies, therefore need to be revised in the light of the current better understanding of nutritional needs, specific properties of certain foods, and bioavailability of micronutrients. With this in mind, WFP is working on the following revisions of its food basket (see **Figure 1**):

Figure 1: Revisions being made to WFP's food basket



a) Improving FBFs, such as Corn Soy Blend (CSB) and Wheat Soy Blend (WSB), by improving the micronutrient profile and dehulling the soy beans (to reduce fiber content), as well as by assessing the possibility of adding some additional ingredients (milk powder, oil, and sugar) to this improved FBF during production, rather than as separate commodities, to increase the energy density for consumption by young (6–23 months) or malnourished children (for further information see **Brief No. 4**).

b) Continuation and expansion of food fortification for the general population as well as for specific target groups through

- fortification of staples (wheat and maize flours, potentially rice), oil and condiments (continuation of oil and salt fortification with vitamins A and D, and iodine, respectively):
- home- or point-of-use- fortification using micronutrient powder (MNP), such as MixMe™ and Sprinkles™, trademarked by DSM and the Sprinkles Global Health Initiative, respectively

c) Development, piloting and evaluation of the use of ready-to-use foods (RUFs) for treating moderate acute malnutrition. Interest is growing in the application of ready-to-use foods, such as pastes (derived from RUTF) and bars or compressed biscuits (providing ~500 kcal/d) for the treatment of moderate acute malnutrition among under-fives. Their distribution should be targeted, unless this is not feasible due to safety, accessibility, or health system capacity issues. These products replace FBFs. New products of a certain specification should only be used when there is good reason to expect that they have the same or a better impact on moderate acute malnutrition than FBFs[2], and their transportation, storage, distribution, and use is more convenient. Supplementary Plumpy™ is a good example of a product that is expected to be effective and can be used for the treatment of moderate acute malnutrition (see **Brief No. 5**).

d) Development, piloting and evaluation of complementary food supplements (CFS) to add essential nutrients to the daily diet or food ration of specific target groups. CFSs promote growth and immunity and address micronutrient deficiencies. They can be in powder or paste form, providing essential nutrients (high quality dairy or soy protein, essential amino acids, essential fatty acids), micronutrients (vitamins, minerals), and macro-minerals (calcium, potassium, phosphorus and magnesium) in a daily portion of 10–50 g, depending on the nutritional needs of the target population. CFSs should typically be provided through blanket distribution to under-twos, under-threes or under-fives in populations that consume a diet with very few animal-source and fortified foods. Where food insecurity is low but stunting prevalence is high, the CFSs should mainly be targeted at under-twos and just provide the essential nutrients (i.e. 10–20 g/d should be sufficient). Where food insecurity and the risk of malnutrition is high, the age group should be widened to all under-threes, and provide

[2] This statement was endorsed by the participants in a meeting on the treatment of moderate malnutrition organized by WHO, in collaboration with WFP, UNICEF and UNHCR, in Geneva, on 30 Sept – 3 Oct, 2008.

a larger amount of nutrients and energy (CFS of up to 50 g/d, ~250 kcal). Most CFS products are still under development or being tested for exact impact. Plumpy'Doz™, which is used for children at high risk of malnutrition during the lean season (46 g/d), and Nutributter™, TopNutri™ and MixMe Plus™ '(Nutributter™, TopNutri™ and MixMe Plus™ are trademarked by Nutriset, Compact and DSM, respectively), which are used for improving dietary quality, are examples of CFS products currently under development.

Potentially, the latter two categories of products could also be used among pregnant and lactating women, and the chronically ill (people suffering from TB and/or HIV/AIDS).

The improvements to currently-used food commodities, such as CSB, and the use of new commodities have cost implications. They result from the higher costs of the commodities themselves, and the additional programming requirements, such as training and the promotion of new foods. On the other hand, there may also be savings because the new commodities are only provided for the targeted individuals (an accompanying family ration, if provided, would consist of other cheaper foods, not the special commodity) and transportation, storage, and spoilage will be lower due to lower volumes and better packaging (for further information on costs of special food commodities, see **Appendix 2**).

3. Programmes, which commodities to choose?

Some of the commodities described above (see also **Appendix 1**) are widely available but in need of improvement (especially FBFs), others have proven to be very effective for alleviating micronutrient deficiencies (MNPs, such as MixMe™ and Sprinkles™). Others still, i.e. RUTFs, have become the preferred choice for treating severe acute malnutrition, due to which demand is currently higher than production capacity. The rest are still being developed and tested (most RUFs and CFSs).

Table 1 shows different kinds of programmes and the most appropriate product options. Most of the newer options are not yet available at large scale, and more information is required about their precise impact on nutritional status and health, especially in comparison to the long-used FBFs, and when used under programmatic circumstances. Therefore, their use in a few programs at a time is encouraged, and this should be combined with strong monitoring and evaluation with carefully controlled testing of impact performed concurrently (possibly in another location; see also commodities section above).

Table 1: Programmatic interventions for different target groups with various food commodities

Intervention	Purpose and target groups	Commodities and considerations
Blanket supplementary feeding (this is complementary to the family diet and/or the general food ration)	• To reduce high or increasing wasting prevalence (≥ 15%) in highly food-insecure and difficult to reach populations • To treat the most vulnerable of the population at high risk of developing undernutrition, such as young children (under-twos or under-threes), pregnant and lactating women, and the chronically ill (people suffering from TB and HIV/AIDS)	• Blanket supplementary feeding of all under-twos/threes is likely to be more effective to treat the population than targeted supplementary feeding of individual already-underweight under-fives • In certain situations, identifying and reaching individual moderately-malnourished children may not be possible. • Provide an RUF of 250 kcal/d, such as Plumpy'Doz™. RUFs that supply more energy, such as Supplementary Plumpy™ (500 kcal/d), should only be used for blanket feeding where targeting of individual malnourished children is impossible, and prevalence of moderate acute malnutrition very high • Alternatively, provide improved FBFs that also include additional dairy protein, oil, and sugar for under-twos (if necessary, the oil and sugar may be given separately) • Use standard FBF with sugar and oil (least preferred) • Add allowance for sharing (500–1000 kcal/d/family); when FBFs are provided, the take-home ration of FBF of 1000–1200 kcal/d allows for some sharing; when another, more expensive, specially-formulated food is provided, the family should preferably receive different foods (flour/pulses/oil) to address food insecurity and sharing
Targeted supplementary feeding	• Children under five years of age with moderate acute malnutrition or underweight • Vulnerable groups, such as people in HIV/AIDS or TB treatment programs	• A ready-to-use paste, compressed biscuit or bar, that provides 251–500 kcal/d, such as Supplementary Plumpy (500 kcal/d) • Improved FBF with dairy protein, oil and sugar • Standard FBF mixed with sugar and oil (least preferred) • Use of a new commodity should be combined with carefully conducted monitoring and evaluation, and concurrent testing of impact (may be in another location) • Add allowance for sharing (500–1000 kcal/d/family) (see above)
Dietary improvement – using complementary food supplements (CFSs) or specific high-quality foods for specific target groups	• Young children (< 5 yrs) • Pregnant and lactating women • Chronically ill All these groups would not meet their needs with general food fortification because their micronutrient needs are too high compared to the amounts of micronutrients that they can get from the consumption of foods that are fortified for the general population, such as wheat flour, cooking oil etc.	• These relatively new commodities for home-fortification of an individual's meal can be used where it is primarily dietary quality that is compromised, and should be used in combination with nutrition counseling • The appropriate age group for a 20 g (110 kcal/d) spread such as Nutributter™ is < 2 yrs because it contains nutrients that are particularly needed by this age group for their growth and development; powdered CFS (10–20 g/d) may be provided to a slightly wider target group, unless it specifically contains the nutrients most critical for under-twos; and MNP can be used by anyone with inadequate MN intake
Therapeutic feeding (note that this is not normally implemented by WFP)	Children with severe acute malnutrition (SAM)	• Provision of RUTFs to cases of SAM without complications (requires community-based management of SAM) • F100, F75, where RUTF is not available or in case of clinical complications • BP100
Food distribution for the general population, including adequately fortified foods	Entire family, for example, as in refugee or acute emergency situation as well as Food For Asset and Social Safety Net programmes	Suited to situations of extreme vulnerability where populations cannot provide for their own food needs. In order to meet the needs of specific target groups, commodities mentioned under 'dietary improvement' may be added

Appendix 1: Various food commodities available or required for addressing malnutrition problems among different age groups

Food commodities	Examples	For Whom? Children aged 6–23 mo	24–59 mo	Problem to be addressed	What will the commodity do?	Proven solution or under development
Ready to Use Therapeutic Food (RUTF) (note, WFP does not implement programs for SAM)	• Plumpy'Nut™	✓	✓	• Severe Acute Malnutrition (SAM)	Restore weight loss and immunity, stimulate growth and development	• Proven, effective and practical as it can be administered at home or in the community
	• BP 100	✓	✓	• Severe Acute Malnutrition (SAM)		• Proven • When RUTF is not available
	• Plumpy'Nut™ and BP100	✓	✓	• Moderate Acute Malnutrition (MAM)		Proven. Use smaller amount (90 g/d). But, cost-effective?
Therapeutic Milk (F75 and F100)	• F75 and F100	✓	✓	• Severe Acute Malnutrition (SAM)	Restore weight and immunity, stimulate growth and development	• Proven • For cases with clinical complications, or • When RUTF is not available • To be used only in clinical settings
Ready to Use Foods (RUFs)	• Supplementary Plumpy™ • Indian RUF	✓	✓	• Moderate Acute Malnutrition (wasted children)	Recover weight and immunity, stimulate growth and development	• Note that Indian RUF is still being developed and tested • Bars and compressed biscuits could also be developed for treating the moderately wasted
Fortified Complementary Food	• Porridge based on cereal(s), milk, sugar, oil, MNs	✓	✓ (✓)	• High risk of developing growth faltering and micronutrient deficiencies, especially when lacking animal-source and fortified foods • Faltered linear growth and micronutrient deficiencies in underweight children	For growth, immunity and development	• Many commercial examples exist, some including milk, some to be prepared with milk, largely for wealthier consumers. • Few non-commercial fortified porridges with milk exist
		✓	✓	• Moderate Acute Malnutrition (wasted children)		• Not proven for treatment
Fortified Blended Food (cereal + plant protein source + MNs)	• Corn Soy Blend • Wheat Soy Blend	(✓)	✓	• Moderate Acute Malnutrition (wasted children)	Gain weight and micronutrients	• Current specifications are inadequate. Revised specifications have improved content and bioavailability of micronutrients, and less fiber (see **Brief No. 4**) • For under-twos and children with moderate acute malnutrition, add milk, oil, and sugar to improved FBF during processing. This can be used at limited scale while impact compared to RUFs is being tested
		(✓)	✓	• Faltered linear growth and micronutrient deficiencies in underweight children, in case of food/nutrition insecurity	Provide energy, protein and micronutrients	

✓ good option for this age group

(✓) can be considered for this age group if no better option can be realized

Food Commodities	Examples	For Whom? Children aged 6–23 mo	24–59 mo	Problem to be addressed	What will the commodity do?	Proven solution or under development
Complementary Food Supplement (CFS)	• Lipid-based nutrient supplement (LNS), such as Nutributter™	✓		• High risk of growth faltering and micronutrient deficiencies, especially when lacking animal-source or fortified foods	Growth, development, immunity and preventing micronutrient deficiencies	• Being developed and tested • High-quality cost-effective CFS is needed • ~20 g/d is typically given in addition to (local) diet • LNS contains micronutrients, essential fatty acids (important for mental and motor development) macro-minerals (calcium, phosphorus, potassium, magnesium), and dairy protein (latter two are important for linear growth, i.e. height)
		✓		• Moderately stunted children	Increase linear growth and immunity, and address micronutrient deficiencies	
	Powdered Complementary Food Supplement,10–20 g/d (MNs, macro-minerals, protein/amino acids, enzymes) such as MixMe Plus™ and TopNutri™	✓	✓	• High risk of/existing growth faltering and micronutrient deficiencies, especially when lacking animal-source or fortified foods	Enhance growth, immunity and development and prevent micronutrient deficiencies	• Powdered supplement can have same composition as lipid-based supplement (LNS), except for relative amount of essential fatty acids, and powdered supplements that currently exist also do not include dairy protein
	• Plumpy Doz™ • Indian RUF	✓	✓	• High risk of developing micronutrient deficiencies, poor growth and diseases, in case of food insecurity or lean seasons	For growth, immunity and development	• Approx 50 g/d (250 kcal) is typically given in addition to (local) diet • Composition comparable to LNS but in larger amounts
Micronutrient-Powder (MNP), supplements, and dispersible tablets	• MixMe™ • Sprinkles™		✓	• Too high prevalence of micronutrient deficiencies (i.e. anemia prevalence in under-fives > 30%)	Treatment and prevention of micronutrient deficiencies	• Available formulations are used and effective • Specific formulation has been developed by WFP and DSM for malaria-endemic areas (first use will be in Kakuma, Kenya)
		✓		• High risk of developing micronutrient deficiencies, in case of (relative) food security, where prevalence of stunting among under fives is limited (< 20%)	Prevention of micronutrient deficiencies	• Where prevalence of stunting is higher (> 20%), a lipid-based CFS, such as Nutributter™, or a powdered CFS that provides a wider spectrum of essential nutrients (see above) will be better

✓ good option for this age group

Appendix 2: Improving the quality of the food basket – what do the new commodities cost?

Different commodities have been developed for improving the food basket for specific target groups (see **Ten Minutes to Learn About** briefs). The table below provides an estimate of the costs of some of the specific commodities, an indication of the target groups and the length of time that the products would need to be consumed, and an indication of the total costs of the product.

It should be noted that the different combinations of diet and additional food commodity are not interchangeable because they serve different purposes and different target groups; the estimates do not include programming costs, either for transport and distribution or for training and social marketing; and, the amounts recommended for consumption per day are per individual child, not including sharing with the family.

Thus, the information is intended to provide a rough idea of the costs of the diet/ration and special food commodities. Precise product costs should be enquired about when planning a program, details about target group, food commodities to be provided, and duration should be planned based on local circumstances, and costs of program implementation and transport and handling of the commodities will also need to be built in.

Table: Costs of specific commodities, per dose and per number of dosages required per year (to complement the daily diet) or per treatment

Commodities for improving dietary quality	Cost per daily dose (USD)	No. dosages required per year or per treatment	Total cost/yr or per treatment (USD)
MNP (minimum 15 MNs)	0.025 for single-dose packaging 0.0045 for multi-dose packaging (20 or more dosages per sachet, for example for schools)	180/yr for non-malaria areas 365/yr for malaria endemic areas (because it requires a formulation with lower amount of iron)	Non-malaria, individual dosing: 4.50 Non-malaria, group dosing: 0.81 Malaria area, individual dosing: 9.13 Malaria area, group dosing: 1.64
CFS - powdered (MNs + macro-minerals, proteins, enzymes) ≤ 10 g	0.045? for single-dose packaging and less for multi-dose jar/bag packaging	Depending on content, same as above	Cost approximately twice as high as above, but due to very limited experience with this kind of product, difficult to estimate
LNS, 20 g (MNs + macro-minerals, proteins, fatty acids)	0.11 (Nutributter™)	180 (daily from 6–11 mo of age) 365 (daily from 6–17 mo of age)	19.80 39.60 Note: Duration varies by population and prevalence of malnutrition
LNS, 45–50 g	0.20 (Plumpy'Doz™)/ 0.13 (Indian RUFC)	Approx. 120 (daily use for 4 mo/yr)	24.00 (Plumpy'Doz™)/ 15.60 (Indian RUFC)
LNS, 90 g	0.41 (Plumpy'Nut™)/ 0.33 (Supplementary Plumpy™/ 0.26 (Indian RUFC)	90 (daily dose, till recovered from moderate acute malnutrition)	36.90 (Plumpy'Nut™)/ 29.70 (Supplementary Plumpy™/ 23.40 (Indian RUFC)

Micronutrient Powder (MNP) for home-fortification or point-of-use fortification, i.e. adding 1 RNI of at least 15 vitamins and minerals to food that is ready for consumption. Can be targeted at any target group (underfives, school children, pregnant and lactating women, or entire population). Also known as MixMe™ or Sprinkles™.

Complementary Food Supplement (CFS, powdered, ≤ 10g). Examples of this product are TopNutri (from Compact, using soy protein as carrier) and MixMe Plus from DSM (malt flour as carrier). Neither have been tested for nutritional impact yet. In addition to micronutrients, these products also contain macro-minerals such as potassium, calcium, magnesium from which 100's of mg are needed, and high-quality protein (e.g. soy protein isolate), amino acids, and/or enzymes (e.g. malt, α-amylase) for reducing viscosity.

Lipid-based Nutrient Supplement (LNS) is also a complementary food supplement. It is lipid-based (i.e. a paste, often containing oil, peanut and protein source) and contains MNs, macro-minerals, high quality protein (milk powder, whey powder or soy protein isolates), essential fatty acids (e.g. from soy bean oil, canola oil), to be added to the daily diet to ensure that nutrient needs are met:

- Dosage of 20 g/d (~110 kcal) is regarded as complementary to basic diet of young children (6–23 mo);
- dosage of 45–50 g/d (~250 kcal) is regarded as required for blanket treatment of population (6–23 or 6–36 or 6–59 mo) in case of severe food insecurity/lean season to avoid deterioration to severe (acute) malnutrition;
- dosage of 90 g/d (~500 kcal) is used for treatment of moderate acutely malnourished (WHZ < -2 and ≥ -3) children.

Other forms of ready-to-use food, such as compressed biscuits/bars, can serve the same purpose as LNS. Note that Indian RUFC is still under development and it is therefore not yet known whether it is interchangeable with Plumpy'Doz or with Supplementary Plumpy or Plumpy Nut (i.e. LNS of 45 or 90 g/d, respectively).

Note that the cost of improved CSB with additional milk powder, oil and sugar (see **Brief No. 4**) has not been listed here because it is not being produced at scale yet (pending production trials) and it can either be provided as one product or it could be provided as CSB mixed with milk powder to which sugar and oil are added just before distribution.

For further information on this issue, please directly contact the authors:
nutrition@wfp.org

Joris van Hees
Saskia de Pee
Martin Bloem
Edith Heines
Pushpa Acharya
Tina van den Briel

WFP United Nations World Food Programme

Unlimited. DSM

Strategic Objectives:
1. Save lives and protect livelihoods in emergencies
4. Reduce chronic hunger and undernutrition

UNITED NATIONS WORLD FOOD PROGRAMME

Via Giulio Cesare Viola 68/70
00148 Rome, Italy
Phone: + 39-066513-2919
Fax: +39-066513-2873

Nutrition and HIV/AIDS Policy Division

David Stevenson
Steven Were Omamo
Martin Bloem
Saskia de Pee

Programme Design Division
Nutrition, HIV/AIDS, Maternal and Child Health

Valerie Guarnieri
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Marco Selva

Ten Minutes to Learn About...
Why WFP's Operations Should have a Strong Focus on Children Aged 0–24 Months:
the Window of Opportunity of Early Childhood

Volume 1, Number 2 **October 2008**

Chronic undernutrition resulting from poor fetal growth and reduced growth in the first two years of life amounts to a "life sentence" for 178 million children worldwide because it causes irreversible damage.[1,2] It also leads to substantial increases in under-five mortality and the overall global disease burden. Poor fetal growth and reduced growth during the first two years of life is the result of a combination of inadequate nutrient intake, high disease exposure, and poor caring practices. To achieve WFP's Strategic Objectives 1 and 4, focusing programs on the prevention and treatment of undernutrition during the first two years of life is essential. The reasons for this and how WFP could do this are outlined in this brief.

1. What are the consequences of childhood undernutrition?

Early undernutrition leads to reduced physical and mental development during young childhood, which subsequently affects school performance and attendance. Undernourished children are more likely to start school later and drop out earlier. This devastating impact on early development adversely affects their income earning potential for life, making it very difficult to rise out of poverty, as emphasized in the second article of the recent Lancet series on Child Undernutrition. In addition, undernourished children who put on weight rapidly at later stages of childhood and adolescence are more likely to develop chronic diseases (diabetes, hypertension and coronary heart disease) related to nutrition.[1,2] The long-term damage caused by early childhood undernutrition also includes shorter adult height and low birth weight babies born to women, which perpetuates the problem in the next generation.

2. How many children suffer the lifetime consequences of early childhood undernutrition?

Of the 556 million children under five years of age living in developing countries, 112 million (20.2%) are underweight and 178 million (32%) are stunted while 55 million (10%) are wasted, including 19 million (3.5%) who are severely wasted.[2] Since many of these are the same children, a conservative estimate is that at least 178 million undernourished under-fives survive beyond five years of age. In other words, every year, 35 million undernourished children (178 million over five years) reach school-going age and grow up without

reaching their full mental and physical potential. This has been the case for decades and, although the prevalence of undernutrition has declined globally, the number of adults suffering the long-term consequences of early childhood undernutrition is enormous and has major implications for societies as a whole. Failing to protect today's under-twos will therefore affect the societies in which they grow up for the next 60 years (see **Figure 1**).

3. How many children die because of undernutrition?

The number of preventable under-five deaths due to undernutrition is at least 3.5 million per year.[2] The responsible factors for these deaths include stunting, severe wasting, intra-uterine growth retardation, micronutrient deficiencies, and suboptimal breastfeeding.

4. What are the economic costs of chronic undernutrition?

It is clear that chronic undernutrition has very serious long-term consequences. In addition to the moral imperative to eradicate malnutrition and food insecurity as soon as possible, a recent report by WFP and the Economic Commission for Latin America and the Caribbean (ECLAC) highlights the high economic costs of inaction.[3] Martínez and Fernández used two methods to estimate the economic impact of child undernutrition in Central America and the Dominican Republic. The first, which they term the "incidental retrospective dimension," is a sum of the losses in a single given year due to child undernutrition. The measure sums the health care costs for the current under-five cohort, the cost of repeated grades in school-aged children previously impacted by undernutrition, and adult productivity losses in the given year due to the impact of their early childhood undernutrition on cognitive development or premature death. In 2004 alone, this dimension cost seven countries nearly $7 billion, or 6.4% of their entire Gross Domestic Product (GDP). The second measure, the "prospective dimension," projects future losses in health, education, and productivity for the cohort of children who are under-five in a given year. The 2004 under-five cohort would accrue nearly $2.3 billion in costs due to malnutrition over sixty-five years.

There are various forms of childhood malnutrition that cause productivity losses in adulthood associated with lower cognitive ability. Protein-energy malnutrition is associated with a 10% loss, iron deficiency anemia with a 4% loss, and iodine deficiency with a 10% loss in adult productivity. Childhood malnutrition also leads to productivity losses in manual labor.

5. Can early childhood damage caused by undernutrition be undone?

Much of the damage caused by early childhood undernutrition is irreversible, especially when the circumstances and diet with which the child grows up remain largely the same. Children born with low birth weight, for example, are at increased risk of chronic diseases (diabetes, hypertension and coronary

heart disease) later in life,[4] especially when they fail to grow well during the first two years of life and rapidly gain weight at any time later in life.[5] Also, physiologically, bones and tissues grow most during certain periods, particularly during the first two years of life and adolescence. When growth during these periods is limited due to a shortage of essential nutrients required for the formation of new tissues, shorter height will be the result, unless the diet is drastically improved. Similarly, for the brain to develop well, it needs nutrients and stimulation. When nutrients are lacking, or the child is constantly tired due to anemia or illness, the response to stimulation will be reduced and overall development hampered. Much remains to be learned about the exact physiological processes of growth, immunity, transmission of stimuli in the brain, etc., but evidence that damage brought about by early childhood undernutrition (including during fetal life) is largely irreversible is accumulating.

6. What has to be done?

Given that the damage is largely irreversible, it is essential that interventions and strategies focus on preventing undernutrition in the earliest phases of life – from conception (i.e. -9 months) to 24 months of age. This age-range is known as the 'window of opportunity' because preventing undernutrition during this period of life benefits children – and society – throughout their lifetime. **Figure 1** shows the impacts of undernutrition throughout the life cycle of current and future generations. Although most damage is done and should therefore be prevented from -9 to 24 months of age, children's vulnerability to morbidity and the risk of death remains high throughout their first five years of life, which is why many health and nutrition interventions focus on all under-fives.

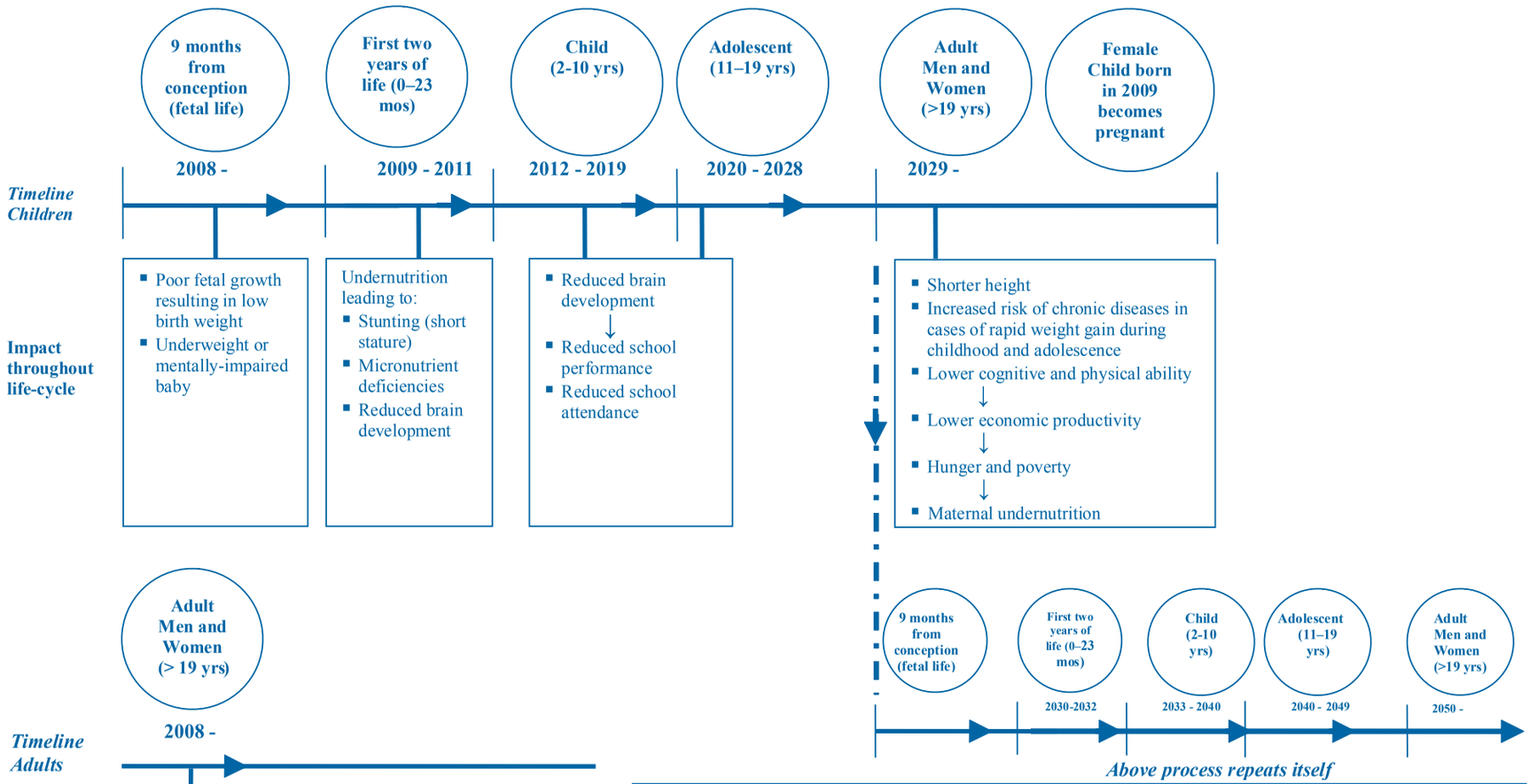
7. How do increased food prices affect undernutrition?

Maintaining sufficient energy intake at a higher cost, due to increased food prices, will result in less expensive and often less nutritious foods being consumed. This will increase the prevalence and severity of undernutrition, including stunting, micronutrient deficiencies, and wasting as well as increase the number of child and maternal deaths from undernutrition, thereby halting the progress made in several countries toward achieving the MDGs.[6] The nutritional consequences of increased food prices among young children will have long-lasting detrimental effects and should be prevented or corrected as soon as possible (see also the **Issue Brief on Increased Food Prices**).[7]

8. What are the benefits of preventing and treating undernutrition?

The prevention of maternal and child undernutrition is a long-term investment that will benefit the present generation and its children. It is very important to focus interventions on the prevention of stunting and micronutrient deficiencies, and the prevention and treatment of wasting (recent weight loss). It is also necessary to provide nutritional support to pregnant women to reduce the risk of giving birth to an underweight or mentally-impaired baby, or of dying

Figure 1: Impact of chronic undernutrition throughout the life cycle of current and subsequent generations



Rough estimated numbers for:

- Undernourished under-fives = **178 million**
- Undernourished under-fives reaching school age each year = **35 million**

- Future adolescents who were undernourished as under-fives: 35 million × 10 years = **350 million**
- Future mothers who were undernourished as under-fives: 45-50% × 35 million × 30 fertile years = **~ 500 million**
- Future children to be born to mothers who were undernourished as under-fives: 500 million × 2.6 children = **1.3 billion**

By preventing undernutrition among children aged 0-23 months, the projected numbers of school-age children, adolescents, and mothers suffering the consequences of being undernourished as a young child can be greatly reduced.

during child birth. In addition, nutritional support is required for mothers to adequately feed and care for their children (i.e. exclusive breastfeeding for the first six months of life, followed by appropriate complementary feeding).

Research has shown that men (aged 25–42 years) in Guatemala who received a nutritious supplement when they were 0–2 years of age earned higher hourly wages (on average 46% higher) than men who did not receive the supplement.[8,i] This indicates that investment in early childhood nutrition can drive economic growth for individuals as well as whole societies.

9. What are the costs of preventing and treating undernutrition?

The cost of preventing undernutrition is much lower than the costs of its consequences (see **Question 4**, above). For example, for $70–100 per child, a complementary food supplement, containing most of the essential nutrients typically lacking from a diet based on staple foods with few animal sources or fortified foods, can be provided every day between 6 and 18 months of age.[ii] The consumption of such a product every day should markedly improve growth and mental development, giving the child a far better start in life.

It is important to note that complementary food supplements should be used in addition to strategies that support exclusive breastfeeding for the first six months of life, and where local conditions make it difficult for many vulnerable children to get appropriate foods in the right amounts. The brief, "Ready-to-Use Foods," discusses the use of complementary food supplements in more detail.

10. What is WFP doing?

WFP is collaborating with DSM (a Dutch Life and Materials Sciences Company that develops and produces nutritional, specialty food, pharmaceutical, base chemical, and intermediate and end products), the Global Alliance for Improved Nutrition (GAIN), WHO, UNICEF, Médecins Sans Frontières (MSF), and UNHCR to develop new commodities and gain experience with their use to provide specific nutrients to children under two years of age in food-insecure situations in order to prevent and treat moderate forms of undernutrition. This collaboration between UN and nonprofit agencies and private sector partners

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[i] It should be noted that girls also received the supplement, together with the boys, but no differences in salary earned as an adult was observed, which may be related to differences in labor force participation and the work activities of the women as compared to the men.

[ii] The calculation is based on daily consumption of 46-50 g/d of a ready-to-use food, with a good micronutrient profile, between the ages of 6 and 18 or 23 months. At a cost of $4.40 per kg, consuming Plumpy Doz daily for 365 days costs 365 x 0.046 x 4.40 = $74. A ready-to-use food that is being developed by WFP in India costs $2.50 per kg, which results in a total cost of $46. Consumption of the above foods over 18 months (from 6 to 23 months of age) would cost $110 or $69, respectively. It should be noted that these foods, although theoretically of the right nutritional composition, are still being tested for their impact in preventing malnutrition. Therefore, this price estimate is indicative only.

includes working with ready-to-use supplementary foods; complementary food supplements; improved fortified blended foods with improved micronutrient profiles, fewer absorption inhibitors and additional ingredients, such as milk powder; and micronutrient powder for fortification at household level.

11. Conclusions

- Chronic undernutrition causes irreversible damage among millions of children between conception and 24 months of age, with devastating effects lasting throughout their lives. Increased food prices will further increase the number of undernourished children.
- The deaths of 3.5 million under-fives each year due to undernutrition can be prevented. Similarly, by tackling undernutrition among young children, the number of 35 million undernourished children reaching school-going age (five years old) each year can be markedly reduced, which is important for their own health and well being as well as for benefits to their societies in the medium to long term.
- Chronic undernutrition leads to lower adult productivity and, in turn, to enormous long-term economic costs to societies.
- It is critical to focus WFP programs on preventing and treating undernutrition in early childhood, and providing nutritional support to pregnant women and breastfeeding mothers.

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For further information on this issue, please directly contact the authors:
nutrition@wfp.org

Joris van Hees Edith Heines
Saskia de Pee Pushpa Acharya
Martin Bloem Tina van den Briel

Ten Minutes to Learn About...

Improving Existing Recommendations on Treatment of Moderate Malnutrition in Children Under 5

Volume 1, Number 3 October 2008

Informal Technical Consultation Organized by WHO in Collaboration with UNICEF, WFP and UNHCR, Geneva, 30 Sept – 3 Oct 2008

Millions of children are affected by moderate malnutrition (low weight-for-age), which puts them at an increased risk of death. Because of the large number of children affected by moderate malnutrition, it is associated with most nutrition-related child deaths. The existing guidelines on managing moderate malnutrition are in need of revision because they have not changed in the last 30 years while nutritional knowledge has evolved. In addition, there are currently few WHO recommendations specific to its treatment. WHO, in collaboration with UNICEF, WFP and UNHCR, organized a technical consultation to discuss recommendations for the dietary management of moderate malnutrition to improve current practices, as implemented by caretakers of affected children, and supported by any health care system or agency, including WFP, UNICEF, UNHCR, and MSF. This will contribute to achieving Millennium Development Goals (MDGs) 1 and 4, and is important for achieving WFP's Strategic Objectives 3, 4 and 5.

Moderate malnutrition

Moderate malnutrition is defined as weight-for-age below a level found in very few healthy children[1] in the reference population.[2] The weight levels of moderately malnourished children are below a cut-off of -2 Z-scores, that is below the level of 2.3% of children of the same age in the reference population. It is also referred to as 'underweight' and monitored through growth-monitoring programmes. Underweight children may be wasted, i.e. have a low weight relative to their height, or stunted, i.e. have a short stature for their age. In most populations, the greater proportion of underweight is due to stunting resulting from chronic undernutrition combined with infections during the first few years of life. Wasting is also known as acute malnutrition because it generally results from weight loss due to illness or reduced food intake. Thus, moderate malnutrition encompasses two different conditions: wasting and stunting (see **Box 2** for a further explanation on these conditions). Moderately malnourished

[1] Depending on the cut-off chosen, Z-scores, or percent of the median, less than 2–4% of the reference population of the same age would have a weight below this cut-off.

[2] As the reference population, WHO recommends the use of the recently released WHO growth standards.

Strategic Objectives:

3. Restore and rebuild lives and livelihoods in post-conflict, post-disaster or transition situations
4. Reduce chronic hunger and undernutrition
5. Strengthen the capacities of countries to reduce hunger, including through hand-over strategies and local purchase

UNITED NATIONS WORLD FOOD PROGRAMME

Via Giulio Cesare Viola 68/70
00148 Rome, Italy
Phone: + 39-066513-2919
Fax: +39-066513-2873

Nutrition and HIV/AIDS Policy Division

David Stevenson
Steven Were Omamo
Martin Bloem
Saskia de Pee

Programme Design Division
Nutrition, HIV/AIDS, Maternal and Child Health

Valerie Guarnieri
Al Kehler
Tina van den Briel

Private Donor Partnership Division

Monica Marshall
Marco Selva

children have an increased risk of dying because of their increased vulnerability to infections as well as the risk of developing severe acute malnutrition, which is immediately life threatening. Because of the large number of children affected by moderate malnutrition (i.e. 55 million wasted, 178 million stunted, 112 million underweight – many of whom are the same children), it is associated with more nutrition-related child deaths than severe acute malnutrition (i.e. 19.3 million children are severely wasted).[3] Thus, the management of moderate malnutrition should be a public health priority.

Focus of the technical consultation

The consultation was aimed at answering the question: "What diets should be recommended to feed moderately malnourished children?" The focus was on the management of moderate malnutrition in food-secure situations, where recommendations for dietary change in combination with a small supplement of essential (micro)nutrients would be most appropriate, and in food-insecure situations, where a larger portion of the daily diet may have to be provided in the form of foods specifically suited to treating moderate malnutrition. The consultation:

1. Examined the nutritional requirements of children with moderate malnutrition, both stunted and wasted children (see **Box 2**).
2. Reviewed current practices (recommended diets and food supplements) for the management of moderate malnutrition.
3. Drafted recommendations on the reformulation of currently recommended diets and food supplements to improve their efficacy.
4. Discussed the implications on messages and the size of food supplements best used for blanket or targeted approaches.
5. Identified avenues to explore for improving current programmes, including those based on dietary counseling, those based on food supplements, and those combining the two approaches, to be most effective in addressing moderate malnutrition.

Current knowledge on the nutrient needs of moderately malnourished children and implications for foods and ingredients consumed were reviewed and discussed. To ensure that the evidence base is built on all currently available information regarding the efficacy or effectiveness of different approaches and products, researchers, agencies and other participants were invited to provide information and present findings on current practices, conventional as well as new ones, to manage moderate malnutrition.

Follow-up to the consultation

Once work has been undertaken to address the most urgent knowledge and research gaps identified during this consultation with regard to nutrient and food needs for the management of moderate malnutrition, a follow-up forum will be organized to review the evidence on best strategies and programmatic approaches for implementing recommended dietary approaches and the use of appropriate products.

Importance of the consultation on moderate malnutrition to WFP

The technical consultation provided important guidance to WFP, other organizations (UNICEF, UNHCR, and NGOs), and governments operating in food-insecure situations on the composition of rations for supplementary feeding programmes that enroll moderately acute malnourished children as well as for blanket feeding of young children (under-twos and under-fives).

As the recommended diets, including food supplements, are quite different from the current widespread practice of providing fortified blended foods to moderate (acutely) malnourished children, implementing change will take time because of the need for other nutrients (taking into account demand, availability, and production capacity), increased costs (more expensive nutrients and production, packaging, and transport costs), and the required adjustment of programmes (selection criteria, providing an amount of the specially formulated food for the affected individual but not his/her family, information campaigns to explain about new commodities etc.).

WFP has already started the process of making changes to the food basket, as follows:

- Ongoing development of a ready-to-use food (Indian RUF) for young children by WFP's India Office.
- Piloting the use of recently developed ready-to-use foods for the treatment of moderate malnutrition in selected operations (i.e. Ethiopia, Somalia, and Myanmar). This includes Plumpy'Doz™ and Supplementary Plumpy™ from Nutriset as well as the Indian RUF.
- Modifying specifications for fortified blended foods for general use to be a better source of micronutrients (especially better micronutrient specifications and less fibre to increase mineral bioavailability).
- Developing a fortified blended food for young children that has higher energy content (from fat and, to some degree, sugar), contains dried skimmed milk, and also has the improved micronutrient profile (see above).
- Using micronutrient powder for home-fortification of meals of specific target groups, such as young children and pregnant women, or of families, to ensure that micronutrient needs are met (started in Nepal, Bangladesh, Kenya, and expansion planned).

WFP uses a double-track approach for the development and use of new or modified foods for young children. New foods are developed in line with current scientific knowledge and hypotheses, with regard to the treatment or prevention of different kinds of malnutrition. These foods will be used in selected operations where they are distributed in place of foods of nutritionally less adequate composition, and where their distribution, acceptance and impact can be adequately evaluated. Simultaneously, testing of the impact of the products on growth (weight as well as length or height), morbidity, and micronutrient status will be conducted under carefully controlled circumstances, and in comparison to both the long-used but suboptimal standard and the supposedly best – but maybe not the most cost-effective – solution.

WFP is able to engage in these discussions and activities with the support of scientific (international universities as well as individual scientists), public (UN agencies), NGOs (MSF, GAIN) and similar agencies as well as private sector (DSM, Kemin Industries, Unilever) partners.

Two specific issues discussed at the meeting are highlighted below in **Box 1** (note that the meeting will be reported on separately and much more extensively).

Box 1: Two specific issues that were discussed at the meeting on moderate malnutrition

1. Blanket feeding can serve two purposes under different circumstances:

    a. Where malnutrition prevalence is high (global acute malnutrition ≥ 15% and stunting > 30%) and the population is difficult to reach due to logistical or security problems, or the health infrastructure is very weak, blanket distribution of a supplementary food for a specific age group (under-twos, -threes or -fives) can be implemented to reduce malnutrition levels.
    b. Because stunting results from the failure to meet nutritional needs over an extended period of time, particularly the first two years of life, and is widely prevalent, the best approach is to provide all children in the critical age group (under-twos) that are at high risk of becoming stunted (as indicated by stunting prevalence among children aged 24–59 months) with nutrients that their existing diets do not adequately provide. Blanket distribution of a complementary food supplement (CFS) would best serve this purpose.

2. Use of new food commodities for treating (or preventing) moderate acute malnutrition. At present, there are few tested foods that are 'perfect' for treating moderate acutely malnourished children, i.e. FBFs are widely used but do not sufficiently meet the needs of these children, and RUTFs work well but current supplies are not even enough to treat the severe acutely malnourished children, and the products are costly. Therefore, new foods are being developed. With regard to their use, the following statement was accepted by the meeting:

When there is good reason to believe that use of a new commodity has at least equal impact compared to the currently used product (often FBF), and can be regarded as safe, it can be used at limited scale in programmes for young (moderately malnourished) children with good programme monitoring and evaluation, while impact is also assessed under carefully controlled circumstances (not necessarily in the same area or country).

Products for which there is "good reason to believe":

i. Nutrient density in combination with family food and breast milk is consistent with adequate nutrient intake for malnourished children
ii. Ingredients, fortificants and hygiene criteria are in accordance with Codex standards and guidelines
iii. Production and packaging are in accordance with the Codex, with appropriate quality control and quality assurance in place

Box 2: Stunting and wasting

Stunting

Stunting, or short stature, develops during the first two years of life although the process begins prenatally, with children born with low birth weight being at greater risk of stunting.

Stunting is better prevented than treated and interventions should therefore focus on increasing linear growth (i.e. becoming taller through the growth of skeletal and related tissues, such as muscles) during the first two years of life.

Linear growth will be accompanied by an increase of weight, which is largely on account of lean tissue, i.e. bones, muscles and skin, and to a lesser extent, adipose tissue (fat). However, additional or surplus weight gain will largely be in the form of fat. In fact, stunted children older than two years of age are at increased risk of obesity and chronic disease when they put on weight in excess of the weight that accompanies their length gain. Thus, length gain accompanied by appropriate weight gain should be the goal among young children.

Linear growth requires a balanced intake of a great variety of nutrients in adequate amounts. Without this, growth will be suboptimal. Laying down fat does not require the same variety of nutrients. This also means that one can be overweight but not adequately nourished.

Wasting

Children who are moderately wasted (low weight for height, or low mid-upper arm circumference, or MUAC) need to lay down more of all body tissues, including fat, and therefore have somewhat different nutrient needs from stunted children.

For these children, weight gain is an appropriate goal as long as it is on the account of all tissues, i.e. enabled by the right mix of energy and specific nutrients, which should then also lead to restoration of normal body functions and immunity. Ready-to-use therapeutic foods (RUTF) and F-100 consist of the right nutrient mix for appropriate recovery of severely wasted children. The question now is: What is the most appropriate nutrient mix for treating moderate acute malnutrition and which combination of foods can provide these?

Different mix of nutrients needed

It is exactly the available evidence about nutrients that are required for linear growth, healthy development and recovery from wasting that were discussed during the consultation on moderate malnutrition. Based on these, recommendations for the most appropriate foods are being formulated, which should then be tested for their impact on treating, and preventing, moderate malnutrition.

[3] Black RE, Allen LH, Bhutta ZA, Caulfield LE, de Onis M, Ezzati M, Mathers C, Rivera J. Maternal and child undernutrition:global and regional exposures and health consequences. The Lancet 2008;371:243–260.

For further information on this issue, please directly contact the authors: nutrition@wfp.org

Joris van Hees
Saskia de Pee
Martin Bloem
Edith Heines
Pushpa Acharya
Tina van den Briel

WFP United Nations World Food Programme

Unlimited. DSM

Strategic Objectives:

1. Save lives and protect livelihoods in emergencies
3. Restore and rebuild lives and livelihoods in post-conflict, post-disaster or transition situations
4. Reduce chronic hunger and undernutrition

UNITED NATIONS WORLD FOOD PROGRAMME

Via Giulio Cesare Viola 68/70
00148 Rome, Italy
Phone: + 39-066513-2919
Fax: +39-066513-2873

Nutrition and HIV/AIDS Policy Division

David Stevenson
Steven Were Omamo
Martin Bloem
Saskia de Pee

Programme Design Division Nutrition, HIV/AIDS, Maternal and Child Health

Valerie Guarnieri
Al Kehler
Tina van den Briel

Private Donor Partnership Division

Monica Marshall
Marco Selva

Ten Minutes to Learn About...

Improving Corn Soy Blend and other Fortified Blended Foods, Why and How

Volume 1, Number 4 **October 2008**

Corn Soy Blend (CSB) and other fortified blended foods (FBFs), such as wheat soy blend, have long been used in food assistance programmes as a 'one-size-fits-all' solution to prevent and address nutritional deficiencies. As a relatively low-cost product with good micronutrient and protein content, CSB has been the mainstay of WFP's Supplementary Feeding and Mother and Child Health (MCH) programmes and is often the main commodity WFP uses to provide extra micronutrients (vitamins and minerals) to complement the general ration. However, in order to achieve WFP's Strategic Objectives 1, 3 and 4, it is important that FBFs are modified to better meet the needs of different target groups.

The composition of CSB and other FBFs has remained largely unchanged for 30 years, despite increased knowledge on how to best meet the nutritional needs of young children and on factors affecting the absorption of vitamins and minerals. The demonstrated effectiveness of ready-to-use therapeutic foods (RUTF), such as Plumpy'Nut™, for the treatment of children with *severe* acute malnutrition has triggered renewed interest in finding better solutions for the treatment and prevention of *moderate* acute and chronic malnutrition (wasting and stunting, respectively) as well as micronutrient deficiencies. It is clear that a one-size-fits-all approach for addressing the nutritional needs of all population sub-groups should no longer be applied.

CSB, as currently used, is not ideal for treating moderate malnutrition among young children because it contains too little of the essential nutrients they require for growth and has a relatively high content of anti-nutrients that limit the absorption of essential micronutrients. Furthermore, CSB needs to be improved to better cover any micronutrient gaps in the food basket when given to a general population to provide micronutrients and protein.

This brief discusses the reasons why CSB and other FBFs should be improved, for which target groups, and how WFP has started doing that.

1. What is the nutritional value of the current form of CSB that is being used?

CSB is a fortified blended food that consists of corn or maize (75–80%) and soybeans (20–25%), which have been milled, blended, pre-cooked by extrusi-

on or roasting, and fortified with a premix of vitamins and minerals. Per 100 g serving, CSB provides approximately 380 kcals, 15 g protein, and approximately two-thirds of a young child's daily requirement of several micronutrients (see **Table 1**).

The micronutrient content is an important aspect of CSB because in many food-insecure situations where WFP operates, local diets lack sufficient micronutrients. Furthermore, a recent study by WFP and the Global Alliance for Improved Nutrition (GAIN) found that only 20–25% of all food aid (not limited to that provided by WFP) is fortified, including CSB. In WFP's food rations, CSB is currently the most important source of micronutrients, which are critical to the life-saving objectives of WFP's operations.

2. How is CSB used in WFP's programmes?

Often, CSB is included in both the general ration (as the primary source of micronutrients) and as the main component of blanket as well as targeted supplementary feeding programmes for young children and pregnant and lactating women. For supplementary feeding of moderately malnourished children (usually moderately wasted as well as underweight or stunted), CSB is often mixed or provided together with oil and sugar (e. g., 200 g CSB : 20 g oil : 20 g sugar) to increase energy density and palatability.

3. Why is CSB not ideal for moderately malnourished children and children under two years old?

The nutritional composition of CSB is not ideal for meeting the high nutritional needs of growth in young children – in terms of both macro- and micronutrients – especially children younger than two years of age or those who are moderately malnourished (see below for proposed modifications). Furthermore, when prepared as porridge, it often becomes too diluted, resulting in a very limited actual intake of essential macro- and micronutrients.

4. What are the strengths of CSB?

CSB provides a good mix of plant proteins (amino acids) and micronutrients at a relatively low cost. Furthermore, because CSB is pre-cooked and distributed as flour, it requires limited cooking time (~10 min). The technology to produce CSB is relatively simple, which has enabled local production around the world. While the product was originally developed in the USA, FBFs are now purchased by WFP from North Korea (which produces blends that also contain milk besides corn and soy, rice or wheat), Bangladesh, El Salvador, Ethiopia (Famix), India (Indiamix), Kenya, Laos, Madagascar, Malawi (Likuni Phala), Nepal (Nutrimix, Unilito), Zambia, Nicaragua, Senegal and Uganda.

5. Which aspects of CSB should be improved?

Although CSB is the main source of micronutrients provided to food assistance beneficiaries, it will be a better source when more micronutrients are included and their bioavailability (or extent to which the nutrients are absorbed by the body) is improved. The high phytate content, which is related to its fibre content, substantially limits mineral bioavailability, which particularly affects iron and zinc absorption. Hence, CSB does little to reduce or prevent anemia and strengthen the immune system.

6. What changes will be made to CSB that will be included in the general ration?

In order to address some of the issues mentioned above, and to be more in line with US Department of Agriculture (USDA) specifications, the WFP specifications for CSB will be changed as follows[1]:

a. **Micronutrient specifications will be improved** to include more micronutrients, in more appropriate amounts, and in the best chemical forms, with increased bioavailability. **Table 1** shows the old and the new micronutrient specifications.
b. In order to **decrease fibre and phytate content,** soy beans need to be blended and will have to be dehulled (i.e. removing of the outer layer of the kernel). While degerming and dehulling the maize would make even more difference, this is practically very difficult because of the large product losses (~25%) and, hence, costs. Dehulling soy beans, even when it constitutes no more than a quarter of the end product and less of the fibre content, will also reduce the content of contaminants. This is in line with the specifications for CSB used as animal feed.
c. The **maximum allowable aflatoxin levels will be reduced** to those set for ready-to-use therapeutic foods (RUTFs, such as Plumpy'Nut™), i.e. 5 ppb.[2]
d. The **maximum limits for microbiological contamination will be tightened** and include more species (see **Table 2**).[1]
e. **Limits for heavy metal contamination that have been introduced to** comply with CODEX STAN 193–195 (Food Chemical Codex for food industry) – which is especially relevant for lead and cadmium – will be randomly checked.
f. **The urease index will be reduced to a maximum of < 0.10 pH units** as it reflects proper heating of the soy, which is important for protein digestibility.

It should be noted that some of the adjustments are particularly important for young children. Although it is stated above that there are better foods for this age group, for the foreseeable future, many young children will still receive CSB. The product should therefore, as far as possible with the specific ingredients, also be suitable for consumption by this age group. It should be further

[1] USAID is also working on the revision of its food basket, including CSB.
[2] These requirements will be introduced gradually, in collaboration with producers.

noted that improved CSB is also intended for pregnant and lactating women, and for chronically ill people.

7. What is the cost of the improved CSB?

The cost of CSB is currently around US$550 per MT. With the dehulling of the soy beans, better cooking to reduce the urease index, and an improved micronutrient premix, the price is expected to increase by ~US$100, resulting in a cost of ~US$650 per MT. This cost estimate applies to the one-third of producers that are able to implement the modifications immediately. Other producers may take more time and possibly incur extra expenses.

8. What changes can be made to CSB for use by children under two years old or moderately malnourished children – the development of CSB plus milk?

Adding milk. An important food needed by young, growing children, especially when malnourished or younger than two years of age, is milk (including breastmilk), not only because of the protein content but also because specific peptides (components of proteins) seem to have a positive impact on the immune and digestive systems. Thus, in order to further increase the nutritional value of CSB, milk powder may need to be added for specific groups of children in addition to the improvements made for general use.

Developing CSB plus milk. Since the CSB that is presently provided to beneficiaries is often given together with additional oil and sugar to increase energy density and palatability, the feasibility of producing a 'special CSB' with all three additional ingredients already included is currently being piloted by WFP at a production facility in Laos. Pilot production and tests of shelf-life will guide the final product specification, which can then be tested in the field (see below).

Biological impact to be assessed. Although such a product (CSB with milk powder, oil, and sugar) would be superior to the CSB currently used for these target groups, it would still have a relatively high level of anti-nutrients and fiber. Therefore, the impact of this special CSB on the growth, morbidity and micronutrient status of moderately malnourished or children under two years of age needs to be compared to that of specially-formulated foods, such as ready-to-use pastes that are derived from RUTFs (see **Brief No. 5**). The cost-effectiveness of the different products should also be taken into account.

Current programs. For supplementary feeding programs, some new products (ready-to-use foods or special CSB) can be used, all of which are of better nutritional quality than the currently-used CSB with additional oil and sugar. However, because they are new and tests are ongoing, their distribution, acceptability and impact should be carefully monitored. Meanwhile, studies are being conducted under controlled circumstances, to assess the impact of the

special CSB and specific ready-to-use foods on moderate malnutrition and the growth of young children.[3] WFP is involved in some of these studies.

9. With whom is WFP working on these improvements?

WFP is working with several partners on improving the items in the food basket, including CSB. This includes DSM (a large producer of vitamins and minerals with which WFP has executed a partnership agreement), GAIN, Johns Hopkins University, the Friedman School of Nutrition Science and Policy at Tufts University, ETH Zurich, UNICEF, WHO, and Unilever.

Summary

There is growing consensus that the current composition of CSB is not ideal for children under two years old and moderately malnourished children. There is an urgent need to develop new, affordable, and *effective* products to address malnutrition among children in this age group. WFP is working with other UN agencies, NGOs and the private sector to create these products, and some programs can already start to use such new products (ready-to-use foods or special CSB) when accompanied by appropriate monitoring and evaluation. Furthermore, the CSB for general use, including use by pregnant and lactating women and the chronically ill, is being improved to become a better source of bioavailable micronutrients. Producers that can produce CSB according to the new specifications should be required to do so while steps to be taken by other producers need to be identified.

Toolbox

WFP is developing a 'toolbox' of commodities to be able to respond appropriately to malnutrition in different contexts and in different forms. In addition to improved CSB, products and strategies currently being developed include micronutrient powder for 'home fortification' (also known as MixMe™ or Sprinkles™), ready-to-use supplementary foods (similar to RUTFs, such as Plumpy Nut™, but for moderate acute malnutrition, which requires less food and is therefore less expensive than RUTFs), blended foods produced with milk protein, and staple food fortification.

[3] Special commodities are needed for the treatment of severe acute malnutrition, i.e. RUTFs or therapeutic milk. Cases with complications also require medical stabilization. None of the modifications of CSB described here is appropriate to treat this type of malnutrition.

Table 1: Comparison of old and new specifications for the micronutrient content of CSB and other FBFs

Micronutrient	**Old** (per 100 g flour)	**New** (per 100 g flour)
Vitamin A (IU)	1664	2612
Thiamine (mg)	0.128	0.128
Riboflavin (mg)	0.448	0.448
Niacin (mg)	4.8	4.8
Folate (µg)	60	60
Vitamin C (mg)	48	100
Vitamin B_{12} (µg)	1.2	2
Iron (mg)	8	8
Zinc (mg)	5	5
Vitamin D (µg)	--	5
Vitamin E (mg)	--	8.3
Vitamin K (µg)	--	100
Vitamin B_6 (mg)	--	1.7
Pantothenic acid (mg)	--	6.7
Calcium (mg)	100	600
Potassium (mg)	--	400

Table 2: New maximum limits for microbiological contamination in CSB and other FBFs

Pathogen	**Maximum CFUs in finished product**
Mesophyllic aerobic bacteria	10,000/g or max 3 out of 5 samples between 10,000–100,000/g
Coliform	10/g or max 3 out of 5 samples between 10–100/g
Salmonella	0/25 g
E. Coli	0/10 g
Staphylococcus	0/10 g
Yeasts and moulds	100/g

For further information on this issue, please directly contact the authors:
nutrition@wfp.org

Joris van Hees
Saskia de Pee
Martin Bloem
Edith Heines
Pushpa Acharya
Tina van den Briel

WFP United Nations World Food Programme

Unlimited. DSM

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UNITED NATIONS WORLD FOOD PROGRAMME

Via Giulio Cesare Viola 68/70
00148 Rome, Italy
Phone: + 39-066513-2919
Fax: +39-066513-2873

Nutrition and HIV/AIDS Policy Division

David Stevenson
Steven Were Omamo
Martin Bloem
Saskia de Pee

Programme Design Division Nutrition, HIV/AIDS, Maternal and Child Health

Valerie Guarnieri
Al Kehler
Tina van den Briel

Private Donor Partnership Division

Monica Marshall
Marco Selva

Ten Minutes to Learn About...

Ready-to-Use Foods (RUFs) and WFP's Approach to Treating and Preventing Malnutrition

Volume 1, Number 5 **October 2008**

This is an exciting time in the area of nutrition and health. After years of struggling to develop appropriate products to fight malnutrition, ready-to-use therapeutic foods (RUTFs), such as Plumpy'Nut™, are revolutionizing the treatment of severe acute malnutrition (SAM, or severe wasting).[1,2] The success is strongly enhanced by the fact that RUTFs permit community-based therapeutic care (CTC) – with treatment at home and in the community – rather than costly and more problematic clinical care.[3,4]

WFP recognizes that we are entering a new age in tackling malnutrition, where the right mix of commodities – even if more costly – can produce dramatically improved outcomes for children. The world judges our progress not only in terms of how many mouths we feed, but how many deaths and how much lifelong suffering we avert as a result of preventing malnutrition. We need to move forward swiftly but carefully toward meeting WFP's Strategic Objectives 1, 3 and 4 by using better foods.

Based on the great treatment success seen with RUTF for SAM, new commodities are being developed by various groups and industries for the prevention and treatment of moderate malnutrition, and studies are underway to evaluate their effectiveness.

This brief answers questions on how WFP is involved in the development and use of these new commodities. Another brief provides further information about the meeting organized by WHO, in collaboration with WFP, UNICEF and UNHCR, at the end of September 2008 on the appropriate mix of nutrients and foods for the treatment of moderate malnutrition.

1. What is WFP's role in the treatment of severe acute malnutrition?

WFP's involvement in the treatment of *severe* acute malnutrition (SAM) has, until now, been limited because this serious form of malnutrition always required intensive rehabilitation in a therapeutic feeding centre or clinic for long periods of time. With the development of RUTF and CTC delivery, much of the detection and treatment can occur in the community and at home. CTC requires effective outreach, training of community members and health staff, and adequate supplies of RUTF, medicines and equipment. Because of our experience in food production, logistics and outreach, WFP, together with local

partners, can play an important role in the roll-out of CTC for treating SAM with RUTFs through reaching out to peripheral health clinics and community staff.

Such a role would be in support of our sister UN agencies (UNICEF and UNHCR take the lead in the treatment of SAM) and implemented together with partners such as Médecins Sans Frontières (MSF). Furthermore, WFP can provide food during the post-acute recovery phase and beyond to prevent children from relapsing once they have recovered. In addition, for children hospitalized with SAM because of clinical complications, WFP may provide food to family members to help ensure that the family supports the full cycle of treatment for their malnourished child.

2. What are WFP's strategies with regard to improving the food basket?

Improving the quality and diversity of food products used in WFP's programmes is critical. WFP is working, swiftly and with great determination, with partners in the private sector, universities, UN agencies, and NGOs to develop and assess the effectiveness of innovative products for the prevention and treatment of malnutrition. We are also working with these partners to develop new products and delivery modalities as part of a toolbox of strategies for treating and preventing different types of malnutrition, including micronutrient (vitamin and mineral) deficiencies.

This toolbox already includes the fortification of staples and condiments, and the production of fortified blended foods (FBFs), such as Corn Soy Blend (CSB), which we have supported for decades. WFP is working on ways of improving the composition of those foods to better meet the nutritional needs of specific target groups (young children, pregnant and lactating women, people suffering from HIV/AIDS or Tuberculosis). This toolbox will also include new strategies, such as home-fortification with micronutrient powder (MNP, also known as MixMe™ or Sprinkles™) to address micronutrient deficiencies, ready-to-use supplementary foods (RUSFs) for treating children with moderate acute malnutrition, and food supplements to complement the diets of young children (6–23 months of age) with the highest nutritional needs in order to prevent malnutrition (see point 6 below).

3. What is WFP's role in treating and preventing moderate malnutrition among underfives?

Many populations depend partially or completely on the food provided through WFP's programmes, and we therefore have significant opportunities to both treat as well as prevent malnutrition. Under the Memorandum of Understanding with UNICEF, WFP has the mandate to treat moderate malnutrition by providing food through supplementary feeding and Mother and Child Health (MCH) programmes.

Having the right approach to preventing and treating *moderate* malnutrition may be even more important in preventing mortality on a large scale than treating *severe* malnutrition. This is because many more children suffer from *moderate* malnutrition – in itself increasing the risk of mortality and life-long suffering – than *severe* acute malnutrition. In many emergency settings, for every child suffering from *severe* acute malnutrition, there are 8–10 suffering from *moderate* malnutrition.[5] And *moderately* malnourished children may become *severely* malnourished. Having effective strategies related to prevention and treatment on a large scale is critical.

The sections below provide further details on commodities that can be used to prevent or treat moderate malnutrition.

4. What is WFP's view of Plumpy'Nut™ and other RUTFs?

Plumpy'Nut™ is an energy- and nutrient-dense ready-to-use therapeutic food that is effective in treating *severe acute* malnutrition (SAM). It contains milk powder (30%), peanuts (25%), vegetable oil (15%), sugar (28%, lactoserum and maltodextrin), and a vitamin/mineral premix (2%). Its composition is completely comparable to F100, but because of its very low water content, which prevents the growth of bacteria, it can be stored and used at home, and is therefore particularly suitable for community-based therapeutic care (CTC). CTC programmes aim to treat children with SAM, provided that they have no medical complications, at home or in the community, instead of at therapeutic feeding centres. WFP fully supports this approach, as described in the joint WHO/WFP/UNICEF/SCN statement on 'Community-based management of severe acute malnutrition.'[4]

5. Will WFP use Plumpy'Nut™?

Traditionally, WFP has not been involved in the treatment or management of SAM or therapeutic feeding (as this is the mandate of UNICEF). However, with the CTC approach, WFP may get involved in situations where the agency has a clear comparative advantage, for instance, in terms of outreach capacity together with local partners. WFP could also support local production of RUTFs. While RUTFs are sometimes used for treating children with moderate acute malnutrition, the search for lower-cost but effective options is ongoing (see below).

6. What about other ready-to-use foods (RUFs) for preventing and for treating moderate malnutrition?

Based on the success of RUTF, other RUFs are being developed for the prevention or treatment of moderate malnutrition. Prevention is best done through blanket feeding of children aged 6–23 months, who are at high risk of developing malnutrition (see next section). In fact, this can also be considered treatment of a population based on high malnutrition levels observed among the 24–59-month-old age group), whereas supplementary feeding programs identify and treat moderately malnourished children aged 6–59 months.[6]

Ready-to-use foods to improve dietary quality and prevent malnutrition[7]

Plumpy'Doz™ is very similar to Plumpy'Nut™ in terms of ingredients, but it is used differently. It is packed in a small cup for feeding of smaller amounts per day (46 g, 250 kcal), and has an adjusted micronutrient content because of the smaller amount consumed. It is meant for blanket distribution in food-insecure areas or during lean seasons, to protect children against illness and weight loss, and promote growth and development. Because the daily amount provided is limited, it is considered a food supplement that is to be added to the normal diet to provide high-quality nutrients to a largely staple diet, and it is preferentially given to young children (aged 6–23 or 6–35 months).

NutriButter™ is a food supplement for young children aged 6–11, 6–17 or 6–23 months whose diets have few animal-source and/or fortified foods. Adding an amount of 20 g/d to the child's diet should ensure that a child's essential nutritional needs, including micronutrients, macro-minerals (calcium, potassium, magnesium), essential fatty acids, and good-quality protein are met. Thus, it is a product for home-fortification of a young child's diet, similar to micronutrient powder but containing additional essential macronutrients. It is meant for blanket distribution and has a preventive purpose. Experience with NutriButter™ is still limited, but considerable development work is ongoing to arrive at a cost-effective and efficacious, product.

Indian RUF; see below

RUFs for treating moderate acute malnutrition through supplementary feeding or MCH programmes

Supplementary Plumpy™ has been developed by Nutriset, France, for children with moderate acute malnutrition (MAM; WHZ < -2 and ≥ -3). Like Plumpy'Nut™, it comes in pouches of 96 g, providing 500 kcal. One sachet is to be consumed per day, irrespective of age, in addition to continued breastfeeding, when applicable, and consumption of other foods. Its composition is very similar to Plumpy'Nut™. The only difference is that full-fat milk powder has been replaced by whey protein (also originating from milk) and soy protein isolates, and that it contains less potassium.[8] This makes the product cheaper (US$0.33 vs US$0.41 per sachet). Because the composition is very comparable to Plumpy'Nut™ and it contains dairy protein, a better micronutrient profile and virtually no anti-nutrients (fibre, phytate etc.), its nutritional quality is superior to that of FBFs and it is therefore very likely to be more effective for treating moderate acute malnutrition. Studies to assess its impact on recovery, growth, immunity and development are ongoing.

Indian RUF is being developed by WFP's country office in India, using chick peas, milk powder, soy bean oil, soy flour, rice flour, sugar, and vitamins and minerals. The aim is to use it for preventive purposes (see above), similar to Plumpy'Doz™, as well as for supplementary feeding of children with MAM (50 g/d and 100g/d, respectively, and adjusted micronutrient content). Howe-

ver, as for Supplementary Plumpy™, it has not been tested yet, and the product formulation, as well as its packaging, is still being optimized.

WFP is actively engaged in global discussions among experts and key organizations on the development and testing of appropriate products for both treatment as well as prevention of malnutrition. There is a great need for good products, which need to be properly tested for both impact as well as programme implementation aspects in order to make cost-effective choices for addressing malnutrition among different populations.

7. Why is WFP continuing to distribute FBFs such as CSB?

The formulation of FBFs is based on the Codex Alimentarius guidelines; FBFs have an acceptable protein content, are fortified with 10 vitamins and minerals, and are easily prepared.

Science has evolved, however, and it is clear that the micronutrient composition of FBFs needs to be improved. Also, anti-nutritional factors in corn and soy, particularly the phytate-rich fibres, negatively affect the bioavailability of micronutrients, particularly iron and zinc. For this reason, FBFs need to be improved to make a greater contribution to preventing micronutrient deficiencies, especially through the inclusion of a greater selection of micronutrients, and more stringent specifications and processing criteria to increase their bioavailability (i.e. absorption by the body). Additionally, to further increase nutritional value for young children, some milk powder, oil, and sugar could be added.

Nevertheless, even with an improved micronutrient profile (but without additional milk powder, oil, and sugar), FBFs will be more suitable for older children (aged two years and above), pregnant and lactating women, and people suffering from HIV/AIDS and tuberculosis, than for young (aged 6–23 mo) or moderately malnourished children. But in the interim, while developing and testing, and increasing production capacity, of more suitable foods and food supplements for young and for moderately malnourished children, improved FBFs will continue to be used. For more information about FBFs, see the brief on CSB improvement.

8. What is WFP doing to develop products to prevent and treat malnutrition?

In summary, WFP is increasingly working on:

- Improving FBFs, such as CSB, by improving the micronutrient profile as well as assessing the possibility of adding some ingredients (milk, oil, sugar) during production for consumption by under-twos and moderately malnourished children.
- Increasing food fortification through
  - fortification of staples and condiments;
  - home-fortification using micronutrient powder (such as MixMe™ and Sprinkles™)

- Development and piloting the use of other ready-to-use foods for preventive use among under-twos and for treatment of moderate malnutrition among under-fives. Potentially, these products could also be used among pregnant and lactating women, and the chronically ill (i.e. people suffereing from HIV/AIDS and tuberculosis).
- Expanding the local production and use, through CTCs, of RUTFs for treating SAM, where WFP has a clear comparative advantage in-terms of access to difficult-to-reach populations.

9. How can WFP ensure that new products will be accepted and used correctly?

This same question applies to any product or concept that the population is not familiar with, such as CSB, micronutrient powder or a spread (such as NutriButter™) for home-fortification, RUTF, etc. WFP staff, partner organizations, and beneficiaries need to be made aware of a product's composition, its advantages and its proper use. Carefully designed advocacy and communication strategies are needed, including face-to-face communication with target groups as well as campaigns, training of health staff, clear and appropriate messages, and declaration of the content on the packaging. Equally important are the design and implementation of the programs that include provision of these commodities, which should include community engagement from an early stage.

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[5] It is estimated that, in the developing world, 19 million children (3.5%) suffer from severe acute malnutrition, 55 million from acute malnutrition (thus 36 million from moderate acute malnutrition, i.e. moderate wasting), 178 million from chronic malnutrition (stunting), and 112 million from underweight. Many of these are the same children.

[6] Only where the prevalence of malnutrition is high but identification of malnourished individuals is not feasible for security or logistic reasons should blanket feeding of commodities normally recommended for treatment be considered.

[7] This is also referred to as Complementary Food Supplements (CFS), a group of products that add nutritional quality to the diet, which also includes micronutrient powders, soy powder with micronutrients, etc.

[8] Please note that this refers to the current formulation of Supplementary Plumpy, which should not be confused with an earlier version of the product that used whole soy flour instead of soy protein isolates and also had a different micronutrient profile.

For further information on this issue, please directly contact the authors:
nutrition@wfp.org

Joris van Hees
Saskia de Pee
Martin Bloem
Edith Heines
Pushpa Acharya
Tina van den Briel

WFP United Nations World Food Programme

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UNITED NATIONS WORLD FOOD PROGRAMME

Via Giulio Cesare Viola 68/70
00148 Rome, Italy
Phone: + 39-066513-2919
Fax: +39-066513-2873

Nutrition and HIV/AIDS Policy Division

David Stevenson
Steven Were Omamo
Martin Bloem
Saskia de Pee

Programme Design Division
Nutrition, HIV/AIDS, Maternal and Child Health

Valerie Guarnieri
Al Kehler
Tina van den Briel

Private Donor Partnership Division

Monica Marshall
Marco Selva

Ten Minutes to Learn About...

Questions & Answers on Micronutrient Powder (MNP) for Home Fortification, also Known as MixMe™ or Sprinkles™

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Micronutrients (vitamins and minerals), although only needed in small amounts, are as essential as macronutrients (protein, fat) and energy in achieving the goals of food assistance programmes. Along with underweight, the World Health Organization (WHO) ranks deficiencies of zinc, iron, and vitamin A in the top ten causes of disease burden in developing countries.[1] Zinc deficiency alone has been shown to increase the risk of diarrhoea in young children by 33%, pneumonia by 69%, and malaria by 56%.[2] Adequate intake of vitamin A among children under five years of age can reduce mortality due to infectious diseases (most notably measles, diarrhoea, and malaria) by approximately 23–35%. Put simply, micronutrients are essential for child growth and cognitive development, and interventions to provide micronutrients save lives.

The World Bank declared delivering micronutrients through food fortification one of the most cost-effective strategies for saving lives. The Copenhagen Consensus ranked micronutrients second among all development interventions in terms of spending priorities based on benefit-cost ratios.

WFP distributes cooking oil that is fortified with vitamins A and D, iodized salt, and fortified blended foods (FBFs), such as Corn Soy Blend (CSB) as well as Wheat Soy Blend (WSB). Furthermore, WFP is actively pursuing local milling and fortification of maize and other staple foods, where possible. Yet, concerns about the shelf life of staples, once milled, and the desire to deliver specific doses of micronutrients to young children and other vulnerable groups have pushed WFP to explore additional opportunities for delivering micronutrients. WFP is able to do so under its partnership with DSM.[3] Micronutrient powder (MNP) for home fortification represents one of the best potential opportunities for WFP to save more lives, to increase the impact of its nutritional interventions on child growth and development, and, hence, for achieving WFP's Strategic Objectives 1, 3 and 4.

1. What is Micronutrient Powder (MNP) for home fortification?

Micronutrient powders, for example known under the trade names MixMe™ (produced by DSM, see **Picture**) and Sprinkles™, are used to fortify foods after preparation, just before consumption, to ensure an adequate intake of micronutrients essential for bodily functions, growth, immunity, productivity,

and prevention of mortality among different population subgroups. Originally, Sprinkles™ was developed to address nutritional anemia among young children, as they are unable to swallow iron and folic acid tablets, and because syrups stain teeth and are too bulky to transport and store.

Picture: MixMe™ sachet

One dose for one person for one day contains one full recommended nutrient intake (RNI) of vitamins and minerals in one gram of powder. It can be used every other day to complement the micronutrients from the daily diet, if it provides a considerable percentage of the RNIs. The powder is white and tasteless. Upon addition to food, there may be a slight change of color (greyish or yellowish), depending on which micronutrients are in the powder and in what form.

WFP uses an MNP composed of 15 vitamins and minerals (iron, zinc, iodine, copper, selenium, vitamins A, B_1, B_2, B_3, B_6, B_{12}, C, D, E, and folic acid), in line with the WHO/WFP/UNICEF statement on the need to provide micronutrients to populations affected by an emergency.[4] The amounts of vitamin A and iodine will be reduced when fortified cooking oil, salt and FBFs are also provided. Currently, the formulation for malaria endemic areas contains 16 vitamins and minerals, including vitamin K.

2. Can MNP be used in areas where malaria is endemic?

Recent research has raised concerns that iron supplementation among under-fives may increase mortality rates in malaria-endemic areas.

The WHO expert consultation in Lyon in 2006 concluded that where malaria control programmes, including coverage of insecticide-treated nets and vector control, are not optimally implemented and individual screening for iron deficiency is not possible, additional iron for older infants and young children should only be provided in the form of processed complementary foods.[5] Although the safety of such fortified foods in malaria-endemic areas has not been documented, it is likely to avoid the potential adverse effects seen with iron supplements since the iron would be consumed in smaller amounts and absor-

bed more slowly. With regard to home-fortification – which typically provides one RNI of iron (10–12.5 mg) in a single meal, more than a meal of fortified complementary food provides – the Lyon consultation concludes that there is reason to believe home-fortification may be safer than iron supplements, but it cannot be recommended until its safety has been demonstrated.

Therefore, WFP and DSM have developed a different MNP formulation with less iron, but with improved bioavailability, which will be piloted in Kakuma, Kenya. At the same time, the formulation is being tested among South African preschoolers for its impact on anemia and iron deficiency. Because of the lower amount of iron, the formulation should be used daily rather than every other day.

3. To whom should MNP be given?

MNP should be provided to populations that consume very little or no animal-source foods and fortified foods. MNP can either be provided to the general population, so that each individual adds one dose to his or her meal, or to specific target groups, such as underfives or pregnant and lactating women. When the same product is given to everyone, the dosage should be such that it is appropriate for young children. When specific groups are targeted, the dosage can be adjusted accordingly. In Bangladesh (Cyclone Sidr EMOP), pregnant and lactating women receive double the dosage that is given to underfives.

4. How should MNP be used?

MNP is packaged in single-dose sachets. The contents of one sachet should be mixed with an individual meal of solid or semi-solid foods that is ready for consumption. However, where meals are commonly shared, the MNP can be added to the shared meal by adding a number of sachets equal to the number of people sharing the meal. The same can be done for institutional feeding (on-site supplementary feeding and schools), in which case MNP can be packed in larger amounts, for example, 20 dosages in one larger sachet rather than single-dose sachets.

5. Wouldn't food fortification of staples or condiments be a better approach?

Whereas the purpose of home-fortification is the same as that of food fortification of staples or condiments, there are a number of important differences, as follows:

a. The fortification of staples and condiments is designed to meet the needs of the average member of the population member and, at the same time, avoid providing too much to people whose meals consist mostly of these foods. Therefore, young children, who consume much smaller amounts of food than adults but have high micronutrient needs, will not obtain enough micronutrients from staples and condiments fortified for the general population. MNP tailored to groups with higher needs ensures that their needs are also met.

b. Some fortified foods are only fortified with a few micronutrients. For example, cooking oil and salt are fortified with vitamins A and D, and iodine, respectively. The WFP specification for flour and FBFs has more micronutrients but is still less comprehensive than what can be provided by MNP.

c. Fortifying staples, such as flour, or condiments, requires specific equipment, and storage and handling conditions. In many situations, whole grain staples are provided instead of milled products that can be fortified. Today, 20–25% of food aid provided worldwide is fortified.[6] The lack of local facilities to mill and fortify, as well as the shorter shelf-life of milled products, are some limiting factors. MNP can be used by any population whose diets do not contain adequate levels of micronutrients or it can be specifically targeted to groups with higher needs, such as young children and pregnant and lactating women.

6. Has the use of MNP been tested? Is it effective?

MNP has undergone extensive testing for its impact on anemia and iron deficiency among young children and has been found to be very effective. This includes a recent study in Haiti that found a reduction of anemia from 54% to 24% among a group of children aged 9–24 months who received WSB and MNP for two months, whereas anemia prevalence remained unchanged (39% and 43%, respectively) in the group that received only WSB.[7]

7. How should MNP be distributed?

When MNP is needed to increase the micronutrient content of the general food ration – thus, for all members of the population – it should be distributed together with the general food ration. When specific groups are targeted, the MNP could also be distributed through existing (e.g. MCH) channels. However, because the concept and the product are new, adequate training, informational materials, time, and manpower are required to carefully introduce it to the beneficiaries.

8. What experience has WFP gained so far with the use of MNP?

In partnership with DSM, WFP has started using MNP in its operations in eastern Nepal (8,000 underfives and refugees) and Bangladesh (Cyclone Sidr EMOP, 110,000 underfives, and 55,000 pregnant and lactating women (PLW) and 27,000 Rohinga refugees (underfives, PLW, adolescent girls) in Cox's

Bazaar). The distribution of a special formulation for malaria-endemic areas will be launched in Kakuma, Kenya in December 2008 (50,000 refugees). In Nepal, Bangladesh (refugees) and Kenya, the pilots are conducted in collaboration with UNHCR. Based on these initial experiences, expansion to other operations is expected in 2009. Other organizations are also using MNP in different settings, including development situations, institutional use, etc.[8] One of the main lessons from these experiences is that careful planning is required on how to communicate the concept and use of the MNP among beneficiary communities.

9. What does MNP cost and who produces it?

When purchased in bulk, the price of MNP sachets is ~US$2.50 for 100 single-dose sachets or US$0.60–0.80 for 100 dosages packaged in sachets of 20–50 dosages each (not including transportation or distribution costs). MNP can be included in the food basket of any WFP project. MNP will be programmed as regular food commodities with all the associated costs per metric tonne. There are a number of producers of MNP and an inter-agency technical advisory group[9] was recently formed that recommends quality criteria for MNP formulations and packaging, and provides programme guidance.[10]

10. Are there potential risks of using MNP?

MNP are formulated to contain one RNI per person per day, which is the amount that should normally come from the diet. Because of the low dosage, the single-dose packaging, there is little risk of overdosing.

11. Should supplementation programmes be continued when MNP is distributed?

Supplementation programmes, such as high-dose vitamin A capsules for young children and postpartum women, and iron and folic acid tablets for pregnant women, should be continued when MNP is distributed. This is mainly because MNP programmes are likely to be implemented for a shorter period than these supplementation programmes, which should therefore not be disrupted, and the amount of vitamin A, iron and folic acid is much lower in MNP than in the respective supplements.

However, for children who are enrolled in supplementary feeding programmes (SFP) that include provision of micronutrient supplements, such as iron syrup, vitamin B-complex etc., the exact daily nutrient intake from these supplements, the MNP as well as the foods that they receive should be compared to the recommended intake of these nutrients[11] for this target group in order to decide whether both supplements should be provided while the child is enrolled in the SFP. If the combination provides too much of one or more micronutrients, particularly iron, only one of the supplementation schemes should be selected. In this case, daily use of MNP may be the best choice as it usually provi-

des a wider range of micronutrients. For pregnant women, separate iron and folic acid supplementation should continue when MNP with an iron content of 12.5 mg or less per dose is provided. Other supplements for pregnant women may be continued, depending on recommended intake, MN content of the MNP and MN content of the supplement(s). Provision of a calcium supplement for example can be continued because MNP does not contain calcium.

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[1] World Health Organization. World Health Report: Reducing risks, promoting healthy life. Geneva: WHO, 2002.

[2] Caulfield, L. E., and R. E. Black. 'Zinc Deficiency.' In Comparative Quantification of Health Risks: Global and Regional Burden of Disease Attributable to Selected Major Risk Factors, ed. M. Ezzati, A. D. Lopez, A. Rodgers, and C. J. L. Murray, vol. 1, 257–9. Geneva: World Health Organization, 2004.

[3] DSM is a Life and Materials Sciences Company that develops and produces nutritional, specialty food, pharmaceutical, base chemical, and intermediate and end products. The partnership with WFP focuses particularly on the improvement of the nutritional quality of WFP's food basket, and primarily involves the Nutrition Improvement Program of DSM and its humanitarian initiative, SIGHT AND LIFE.

[4] WHO/WFP/UNICEF. Preventing and controlling micronutrient deficiencies in populations affected by an emergency: Multiple vitamin and mineral supplements for pregnant and lactating women, and for children aged 6 to 59 months. Joint statement, 2007. Internet: http://www.who.int/nutrition/publications/WHO_WFP_UNICEFstatement.pdf (accessed 22 October 2008)

[5] This would include FBFs, such as CSB, even though FBFs have not been found to be very effective in reducing anemia (see Question 6).

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[8] de Pee S, Moench-Pfanner R, Martini E, Zlotkin S, Darnton-Hill I, Bloem MW. Home fortification in emergency response and transition programming: Experiences in Aceh and Nias, Indonesia. Food Nutr Bull 2007;28:189–197.

[9] The group includes UN, private sector, and scientific partners: WFP, UNICEF, GAIN, MI, IFPRI, HKI, Heinz, Tufts, DSM, and Fortitech.

[10] de Pee S, Kraemer K, van den Briel T, Boy E, Grasset C, Moench-Pfanner R, Zlotkin S, Bloem MW. Quality critieria for micronutrient powder products. Report of a meeting organized by the World Food Programme and the Sprinkles Global Health Initiative. Food Nutr Bull 2008;29(3):232–41.

[11] The fact sheets that are prepared by WFP and DSM for specific MNP formulations provide information on recommended nutrient intake for the specific target groups and compare this to the content of the MNP that is provided.

For further information on this issue, please directly contact the authors: nutrition@wfp.org

Joris van Hees
Saskia de Pee
Martin Bloem
Edith Heines
Pushpa Acharya
Tina van den Briel

Colophon

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SIGHT AND LIFE
Dr Klaus Kraemer
Secretary General
PO Box 2116
4002 Basel, Switzerland
Phone: +41 61 815 8756
Fax: +41 61 815 8190
Email: info@sightandlife.org
www.sightandlife.org

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