CMAM Forum

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Management of Moderate Acute Malnutrition (MAM): Current Knowledge and Practice

Reginald A. Annan[1], Patrick Webb[2], Rebecca Brown[3]

1. Kwame Nkrumah University of Science and Technology, KNUST, Kumasi, Ghana
2. Friedman School of Nutrition Science and Policy, Tufts University, Boston, USA
3. CMAM Forum

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Abbreviations

ACF	Action Contre la Faim / Action Against Hunger
ART	Antiretroviral Therapy
BCC	Behaviour Change Communication
BSF	Blanket Supplementary Feeding
BSFP	Blanket Supplementary Feeding Programmes
CMAM	Community based Management of Acute Malnutrition
CSB	Corn Soy Blend
CSM	Corn Soy Milk
DSM	Dried Skimmed Milk
EFA	Essential Fatty Acids
ENN	Emergency Nutrition Network
FANTA	Food and Nutrition Technical Assistance
FAO	Food and Agriculture Organisation of the United Nations
FBF	Fortified Blended Foods
FFP	USAID Office of Food For Peace
GFD	General Food Distribution
GAM	Global Acute Malnutrition
GNC	Global Nutrition Cluster
HEB	High Energy Biscuits
HFA	Height-for-Age
HIV	Human Immunodeficiency Virus
IAEA	International Atomic Energy Agency
IASC	Inter-Agency Standing Committee
IMTF	International Malnutrition Task Force
IPC	Integrated Food Security Phase Classification
IYCF-E	Infant and young child feeding - Emergencies
LNS	Lipid-based Nutrient Supplement
MAM	Moderate Acute Malnutrition

MNP	Micronutrient Powder
M&E	Monitoring and Evaluation
MSF	Médecins Sans Frontières
MUAC	Mid-Upper Arm Circumference
NCHS	National Centre for Health Statistics
NGO	Non-Governmental Organisation
PDCAAS	Protein Digestibility Corrected Amino Acid Score
PLW	Pregnant and Lactating Women
PUFA	Polyunsaturated Fatty Acids
RCT	Randomised Controlled Trial
cRCT	cluster Randomised Controlled Trial
RDA	Recommended Daily Allowance
RNI	Recommended Nutrient Intake
RSB	Rice Soya Blend
RUF	United Nations University
RUSF	Ready-to-Use Supplementary Food
RUTF	Ready-to-Use Supplementary Food
SAM	Severe Acute Malnutrition
SD	Standard Deviation
SFP	Supplementary Feeding Programme
TSFP	Targeted Supplementary Feeding Programme
TFP	Therapeutic Feeding Programme
UN	United Nations
US	United States
USDA	United States Department of Agriculture
USAID	United States Agency for International Development
UNHCR	United Nations High Commission for Refugees
UNICEF	United Nations Children's Fund
UNSCN	United Nations Standing Committee on Nutrition
WFA	Weight-for-Age
WFH	Weight-for-Height
WFP	World Food Programme
WSB	Wheat Soy Blend
WSM	Wheat Soy Milk
WHO	World Health Organisation

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1 Introduction

This Technical Brief is one of three commissioned by the Community-Based Management of Acute Malnutrition (CMAM) Forum. The Brief focuses on current principles and approaches to Moderate Acute Malnutrition (MAM) management, highlighting key constraints, gaps in knowledge and areas still lacking consensus. It is intended to inform ongoing debates among practitioners, national partners, donors and analysts on what information and evidence on best practices are currently available, where the gaps are, and priorities for knowledge generation going forward.

1.1 Brief Methodology

To understand current knowledge and practice relating to the management of MAM, recent systematic reviews, meta-analyses and other major narrative reviews on the management of MAM were considered. Additionally, a manual search of unpublished literature, including consultation meeting reports, technical reports, decision making tools, training manuals and modules on MAM management was conducted. Information was reviewed from the United Nations agencies and international Non-Governmental Organisations (INGOs) involved in managing MAM management programmes for any reports and guidance materials on MAM management. Websites, including those of the Emergency Nutrition Network (ENN) and Epicentre, CMAM forum, International Malnutrition Task Force (IMTF), World Health Organisation (WHO), United Nations Children Fund (UNICEF), International Atomic Energy Agency (IAEA), World Food Programme (WFP), Food and Agriculture Organisation (FAO), and the World Bank were visited to locate resources and reports on MAM management.

In addition to the literature review, a short questionnaire was sent to key informants in specific agencies, to facilitate sharing of their experience on MAM management from a practitioners' perspective. Information collected in these questionnaires included the following:

- **Level of attention:** whether MAM issues are receiving adequate attention.
- **Guidance:** which guidelines are being used (including definition of MAM and its detection, screening, referral, diagnosis and treatment protocols).
- **Consensus:** areas of consensus around the management of MAM, and where consensus does not currently exist.
- **Knowledge Gaps:** areas where more empirical information is urgently required to inform MAM management policies and practices.
- **Effectiveness:** effectiveness of MAM treatment.
- **Areas for improvement:** means of improving MAM management.

Information from all sources was collated and summarized in draft form for comment on, and discussion with, numerous experts including various practitioners, national decision makers, academics, development agency staff, and members of the CMAM Forum Steering Committee. The current document reflects broad consensus views, but highlights gaps in knowledge and areas where differences of opinion remain (in terms of approaches to the management of MAM).

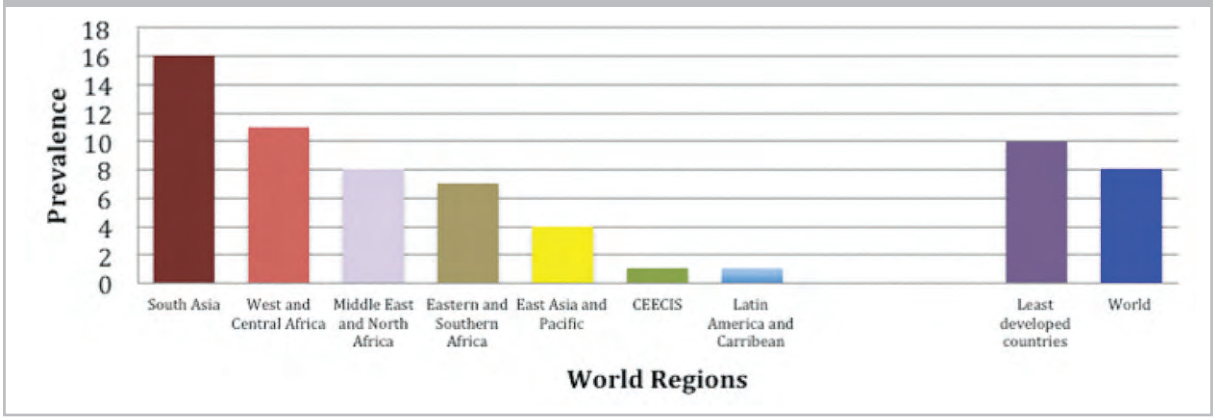
1.2 The Global Burden of MAM

Acute malnutrition (often referred to as wasting) is a major global health problem.[1,2] According to the World Health Statistics report, a global total of 52 million children under 5 could be classified as having acute malnutrition in 2012, of which 33 million had MAM (defined as weight-for-height (WFH) between -3 to -2 Standard Deviations).[3] Thus, MAM affects roughly one in ten children under 5 years of age in the least developed countries.[4]

There are significant regional variations in the prevalence of MAM (Figure 1). Approximately one in 6 children under 5 years in South Asia suffered from MAM in 2013 (i.e. 17%), followed by West and

Central Africa (11%) and Middle East and North Africa, (8%). MAM prevalence is 10% or higher in 19 out of 80 countries with recent estimates. These children are at increased risk of Severe Acute Malnutrition (SAM), and even with MAM have a roughly three times higher risk of mortality from common communicable diseases than if they were well-nourished.[5,6] Indeed, MAM and SAM together account for roughly 11.5% of total deaths of children under 5 (representing roughly 875,000 preventable deaths each year).[1]

Figure 1: Percentage of Children under 5 Wasted (MAM) in 2012



Source: *United Nations Children's Fund, World Health Organization, The World Bank, UNICEF-WHO-World Bank Joint Child Malnutrition Estimates, 2013.*

The top 10 countries most affected by MAM and SAM as of 2013, in terms of prevalence rates, are presented in **Table 1**. The majority of these countries have a prevalence of MAM greater than 10%. South Sudan tops the list with a prevalence of 23%, while Indonesia has a prevalence of 13%. In absolute numbers however, India has the highest burden, with over 25 million children under 5 with MAM or SAM, followed by Nigeria, with close to 4 million children.

The distribution and prevalence of MAM has not changed a great deal in recent decades[3,4] although notable reductions have been recorded in Latin America.[6-8] In 1990, the global estimate of children suffering from MAM or SAM was 58 million according to UNICEF,9 implying that between 1990 and 2011, the prevalence of acute malnutrition reduced by only 11%.

Table 1: Wasting Prevalence (MAM and SAM) among Children under 5 Years of Age in the 10 Most Affected Countries Worldwide (based on <-2 SD WFH)

Ranked by prevalence (2007–2011)	Country	Year	MAM prevalence (%)	SAM prevalence (%)	Number of MAM and SAM children 2011 (thousands)
1	South Sudan	2010	23	10	338
2	India	2005–2006	20	6	25,461
3	Timor-Leste	2009–2010	19	7	38
4	Sudan	2010	16	5	817
5	Bangladesh	2011	16	4	2,251
6	Chad	2010	16	6	320
7	Pakistan	2011	15	6	3,339
8	Sri Lanka	2006–2007	15	3	277
9	Nigeria	2008	14	7	3,783
10	Indonesia	2010	13	6	2,820

Source: *United Nations Children's Fund, World Health Organization, The World Bank, UNICEF-WHO-World Bank Joint Child Malnutrition Estimates, 2013.uploads/2012/07/GHA_Report_2012-Websingle.pdf*

Both moderate and severe acute malnutrition have serious consequences, contributing to increased morbidity and mortality, impaired intellectual development, suboptimal adult work capacity and increased risk of disease in adulthood.[1,2,5] Interventions to address undernutrition should therefore include a strong component of MAM management, where possible, not only treatment.

2 The Management of MAM: Recent History

Although there are still gaps in current understanding of prevention and treatment of acute malnutrition, there is a greater level of consensus around the management of SAM[10] than of MAM.[11] There are too few studies, and numerous inconsistent findings, on the effectiveness of MAM management.[12-14] Several reviews have highlighted the apparent lack of effectiveness of targeted SFPs aimed at treating MAM in emergencies, noting high rates of defaulting, low coverage and high associated costs.[14] That said, the development of new practices under the rubric of Community Based Management of Acute Malnutrition (CMAM), also sometimes known as Community-based Therapeutic Care (CTC) or even Integrated Management of Acute Malnutrition (IMAM), has prompted growing interest in the evidence base for effective action.

CMAM was designed to address the limitations inherent in facility-based care of low access, low coverage and high cost associated with inpatient management of SAM, by providing care to the majority of children with uncomplicated SAM as outpatients.[10] Many programs have claimed evidence of success, and this has fuelled a demand for wide dissemination of evidence-based best practice, a) in sustaining recovery from SAM through MAM, b) in treating MAM (thereby preventing SAM), and c) in seeking to prevent MAM from occurring. While considerable attention is often focused on curative measures, it is increasingly acknowledged that multiple integrated interventions are often needed to address underlying causes as well as immediate symptoms. Thus, while this Brief focuses on Nutrition Counselling and Education and Supplementary Feeding as the two main established forms of MAM management currently widely implemented, this does not negate the need in many MAM contexts for broader complementary actions aimed at disease prevention, psychosocial care, shelter, etc.

2.1 Nutrition Counselling and Education

Nutrition counselling has long been used as an approach to MAM management in situations where caregivers may have access to affordable food, and knowledge of appropriate care practices is not a constraint. This approach is predicated on the assumption that nutritious food is available, but also that caregivers do not have sufficient awareness of how to combine foods into appropriate diets for malnourished or at-risk children.[15] This approach focuses on disseminating information on appropriate feeding practices which can increase dietary diversity and meet nutritional requirements, as well as improvements in sanitation and hygiene practices.[16] In later sections of this Brief, guidance for carrying out dietary counselling and a review of its effectiveness will be discussed.

2.2 Supplementary Feeding

Supplementary feeding (the provision of specially formulated supplementary foods[i]) has long been a component of emergency food aid interventions, mostly implemented by non-governmental and United Nations agencies to treat moderately malnourished children or to prevent a deterioration of nutrition

[i] "Supplementary foods" refer to specially-formulated foods in ready-to-eat or milled form, which are modified in their energy density, protein, fat or micronutrient composition to help meet the nutritional requirements of specific populations. Supplementary foods are not intended to be the only source of nutrients, and they are different from complementary foods in the latter are intended to facilitate the progressive adaptation of infants 6 months of age and older to the food of the family. They are also different from diet supple¬ments, which refer to vitamin and mineral supplements in unit dose forms, such as capsules, tablets, powders or solutions, where national jurisdictions regulate these products as food.

among at-risk popualtions.[17] They are sometimes also implemented in non-emergency contexts where rates of MAM and SAM are found to be unusually high. There are two types of Supplementary Feeding Programme: blanket and targeted supplementary feeding[18]:

Blanket Supplementary Feeding Programmes (BSFP) involve the distribution of supplementary foods to all target vulnerable families in food insecure situations. This approach has been used to address MAM when prevalence rates exceed 20% (or when it is >15% in the context of aggravating circumstances, such as epidemics). The objective of a BSFP is to prevent widespread malnutrition (or to control its spread) and to reduce excess mortality among those at risk through the provision of food rations and/or micronutrient supplements for vulnerable groups (such as children, pregnant and lactating women, the elderly and chronically ill in the affected areas).[19] Blanket supplementary feeding will not be discussed in detail in this brief as it is covered in a separate Brief looking at the role of nutrition-specific interventions in the prevention of MAM. Two separate but concurrent Briefs address preventative approaches to MAM management.[20,21]

Targeted Supplementary Feeding is implemented in food insecure situations, including in emergencies, in order to treat MAM and to prevent children with MAM from becoming severely malnourished (falling into SAM). Targeted Supplementary Feeding is usually indicated when MAM and SAM prevalence rates are between 10-14% or 5-9% with aggravating circumstances. Examples of these aggravating circumstances are presented in **Table 9**. Targeted Supplementary Feeding involves the provision of food supplements for children between 6 months and 5 years, pregnant and lactating women and other individuals with MAM.[18,19] Targeted SFPs should ideally be run in conjunction with a general food distribution (GFD).[18,19] Details on current guidance for TSFP are presented in Section 3.6.

The targeting of supplementary foods for MAM within community interventions (rather than in facilities) developed around the year 2000. The CMAM approach, originally developed by non-governmental organizations, but formally adopted by the UN System in 2007[22] and subsequently incorporated into the national Ministry of Health protocols of many developing countries, also links the management of MAM with inpatient and outpatient care of severely malnourished children with, and without, complications.[22] It was the rapid spread of CMAM approaches, first in humanitarian settings and then in development contexts as well, that served to highlight the value of a new generation of specialized supplementary food products.

2.3 Specialised Foods used for Supplementary Feeding

Prevention and treatment of MAM with food supplements necessitated the development of specialised food products, including FBFs which have been traditionally used for decades.[23,24] Various formulations of corn (maize), soy blends (CSB) and wheat soy blends (WSB) have been used for the past five decades, evolving with the advances in scientific evidence of their nutritional value and impact.[17] Webb et al. summarised milestones in the development of specialised food products used for MAM management, presented in **Table 2**.

Table 2: Milestones in the Development of Specialised Food Products for MAM Treatment	
Timeframe	Specialised Food Product
1964	Cereal–plant–protein (Ceplapro) prototype FBF developed for Food for Peace (FFP)
1966–1970s	Corn–Soy Milk (CSM), Corn–Soy Blend (CSB), UNIMIX
1980s	High-Energy Biscuits (HEBs)
1990s	Ready-to-Use Therapeutic Foods (RUTFs)-sometimes used in MAM programming
2000s	Ready-to-Use-Supplementary Foods (RUSFs) Lipid-Based Nutrient Supplements Other fortified-soy flours
2010s	Enhanced variants of Corn-Soy Blend and Wheat-Soy Blend (Supercereals with new micronutrient forumulations), new FBFs made of alternative grains and pulses, emergency survival bars/pastes, reformulated high-energy biscuits

Source: *Adapted from Webb, Patrick, Beatrice Lorge Rogers, Irwin Rosenberg, Nina Schlossman, Christine Wanke, Jack Bagriansky, Kate Sadler, Quentin Johnson, Jessica Tilahun, Amelia Reese Masterson, Anuradha Narayan. 2011. Improving the Nutritional Quality of U.S. Food Aid: Recommendations for Changes to Products and Programs. Full Report to USAID of the Food Aid Quality Review. Boston, MA: Tufts University.*
Blanket Supplementary Feeding (BSF)

The original formulations of FBFs were known as Corn–Soy Milk and Wheat–Soy Milk (CSM and WSM) and were high in protein (17.8 g/100 g dry weight compared with 5.9 g/100 g in the current CSB13) and relatively low in fat (6.3 g/100 g, compared with 8.7 g/100 g CSB13). They were originally fortified with 11 vitamins and minerals and contained dried skimmed milk (DSM).[23,24] In 1971, CSM and WSM cost roughly $0.40 per 1000 kilocalories compared with $0.08 per 1000 kcal for CSB13. The high cost affected the availability of these products, leading to the reformulation of FBFs to omit the DSM in the 1980s.[24]

The subsequent formulation of CSB without DSM was made of cereals and legumes and sometimes had no added fat.[11] They were therefore less high in protein, low in fat, high in dietary fibre and anti-nutrients such as phytates, and lacked the animal protein that is widely suggested is needed to promote recovery in malnourished children.[25,26] These products were therefore considered to be ineffective in addressing MAM due to inadequate nutrient composition and wider sharing at the household level.[24]

Modifications have been made to Fortified Blended Foods (FBF) to improve their nutritional quality over the years. This includes improving the micronutrient content of CSB,[27] the use of soybean protein isolate and other forms of quality protein additives, lowering phytate content by using de-germed and de-hulled maize flour, adding sugar and oil to improve energy density, treating ingredients of FBF with phytase[26] to minimise the effects of phytates, and enhanced mixing and cooking through extrusion technology.[23,24] Currently the two newest versions of FBFs are Supercereal and Supercereal+.27 In Section 3.7, a list and description is provided of the most common of these specialised products.

Although the original formula for FBF was designed to treat acute malnutrition in under 5s,[28] the current use of FBF includes additional age groups such as adolescents, pregnant and lactating women and the elderly.[24,29,30] However, the move towards community-based care using lipid (rather than grain-based) products, led to the current generation of ready-to-use foods (RUFs), initially intended solely for therapeutic treatment of SAM. Although the effectiveness of RUTFs (therapeutic versions of RUFs) has been demonstrated in the outpatient management of SAM,[31,32] it has been considered to be inappropriate by some for use in the management of MAM, due to its cost and specialized nature (i.e. unfamiliarity).[26] Research has recently focused on developing specific specialised food products for MAM management, leading to the development of Lipid Based Nutrient Supplements (LNS) such as Ready-to-Use Supplementary Foods (RUSFs); these are described in section 3.72.[ii]

3 An Overview of Current Guidance for MAM Management

Key guidelines on the management of MAM are highlighted in this section. These include: the Global Nutrition Cluster's publication: Moderate Acute Malnutrition: A Decision Tool for Emergencies,[18] WHO's Technical Note on Supplementary Feeding for the Management of MAM,[33] Harmonised Training Package module 12 on MAM management,[34] UNHCR Operational Guidance on the use of special nutritional products in refugee populations,[35] and UNHCR/WFP Guidelines for Selective Feeding: The Management of MAM in Emergencies.[19] Some national guidelines are also available and should be consulted for country-specific programmatic recommendations. Examples of national guidelines are listed in the appendices.

3.1 Principles of MAM Management

At a consultation in 2012, the World Health Organisation endorsed a number of principles for the management of children with MAM.[33] These principles provide guidance on best practices, the types and sources of nutrients and food required for MAM treatment, and on ensuring that supplementary food formulations are safe and effective. Some of the principles relevant to children 6-59 months of age are listed in **Box 3** below.

It is not recommended that infants below 6 months of age with MAM be admitted into SFPs. At this point, recommendations are for exclusive breastfeeding to be adopted or continued for the first six months of a child's life. In other words, breastfed infants under 6 months with MAM should be managed by providing supplementary food and skilled support to the mothers to enable continued breastfeeding. The infant should be monitored for weight gain. A lactating mother should be admitted to SFP regardless of her own nutritional status if her infant is deemed to be MAM. If infants less than 6 months have SAM, they should be referred to the hospital for intensive Infant and Young Child Feeding (IYCF) support and/or inpatient care as necessary.[36,37] Mothers of infants who have stopped breastfeeding should be supported to re-establish exclusive breastfeeding wherever possible.

In addition to children under 5, there are other groups vulnerable to MAM, including pregnant and lactating women (PLW), people living with HIV [38,39] and certain groups amongst the elderly. It is important that these groups not be overlooked in assessments of need in the context of MAM management programmes. Guidelines are available for planning and implementing MAM prevention and treatment programmes for PLW[40-43] dealing with MAM in infants below 6 months of age and their mothers,16 elderly people with MAM and people living with HIV/AIDS.[47] More attention is also being paid these days to the design of programmes for MAM management in urban rather than rural settings.[44,45]

[ii] Discussions are ongoing on the desirability of producing a single product that could potentially be used at different doses and frequencies for either SAM or MAM. This discussion has arisen since the formulation of most common RUFs for SAM and MAM are very similar (in terms of macro and micronutrients), and cost-savings could be derived from the production of more standardised commodities. There are many issues to be resolved in this particular debate, with many agency-specific concerns to be taken into account.

Table 3: Principles of Nutritional Management of MAM

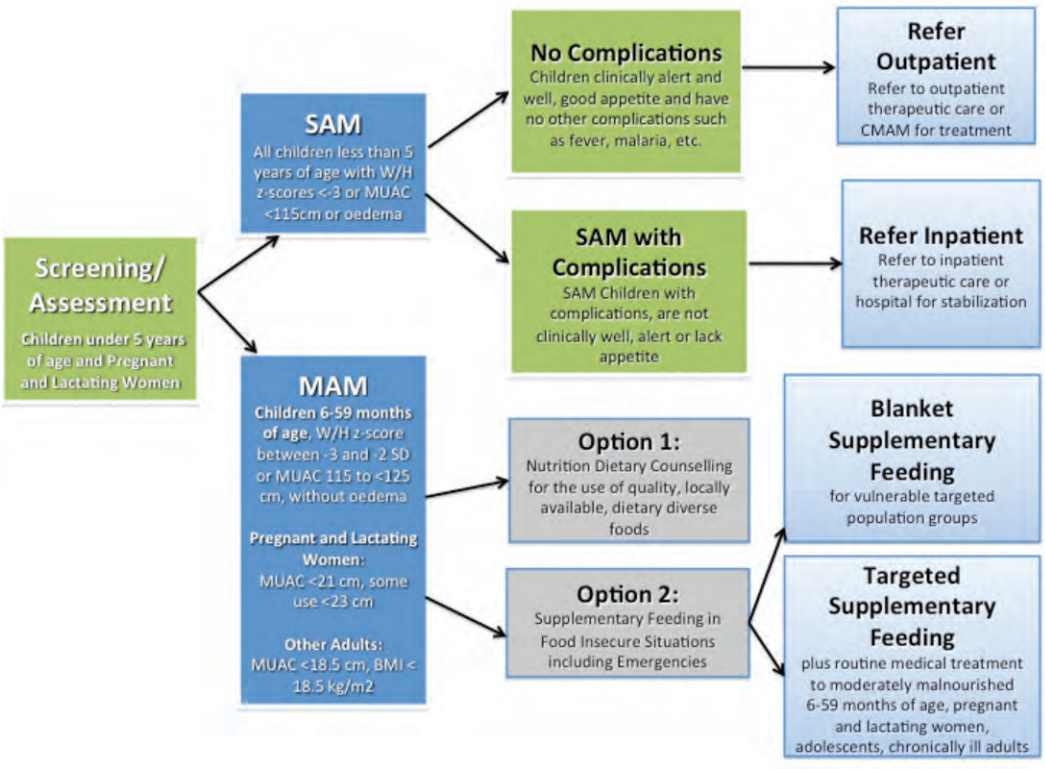
- Every child should receive nutrition of a sufficient quality and quantity to enable normal growth and development
- Management of MAM in children 6–59 months of age should include essential nutrition actions such as breastfeeding promotion and support, education and nutrition counselling for families
- Children 6–59 months of age with MAM need to receive nutrient-dense foods to meet their extra needs for weight and height gain and functional recovery.
- Animal-source foods are more likely to meet the amino acid and other nutrient needs of recovering children. Plant-source foods, in particular legumes or a combination of cereals and legumes, also have high-quality proteins, although they contain some anti-nutrients
- Supplementary foods, particularly when they represent the main source of energy, need to provide nutrients at levels that do not cause adverse effects in moderately malnourished children when consumed for several months.
- The formulation of supplementary foods should be safe and effective, particularly where moderately malnourished children use this food as their only source of energy.
- The mineral components should be authorised by a regulatory body. The Codex Alimentarius includes a list of approved additives and fortificants for foods for infants and young children

Source: *WHO. Technical note: supplementary foods for the management of moderate acute malnutrition in infants and children 6–59 months of age. Geneva, World Health Organization, 2012.*

3.2 MAM Management Decision Making Framework

This section focuses on guiding principles and recommendations for MAM management, including screening, assessment, identification, admission and discharge criteria, treatment options and treatment specialised food products, follow-up, monitoring, reporting and stopping SFPs. A framework for decision-making on acute malnutrition is presented in **Figure 2**.

Figure 2: Decision-making Tree for Acute Malnutrition



Source: *modified from management of MAM guidelines by IASC Nutrition Cluster and Nutrition Working Group of the Somalia Support Secretariat (2014). In many countries and programmes the use of both MUAC cut-offs for both SAM and MAM identification is common, and where weighing or measuring weight/length is not feasible, MUAC is exclusively used.*

3.3 Recommended Nutrient Requirements for MAM

Little is currently known about the nutrient requirements for MAM children,[19] but some recommendations have been proposed.[46] The proposed Recommended Nutrient Intakes (RNI) for children with MAM are illustrated in **Table 4**. Two separate recommendations have been proposed. First are the minimum nutrient requirements when using a variety of appropriately processed locally-available foods. Second are the optimal requirements proposed for the formulation of specialised complementary, supplementary, or rehabilitation foods for children with MAM. [46,47]

Table 4: Proposed Recommended Nutrient Intake (RNI) for Children with MAM Living in Poor Environments Expressed as Nutrient Energy Densities (amount of nutrient/1000 kcal)

Nutrient	Unit	Locally available foods	Specially formulated foods	Nutrient	Unit	Locally available foods	Specially formulated foods
Protein				Water Soluble Vitamins			
Protein	G	24	26	**Thiamine**	Mg	600	1000
Sodium	G	3.9	4.2	**Riboflavin**	Mg	800	1800
Minerals				**Pyridoxine**	Mg	800	1800
Sodium	Mg	550	550	**Cobalamin**	Ng	1000	2600
Potassium	Mg	1400	1600	**Folate**	Mg	220	350
Magnesium	Mg	200	300	**Niacin**	Mg	8.5	18
Phosphorus	Mg	600	900	**Ascorbate**	Mg	75	100
Sulphur	Mg	0	200	**Panthothenic acid**	Mg	2.7	3
Zinc	Mg	13	20	**Biotin**	Mg	10	13
Calcium	Mg	600	840	Vitamins, fat soluble			
Copper	Mg	680	890	**Retinol**	Mg	960	1900
Iron	Mg	9	18	**Cholecalciferol**	Mg	7.4	11
Iodine	Mg	200	200	**Tocopherol**	Mg	11.5	22
Selenium	Mg	30	55	**Phytomenadione**	Mg	20	40
Manganese	Mg	1.2	1.2	Essential fatty acids			
Chromium	Mg	0	11	**N-6 fatty acid**	G	5	5
Molybdenum	Mg	0	0	**N-3 fatty acid**	G	0.85	0.85

Source: *Adapted from Golden (2009) – proposed nutrient densities for moderately malnourished children Food and Nutrition Bulletin, vol. 30, no. 3 (supplement). Recommendations for other nutrients can be found in that report.*

A consultation was conducted by WHO/ UNICEF/WFP/UNHCR on MAM for children under 5 in 2009, to identify areas of consensus on nutrient needs and dietary management of acute malnutrition and to identify knowledge gaps that should be addressed by research, both in the areas of dietary management and modalities of dietary provision.[498] Some of the consensus statements developed by this working group are presented in **Table 5**.[48]

In the five years following that meeting, there have been numerous international expert gatherings aimed at fine-tuning these recommendations, establishing additional methods for their computation, determining their viability as benchmarks for industry (i.e. their ability to translate such recommendations into affordable, palatable and efficacious products), and exploring the clinical relevance of extreme specificity in the context of complex and chaotic operational realities. As of 2014, the micronutrient premix formulation for FBFs and some RUFs have been increasingly standardised (harmonised) across the key food aid agencies concerned (notably USAID, WFP, UNICEF and UNHCR), and discussions continue regarding the potential for further harmonisation of specifications beyond nutrient levels, potentially to include food safety standards, testing requirements, labelling, package sizes, etc. In other words, while

there is increasing convergence on the range of nutrient specifications for food products used in MAM management, the details continue to evolve and innovations in processing, packaging and microencapsulation offer potential for enhanced products in coming years.

Table 5: Recommendations on Diets Suitable for Children with MAM

- Energy requirements of moderately malnourished children increase in relation to the rate of weight-gain during catch-up growth. Energy requirements also depend on the type of tissue deposition.
- A low weight-gain in relation to energy intake may be due to preferential fat deposition as a result of an inadequate supply of nutrients needed for the accumulation of lean tissue.
- The diets of children recovering from moderate wasting should provide at least 30% of their energy as fat and 10-15% as protein.
- Diets for moderately malnourished children should have at least 4.5% of their total energy content from n-6 polyunsaturated fatty acids (PUFAs) and 0.5% from n-3 PUFAs. The ratio of linoleic/alpha- linolenic acid should remain in the range of 5 to 15. A ratio within the range of 5 to 9, however, may be preferable.
- The energy needs of moderately malnourished HIV-infected children are increased by 20%-30% in comparison with those of non-HIV-infected children who are growing well. There is no evidence for increased protein requirements in relation to energy; i.e. 10% to 15% of the total energy intake is sufficient, as for non-HIV-infected children with moderate malnutrition.
- The nutritional requirements of moderately malnourished children probably fall somewhere between the nutritional requirements for healthy children and those for children with severe acute malnutrition during the catch-up growth phase.

Source: *Adapted from Golden (Golden (2009) – proposed nutrient densities for moderately malnourished children Food and Nutrition Bulletin, vol. 30, no. 3 (supplement)*

Based on **Table 5**, and subsequent discussions, a range of guidance exists on the appropriate combinations in food rations of energy density, protein, fat, carbohydrate, vitamins and minerals for MAM: these are presented in **Table 6**.[49]

Beyond food aid composition, recommendations also exist for overall dietary adequacy of MAM children which can be useful in the context of non-emergency counselling approaches that rely on domestic sources of food.[11] The WHO/UNICEF/WFP/UNHCR agreed that for the Management of MAM in Children under 5 years of age using dietary counselling, certain principles should be considered to enhance effectiveness.[48] Presented below in **Table 7** are some recommendations for counselling on the use of household/family foods. A full list of these recommendations can be found in the Food and Nutrition Bulletin (2009).[48]

A review of current practices by selected agencies and national programmes on the use of household/family foods for managing acute malnutrition revealed that very few counselling approaches used appropriate practices.[15] Less than half of programmes reviewed gave specific messages, such as feeding children a specific number of times per day with appropriate quantities of energy-dense foods including foods from animal origin. The review aimed to include studies which examined approaches where mothers or caregivers of moderately malnourished children were counselled about rehabilitating their children at home with family foods, but only two such studies were identified. As an alternative, 10 studies were included which followed severely malnourished children who were rehabilitated at home with family foods until they reached at least 80% WFH or –2 z-scores. The justification for the inclusion of these studies was that these children pass through a phase of moderate malnutrition during recovery. The studies recorded varying successes with average weight-gains ranging from around 1.5g to 10g/kg/day. Five studies reported morbidity as an outcome and this was high in four of the five. The review findings revealed that nutrition counselling as an approach for MAM management was not effective. However the authors noted that the lack of impact was not necessarily because dietary counselling does not work but may rather be due to the fact that it was inappropriately implemented.

Table 6: Nutritional Recommendations for the Management of Moderate Acute Malnutrition				
Energy Density	Protein	Fat	Carbohydrates	Minerals and Vitamins
• Children with stunting have smaller energy requirements than children with moderate wasting and therefore do not have the same need for foods with a high energy density. The energy density of their food probably should not be much higher than that of food for children without malnutrition. • Energy densities between 1 and 1.5 kcal/g are recommended for infants and young children with stunting. • Giving a diet with a high energy density for a long period to stunted children could potentially lead to obesity. • For children with moderate wasting, foods with energy densities between 1.5 and 2.0 kcal/g is preferred. • High energy densities can be obtained by adding fats or oils to the food, which will not increase the osmolarity.	• Protein intake and quality are important determinants of growth in the treatment of moderately malnourished children. • A surplus of protein in the diet may reduce appetite and is an ineffective and costly source of energy • A high protein quality, i.e., PDCAAS > 70% to 80%, should be aimed for. • Children receiving a diet with a low PDCAAS would benefit from addition of animal-source foods to the diet. It is suggested that about one-third of the protein intake should come from animal-source foods to make a significant impact on growth.	• A low content of fat in the diet reduces the energy density and total energy intake. • Diets for moderately malnourished children should • aim at a fat energy percentage between 35 and 45, and not go below a minimum level of 30% fat. • When the fat content is increased, there may be a need to also increase the content of other nutrients to avoid a decline in the nutrient density.	• Lactose mal-digestion and intolerance is generally not a problem in the treatment of children with moderate malnutrition. • Lactose may improve mineral absorption and have prebiotic effects. • Starch is an important and cheap source of energy for children with moderate malnutrition. • Dietary fibres increase bulk and satiety and reduce nutrient and energy digestibility, which may be harmful to children with malnutrition. • It is unknown to what degree fibres are available as energy in infants and children with moderate malnutrition, especially if they have gastrointestinal problems. • In infants and children up to 2 years of age, the fibre intake, and especially the intake of insoluble fibres, should be kept as low as possible until further evidence is available. • There is inadequate data to determine an upper limit for intake of insoluble dietary fibres.	• The content and bioavailability of minerals and vitamins are often poor in diets of children with moderate malnutrition and should be improved. • The bioavailability of minerals is influenced by various dietary components that may act as either enhancers or inhibitors. • The content of phytate in foods has a strong negative effect on the bioavailability of important minerals, and food-processing methods that reduce the phytate content of foods should be promoted. • Fortification or supplementation may be needed to cover the high mineral and vitamin requirements of those with moderate malnutrition.

Source: *Source: Michaelson et al., 2009 Choice of foods and ingredients for moderately malnourished children 6 months to 5 years of age. Food and Nutrition Bulletin, vol. 30, no. 3 (supplement), The United Nations University. PDCASS: Protein Digestibility Corrected Amino Acid Score*

Table 7: Recommendations for Counselling Caregivers with MAM Children on Appropriate use of Household/Family Foods

- Dietary counselling, when done well, can be effective in managing moderate malnutrition.
- Dietary counselling, breastfeeding counselling, and positive feeding and caring practices should always be part of the management of moderate malnutrition, even when food supplements are given.
- Only foods and feeding practices that are affordable, feasible, and acceptable to families should be recommended. Remember: Age-appropriate Frequency, Amount, Texture (thickness), Variety, Responsive Feeding, and Hygiene
- Caregivers of children with moderate acute malnutrition need additional dietary counselling supported by cooking demonstrations, home visits, and/or support/caregiver group meetings.
- Dietary counselling for children with moderate acute malnutrition should specifically reinforce the quantity of nutrient- and energy-dense foods that are needed for recovery and promote age-appropriate feeding practices that are needed for recovery.
- As a strict minimum, recommended diets should aim to provide all nutrients at the level currently recommended by FAO and WHO for healthy children, but a higher nutritional density would be preferable.
- Dietary counselling as a means to provide essential knowledge and skills will contribute to sustained improvements in feeding practices, which can potentially prevent malnutrition and/or relapse into MAM.

Source: *Source: Shoham J and Duffeld A (2009) Proceedings of the World Health Organization/ UNICEF/World Food Programme/United Nations High Commissioner for Refugees held a consultation on the Management of Moderate Malnutrition in Children under 5 Years of Age. Food and Nutrition Bulletin, vol. 30, no. 3 (supplement), The United Nations University.*

Table 8 summarises the different ways in which the dietary counselling approach for MAM management has been implemented among some UN agencies and implementation partners, and may go some way in explaining the lack of effectiveness.[15]

Table 8: Counselling Practices on Moderate Acute Malnutrition by Selected UN Agencies, Implementation Partners and National Programmes

Reponses	**Number of agencies/programmes**
Programmes that give specific messages about household/family foods	
Yes	16
No	21
Some	3
Current practices and focus of emphasis regarding household/family foods	
Strong emphasis family foods	1
Little emphasis on family	6
Mix of home and supplementary feeding	26
Programmes gave specific targets for nutrient intake from household/family foods	
Yes	4
None	42

Source: *Ashworth and Ferguson, 2009 (Adapted). Expanded table of list of agencies/national programmes who provided information on their programmes is presented based on which these frequencies were derived*

3.4 Targeted Supplementary Feeding Programmes (TSFPs)

A decision-making framework for the selection of different types of feeding programme is presented in **Table 9**. Targeted Supplementary Feeding is primarily used for treatment and focuses on treating those with MAM whilst also preventing the development of SAM. Targeted supplementary feeding has the following objectives: [18,19]

- To treat individuals with MAM.
- To prevent individuals with MAM from developing SAM by adding a food supplement to the general ration.

- To reduce the risk of mortality and morbidity in children under 5 years of age.
- To prevent malnutrition in vulnerable pregnant and lactating mothers and other individuals at risk.
- To provide follow-up and facilitate the rehabilitation of referrals from treatment of SAM.

Table 9: Decision-Making Framework for Selective Feeding Programmes

Finding	Action Required
Malnutrition rate (GAM) ≥15% or 10-14% plus aggravating circumstances*	Serious situation: • General rations (unless situation is limited to vulnerable groups) • Blanket supplementary feeding for all members of vulnerable groups, especially children, pregnant and lactating women Therapeutic feeding programme for severely malnourished individuals
Malnutrition rate (GAM) 10-14% or 5-9% plus aggravating circumstances*	Risky situation (alert): • **Targeted Supplementary feeding targeted for individuals identified as malnourished in vulnerable groups Therapeutic feeding programme for severely malnourished individuals
Food availability at household level < 2100 kcal per person per day	Unsatisfactory situation: Improve general rations until local food availability and access can be made adequate
Malnutrition rate (GAM) under 10% with no aggravating factors	Acceptable situation: No need for population interventions Attention to malnourished individuals through regular community services

* Aggravating circumstances are defined as:
1.Nutrition situation not improving
2.General food ration is below the mean energy, protein and fat requirements
3.Crude mortality rate >1 per 10,000/day
4.Epidemic of measles or whooping cough
5.High prevalence of respiratory or diarrhoeal diseases [33]

** It is essential that an adequate general food distribution for the whole household is in place so that the ration is not shared with other members of the family. If this is not the case then there is a substantial risk that the malnourished individual does not receive enough of the supplement to recover from moderate malnutrition and this influences the effectiveness of TSFP.[53]

Source: *MAM Decision Making tool for Emergencies, 2014, Harmonised Training Package, Module 12 Technical notes management of MAM, Inter-Agency Standing Committee's Nutrition Cluster& Nutrition Working Group of the Somalia Support Secretariat (2009)*

3.4.1 Target Population Groups

Targeted Supplementary Feeding Programmes typically include children with MAM from 6 months of age to 5 years and those who have been discharged from SAM management programmes. Pregnant and lactating women, individuals with special circumstances such as twins, orphans, disabled and elderly people with MAM, chronically ill adults such as those with HIV/AIDS and Tuberculosis with MAM can also be targeted.[18,19,50]

3.4.2 Admission and Discharge Criteria

Admission and discharge criteria for targeted SFPs rely on anthropometric definitions of MAM and/or indicators of vulnerability. Cut-off points used to define MAM should be in agreement with national policies and guidelines, taking into consideration capacity and resources required for implementation.1[8,19] The following recommendations listed in **Table 10** are consensus statements by WHO/UNICEF/WFP/UNHCR.[51]

Table 10: Suggested Admission and Discharge Criteria for MAM Treatment
1. A MUAC-based case-definition admission MUAC <125 mm & >115 mm without oedema & discharge >125 mm WFH-based case definition of WFH between -3 to -2 SD and discharge >-2 SD 2. Children > 67 cm and ≥ 6 months of age: MUAC <125 cm can be used as admission criteria. Discharge can be made at MUAC ≥ 125 mm for 2 consecutive visits. 3. Children < 67 cm and ≥ 6 months of age: WAZ was suggested for admission where growth monitoring programs exist) and percentage weight gain for discharge. Additional criterion for admission to SFP is discharge from outpatient therapeutic treatment (OTP) of children who had SAM.

Source: *WHO, UNICEF, WFP and UNHCR (2010) Consultation on the Programmatic Aspects of the Management of Moderate Acute Malnutrition in Children under 5 years of age 24-26 February 2010, Geneva: WHO*

A review of implementing partners and national programmes demonstrates varied practices regarding admission and discharge of children into MAM management programmes.[15] Almost half of the implementing partners included in the review admitted stunted non-wasted children in programmes (**Table 11**). The majority used the National Centre for Health Statistics (NCHS) growth references rather than the recommended WHO growth standards. Even among those who used the correct indices for definition of MAM, such as WFH or MUAC, the cut-offs were diverse and sometimes incorrect.[15] Information from key informants provide some explanation for this occurrence, and the explanation given is that organisations involved in MAM management programmes are unable to turn away children with other types of undernutrition, in order to prevent a further deterioration in nutritional status. Although this review was conducted five years ago and a number of agencies took time to transition from NCHS to WHO standards, the diverse range of admission and discharge practices is still relevant.

Table 11: Practices Among Implementing Partners and National Programmes regarding MAM Management	
Are stunted, non-wasted children included?	
Yes	19
No	23
Use of NCHS or WHO growth reference?	
NCHS	23
WHO	10
Both	5
No selection	3
Indicator used for moderate malnutrition	
WFH cut off <-2 to -3 SD	7
WFH 70-80%	22
WFH 70-75%	1
WFA 60-74%	16
MUAC 115-125 cm	3
MUAC 110 to <120 cm	6
MUAC 110-125 cm	10

Source: *Ashworth and Ferguson, 2009 (Adapted). Table of list of agencies/national programmes who provided information on their programmes.*

3.4.3 Routine Medical Care

Beyond food and behavioural change interventions, MAM children often require medical attention. However, there is currently no globally-ratified consensus on routine medical treatment for MAM. It is therefore usual practice to employ the types of drugs and dosages specified by national guidelines. The UNHCR and WFP provide a guide (UNHCR/WFP Guidelines for Selective Feeding: The Management of Malnutrition in Emergencies, 2009)[19] for routine health-related interventions for MAM including anti-helminths for all children from 12-59 months of age, iron for anaemic children, measles vaccination and Expanded Programme on Immunisation (EPI) following specific protocols.[18,34] One key informant mentioned that in South Sudan where Action Contre la Faim (ACF) implements TSFPs for MAM, children who are referred to health centres for medical care may be lost to the programme, since they need to travel long distances to access health care. In this respect, it is possible that where access to health care is limited, routine medical treatment should be an essential component of TSFPs. This is one of the many principles that require further deliberation and agreement.

3.4.4 Monitoring and Evaluation (M&E)

The management of MAM requires appropriate monitoring of interventions and of the situation overall. This is important to ensure that the correct processes are being followed (quality control), that conditions are not deteriorating (affecting incidence and case load coverage), and evaluations should be scheduled to assess programme effectiveness and impact in line with best practice standards. Indicators to be monitored for all SFPs include: mean length of stay, average weight gain, recovery rate, death rate and defaulting rate.[18,19] It has been suggested that some government-implemented programmes are either unable to include, or choose to exclude, data collection on mean length of stay and average weight-gain, due to time, capacity and cost restrictions. Where development partners can strengthen and assist weak national systems, that is an important priority. M&E tools include individual record cards, ration cards, referral slips, tally sheets, monthly statistical reports and commodity distribution records.

A stated rationale for many emergency SFPs is to reduce levels of malnutrition and mortality at population level. Programme effectiveness can therefore be assessed by programme coverage, changes in population malnutrition rates and ratio of severe to moderate malnourished children identified in programmes and in periodic nutrition surveys.[52] However, most SFPs demonstrate poor M&E and reporting. High rates of defaulting are common and of great concern in MAM management programmes.[52] In a review of 82 SFPs, covering both blanket and targeted programmes, over 65% reported high default rates that in some months exceeded 80%. Default rates are influenced by seasonal factors, with higher rates observed in the cultivation and harvest months, when access to programmes is typically limited due to rains, flooding or snow, or where there are sudden increases in insecurity.[14,52] The high rate of defaulting, coupled with poor quality of data and reporting means that it is not possible to know the outcomes for many children in these programmes.

Médecins Sans Frontières (MSF) in Niger reported a low default rate of around 3% in its SFP in 2006, although children with MAM were treated similarly to children with SAM with RUTF.[53] The programme did not distinguish between SAM and MAM, making the distinction instead between acute malnutrition with or without complications. A total of 64,733 children were admitted to the programme, out of which 92.5% (59,880) had moderate malnutrition, and 7.5% (4,853) had severe malnutrition. The authors attributed the large numbers treated and the low numbers of defaulters to strong participation and good adherence to the programme.[53]

3.4.5 Referrals

The lack of a referral system between SFP and other treatment services has been associated with high defaulting.14,52 MAM Management programmes should ideally be linked to other programmes to ensure

sustainability[54] and easy referral between programmes. A system to refer children who deteriorate to SAM or who fail to put on weight (and need therapeutic feeding or inpatient stabilisation) must be in place, in line with national protocols and guidelines. Programmes to manage MAM and SAM should therefore have mechanisms in place to ensure ease of access and treatment follow-up in the case of referral. Sphere Standards recommend that more than 90% of the targeted population should be within less than one day's return walk (including time of treatment) of programme sites.[55] Referral systems for children with MAM with underlying infections such as TB, malaria and HIV should also be in place.

3.4.6 Coverage

Programme coverage needs to be monitored to ensure adequate access to services and to evaluate the effectiveness of the programme. This is a critical aspect of MAM management that has recently been receiving a lot more attention.[44] A programme with low coverage will have little impact even if performance indicators are good. In rural areas, the current recommended SPHERE target for coverage of an SFP is >50% and in urban areas it should be >70%.[55] Refugee camps are expected to have coverage of above 90%.[55] The distance of SFPs from the target population and the level of decentralisation of service delivery can affect coverage of the programmes. In a review of 19 SFPs, programme coverage was shown to range from between 1% and 71.7%, with a median coverage of 20.5%.[14,52] This is another area where best practices (in overcoming contextual hurdles) need to be more widely documented and shared.

3.5 Capacity Strengthening and Exit Strategy

Supplementary feeding programmes have the potential to create dependency on products and resources which are usually finite and it is therefore important that a phase-out be planned from the outset, including consideration of a longer-term strategy to prevent MAM. This could include the continued care of MAM cases through national health centres or hospitals, or through existing nutrition-specific and nutrition-sensitive programming. Capacity-strengthening of systems at the local and national levels for CMAM need to consider how ongoing caseloads of MAM will be managed in addition to the management of SAM.

There are several criteria to consider when making decisions on the phasing out of a targeted SFP including:

1) adequacy of any ongoing General Food Distribution in meeting the nutritional requirements of the population or adequacy of food and nutrition security of the population
2) the prevalence of acute malnutrition (if <10% without aggravating circumstances)
3) effectiveness of control measures for infectious diseases
4) expected seasonal deterioration (peaks) in the nutritional situation.[18,19]

3.6 Overview of Specialised Foods Currently used for MAM Management

Specialised food products or other food commodities used in MAM management can be classified according to the ingredients used and their programmatic roles. This section presents different examples of food products, their nutrient profile and the ingredients used in their formulation. Further details on these foods including shelf life, rations/dose per day, cost and target groups, can be found in Appendix 2.

The World Food Programme categorises food products for MAM into treatment, prevention or both, and as lipid-based or nonlipid-based.[56,57] Specialised food products for manageing MAM in infants below 6 months of age are not available, given that exclusive breastfeeding is recommended for this group.

3.6.1 Fortified Blended Foods (FBF)

Fortified Blended Foods are blends of partially pre-cooked and milled cereals, soya beans, pulses fortified with vitamins and minerals. Some formulations contain vegetable oil or milk powder.[57]

Corn Soy Blend (CSB)

Corn Soy Blend is the main fortified blended food product distributed by the WFP and USAID. Wheat Soya Blend (WSB) and Rice Soya Blend (RSB) are also sometimes used. These come as flours, which are usually mixed with water and cooked as porridges.[57] The current corn soy blends used are known as Supercereal and Supercereal Plus.[27,57] These are a mixture of cereals and other ingredients (such as soya beans or pulses) that have been milled, blended, pre-cooked by extrusion or roasting, and fortified with a wide range of vitamins and minerals, for children under 5 with MAM as well as other vulnerable groups (pregnant and lactating women and people chronically ill with HIV/AIDS or tuberculosis) with MAM.[56] These improved FBF were formulated to overcome constraints with earlier formulations (which were bulky, poorly absorbed and with an incomplete range of vitamins and minerals).[26] The CSB and WSB are the main FBF used in MAM management but there are several varieties under development, including sorghum-pea blend, oat-soy blend, and millet-pulse which include non-genetically modified staple grains, and those with a variety of proteins and a range of animal protein ingredients.[58] Over the past two years, WFP, UNICEF, USAID's Office of Food for Peace, and United States Department of Agriculture (USDA) have been engaged in a specification and product harmonisation process aimed at streamlining the premix and product specifications.

Supercereal (or Corn Soy Blend Plus - CSB+)

Supercereal contains maize (64%), whole soyabean (24%), sugar (10%), vegetable oil, and vitamin & mineral premix formulated for children over the age of 24 months and adults. It provides 380 kcal/100g of dry product (14% protein and 6% fat).[27,57] CSB+ contains 380 kcal of energy, a minimum of 380 kcal of protein and 6% fat per 100g of product. Micronutrients added include vitamins A, C, B_{12}, D, E, K, B_6, Thiamin, Riboflavin, Niacin, Pantothenic acid, Folic acid, Zinc, Iron, Calcium and Potassium.[56]

Supercereal Plus (or Corn Soy Blend Plus Plus / CSB++)

Supercereal Plus is a product intended for children between 6-24 months of age as a complement to breast milk. It is made from maize (58%), de-hulled soya beans (20%), dried skimmed milk powder (8%), sugar (10%), vegetable oil, and vitamin and mineral premix (UNICEF, 2014, WFP, 2012).[27,57]

3.6.2 Lipid-based Nutrient Supplement (LNS)

LNSs belong to the broad family of products known as Ready-to-Use Supplementary Foods (RUSF). Ready-to-Use Foods (RUF) include any foods that do not require preparation in the home, are safe to store without refrigeration, have low moisture content and do not require dilution or cooking, so risk of contamination is low.[59] They are considered "lipid-based" because the majority of the energy provided by these products is from fats and they provide a range of vitamins and minerals in addition to energy, protein and essential fatty acids (EFA).[59,60] A variety of products fall under this category.[57] Some are manufactured in industrialized countries, and some by producers in countries such as India, Haiti, Ethiopia and Malawi. Highlighted below are some examples of LNS specific to the management of MAM.

Supplementary Plumpy or Ready-to-Use Supplementary Food

Also known as Plumpy Sup® this product is similar to RUTF in terms of ingredients but differs slightly in protein and energy content. In this product, the skimmed-milk powder of RUTF (Plumpy'Nut®) has been replaced with whey and soy protein isolates.[26] The product comes in one-day sachets and is made from peanut paste, vegetable fat, soy protein isolates, whey, maltodextrins, sugar, cocoa and a range of micronutrients. It can be eaten directly from its packaging and is designed to be eaten in small quantities, as a supplement to the regular diet.[56]

Plumpy'DozTM

Plumpy'Doz, comes in tubes containing weekly rations and is made from peanut paste, vegetable fat, skimmed milk powder, whey, maltodextrins, sugar and various vitamins and minerals.[56]

Small dose lipid supplements

These represent RUFs which typically come in a 20 g sachet or spill. They are mostly made from peanut paste, sugar, vegetable fat, skimmed milk powder, whey powder, vitamins and minerals, maltodextrin, cocoa, lecithin. Designed to deliver key micronutrients and to promote linear growth among children 6-24 months of age.[61]

4 Effectiveness of specialised food products: recent reviews/ meta-analyses

Recent systematic reviews have analysed the effectiveness of MAM management approaches, focusing on the different food products currently being used.[12,13,62]

4.1 Effectiveness of targeted SFP

A review published in 2008 of targeted SFPs implemented by a range of participating agencies evaluated their impact and cost-effectiveness in acute and chronic emergencies.2 In all, 82 SFPs with a total of 376,179 beneficiaries were included in the review. The evaluation found that 63.9% of SFPs considered in the review obtained a recovery rate equal to or above 75% (following the Sphere indicator). However, when defaulters (i.e. children who exited the programme before recovery from MAM) were included in this calculation, only 39.3% of SFPs achieved this indicator. Only 25 of 61 programmes (41%) met all Sphere indicators relating to recovery, defaulting and mortality. When the raw data from all programmes reviewed is pooled, a total of 260,034 children recovered (69%), 67,366 defaulted (17.9%), 1,763 died (0.46%) and 47,016 (12.5%) were classified as non-responders to treatment.[52]

Although the findings of this review suggest that many SFPs have been ineffective, contextual factors and challenges affecting implementation should also be taken into account. For example, high defaulting rates in SFPs in Burundi and DRC were attributed to high levels of insecurity and population displacement, and a SFP in the Panjsheer Valley in Afghanistan was inaccessible during winter, with recurrent supply problems.[52]

4.2 Effectiveness of Specially-Formulated Foods in the treatment of MAM

This review evaluated the safety and effectiveness of different types of specially-formulated food products for children with MAM in low- and middle-income countries and assessed the safety and efficacy of foods complying or not complying with specific nutritional compositions, such as the WHO technical specifications. The review included eight studies,[12] enrolling 10,037 children.[63-71] Two of the studies compared providing foods with counselling for the management of MAM, seven compared LNS to blended foods, two compared complementary LNS to blended foods, three compared specific blended foods (CSB++ or CSB premix) to other LNS, and one compared CSB++ to other blended Foods.

The comparison between LNS versus any blended foods (dry food mixtures, without high lipid content) did not show significant difference in mortality, progression to SAM or the number of defaulters from the programme. However, the use of LNS was found significantly to increase the number of children who recovered in five trials. LNS was also associated with improved weight gain, WFH, and mid-upper arm circumference (MUAC), although these improvements were regarded as modest. One trial observed

[iii] There are many analogue lipid products being developed, tested and trialed that are not peanut-based, as some agencies seek to contain cost, improve acceptability for some populations, avoid allergens, etc.[81]

more children with vomiting in the LNS group compared to those receiving blended food. Fortified blended foods resulted in similar outcomes to LNS. In one trial, however, CSB++ was not found to be more effective than locally made blended food. The review findings demonstrated that both LNS and blended foods are effective in treating children with MAM although there are no such published studies for Asian countries, where MAM is most prevalent.

Lenters et al reviewed five studies investigating the effect of RUSF compared to CSB in moderately malnourished children under 5 years of age.[63,66,67,70] Two of the studies were cluster Randomised Controlled Trials (RCT), and three were RCTs. The review found no difference in mortality between those children given RUSF compared to those who received CSB. However, the non-response rate was significantly lower in the RUSF group. Children in the RUSF group were also more likely to recover compared to the CSB group. The rate of height gain did not differ between the intervention and comparison groups. Children who received RUSF had a greater gain in MUAC (0.04 mm per day) and weight (0.61 g/kg/d) than those who received CSB. The authors noted that there were considerable variations among the programmes reviewed and that the effectiveness of overall treatment approaches for MAM was inconclusive and therefore studies with a wider range of settings and higher quality programme evaluations are required.

In another review, various food-based, and non-food-based interventions (including FBF and LNS) in the management of MAM for children 6 to 60 months of age in twenty-two studies were analysed.[62] LNS was associated with a higher rate of recovery and more rapid weight gain, when compared with FBF supplementation in children, but not height gain. The study observed a wide variation in food supplements used, even for foods belonging to the same group, such as LNS. There was also substantial variation in definitions. This, like other studies, highlighted the need for longer-term follow-up in future SFPs to enhance the effectiveness of programmes.[72] It also raised the need to compare the cost-effectiveness of programme approaches, and to differentiate between fat deposition and lean mass accretion rather than just weight gain.

5 Challenges Faced in MAM Management

5.1 Low profile and lack of consensus

Possibly the key constraint in the management of MAM is the lack of attention that this problem currently receives compared with SAM (and even compared with stunting as part of the 1,000 days agenda), despite its large global caseload and associated mortality risk. This lack of attention is attributed partly to the fact that the current methods in managing MAM include products with a high unit cost, programmes that often have low coverage, a focus on generalized prevalence rates rather than season-specific incidence rates, and frequent high defaulting. This is coupled with a lack of consensus around programmatic guidance on issues such as definitions, admission and discharge criteria, products to use and treatment protocol, evident from the diverse practices and approaches being implemented.

Yet, things are changing. The inclusion of a target for wasting among the six nutrition World Health Assembly goals for 2025 brings MAM and SAM on par with obesity and stunting, among other global nutrition problems to be addressed.[73] This is in part a result of the Lancet Series' highlighting of MAM as well as SAM management as an evidence-based intervention of sufficiently proven efficacy to warrant action at scale.[38] Similarly, the report of the High-Level Panel of Eminent Persons on the Post-2015 Development Agenda (UN 2013) proposed a specific target for wasting among the goals aimed at improving nutrition and food security globally.[74] These new initiatives reflect growing awareness of a need to address wasting alongside the other important manifestations of malnutrition through the lifecycle. But agreement is still needed on viable targets, feasible annual rates of reduction through

improved management and prevention, and appropriate ways to monitor and report on progress in relation to AM.

5.2 Focus on products

Approaches to address MAM have tended to focus predominantly on targeted and blanket supplementary feeding, although both approaches have limitations. Both forms of supplementary feeding are product-focused and do not always take into consideration the underlying causes of malnutrition, nor do they always pay adequate attention to institutional and system capacity-building or to the training and education needed for professionals as well as for carers of wasted children. Beneficiaries of these programmes often return to the same conditions which caused them to become malnourished in the first instance, and so are at risk of relapse.[69] Thus human resource development, professionalization of programming, and adequate investment in awareness-raising and behaviour change as part of both facility and community-based interventions are essential.[75]

Where products are concerned, the wide choice of specialised food items has generated some confusion about their uses (treatment versus prevention, SAM versus MAM, supplement versus diet replacement, etc.). Some products have been designed with specific demographic groups in mind, for delivery of key nutrients under particular conditions. For example, Plumpy'Doz (an RUSF) which is designed to be given in a small daily dose (46.3g = roughly 3 teaspoons) for children 6-36 months as a supplement[57], is suitable for emergency situations where a reliable GFD exists or where adequate access to a diverse diet is assured. There are many times, however, when such products have been used in blanket distributions or delivered to age-groups beyond those for whom the foods were designed. In other words, greater clarity (and guidance) is still needed on what can or should be used for what purposes in what circumstances. Many of the guidelines and protocol materials referenced here represent a good step in that direction, and moves towards harmonization of product formulations and specifications would further simplify the decisions required to link product to purpose.

5.3 Inconsistent definitions in MAM Management programmes

A variety of definitions and classifications are still used across different MAM management programmes. For example, some SFPs include underweight (low weight-for-age, WFA) or stunted (low height-for-age, HFA), children in MAM programmes, while others use MUAC. This leads to confusion over inclusion and exclusion criteria, and difficulty in evaluating the effectiveness of MAM programmes and associated products.[25,26,86] Agreement is still needed on terminology, reporting approaches, monitoring of actual programmatic use of various entry and exit criteria, and methods used to assess incidence, coverage and effectiveness.

5.4 Evidence gaps

Empirical evidence remains scarce in several key areas. First, on the effectiveness of nutrition counselling (separately or combined with products and medical interventions) in both facility and community management of MAM. Nevertheless, most guidance materials continue to recommend counselling within MAM interventions. CMAM was predicated on empowerment of mothers in the process of treatment, requiring high quality and intensive behaviour change communication as part of any intervention. Research is required to generate appropriate evidence of best practice within such approaches. Second, cost-effectiveness remains poorly documented for most interventions and contexts. Third, comparing products appropriately (using study designs that allow for iso-caloric and iso-nutrient density comparisons, with comparable packaging, programming and promotion) remains the exception rather than the rule. More care is required in drawing conclusions from studies that claim to be comparing a variety of foods, when their delivery, dosage and associated Behaviour Change Communication (BCC) are all different. Fourth, most large-scale, empirically valid studies on MAM derive from only a few

countries, mostly in Africa. A wider variety of settings and contexts should be explored. Fifth, evidence on sharing of products remains at the anecdotal level. Evidence is needed on how products are actually used within community interventions, and how this affects measured outcomes.

5.5 Limited understanding of Nutrient Requirements for MAM

Nutrient requirements for children with MAM, living in unhealthy, insanitary and often insecure environments, are still being defined, building on the WHO guidelines proposed in 2009. Discussions on food formulations, dosages (supplement size in relation to overall diet), and alternatives to nutrient deliveries (small dose lipids, micronutrient powders, etc.) continue. Further research is needed to define the effectiveness and cost-effectiveness not of individual products, but of a variety of interventions that have clearly-defined goals in terms of nutrients delivered and outcomes expected. There is a need to better understand the nature of weight gain (fat and lean mass accretion) associated with treatment for MAM with different products, and further work is expected on the optimal content of polyunsaturated fatty acids (PUFA). The effects of different levels of fibre intake in children with MAM also need to be studied; this is important in ensuring that nutrients can be properly digested and absorbed[49].

5.6 Gaps in consensus around MAM management protocols

There are a number of areas where there is a lack of consensus on MAM management protocols, as well as some questions around the management of MAM in specific population groups. Some of these are presented in **Table 12**. These domains will become priority topics for debate and agreement in the coming year or so.

Table 12: Gaps in MAM Management Programming

Management of MAM and Diarrhoea: Effect of identification and treatment of diarrhoea pathogens on admission on improving treatment of MAM (faster recovery, higher weight gain etc.)

- **MUAC for Monitoring:** Suitability of MUAC for monitoring progress in Antiretroviral Therapy(ART) programmes (it may not be an appropriate measure due to abnormal fat distribution).
- Anthropometric Measurements: How different anthropometric indicators (HFA WFH, WFA, and MUAC) respond to newly developed treatments for MAM. Debates over whether MUAC and WFH should be used as a combined admission criteria, or whether MUAC alone would suffice as an anthropometric indicator of wasting, given the arguments surrounding body shape (Cormic index) and its influence in WFH z-scores.
- **Integration of Guidelines:** There is the need to integrate nutrition and HIV guidelines because these are inconsistent within and between countries. There is also a need to define a single entry, exit and referral criteria and the need for rolling out CMAM and HIV-nutrition programs in tandem to increase decentralisation and reduce defaulting.
- **MAM Admission and Discharge Criteria:** For children < 67 cm and above 6 months of age, the following issues are not fully understood; the appropriate admission and discharge criteria to use, the appropriate algorithm for monitoring treatment progress within the programme and how to estimate incidence in programme settings. For infants below 6 months of age, a key knowledge gap is how to define and identify MAM and how this should inform its treatment.

Source: *WHO, UNICEF, WFP and UNHCR (2010) Consultation on the Programmatic Aspects of the Management of Moderate Acute Malnutrition in Children under 5 years of age 24-26 February 2010, Geneva: WHO and key informants*

5.7 Lack of provision of basic medical treatment

MAM management programmes do not always include provision of basic medical treatment and children who are referred for primary health care services may need to travel long distances to access treatment and therefore are likely to be lost to follow-up. This absence of essential attendant care can compromise effective MAM management in the long-run. Institutional and professional capacity-building are essential, and the integration of MAM within national systems and protocols is essential.

5.8 Constraints in monitoring and reporting of MAM management data

A major challenge is how MAM treatment information is aggregated and analysed at a central level. As MAM management is often implemented by NGOs, these programmes are not always linked to formal health information systems, and therefore data relating to MAM admissions and treatment is not recorded or analysed at a level where decision-making for programme and policy formulation takes place.

6 Way forward and conclusion

Prioritisation of MAM

Although the global caseload of MAM is much greater than that of SAM, the condition has not received the same level of attention or priority, due in part to a lower risk of mortality and the lack of an agreed affordable solution to treating conditions at scale. Although treatment of MAM is not inexpensive, it has been identified as an evidence-based targeted nutrition intervention of critical importance not only in addressing the risks associated with wasting, but also those associated with child stunting, morbidity and mortality.[5] It is therefore important that awareness be raised not only about the condition itself, and its associated short and long-term risks, but that proven approaches to treatment exist, while investments needed for effective prevention should be prioritized at national level. For this to take root, effective (funded) MAM programmes and associated protocols have to be embedded within national health and nutrition policies, and MAM prevention should be taken into consideration in food security and other development strategies, and hence built into post-Millennium Development Goal agendas. Promoting links between nutrition-specific and nutrition-sensitive interventions that address underlying causes not only of wasting, but of stunting and micronutrient deficiencies too, should be an integral part of a strategy for tackling MAM.

Promote consistent use of current guidance, terminology and criteria and address areas where consensus is still lacking

Despite a number of gaps in knowledge and consensus around the management of MAM, considerable guidance, protocols and tools exist at global and country levels. These should be promoted in the interests of ensuring appropriate standardised approaches for treatment, prevention of MAM, and linking effectively to programmes focused on SAM as well as those engaged in the 1,000 days agenda.

Nutrition counselling and education for improved feeding practices

Nutrition counselling should always be an integral part of the management of MAM, whether or not products are involved. It is therefore important to identify and ensure the most effective means of delivery of counselling and BCC in ways that are appropriate, relevant and realistic within diverse contexts.

Research priorities in MAM management

The implementation of strong impact studies has been recommended in recent systematic reviews, in a wider range of settings (including Asia), over a longer time period and with more consistent and rigorous methodologies.[12,13] Questions of cost-effectiveness of programming approaches, genuine like-with-like comparisons multiple food products in varied settings, the clinical significance of rate of weight gain in the process of recovery, determinants of relapse into MAM post treatment exit (the sustainability of

recovery), and cost per effective treatment across different products and programming approaches all require urgent attention.

Other research priorities identified include:
- Comparison of cost-effectiveness of various programme approaches.
- Differentiation between fat deposition and lean mass accretion in relation to weight gain.
- The impact of nutritional counselling in the absence of supplementary feeding and what works in terms of delivery mode and choice of topic.
- Measuring effectiveness (outcomes, impact, coverage etc.) and efficacy (physiological, clinical etc.) of new products for various MAM contexts.
- Definition of clear guidance on cut-offs for admission and discharge from MAM management programmes.
- The link between different morbidities (diarrhoea, malaria, TB, etc.) and MAM, and the effect of addressing these conditions on acute malnutrition.

Specialised Food Products for MAM Management

In order to ensure that those involved in the management of MAM make the right choice of product for the type of intervention and specific context, there is a need to improve and standardise communication on product information (including, going forward, data not only on unit cost or cost per ton of product, but costs per treatment or costs per day of feeding in relation to other programming costs). Information on categories of products and types of products under the various categories are often difficult to find, and product evaluation has focused predominantly on FBFs and LNS.

Monitoring and reporting of MAM data

Data relating to MAM management should be reported, collated and shared beyond the level of programme implementation, in order to ensure that the issue is captured at decision-making levels so that appropriate programme and policy measures can be taken. Where possible links should be made with formal Health Information Systems to enable this process.

Conclusions

While wasting remains a major global public health concern, and much remains to be clarified, defined and agreed regarding terms, approaches and data requirements involved in MAM management, huge gains have been made in recent years. There is more attention to wasting in global policy agendas, evidence has been generated on intervention efficacy for MAM (as well as SAM), and there is increasing consensus across the international nutrition community on the need to link wasting, stunting and micronutrient etc. deficiencies into integrated, nationally-owned strategies. At the heart of quality care, remains quality evidence. New research in key areas remains a priority, but the generation, compilation and sharing of data on operational effectiveness (including costs) is equally critical.

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ANNEXES

ANNEX 1: MAM PROGRAMMATIC GUIDANCE

Overview of current guidance making programmatic choices relating to MAM management interventions (e.g. anthropometric surveys, dietary assessment tools, assessment of health/sanitary environment), decision-making frameworks (IPC classification table, MAM Decision Tool, cluster tools, Sphere guidelines etc.)

Authors (year of publication)	Guidelines, Surveys and Tools	Purpose and scope
Global Nutrition Cluster in collaboration with UNHCR/WHO/WFP (2009)	**Guidelines for Selective Feeding the Management of Malnutrition in Emergencies (2009)**	This is a practical guide to design, implement, monitor and evaluate selective feeding programmes in emergency situations.
Harmonised Training Package, Version 2, 2011	**Training Module 12 Management of Moderate Acute Malnutrition Technical Notes (2011)**	This module is about the management of moderate acute malnutrition (MAM) with emphasis on emergency Supplementary Feeding Programmes (SFPs). The aims are to prevent individuals with MAM from developing severe acute malnutrition (SAM), to treat those with MAM and to prevent the development of moderate malnutrition in individuals.
Global Nutrition Cluster MAM Taskforce (2012)	**Moderate Acute Malnutrition a Decision Tool For Emergencies**	The tool is designed to guide decision-making on the type of programme(s) to implement (e.g. prevention, treatment, both) of MAM the programme modality (e.g. food supplement, cash/voucher, health and nutrition communication), the risk groups to target, the specialised nutrition products to use, the programme duration and the delivery mechanism for the programme(s).
Management of Acute Malnutrition in Infants Project	**Chapter Four Review of MAMI Guidelines**	This chapter reviews current guidelines on the management of acute malnutrition, both inpatient and community-based. The chapter looks at similarities and differences on how infants <6 months are treated and identifies strengths, weaknesses and gaps in guidance materials.
The Sphere Project (2011)	**Humanitarian Charter And Minimum Standards in Humanitarian Response Geneva: The Sphere Project**	This edition takes into account recent developments in humanitarian practice in water and sanitation, food, shelter and health, together with feedback from practitioners in the field, research institutes and cross-cutting experts in protection, gender, children, older people, disabled people, HIV/AIDS and the environment. It is the product of an extensive collaborative effort that reflects the collective will and shared experience of the humanitarian community, and its determination to improve on current knowledge in humanitarian assistance programmes.
World Health Organisation, 2012	**Technical Note: Supplementary Foods for the Management of Moderate Acute Malnutrition in Infants and Children 6–59 Months of Age**	This technical note summarises the available evidence and presents some principles underlying the dietary management of children with moderate acute malnutrition with a proposed nutrient composition profile for supplementary foods relevant to situations in which their use may be warranted
UNHCR 2007	**Handbook for Emergencies**	Covers both SAM and MAM programme issues
Médecins Sans Frontières (2006)	**Nutrition Guidelines**	Update of 1995 guidelines, available in electronic version and covers both MAM and SAM.

Médecins Sans Frontières (1997)	**Refugee Health: An Approach to Emergency Situations**	The guideline is aimed a field practitioners. It covers assessment and key areas of health, water and sanitation, food and nutrition, shelter, and health. Of particular relevance is chapter 4 on food and nutrition, which includes a short summary of principles of SFPs.
WHO and UNICEF (2009)	**WHO Child Growth Standards and the Identification of Severe Acute Malnutrition in Infants and Children**	The joint statement presents rationale and recommended cut-off points for the identification of severe acute malnutrition in children 6-60 months of age using weight for height Z scores with the new WHO Growth Standards and MUAC. It also briefly introduces programmatic implications of the operationalisation of these recommendations.
Oxfam (1992)	**Food Scarcity and Famine. Assessment And Response**	Chapter 4, section 4.3 covers design and management issues in supplementary feeding programmes. For Oxfam field staff and other agency health and nutrition staff.
SCN Working Group on Nutrition in Emergencies (2007)	**Use of the WHO 2006 Growth Standards in Emergency Nutrition Programmes**	Statement on the use of WHO 2006 Growth Standards in Emergency Nutrition Programmes
WHO (2004)	**Guiding Principles For Feeding Infants And Young Children During Emergencies. Geneva, WHO**	The document defines a starting point for planning intervention in emergencies that protect, promote and support optimal infant and young child feeding in emergencies. Supplementary feeding is discussed under Complementary Feeding/Principle 5 “Caregivers need secure uninterrupted access to appropriate ingredients with which to prepare and feed nutrient-dense foods to older infants and young children.”
WHO (2000)	**The Management of Nutrition in Major Emergencies. Geneva: WHO**	For health and nutrition staff of humanitarian agencies; of particular relevance: Chapter 4: Nutritional relief: general feeding programmes Chapter 5: Nutritional relief: selective feeding programmes

ANNEX 2: SUMMARY OF PRODUCTS FOR MAM MANAGEMENT

Objective	Treatment of Severe Acute Malnutrition	Treatment of Moderate Acute Malnutrition		Prevention of Malnutrition				Other
				Acute malnutrition		Micronutrient and chronic malnutrition		
Generic Term	Ready-to-Use Therapeutic Foods (RUTF)	Ready-to-use Supplementary Foods (RUSF) *High quantity**	Fortified Blended Foods	Lipid-based Nutrient Supplements (LNS) *Medium quantity**	Fortified Blended Food	Lipid-based Nutrient Supplements (LNS) *Low quantity**	Vitamin & Mineral Powder	High Energy Biscuit (HEB)
			Supercereal Plus	Wawa Mum	Supercereal Plus			
Purpose	Treatment of uncomplicated severe acute malnutrition with continued breastfeeding	Supplement to treat moderate acute malnutrition with continued breastfeeding	Supplement to treat moderate acute malnutrition with continued breastfeeding	Supplement to the local diet for prevention of acute malnutrition with continued breastfeeding and prevent micronutrient deficiency and stunting	Supplement to the local diet for prevention of acute malnutrition with continued breastfeeding and prevent micronutrient deficiency and stunting	Supplement to the local diet with continued breastfeeding to prevent micronutrient deficiency and stunting	Fortification of home prepared foods, just before consumption, with continued breastfeeding to prevent micronutrient deficiencies	Temporary meal replacement prevention for acute malnutrition and micronutrient deficiencies
Target Group	6-59 months *Older children and adults including HIV+*	6-59 months *Others pregnant and lactating women including HIV+ adults*	6-59 months: *SuperCereal Plus Others including PLW, HIV+ adults: SuperCereal*	6-23 months	6-23 months: *SuperCereal Plus* *PLW: SuperCereal*	6-23 months	6-59 months	General population, vulnerable groups

Energy /nutrient per 100g	500 kcal 12.5g protein 32.9g fat	500 kcal 12.5g protein 32.9g fat	840kcal 32gprotein 18g fat	247kcal 5.9gprotein 16g fat	840kcal 32gprotein 18g fat	108kcal 2.5gprotein 7g fat	Daily supplement: RDI: A-400ug, C- 30ug, D- 5ug, E-5ug, B1- 0.5, B2- 0.5 ug, niacin- 6ug, B6-0.5ug, B12-0.9ug, folic acid-150ug, Iron-10ug, zinc- 4.1, copper- 0.56, iodine- 90ug, selenium-17ug	1,800 kcal/400g (biscuits) 2,300kcal/500g (BP-5, NRG-5) Age / Bars 6 months-3 years: 3-4 4-8 years: 5-6 Adults: 8-9
Packaging	Sachet = 92g	Sachet = 92g	SuperCereal: 25 kg bag SuperCereal Plus: 1.5kg bag	325 gm pots or sachets of different quantities	SuperCereal: 25 kg bag SuperCereal Plus: 1.5kg bag	Sachet = 20g	Sachet = 1g	400g packs (HEB) 500g packs (NRG-5, BP-5)
Target Group	6-59 months	6-59 months	*6-59 months: SuperCereal Plus*	6-23 months	6-23 months: SuperCereal Plus	6-23 months	6-59 months	General population, vulnerable groups
	24 months	24 months	12 months	24 months	12 months	18 months	24 months	5 years
Ration/ dose	According to weight: 6-59m: 200kcal/kg/day	One sachet/day 92g/day (75kcal/kg/day)	200g/day	47-50g/day	200g/day	20g/day	One sachet/day 1g/day or 5g/day	Adults: 400g/day (HEB),500g/day (NRG-5, BP-5)
Approximate duration of Intervention	6-8 weeks	3 months	3-6 months	3-6 months	3-6 months	Up to 18 months	Up to 59 months	1 week as full diet 1 month for children
Cost/dose/ day (USD)	0.36/sachet	0.29/day	Super Cereal: 0.17 / day Super Cereal Plus 0.15/day	0.18/day	Super Cereal: 0.17 / day Super Cereal Plus 0.15/day		0.028/day	2.84/day
Manufacturer	Nutriset (Fr); Vitaset (DR); JB (Mad); Nutivita (Ind), Edesia (US); Diva (SA); Com-pact (N, Ind); Tabatchnick (US); Challenge (US), Insta(Ke); local production	Nutriset (Fr); Edesia (US); Compact (India & Norway); Nutrivita (India); Four local producers in Pakistan	Michiels fabrieken (Bel); CerFar (It); ProRata, Somill, J&C (SA) ; Export Trading, Rab (Mal) ;	Nutriset (Fr); Edesia (US); Compact (India, Norway); Nutrivita (India)	Michiels fabrieken (Bel); CerFar (It); ProRata, Somill, J&C (SA) ; Export Trading, Rab (Mal) ;	Nutriset (Fr); Edesia (US)	Global Health Initiative; DSM; Fortitech; Heinz; Hexagon; Piramal (India); Renata (Bangladesh)	NRG-5/BP-5: MSI (D), Compact (N), Biscuits: Nuova Biscotti (I); Michiels (B); Insta (Ke)

Note: Refer to the decision tool and guidance note in using this product sheet and following the decisions made on what type of products to use

* Quantity is referring to kcals in most cases

** The list of products is not exhaustive as new products and producers exist and are emerging rapidly

	FORTIFIED BLENDED FLOURS				MICRONUTRIENT POWDERS	FORTIFIED BISCUITS
PROGRAMME	Treatment of MAM		Prevention of MAM		Prevention and treatment of micronutrient deficiencies and MAM	
PRODUCT	Super cereal plus	Super cereal	Super cereal plus	Super cereal	Micronutrient powders	High energy biscuits
						
INGREDIENTS	Corn/wheat/rice soya, milk powder, sugar, oil, V&M	Corn/wheat/rice soya, V&M	Corn/wheat/rice soya, milk powder, sugar, oil, V&M	Corn/wheat/rice soya, V&M	Vitamins and minerals	Wheat flour, Hydrogenate Vegetable Shortening, Sugar, Soy flour, Invert Syrup, High fructose, Corn Syrup, Skimmed milk powder, minerals and vitamins
TARGET GROUP	6-59 months	Pregnant and Lactating Women (PLW) Malnourished individuals on ART/ DOTS	Children 6-23 months	Pregnant and lactating women	Children 6-59 months School age children	General population and vulnerable groups
NUTRIENT PROFILE	787 kcal, 33g protein (17%), 20g fat (23%). Contains EFA, meets RNI and PDCAAS	752-939 kcal, 31-38g protein (16%), 16-20g fat (19%). Meets RNI and PDCAAS	394-787 kcal, 16-33g protein (17%), 10- 20g fat (23%). Contains EFA, meets RNI and PDCAAS	376-752 kcal, 15-31g protein (16%), 8-16g fat (19%). Meets RNI and PDCAAS	Meets RNI (No energy, fat or protein content)	1,800 kcal/400g (biscuits) 2,300kcal/500g (BP-5, NRG-5)

DAILY RATION	200g (includes provision for sharing)	200 to 250 g (includes provision for sharing)	100-200g (200g includes provision for sharing)	100-200g (200g includes provision for sharing)	1g sachet every second day	Adults: 400g/day (HEB),500g/day (NRG-5, BP-5)
SHELF LIFE	12 months	12 months	12 months	12 months	24 months	5 years
PACKAGING	Primary: 1.5kg (net) bag Secondary: 15kg (net) carton has 10 bags or 18kg sack has 12 bags	25kg (net) bags	Primary: 1.5kg (net) bag Secondary: 15kg (net) carton has 10 bags or 18kg sack has 12 bags	25kg (net) bags	Carton: 14kg (gross) has 240 boxes 30 sachet in each box. *Packaging varies with supplier	400g packs (HEB) 500g packs (NRG-5, BP-5)
COST					$2-3 per sachet	$0.12 per 100g packet
MANUFACTURERS	Michiels fabrieken (B); CerFar (It); ProRata, Somill, J&C (SA); Export Trading, Rab(Mal)	Michiels fabrieken (B); CerFar (It); ProRata, Somill, J&C (SA); Export Trading, Rab(Mal)	Michiels fabrieken (B); CerFar (It); ProRata, Somill, J&C (SA); Export Trading, Rab(Mal)	Michiels fabrieken (B); CerFar (It); ProRata, Somill, J&C (SA); Export Trading, Rab(Mal)	Global Health Initiative; DSM (Ch); Heinz (I); Hexagon (I); Piramal (I); Renata (Ban)	NRG-5/BP-5: MSI (D), Compact (N), Biscuits: Nuova Biscotti (I);

Source: *WFP Specialised nutrition food products sheet. Global Nutrition Cluster MAM Taskforce Product Sheet, Version 1 – 1st January 2012*

ANNEX 3: RESOURCES RELATING TO THE MANAGEMENT OF MAM

TRAINING MANUALS AND GUIDELINES

From Agencies:

Global Nutrition Cluster in collaboration with UNHCR/WHO/WFP (2009) Guidelines for Selective Feeding in the Management of Malnutrition in Emergencies.

Harmonised Training Package (2011) Training Module 12 Management of Moderate Acute Malnutrition Technical Notes.

Global Nutrition Cluster MAM Taskforce (2014). Moderate Acute Malnutrition A decision tool for emergencies.

Valid International (2006). Community-based Therapeutic Care: A field manual. 1st Ed. 2006. Valid International and Concern Worldwide.

WFP/UNHCR (2008). NutVal. Rome, WFP.

The downloadable spreadsheet application can be used to plan and monitor nutrient content of food rations.

WHO, WFP, IASC, UNICEF. (2007). Joint Statement on Community-Based Management of Severe Acute Malnutrition. Geneva: WHO.

WFP (2005). Food and Nutrition Handbook. Rome: WFP. Manual designed to enable staff to assess and analyse the nutrition situation in their country or region.

FANTA (2008). Training guide for community-based management of acute malnutrition (CMAM). Washington DC. FANTA.

University of Nairobi, FSAU & FAO (2005). Training Package of Materials for the Course Food and Nutrition Surveillance and Emergency (Unit I through III). Nairobi: FSAU.

Turmilowicz, Alison (2010). Guide to Screening for Food and Nutrition Services Among Adolescents and Adults Living with HIV. Washington DC, FANTA-2.

NATIONAL GUIDELINES

These national guidelines cover aspects of Moderate Acute Malnutrition as part of management of SAM or inpatient therapeutic care. Guidelines that deals only with SAM have not been included.

1. Inter-Agency Standing Committee's Nutrition Cluster & Nutrition Working Group of the Somalia Support Secretariat. Management of Moderate Acute Malnutrition Guidelines. Somalia 2009
2. Depistage et prise en charge de la malnutrition Madagacar, September 2007
3. Manual de Orientacao para Tratamento da DesnutricaoAguda Grave. Mozambique, June 2008
4. Management of Acute Malnutrition National Guidelines. Tanzania 2008
5. Integrated Management of Acute Malnutrition, Uganda, November 2006
6. Integrated Management of Acute Malnutrition, Zambia 2009
7. Guidelines for the Management of Severe Acute Malnutrition through Community Based Therapeutic Care, Zimbabwe, 2008

SUGGESTED FURTHER READING

1. UNICEF (2012) Improving Child Nutrition: The achievable imperative for global progress.
2. Management of Acute Malnutrition in Infants project Chapter Three: How big is the problem.

3. Food and Nutrition Bulletin, vol. 30, no. 3: 2009 (supplement), The United Nations University. Devoted solely to management of MAM. Topics of articles published.
   a. Dietary management of moderate malnutrition: Time for a change by A. Briend and Z.W. Prinzo
   b. Proposed recommended nutrient densities for moderately malnourished children by M.H. Golden
   c. Choice of foods and ingredients for moderately malnourished children 6 months to 5 years of age by K.F. Michaelsen, C. Hoppe, N. Roos, P. Kaestel, M. Stougaard, L. Lauritzen, C. M. lgaard, T. Girma, and H. Friis
   d. Dietary counselling in the management of moderate malnourishment in children by A. Ashworth and E. Ferguson
   e. Current and potential role of specially formulated foods and food supplements for preventing malnutrition among 6- to 23-month-old children and for treating moderate malnutrition among 6- to 59-month-old children by S. de Pee and M.W. Bloem
   f. Proceedings of the World Health Organization/UNICEF/World Food Programme/United Nations High Commissioner for Refugees Consultation on the Management of Moderate Malnutrition in Children under 5 Years of Age by J. Shoham and A. Duffield
4. UNHCR (2006). UNHCR Policy Related to the Acceptance, Distribution and Use of Milk Products in Refugee Settings. Geneva, United Nations High Commissioner for Refugees.
5. ENN, UCL-CIHD, ACF (2010). Management of Acute Malnutrition in Infants (MAMI) Project: Technical Review: Current evidence, policies, practices & programme outcomes. London. ENN.
6. Navarro-Colorado, Carlos, Frances Mason and Jeremy Shoham (2008). Measuring the effectiveness of Supplementary Feeding Programmes in Emergencies. London: Humanitarian Practice Network. Network Paper 63
7. Emergency Nutrition Network (2013) Maternal Nutrition in Emergencies. Summary of the state of play, key gaps and recommendations Background Technical Paper and Report of the Round Table DG ECHO Brussels, 12 November 2013.

ONLINE RESOURCES AND WEBSITES

The following websites could be visited for training manuals, guidance, eLearning, documents, technical reports and updates on MAM management.

- Emergency Nutrition Network, www.enn.net
- CMAM Forum, www.cmamforum.org
- International Malnutrition Task Force, www.imtf.org
- REFINE, http://refinenutrition.org/index.htm
- Valid International, www.validinternational.org
- United Nations World Food Programme, www.wfp.org/nutrition
- UNICEF, www.unicef.org/nutrition
- UNHCR, www.unhcr.org/nutrition
- WHO, www.who.int/nutrition
- Save the Children, www.savethechildren.org
- Action Contre la Faim, www.actioncontrelafaim.org

ONGOING AND FUTURE RESEARCH

Some ongoing research on MAM management can be found on the CMAM forum website (www.cmamforum.org) and REFINE (Research Engagement on Food Innovation for Nutritional Effectiveness – www.refinenutrition.org) websites. A relatively new initiative called REFANI (Research on Food Assistance for Nutrition Impact) is also planning four country studies in the coming years (http://www.ennonline.net/ourwork/research/refani).