برنامج الأغذية العالمي

Programme Alimentaire Mondial

World Food Programme

Programa Mundial de Alimentos

Executive Board
Annual Session

Rome, 24–26 May 2004

POLICY ISSUES

Agenda item 5

For approval

MICRONUTRIENT FORTIFICATION: WFP EXPERIENCES AND WAYS FORWARD

Distribution: GENERAL
WFP/EB.A/2004/5-A/2
6 April 2004
ORIGINAL: ENGLISH

NOTE TO THE EXECUTIVE BOARD

This document is submitted to the Executive Board for approval.

The Secretariat invites members of the Board who may have questions of a technical nature with regard to this document to contact the WFP staff focal points indicated below, preferably well in advance of the Board's meeting.

Director, Division of Strategy, Policy and Programme Support (PSP):	Mr S. Samkange	tel.: 066513-2600
Chief, Nutrition Service (PSPP):	Mr P. Webb	tel.: 066513-2565

Should you have any questions regarding matters of dispatch of documentation for the Executive Board, please contact the Supervisor, Meeting Servicing and Distribution Unit (tel.: 066513-2328).

EXECUTIVE SUMMARY

Micronutrient deficiencies represent a largely invisible but often devastating form of malnutrition that is particularly prevalent among WFP's beneficiary populations already lacking sufficient food. Known effects of micronutrient deficiencies include impaired physical and mental growth among children, iron-deficiency anemia, maternal mortality, low adult labour productivity and blindness.

WFP makes important, often pioneering contributions to overcoming such deficiencies through:

- careful attention to micronutrients in needs assessment and ration planning;
- delivery of fortified foods, particularly to nutritionally vulnerable groups, on an increasingly large scale;
- promotion and use of locally produced and fortified commodities in several low-income food-deficit countries; and
- advocacy for fortification at national and international policy levels.

Important activities in local processing and fortification have recently taken place in Angola, Bangladesh, India, Nepal and Zambia, and in the context of the southern Africa regional drought emergency. Each case demonstrates that where micronutrient deficiencies are an operational concern, local fortification is possible but challenging. Several ongoing assessments of the impact of such initiatives suggest important nutritional benefits. That said, challenges remain in terms of (i) technical and managerial capacity constraints, (ii) the need for systematic compliance with procurement specifications and quality control, (iii) clearer policies on micronutrient content labelling and (iv) the need for cash resources to support many aspects associated with local processing and fortification activities.

This paper should be read in conjunction with two other policy papers— "Food for Nutrition: Mainstreaming Nutrition in WFP" (WFP/EB.A/2004/5-A/1) and "Nutrition in Emergencies: WFP Experiences and Challenges" (WFP/EB.A/2004/5-A/3).

DRAFT DECISION*

In accordance with decision 2002/EB.A/4, the Board requests the Secretariat to add the following language to "Consolidated Framework of WFP Policies: A Governance Tool" (WFP/EB.A/2002/5-A/1):

"WFP will increase its efforts to meet micronutrient deficiencies among beneficiaries through the distribution of appropriately fortified foods and support for national and international fortification initiatives and policies, paying particular attention to micronutrient needs in emergencies and meeting the special needs of people living with HIV/AIDS. Ensuring adherence to WFP's procurement specifications and quality control procedures and documenting effectiveness and impact of fortification activities are central to these efforts. WFP will expand its local initiatives in the production of fortified blended foods and biscuits, and in the milling and fortification of cereals. Institutional and staff capacity to implement these activities will be enhanced as necessary."

* This is a draft decision. For the final decision adopted by the Board, please refer to the Decisions and Recommendations document issued at the end of the session.

INTRODUCTION

1. WFP seeks to support improved nutrition and health of children, mothers and other vulnerable people as a strategic priority. While this implies a focus on meeting macronutrient needs—adequate carbohydrate, fat and protein intake—the enormous magnitude of deficiencies in micronutrients such as vitamin A, iron, iodine and zinc requires WFP to pay more attention not only to the quantity of food that it delivers but also to its quality.

2. For many years, WFP has been distributing several procured or donated fortified commodities such as oil and dried skim milk fortified with vitamin A, iodized salt and fortified blended foods (FBFs) or biscuits whenever possible. More recently, WFP has directly supported the processing of food commodities at a local level, including milling and fortification of cereals and production of fortified blended foods and biscuits. The importance of these activities is increasingly apparent as evidence accumulates on the pivotal role of micronutrient deficiencies not only in mortality, morbidity and malnutrition, but also in national economic development potential.

3. This paper (i) considers why WFP pays explicit attention to micronutrient deficiencies in its strategies and operations, (ii) highlights WFP's recent experiences with micronutrient-fortified foods and the fortification process and (iii) proposes ways to expand such efforts at the policy level and through actions on the ground.[1] The goal is not to achieve 100 percent fortification of food aid, but rather 100 percent effective responses to micronutrient problems where food aid is an appropriate and viable mechanism.

MICRONUTRIENT DEFICIENCIES AND FOOD INSECURITY

4. According to the World Health Organization (WHO), deficiencies in iron, vitamin A and zinc rank among the top ten leading causes of death through disease in developing countries.[2] Most people affected by micronutrient deficiencies do not show overt clinical symptoms, nor are they themselves necessarily aware of the deficiency, a phenomenon called "hidden hunger". Yet hidden hunger makes people susceptible to infectious diseases, impairs their physical and mental development, reduces their labour productivity and increases the risk of premature death.

5. Iron deficiency, for example, is one of the most widely prevalent micronutrient deficiencies in the world, affecting at least half of all pregnant women and young children in developing countries. Children under 24 months are especially at risk of anaemia, which stunts their growth and reduces their ability to resist common childhood illness. In older children, the ability to concentrate and perform well in school is reduced.[3] Anaemia is a serious risk to mothers in childbirth and it impairs the health and labour productivity of working adults in general. As a result, countries such as Bangladesh lose between 1 percent and 2 percent of their annual economic growth as a direct result of high levels of anaemia.[4] When iron deficiency is compounded by other vitamin and mineral deficiencies (VMDs),

[1] Constructive comments from UNICEF, FAO, IFAD and WHO on earlier drafts are gratefully acknowledged.

[2] WHO. 2002. *The World Health Report 2002*. Geneva.

[3] Mason, J. *et al*. 2001. *The micronutrient report: current progress and trends in the control of vitamin A*. Ottawa, Micronutrient Initiative and International Development Research Centre.

[4] FAO. 2002. *The state of food insecurity in the world*. Rome.

the economic impact often exceeds 2 percent of gross domestic product per year. Economic losses due to VMDs are put at 2.7 percent in Mali, 2.5 percent in Burundi and 2.3 percent in Afghanistan.[5]

6. Such huge economic losses result from human resource depletion linked to ill-health, reduced intellectual capacity and early death. For example, a lack of vitamin A is not only the leading cause of child blindness across developing countries, it affects children's immune systems and is directly responsible for 10.8 million deaths each year. Eradicating Vitamin A deficiency would cut child deaths from measles alone by 50 percent.[6] Removing zinc deficiencies would prevent 800,000 deaths per year from growth failure and weakened immunity, which renders children particularly vulnerable to diseases such as pneumonia, malaria and diarrhoea.[7]

7. VMDs result from a low intake of micronutrients and/or infectious diseases that hamper absorption and increase requirements. The wide prevalence of VMDs in poor countries leaves most of WFP's beneficiaries even more vulnerable to the effects of periods of constrained food intake. Obviously, if a population is already micronutrient deficient when a food emergency unfolds, the impact is worse than if pre-existing conditions had been satisfactory. In Bangladesh, for example, a higher intake of vitamin A was associated with a lower risk of severe malnutrition among children directly affected by floods; in Indonesia, although the drought and economic crisis of the late 1990s did not have a significant impact on weight-for-age among children, child iron status deteriorated sharply during the crisis and five years later still had not recovered to its pre-crisis level.[8]

8. Even where deficiencies were under control before a crisis, sub-clinical deficiencies can become overt problems when displaced persons become dependent on a limited range of foods. Populations dependent on food aid face a particular threat of micronutrient diseases if their diet lacks important nutrients for an extended period. While serious outbreaks of micronutrient diseases are increasingly rare in emergency contexts, thanks in part to WFP's recently increased focus on micronutrient concerns, they can still occur. Scurvy—vitamin C deficiency—was noted in the context of WFP operations in Somalia and Kenya in the mid 1990s, and again in Afghanistan in 2001. Beri-beri, a deficiency of vitamin B1, was recorded in Nepal in camps for Bhutanese refugees as recently as 1999. Pellagra—niacin deficiency—was a problem among Mozambican refugees in Malawi at the end of the 1980s and in the mid-1990s and in Tanzania in 2001; it remains a concern in Angola even in 2004. Such deficiencies are rare, but when an agency assumes responsibility for meeting the entire food needs of a population such risks have to be taken into account.

[5] UNICEF/Micronutrient Initiative. 2004. *Vitamin and Mineral Deficiency: A global damage assessment report*. New York; Horton, S. 1999. Opportunities for investments in nutrition in low-income Asia. *Asian Development Review*. 17 (1/2): 246–73.

[6] UNICEF. 2002. *A world fit for children*. New York.

[7] WHO. 2002.

[8] Choudhury, A. & Bhuiya, A. 1993. Effects of biosocial variables on changes in nutritional status of rural Bangladeshi children, pre- and post-monsoon flooding. *Journal of Biosocial Science*. 25: 351–57; Block, S. *et al*. 2004. Macro Shocks and Micro(scopic) Outcomes. *Journal of Human Ecology*. Forthcoming, 2004.

FOOD FORTIFICATION IN ADDRESSING MICRONUTRIENT DEFICIENCIES

9. There are many ways to address micronutrient deficiencies, including the distribution of vitamin/mineral supplements in capsules, tablets or syrups, public education on the foods that can increase intake of micronutrients, agricultural programmes that increase production of and access to a wider diversity of foods, disease control—because parasitic infections and diseases impair the body's ability to absorb micronutrients—and food fortification. Fortification is considered to be one of the most cost-effective approaches to addressing widespread deficiencies; according to the World Bank "…probably no other technology available today offers as large an opportunity to improve lives and accelerate development at such low cost and in such a short time."[9]

10. The aim of fortification is to increase intake of one or more nutrients that are inadequate in the food supply. This can be done in three ways: (i) restoring the nutrients lost during food processing by restoring depleted nutrients to their natural level, for example restoring B-vitamins, which are lost during milling; (ii) increasing the level of a nutrient above that normally found in the food, for example adding extra iron to wheat flour or extra calcium to milk; and (iii) adding nutrients that are not normally present in a food which is nevertheless a good vehicle for delivering micronutrients to the consumer, for example putting vitamin A into sugar, or iodine into salt.[10]

11. In developing countries the importance of fortification from public health and economic standpoints is increasingly recognized. Fortification of salt with iodine is now mandatory in 75 percent of developing countries, while fortification of oil and sugar with vitamin A and cereals or noodles with multiple micronutrients has become standard in China, Brazil, South Africa and Zambia.[11] Fortified foods are an important source of vitamin A for poor children in urban Guatemala: over half of their total vitamin A intake from non breast-milk food sources derives from three fortified foods: sugar, *Incaparina*, a fortified blended food based on maize, and margarine. Evaluations of vitamin A fortification initiatives in Guatemala and other Central American countries such as Honduras and Venezuela have shown a reduction of about 60 percent in the prevalence of vitamin A deficiency.[12]

12. However, there are constraints to this approach. On the one hand, such initiatives are still relatively limited, especially in low-income food-deficit countries, because they require coordinated efforts and start-up investments from many stakeholders, including governments, the private sector and consumer organizations. On the other hand, even when fortification is successfully introduced in countries such as Zambia or Kenya "enhanced" foods do not automatically reach remote rural areas because of poorly functioning markets. Even if available in such locations, these foods are not accessible to poorest households because the poor rarely purchase value-added, processed and packaged goods. In other words, WFP's beneficiaries are typically by-passed by most current fortification efforts to address micronutrient deficiencies. This will change over time but for the immediate future more direct, targeted approaches have to be implemented.

---

[9] World Bank. 1993. *Enriching Lives*. Washington DC.

[10] Different technical terms may be used in this context, such as "restoration" and "enrichment". The term "fortification", however, is increasingly used to cover any form of adding micronutrients to a commodity during processing and will be used as such in this paper.

[11] Mason, *et al*., 2001.

[12] USAID/International Life Sciences Institute. 2003. *Food Fortification and Public Health*. Washington DC.

WFP Beneficiaries Lack both Macronutrients and Micronutrients

13. There is a close relationship between malnutrition, which is often linked to lack of food, and specific micronutrient deficiency diseases that are associated with consumption of foods poor in micronutrients. Since WFP's beneficiaries are known to have limited access to a varied diet, a large proportion of them are also likely to suffer micronutrient deficiencies, especially those fully dependant on rations for survival such as camp-restricted refugees. WHO prevalence data for micronutrient problems in the countries supported by WFP suggest that 4 million women and young children are vitamin-A deficient, almost 7 million school children face iodine deficiency and 7 million women of child-bearing age are anaemic.[13] As the prevalence of VMDs amongst WFP beneficiaries is likely to be higher than in a national population as a whole, it can be argued that close to 20 million of WFP's beneficiaries currently face serious micronutrient problems, even if we accept that some of these deficiencies overlap. The figures would be higher if we counted other population groups such as elderly people and adults who are also at risk of micronutrient impairment where a lack of food, disease and displacement affect their ability to consume an adequate diet.

14. The seriousness of this hidden hunger problem is increasingly reflected in WFP's operations. About 75 percent of country programmes that include explicit mother-and-child health and nutrition interventions make mention of micronutrient problems and seek to address them through the use of fortified blended foods and fortified oil, salt and even cereals. Similarly, more than half of the emergency operations (EMOPs) and protracted relief and recovery operations (PRROs) during 2002 specified micronutrient concerns as part of the crisis being addressed; 80 percent of those included various fortified foods in the ration distributed.[14]

WFP'S EXPERIENCES WITH FORTIFIED FOOD AID

15. WFP addresses micronutrient deficiencies through (i) careful attention to micronutrients in ration planning, (ii) programming donor-supplied or internationally procured fortified foods, (iii) promotion and use of locally processed fortified commodities and (iv) increasing advocacy for fortification at national and international policy-making levels.

Ration Planning

16. During the past decade WFP has made more systematic efforts to recognize conditions that increase the likelihood of VMDs and plan operations accordingly. Today, the micronutrient content of the food basket is a major consideration in most ration planning. Determining the micronutrient adequacy of rations requires a comparison of a population's daily micronutrient requirement and potential intake with the level of micronutrients in the ration. In theory, general rations should also meet higher requirements during critical periods of life, including pregnancy and lactation, early infancy, child growth, adolescence and during certain illnesses. However, provision of extra rations of FBFs to pregnant and lactating women and young children through clinics is often the modality chosen when

[13] WHO. 2003. *World Health Report*. Geneva.

[14] See *Nutrition in Emergencies: WFP Experiences and Challenges* (WFP/EB.A/2004/5-A/1) for details of the 38 EMOPS and PRROs reviewed.

general rations may not be fully adequate or when malnutrition rates are indicative of inadequacies in the diet.

17. The high prevalence of HIV/AIDS affected people in some regions adds new challenges to ration planning. People living with HIV/AIDS (PLWHA) may face greater risks of malnutrition for various reasons such as loss of appetite and poor intestinal absorption. In this context, micronutrients are important in preserving immune function and promoting survival. While the scientific debate about recommended micronutrient intake levels for PLWHA is still going on, milling and fortification of food aid or provision of blended foods are seen as possible strategies for improving their access to an adequate diet.[15]

18. Calculating the content of rations in terms of individual vitamins and minerals manually is a complex task. This process will be considerably simplified through development by WFP in collaboration with the Office of the United Nations High Commissioner for Refugees (UNHCR) of a web-accessible software called "Nutval", a food-basket calculator that defines micronutrient content of all commonly used foods and calculates the degree to which the food basket meets a population's requirements based on FAO/WHO recommended nutrient intakes, and allows for comparisons of alternative basket composition.

International Procurement of Fortified Foods

19. During the 1990s, WFP set out procurement specifications for several processed commodities, including oils, blended foods, salt and high-energy biscuits (HEB). The guidelines prescribe the type and quantity of vitamins and minerals each commodity should contain.[16] For example, WFP requires that vegetable oil be fortified with vitamin A and with vitamin D as appropriate. Salt must be fortified with iodine. When wheat flour is internationally procured, it should be fortified with a mix of vitamins B1 and B2 as well as niacin, folate and iron.

20. Procured FBFs or HEBs are also fortified with a range of micronutrients. Blended foods were originally designed to provide additional protein to younger children, but in many instances they are used for all age groups in nutritional rehabilitation programmes and sometimes in general rations, particularly where the threat of VMDs is high. FBFs must comply with the "Guidelines on Formulated Supplementary Foods for Older Infants and Young Children" of the *Codex Alimentarius*. However, a range of FBFs and biscuits exist because they are versatile in terms of uses and objectives. For example, HEBs donated by India to Afghanistan were re-routed to Bam in Iran in the immediate aftermath of the earthquake in December 2003 for distribution alongside canned foods and bread. Similarly, 100 mt of BP5-biscuits were donated by Norway for use in southern Africa in response to the drought emergency in 2002; many of these were used in the Mozambican flood operations.

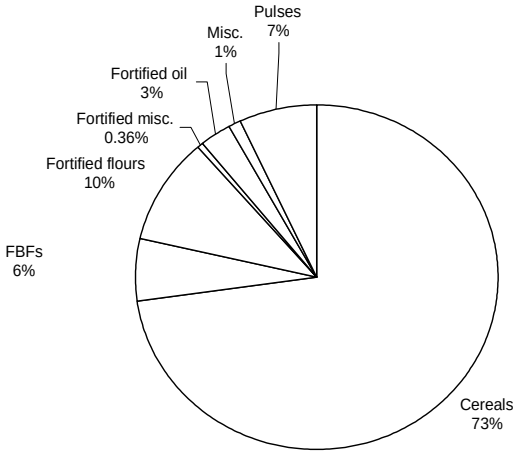
21. Figure 1 indicates that a large proportion of WFP's food commodities—20 percent by volume—is fortified. Cereal flours made up about 50 percent of processed fortified foods used by WFP in 2002, but FBFs and oil together make up an equivalent share. Roughly 80 percent of WFP's food is in the form of cereals and pulses. To increase the share of fortified foods, it will be necessary to mill and fortify more wheat and maize, but this would not yet be cost-effective or feasible for rice and pulses. Given that most fortified food is intended for consumption by nutritionally vulnerable beneficiaries, the share of

[15] The SPHERE Project. *Humanitarian Charter and Minimum Standards*, 2004 edition. Geneva.

[16] For details see WFP's *Food and Nutrition Handbook*, 2002 edition.

fortified food channelled through maternal and child nutrition or school meal interventions is much higher than the 20 percent indicated in Figure 1; indeed, nearly all processed foods are fortified.

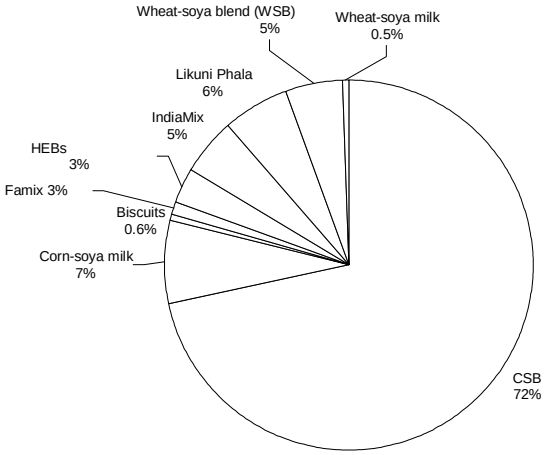
Figure 1: Fortified foods as a share of WFP's total food aid in 2002



In-Country Fortification Supported by WFP

22. Already the leading purchaser of fortified blended foods worldwide, WFP also promotes local capacity to produce fortified blended foods in several of the world's poorest countries including India, Nepal, the Democratic People's Republic of Korea (DPRK), Ethiopia, Madagascar, Malawi and Senegal. Figure 2 shows that of all FBFs used by WFP in 2002, almost 200,000 mt, corn-soya blend (CSB) made up the largest share. A variety of local FBFs such as *Unimix* produced in Kenya, *Likuni Phala* made in Malawi, high-energy protein fortified biscuits from Zambia, *Indiamix* from India and *Famix* from Ethiopia also contributed important amounts.

Figure 2: Fortified blended foods, by commodity, in 2002



23. Experience shows that these activities generally work best through the private sector, where a reasonable production capacity exists. With smaller producers, timely output of the required quantity and quality is a recurrent issue. Producer dependency on WFP should be avoided. Promotion of local commercial demand for blended foods may be needed in

some countries to ensure sustainability in the longer term. In a number of cases, WFP has invested in special equipment such as extruders. For example, the operations in DPRK provide a supplementary take-home ration for pregnant or lactating women in the form of micronutrient fortified noodles. From a single WFP-supported factory established in Pyongyang in 1999, there are now 18 operational factories in six locations around the country producing 50,000 mt of fortified foods using micronutrient premix provided by the United Nations Children's Fund (UNICEF).[17]

24. Bangladesh offers another example of enhanced local capacity for fortification. WFP supports a vulnerable group development (VGD) intervention that reaches 500,000 very poor women, who receive literacy and legal rights training and training and support to set up new income-generating activities. In the course of the intervention it became clear that food quality was as important as its quantity: Vitamin A deficiency was found to be widely prevalent among the target group. In 2002, a pilot project to fortify wheat flour (*atta*) was introduced. WFP worked with local non-governmental organizations (NGOs) to set up four hammer mills equipped with novel fail-safe fortification devices that prevent over-fortification, which provide 28,000 VGD families with 25 kg of fortified flour each month at a processing cost of less than US$20/mt. In 2003, an independent study confirmed the beneficial impact on vitamin A status among recipients of the fortified wheat flour compared with a control group.[18] Further monitoring of the micronutrient impact will be pursued, but in the meantime the results are sufficiently encouraging for WFP to expand the project during 2004 to 22 units to meet the needs of 200,000 participants per year.

Fortification of Cereals in Emergencies

25. While processing of foods close to the beneficiary has been discussed for decades, WFP's own experience of fortifying staples in emergencies is quite recent. For example, in an Angolan refugee camp in Western Zambia sometimes inaccessible because of flooding of the Zambezi river, WFP provides rations to 26,000 people. The refugees are almost entirely dependent upon WFP for food supplies, because their access to land is limited. Consequently, WFP together with UNHCR, the Micronutrient Initiative and Care Canada decided to pilot on-site maize milling and fortification. WFP designed two containerized milling/fortification units in collaboration with the Natural Resources Institute and the Canadian Government. Set up in a mobile warehouse, two new mills began operation in 2003, producing fortified maize meal. Labour is provided by the refugees themselves. Advocacy on micronutrient concerns raised awareness among beneficiaries of the nutritional benefits of consuming the fortified product and a study of the impact of this local fortification is ongoing.

26. Across the border in Angola, pellagra remains a serious threat to the health of internally displaced people (IDPs) in Bie province.[19] In 2001, a USAID-funded mission recommended that WFP's food basket be expanded to include niacin-rich foods. In the interim WFP responded by providing groundnuts and dried fish and by increasing FBF rations. With a view to a more sustainable solution, however, WFP arranged for a fortification facility to be established at a commercial maize mill in Lobito during 2003.

[17] Five fortified commodities are now produced in DPRK for WFP's operations: corn-soya milk blend, corn-milk blend, rice-milk blend, enriched biscuits and enriched noodles.

[18] USAID. 2003. *Wheat Flour Fortification Program in Bangladesh: Final Report*. Arlington, VA, USAID Micronutrient Program.

[19] Pellagra is fatal if not treated; it results from a monotonous, maize-based diet deficient in niacin.

The mill has the capacity to provide 1,000 mt of maize flour per month fortified with an extra-high content of niacin. This flour is being distributed to IDPs and returnees.[20]

27. On a much larger scale, the southern Africa drought emergency was the first regional crisis to highlight the importance of cereal fortification in the context of greater understanding of linkages between HIV/AIDS, food security and nutrition. The unusually high prevalence of HIV/AIDS in the affected countries coupled with serious and growing food insecurity led to closer scrutiny of the potential for general rations to address micronutrient needs. The availability of large quantities of maize grain in the region and the requirement among some recipient governments that genetically modified grains be milled prior to delivery, offered an opportunity for fortification at a large scale. Almost 70,000 mt were fortified during the first half of 2003 in the largest ever milling and fortification effort in any humanitarian emergency.

CHALLENGES TO WFP FROM MICRONUTRIENT FORTIFICATION

Technical, Managerial and Industrial

28. The examples outlined above demonstrate that WFP has taken many opportunities to pioneer technical and operational innovations. Processing and fortification close to the consumer has numerous benefits, including enhancement of local food processing capacity, employment generation, the option of higher extraction rates and added benefits to beneficiary households. While the number of success stories continues to grow and guidance on best practice is being developed, many fortification interventions still face challenges.

29. On the technical side, milling capacity is often a limiting factor where the need for large quantities of fortified staples is urgent. In the southern Africa emergency, there was a limited number of mills with adequate capacity in places where logistical and operational requirements could be met, despite the relatively high level of market and economic development in the region. In the very poorest countries and those emerging from destructive wars, capacity has to be built up from scratch, as for example in Afghanistan, where WFP's distribution of fortified cereals relied on industrial capacity in Pakistan in the first years of post-Taliban government.

30. Capacity is also likely to be constrained in terms of managerial and supervisory skills. For fortification to be safe and cost-effective, food producers and millers and WFP staff must understand the importance of careful dosing and proper mixing to ensure homogeneous distribution of micronutrients in the product and the importance of storing and handling micronutrient pre-mixes. In order to increase capacity for fortification, WFP is initiating new training courses mainly for procurement and logistics personnel; the first one was held in December 2003. WFP will collaborate with UNICEF, the Micronutrient Initiative (MI), WHO, FAO, non-governmental organizations, private-sector companies and national institutions to pioneer innovative approaches and strengthen national expertise in fortification.

[20] Funding for the fortification unit came from the Canadian International Development Agency (CIDA); UNICEF provided the micronutrient pre-mix.

31. In several countries, national policies need to be developed; WFP has begun playing a more active role in partnership with UNICEF, MI and the Global Alliance for Improved Nutrition in helping to frame the agenda for policy development on fortification. In several cases, UNICEF and MI were instrumental in establishing local fortification standards and in supplying the required fortificant. Under umbrella agreements, MI assisted in awareness-raising or social-mobilization campaigns to increase awareness and acceptance of fortified foods among WFP beneficiaries and partners. MI also frequently provides technical expertise and guidance to WFP on design and establishment of fortification facilities in developing countries. Other technical expertise is provided by the University of Greenwich Natural Resources Institute, the University of London Institute for Child Health and the Center for Disease Control and Prevention, Atlanta, USA.[21]

Costs and Benefits

32. Fortification involves adding value to a food. It is not cost-free. FBFs and biscuits are valued commodities and their use outside targeted child nutrition interventions continues to grow. Usually more expensive than wheat or maize, a product such as CSB delivers more energy, protein, fat and considerably more micronutrients per unit. The balance is redressed when cereals are milled and fortified, but the cost of the cereal then rises too. Apart from FBFs and biscuits, most milled and fortified flours are appreciated by beneficiaries because of their taste and fine consistency, better digestibility and the time saved on pounding or milling. These are additional benefits, particularly in a context where HIV/AIDS may affect a household's capacity to undertake such tasks. That said, higher-value commodities imply lower tonnage delivered to an operation; WFP ration planners have to compromise where nutritional priorities compete with other programmatic goals and where cash is limited. New WFP training on commodity handling, processing and fortification will enhance understanding of the importance of micronutrient fortification and allow WFP staff to make better informed decisions.

33. Cash is needed to support pre-mix procurement and the added costs of processing and fortification. With cereals, the main cost increase relates to milling. Depending on the mix of micronutrients added, the fortification pre-mix itself typically costs less than US$5/mt compared with milling, which can add up to US$25/mt.[22] This becomes a cost borne by WFP that was formerly paid by the beneficiary. When given whole grains, WFP's food recipients have to organize and pay for pounding or milling, and typically lose as much as 20 percent of the value of the grain, a loss that relates not only to cash or in-kind payments to millers, but also to losses in the milling process.

34. To date, it has been recommended to increase rations, thereby adding to planned tonnage figures with a view to covering this particular loss for the beneficiary. For example, the PRRO in Eritrea increased its total ration planning figure by 10 percent because beneficiaries were known to have to pay high fees to millers and therefore consumed appreciably less than the ration figure implied. Alternatively, rations that include fortified flour may be reduced by 10 percent to 15 percent and achieve the same goal, a reduction that compares favourably with the cost of local milling. Local milling and fortification can therefore have economic and nutritional advantages.

---

[21] The critical role played by CIDA in financial support for many WFP micronutrient activities is gratefully acknowledged.

[22] In some countries, millers accept payment in the form of milling waste—the husk and bran by-products—when there is high demand from the animal husbandry sector. However, there may be other costs relating to the logistics of adding a cereals processing step between the port of arrival and extended delivery points.

Shelf-life

35. Aside from cost, the main variable of concern in decisions on fortification relate to shelf life. Well stored whole grain can last a year; many milled and fortified products, including FBFs and flour or meal, have a shorter shelf-life. The longevity of a milled cereal is determined by the extraction rate used. Flour with an extraction rate of 90 percent or higher is classified as a wholemeal flour, which does not have a long shelf life. In situations where the pipeline is short, this is acceptable. However, when the pipeline is long, logistics are complex and storage conditions are poor a longer shelf life and thus a lower extraction rate are essential. A longer shelf life may require improved but more costly packaging.

36. The stability of vitamins and minerals added to food varies according to the nutrient and depends on moisture content, light, exposure to oxygen and ambient temperature. Even under normal conditions, most vitamins lose their potency over time. Dried products such as flour, salt and FBFs become damp and deteriorate quickly under humid conditions; oil will become rancid and lose its vitamin A when exposed to light and high temperatures. To minimize micronutrient losses during storage and transport, processed fortified foods must be packed to exclude air, light and moisture. Effective pipeline management is essential to ensure the shortest possible period between production and consumption. Increased capacity to mill and fortify products as close to beneficiary populations as possible is of considerable value to WFP.

Policies and Standards

37. To achieve compliance and quality control in its growing number of micronutrient activities, WFP needs to ensure that specifications are clearly defined and followed and that levels of nutrient content are appropriate to each context, and be able to share the information with implementing partners. As things stand, this is not always possible. There is a need for (i) an assessment of levels of fortificants used in different commodities and different contexts, emergencies in particular, leading to guidelines on how levels should be set and achieved, (ii) review of the quality and costs associated with alternative pre-mix suppliers, (iii) improved product labelling and (iv) clearer guidelines on quality-control procedures in the field.

38. WFP should follow national policies on fortification standards, but these do not yet exist everywhere. WFP should be part of the process that leads to setting national standards and should prepare more detailed guidance for its own operations. Such guidance would focus on defining levels and standards for different contexts in the light of recent scientific recommendations and on the basis of the costs and benefits of vitamin and mineral pre-mixes. WFP will engage in the debate on new foods for fortification, including participation in operational research on their efficacy and acceptability. Similarly, operational research into ways of meeting the dietary needs of PLWHA may affect the choice of commodities, processing requirements and levels of fortification. WFP is involved in some of these studies and will remain a leader in scientific and practical issues.

39. Specification of commodity content is increasingly important for WFP. Some operations receive vegetable oil from multiple donors or from a combination donations and procurement, which creates confusion in cases where both fortified and unfortified oil are in the pipeline. Similarly, where products are not labelled, it is hard for WFP and its partners to (i) make judgments on alternative food basket compositions where micronutrient deficiencies are of concern, (ii) assess whether additional vitamin supplements may be needed in tablet form in refugee camps or clinics and (iii) decide whether recommended micronutrient intake levels might be exceeded where multiple micronutrient activities are concerned. As a result, efforts should be made to ensure that

fortified commodities are clearly labelled at the point of production or packaging, or at least that they are accompanied by micronutrient specifications.

CONCLUSIONS AND RECOMMENDATIONS

40. WFP has already made significant and often pioneering contributions to addressing the global burden of micronutrient deficiencies. An increasing amount of WFP food is fortified, innovative approaches to enhancing local milling and fortification capacity have been developed, local production of fortified blended foods continues to grow and there is work with partners to place micronutrient-deficiency diseases higher on international and national political agendas.

41. The next steps for WFP include the following:

- Make efforts to ensure appropriate micronutrient fortification of commodities intended for use in WFP operations. To support this goal, WFP will collaborate with partners in formulating guidelines and standards that establish appropriate commodities and levels of fortification, and providing operational guidance based on best practices and lessons learned from the field.
- Seek opportunities to support and strengthen capacity for local milling and fortification of cereals and production of fortified blended foods, with a view to processing and fortifying commodities as close to consumers as possible. In this context, WFP will provide technical guidance on procedures and criteria for ensuring quality of the product.
- Explore funding mechanisms that would disassociate tonnage levels from cash available to country operations to cover the costs of in-country value-added from milling and fortification. Discussion is needed on the extent of donor responsibility in covering the cost of milling and fortification where (i) micronutrient deficiencies are a concern and (ii) only whole grains have been supplied.
- Increase efforts to build capacity in-house and among partners in the field to plan and manage distribution of fortified foods. This will entail more training on processing, milling and quality concerns for programme, logistics and procurement staff and partners. Practical publications covering aspects of quality, shelf life and costs must be developed for use in the field.
- Enhance WFP's capacity to conduct rigorous needs assessments and baseline and impact surveys. Documenting effectiveness and impact of fortification activities will be an important input to RBM during the 2004–2007 Strategic Plan. Research aimed at identifying new foods for fortification and delivery to vulnerable population groups will also be supported.
- Review existing commodity specifications and update internal procedures to support appropriate procurement, receipt and handling of commodities. There are needs for (i) more systematic compliance with WFP's micronutrient specifications, (ii) tracking of products in relation to their micronutrient content, perhaps through a modification of COMPAS and the commodity-tracking system.
- Strengthen partnerships with technical agencies, research institutions and private-sector entities that can collaborate in identifying cost-effective approaches to meeting the micronutrient needs of WFP beneficiaries. At national and international policy levels, alliances with United Nations agencies, governments and NGOs will be pursued to promote and support national fortification policies.

ACRONYMS USED IN THE DOCUMENT

CIDA	Canadian International Development Agency
CSB	corn-soya blend
DPRK	Democratic People's Republic of Korea
EMOP	emergency operation
FAO	Food and Agriculture Organization of the United Nations
FBF	fortified blended food
HEB	high-energy biscuit
IDP	internally displaced person
MI	Micronutrient Initiative
NGO	non-governmental organization
PLWHA	people living with HIV/AIDS
PRRO	protracted relief and recovery operation
UNHCR	Office of the United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
VGD	vulnerable group development
VMD	vitamin and mineral deficiencies
WHO	World Health Organization