**Follow-up meeting of the Joint WHO/UNICEF/WFP/UNHCR consultation on the dietary management of moderate malnutrition**

**23rd February, 2010, WHO HQ, Geneva**

## 1. Scope and objectives

In 2008, WHO's Departments of Child and Adolescent Health (CAH) and Nutrition for Health and Development (NHD), in collaboration with partners and with support from the IASC Nutrition Cluster, convened a consultation on the dietary management of moderately malnourished children. The aim of the consultation (hereon called MM1) was to discover what diets should be used for moderately malnourished children. The conclusions, recommendations and background papers of the consultation have been published in the Food and Nutrition Bulletin, Volume 30, Number 3, September 2009.

The WHO CAH and NHD, in collaboration with UNICEF, WFP and UNHCR, hosted a second consultation to discuss the programmatic aspects of the management of moderate malnutrition in children under five years of age from 24th to 26th February 2010 (hereon called MM2). The consultation was preceded by a one day meeting on 23rd February to discuss the follow up of MM1. The purpose of this one day meeting was to report back on related developments within participating agencies and to feed back on the findings of operational research.

## 2. Context

Andre Briend (formerly WHO) outlined the context of the meeting. He explained that, since MM1, a background paper was commissioned to define specifications for foods for treatment of moderate acute malnutrition (MAM) while UN agencies (including WFP, UNICEF, UNHCR and WHO) have worked together to develop improved CSB (CSB++) which is going to be used as a supplementary food for MAM children where there is insufficient access to nutrient dense foods. Following this meeting and MM2, it is expected that the specifications of foods for moderate acute malnutrition will be summarised and reviewed by an expert group. A joint statement will then be prepared by the agencies to include a description of the limitations of evidence and a date for revisions to have been made. Scientists and NGOs will then be invited to produce evidence from efficacy trials to inform further revisions. Dr Briend stated the expectation that the expert group will conduct their review before the end of 2010.

## 3. Product development in response to MM1

*Summary of Presentations*

Saskia de Pee (WFP) introduced this section with a summary of the rationale for producing CSB++. Where home diets and complementary foods are inadequate, special foods are required to complement the local diet, either in the form of fortified blended foods (FBF) or lipid-based nutrient supplements (LNS), providing up to 500kcal/day. However, LNS are somewhat more costly and may be best used in specific circumstances, such as emergencies where cooking possibilities are constrained or for non-responders to FBF. In other circumstances FBF will be used. WFP has been

working to improve traditional CSB by increasing its nutrient content and quality and reducing its anti-nutrient content (named improved CSB, or CSB++). However, there are many issues to resolve when considering further changes. For example, who is the target group, and what product modifications are producible, palatable, and stable?

John Wood (WFP) outlined the practical process of developing CSB++. The demand for CSB++ is estimated to be around 60-80,000 tons per annum (based on the number of moderately malnourished and under twos that are expected to receive fortified blended foods from WFP). CSB++, compared to CSB, has greater energy density (due to increased fat content), reduced crude fibre, reduced moisture content (and therefore better microbiological control) and reduced antinutrients through tighter control on aflatoxin and coliforms. There have also been significant improvements made by using less maize, dehulling soy and adding skimmed milk powder, sugar, soya oil and improving the vitamin and mineral mix.

There are, however, practical challenges involved in the production of CSB++. The improved premix, with better bioavailability, is more complex to use within the production facility as inclusion levels have increased from 1 kg vitamins + 3 kg minerals per ton to 2 kg vitamins + a total of 15.8 kg of calcium phosphate and potassium chloride added as separate components . This change has necessitated the installation of new dosing feeders. Dehulling is expensive and facilities for this are also largely unavailable. Fibre content must be reduced, but not to the extent that it reduces traction in the extruder (which will inhibit extruder throughput). Getting this balance right is challenging. Milk powder is susceptible to Maillard browning while copper oxidises fats, both of which can reduce shelf life. The impact of these reactions on product shelf life is under investigation. Storage can also lead to losses of certain micronutrients (e.g. vitamins A and C) as is the case with all fortified blended foods. Other practical challenges include dealing with humidity in rub halls and lack of capital investment to improve capacity and hygiene in local factories. Lastly, a major bottleneck in production is packaging. The desired pack size of 3kg (designed to reduce sharing) takes longer to fill and is considerably more expensive to produce than larger 25 kg packages that were previously used for standard corn soya blend. Other price issues relate to volatility of prices for milk powder and the basic ingredients maize and soya. WFP seeks to purchase its products at the best quality and most beneficial cost. Unfortunately, many developing country processors cannot match the price of European CSB even on an import parity basis, especially during periods of national crop shortages. These economic constraints apply to all ***food products and not only to CSB++***

Saskia de Pee (WFP) then outlined the need for more research into the efficacy of CSB++ compared to other interventions, e.g. dietary counselling, provision of local blended foods, CSB and CSB+, especially with respect to treating wasting, improving linear growth and functional outcomes. Research is also needed into the utilization of CSB++ at the household level, e.g. extent of sharing compared to other products (perhaps using tracers), how to add reactive forms of micronutrients safely without risking toxic effect or substantial shelf life reduction and how to overcome the packaging bottleneck outlined above. She also outlined the current proposed use of CSB++ in WFP, including treating MAM and blanket feeding children less than <2 years of age, using LNS when appropriate, i.e. when there are no cooking facilities or poor responses to CSB ++. She concluded by saying that CSB composition can be further adapted as knowledge and expertise develop.

*Summary of plenary discussion*

Plenary discussion following the presentations raised a number of issues and questions around the rollout out of CSB. The need to gather evidence on the appropriateness of 3 kg packaging was highlighted in order to justify the extra time and cost involved. The presumed shorter shelf life of CSB++ compared to LNS was also highlighted although it was noted that a longer shelf life wouldn't be necessary where good logistical management is in place. A note of caution was sounded regarding the use of different food composition databases when making up formulations, as there are significant differences, particularly when comparing US databases with others.

There was some discussion about the degree to which fluctuations in commodity prices impact the cost of production. The point was made that costs of importing items such as milk powder and vitamins and minerals make it difficult to expect cheaper production from developing countries.

Saskia de Pee (WFP) clarified that estimated tonnage requirements of CSB++ are based on WFP's existing case load. If the product is rolled out more widely, particularly for prevention purposes, then the requirements will dramatically increase. There are as yet no data to estimate by how much the case load would increase in this case.

There was considerable discussion around upper limits of nutrients and the need to balance IOM recommended ULs against the risks of malnutrition. The majority of cereals exceed upper limits set by IOM . Upper limits were set for long-term chronic use by a healthy US population and are therefore not necessarily appropriate for food insecure populations. It was argued that the IOM upper limits (ULs) constrain what we can put into the diet for certain nutrients and as a result prevent us from treating moderately malnourished children optimally. At the same time ULs for other nutrients like Na and Fe for moderately malnourished children may actually be lower than the IOM UL for health children

It was proposed at the meeting that the UN should give priority to drawing up specific nutrient upper limits or at least comment on the existing ones on a one by one basis for moderately malnourished children, i.e. set upper limits which can be officially presented to governments. Although a great deal of work, this will enable newly emerging products to be passed by governments to allow their use in prevention and treatment programmes.

## 4. Operational Research

Flora Sibanda-Mulder(UNICEF) presented a summary of ongoing UNICEF research activities, developed in response to the need for rigorous evaluation of different food products in the prevention and treatment of moderate malnutrition, highlighted by MM1. UNICEF has set up operational studies in Somalia, South Darfur, Madagascar and Djibouti to test the effectiveness of blanket distribution of different food products to children between 6-36 months in preventing nutritional deterioration. A randomised control study has also been set up in Mali to compare the effectiveness of RUSF, Misola (a locally produced micronutrient enriched food), locally available foods, and CSB++ in the treatment of moderate malnutrition amongst children between the ages of 6-36 months. It is hoped that this work will help inform the development of a UNICEF strategy for

management of MAM and contribute to a joint WHO/UNICEF/WFP/UNHCR joint statement. Four presentations provided further details of these studies.

Paola Valenti (UNICEF) reported on a study in Fianarantsoa, Madagascar which aims to evaluate the impact of plumpy'doz supplementation during the lean season on the nutritional status of children 6 to 36 months, comparing intervention (Fianaratsoa) and control areas (Ambohimasoa).. The study started in October 2009 and is due to be completed in March 2010. Although too early to present any analysis on impact, the study determined that out of the 461 children who received two months supply of plumpy'doz, 95% liked it and 91% have no difficulty eating it. Final data analysis is expected May 2010.

Marc-Andre Prost (WFP) reported on a study of the acceptability and effectiveness of RUSF in a WFP supplementary feeding programme in Somalia. The justification for introducing RUSF was that given the security situation and limited access, follow up, teaching, training and social marketing was difficult to implement. Furthermore, it has a longer shelf-life than CSB, is less susceptible to contamination and may incur less intra-household sharing. A household questionnaire and routine data collection were implemented on a random sample of children (n=240). The study is ongoing, but preliminary findings show caregiver knowledge about the purpose, dosage and key messages of RUSF are almost universally good in the target population and that the product is well accepted by children and caregivers. There is evidence of sharing mostly with other children <5 years. The product may benefit from a specific, locally acceptable name or logo. It was also noted that while defaulter rates were very high at the start of the programme these had declined to within SPHERE standards by January 2010. Another key finding has been that 20% of respondents stated they would be prepared to pay for the RUSF if supplies ran out. Further study is needed to compare RUSF with fortified blended foods and to analyse cost-effectiveness. A key conclusion of the presentation was that RUSF has specific advantages for the Somalia context. In plenary discussion it was suggested that additional qualitative data be collected on perceived benefits as well as potential side effects attributed to RUSF by caregivers, e.g. stool changes, skin and behaviour changes.

Carlos Navarro-Colorado (Independent Consultant) reported on a randomised trial of plumpy'doz and CSB for moderate malnutrition in Darfur. 480 children aged 6 to 36 months were randomised into two groups, one receiving the standard CSB monthly distribution for three months and the other receiving plumpy'doz monthly for three months. There are as yet no results, although there are early signs of encouraging data to show that children in the plumpy'doz group grow faster in height than those on CSB.

Roland Kupka (UNICEF) reported on a randomized controlled community-based effectiveness trial of selected dietary strategies for the management of moderate malnutrition in children aged 6 to 35 months. Children in South West Mali are recruited through community based screening activities and then randomised to one of four dietary regimes; supplementary plumpy, CSB++, locally produced complementary food enriched with MN (Misola) or local foods plus MN powder (control group). Impact is being measured through participation in the rehabilitation programme, physical growth, recovery from moderate acute malnutrition, body composition and micronutrient status. The study is about to start and therefore there are as yet no results to report. The minimum sample size will be 840 children, e.g. 210 per intervention group.

*Summary of plenary discussion*

Following the above presentations a number of questions and issues were raised in plenary discussion. There was concern expressed about the lack of a common evaluation framework and coordination structure for the various ongoing and planned research activities related to development of products for treatment and prevention of MAM. There was also a question about why the Mali research was focussing on children between 6-36 months when CSB ++ (and P'Doz as well) is designed for the 6-24 months age-group. It was suggested that there should be separate analysis of data for 6-24 months and 24-36 month age groups.

Mark Manary ( St Louis Children's Hospital, US) reported on a randomized investigator-blind trial for three supplementary foods for moderate malnutrition in Malawi (n=3000 children aged 6-60 months). The study compares CSB++, soy/peanut fortified spread and supplementary plump'y. Enrolment started in October 2009 and the study is expected to last for 18 months. There are as yet no results to report.

He also reported on a 2007-8 RCT in Malawi comparing isoenergetic amounts of soy/peanut fortified spread with standard CSB in 2000 children with moderate wasting. Recovery was seen in 80% of children receiving the fortified spread and 72% of the children receiving CSB. Following the study, the project continued using fortified spread in the same operational setting (but without the same level of input and support as in the research phase). The results were nonetheless similar (80% recovery). Weight gain was also identical while mean duration of treatment was substantially shorter. This shows that the use of fortified spread to treat moderate malnutrition is robust. However, indirect evidence suggests that use of CSB is less robust ; the average duration of treatment is longer while the cost is similar.

Judy Canahuati (US Agency for International Development) notified the group about funding windows within the USA Agricultural Appropriations for projects to develop, pilot and test new and improved micronutrient fortified products designed to meet energy and nutrient need of populations. The USDA research centre also has funds to develop and test new food products to improve delivery of humanitarian food assistance. Both sources of funding are open to international organisations and will open in March 2010.