

Management of Acute Malnutrition in Infants (MAMI) Project

Technical Review:

Current evidence, policies, practices & programme outcomes

January 2010



IASC

Inter-Agency
Standing Committee



 **UCL**



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Photos

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Acronyms and Abbreviations

ACF (AAH/ACH)	Action Contre la Faim (Action Against Hunger/Action Contre la Fambr)
AFASS	Acceptable, Feasible, Affordable, Sustainable and Safe
AGREE	Appraisal of Guidelines for Research and Evaluation
ARV	Antiretroviral drugs
BF	Breast feeding (or breast-fed)
BFHI	Baby Friendly Hospital Initiative
BMS	Breastmilk substitute
CF	Complementary food
CFR	Case Fatality Rate
CHW	Community Health Worker
CIHD	Centre for International Health & Development, UCL, London
CMAM	Community Management of Acute Malnutrition
CSB	Corn Soy Blend
CTC	Community-based Therapeutic Care (original term for CMAM)
DC	Day Centre
DHS	Demographic and Health Survey
EBF	Exclusive breast-feeding (or exclusively breast-fed)
EBM	Expressed breast milk
ENN	Emergency Nutrition Network
GAM	Global Acute Malnutrition
HA	Height-for-Age
HAM	Height-for-Age % of median
HAZ	Height-for-Aged Z-score
HC	Head Circumference
HCW	Healthcare worker
HT	Home Treatment
IFE	Infant Feeding in Emergencies
IMCI	Integrated Management of Childhood Illness
Infant(s) <6m	Infant(s) aged under 6 months (0 to 5.9 months)
IPC	Integrated Food Security Phase Classification
IUGR	Intrauterine Growth Retardation
IYCF	Infant and Young Child Feeding
LBW	Low Birth Weight
MAM	Moderate Acute Malnutrition
MAMI	Management of Acute Malnutrition in Infants < 6m (in general)
MAMI Project	Management of Acute Malnutrition in Infants < 6m Project
MDG	Millennium Development Goals
MoH	Ministry of Health
MSF	Medecins Sans Frontieres
MUAC	Mid-Upper Arm Circumference
NCHS	National Centre for Health Statistics

Acronyms and Abbreviations

NGO	Non-Governmental Organization
NRU	Nutritional Rehabilitation Units
Ops Guidance on IFE	Operational Guidance on infant and young child feeding in emergencies
OTP	Outpatient Treatment Programme
RCT	Randomised Control Trial
RSL	Renal Solute Load
RUSF	Ready to Use Supplementary Food
RUTF	Ready to Use Therapeutic Food
SAM	Severe Acute Malnutrition
SC	Stabilisation Centre
SFC	Supplementary Feeding Centre
SFP	Supplementary Feeding Programme
SGA	Small for gestational age
SS	Supplementary Suckling
TFC	Therapeutic Feeding Centre
TFP	Therapeutic Feeding Programme
UNHCR	United Nations High Commissioner for Refugees
UTI	Urinary Tract Infection
IASC	Inter-Agency Standing Committee
WA	Weight-for-age
WAM	Weight-for-age % of median
WAZ	Weight-for-age Z-score
WH	Weight-for-height
WHA	World Health Assembly
WHM	Weight-for-height % of median
WHZ	Weight-for-height Z-score
WHZ(WHO)	Weight-for-height Z-score calculated using WHO-GS
WHZ(NCHS)	Weight-for-height Z-score calculated using NCHS references
WHO	World Health Organisation
WHO-GS	World Health Organisation Child Growth Standards, 2006

Executive Summary

Child malnutrition is a major global public health problem. In developing countries, it is estimated that 19 million children are severely wasted and malnutrition is responsible for 11% of the total global disease burden. Challenges in managing acute malnutrition in infants <6m (MAMI) have been widely reported over the past eight years. Non-governmental organisations (NGOs) have undertaken different interventions in response, sometimes guided by field research. Until now, this accumulated body of experience has remained disparate and largely 'hidden'.

The aim of the MAMI Project was to investigate the management of acutely malnourished infants <6m in emergency programmes. The objectives were to:

- Establish the burden of acute malnutrition in this age-group
- Identify what guidelines, policies and strategies currently stipulate with regard to case management
- Determine practice in the field and make recommendations for future practice and research.

The MAMI Project focused on available treatment in selective feeding programmes.

The MAMI Project was implemented from March 2008 to July 2009 in a partnership between the Emergency Nutrition Network (ENN), University College London Centre for International Child Health and Development (CIHD) and Action Contre la Faim (ACF). A research advisory group (RAG) and an interagency steering group (IASG) informed research questions and the process. A draft framework for the management of acute malnutrition in infants <6m, modelled on the UNICEF conceptual framework on the causes of malnutrition, informed early planning and was further developed during the course of the project.

Infant <6m burden of disease

To investigate the burden of disease of acute malnutrition in infants <6m, secondary analysis of 21 Demographic Health Survey (DHS) national datasets was carried out. This found that wasting in infants <6m is a prevalent public health problem, whether using NCHS¹ growth references or 2006 WHO Growth Standards (WHO-GS), but especially with WHO-GS. Infant <6m wasting prevalence ranged from 1.1% to 15.0% with NCHS and 2.0% to 34.1% using WHO-GS. Severe wasting increased over three fold and moderate wasting 1.4 fold when transitioning from NCHS to WHO-GS. Selective feeding programmes rely on

current size rather than growth monitoring for admission. On this basis, WHO-GS will result in particularly large increases in infants <6m eligible for admission to selective feeding programmes. As many selective feeding programmes use weight-for-height % of median (WHM) indicators, the implications of moving from WHM using NCHS to WHZ based on WHO-GS needs additional urgent investigation.

Further implications of these findings are that nutrition surveys should more routinely include infants <6m to establish local burden of disease, while feeding programmes should more actively consider the likely prevalence of infant <6m wasting.

Guidelines review

A review of 14 international and 23 national guidelines for management of acute malnutrition found wide variation in the way acute malnutrition in infants <6m is addressed. Some only implicitly recognise the problem. Both inpatient and community-based guidelines recommend inpatient care for severe acute malnutrition (SAM) in infants <6m. They focus on nutritional treatments with the aim of restoring exclusive breastfeeding (using the supplementary suckling technique). Very few guidelines give details of moderate acute malnutrition (MAM) management in infants <6m or infant and young child feeding/ breastfeeding support. MSF guidelines (2006), ACF Assessment and Treatment of Malnutrition guidelines (2002) and IFE Module 2 were found to be important exceptions.

Field data

Based on 33 selective feeding programme datasets from 12 countries, an analysis of individual and summary level data on infants <6m found that this demographic group accounted for 16% of admissions, ranging from 1.2% in Uganda to 23.1% in Tajikistan. The majority of infants <6m did not fulfil standard anthropometric SAM criteria for admission. In line with expectations, % mortality in infants <6m was significantly higher than children aged 6 to 59 months (4.7% vs. 4% respectively, $p < 0.01$). Lack of survey data on infants <6m meant it was not possible to compare inpatient mortality figures with those of infants <6m in the general population. Few countries met all Sphere exit indicators for therapeutic care (Correction of Malnutrition Standard 2); current Sphere Standards have their limitations with regard to this age-group.

The analysis also showed that significant work is needed to harmonize and improve the quality of field

databases. Standardisation in reporting is needed, including database structure, case definitions, outcome coding and variable formatting, to facilitate future research and routine audit.

Field experiences

Key informant interviews found that many therapeutic feeding programmes struggle in treating malnourished infants <6m. There is much inter-programme variation in the profile of admission, with a combination of clinical judgement and/or anthropometric indicators often used to determine admission. Nutritional and psychosocial care of the mother was often lacking. Experiences with the supplementary suckling technique were sometimes good but varied; staff time and experience were important limiting factors. Interviewees identified 'ways forward' that centred on admission criteria, guidance development, linking with other services, building staff capacity and 'on the job' training and support.

Breastfeeding assessment tools

Fifteen breastfeeding assessment tools were reviewed to explore their potential application to MAMI in both inpatient and community-based settings. No one tool was identified as sufficiently sensitive for community use and specific for use in inpatient settings. Quality research studies to test the validity of existing breastfeeding assessment tools in different settings are needed. In the interim, UNICEF b-r-e-a-s-t, the UNICEF 2006 breastfeeding observation aid and the aids described in IFE Module 2 can be used to assess breastfeeding in programmes managing infants <6m. Severe maternal wasting and maternal and infant HIV status are just two of the important wider considerations when assessing breastfeeding effectiveness.

Psychosocial considerations

WHO 1999 guidelines on treatment of SAM include guidance on psychosocial support and stimulation for children under five years and their mothers. The MAMI Project identified little guidance on specific stimulation activities for infants <6m, a lack of knowledge concerning the impact of severe malnutrition in infants <6m on psychosocial development, and little evidence of the long term effects of psychosocial support on this age group. Psychosocial stimulation is not currently integrated into community-based management of acute malnutrition (CMAM) recommendations and not routinely integrated into emergency programmes in general. Building upon a recent review of maternal depression and child growth, our review indicates evidence of the consequences of maternal depression on breastfeeding, child development and the ability to seek treatment. The available evidence is sufficient to recommend detection and appropriate treatment of maternal depression within the framework of management of infant malnutrition. Strengthened psychosocial stimulation/support of the inpatient

infant <6m, the mother-infant dyad and their families is needed. Studies are needed to explore which psychosocial support activities are most effective, when they should start, the minimum duration of intervention, the impact on social and emotional development of the child and/or on the mother-child relationship, and how to adapt these activities to the community care of malnutrition.

Antibiotics review

Our review of antibiotic use in infants <6m shows the evidence base on antimicrobial treatment in infants <6m is severely lacking, and for malnourished infants and children needs urgently updating. Sensitivity to amoxicillin, which is the commonest currently recommended antibiotic, is low. There is a lack of intervention trials. New trials are needed which use current case definitions of acute malnutrition, especially in settings where HIV is now prevalent.

Change in model of care?

The population burden of acute malnutrition in infants <6m, the varied profile of current caseloads and the challenges in inpatient management suggests a radical shift in the model for management of acute malnutrition in infants <6m is needed. A move towards community-based care is an appropriate model to consider. Such a development would harmonise acute malnutrition management for infants <6m with that of older children and broaden opportunities to tailor care for larger numbers. It may also offer a more appropriate and safer setting to manage infants <6m that present early and with more manageable feeding problems ('uncomplicated' cases). Inpatient care could be reserved for those infants needing specialist clinical and dietetic care ('complicated' cases). Research is needed to explore the safety, practicality and cost-effectiveness of such an approach. Improved clinical assessment strategies are needed to enable triage, to identify those with urgent need and to enable inter-programme comparisons.

The way forward

In the immediate term, there are many resources, good practices, and initiatives to consolidate and build upon. Existing guidelines with strong MAMI components are MSF guidelines 2006, ACF Assessment and Treatment of Malnutrition, 2002 and IFE Module 2. Strategies with potential to improve inpatient outcomes of 'complicated' infant <6m SAM include implementation of routine kangaroo care, breastfeeding 'corners' with skilled breastfeeding support, and tailored psychosocial stimulation/support of infants <6m. Strategies with potential for effective outpatient-based care of infant <6m with MAM and 'uncomplicated' SAM include community-based breastfeeding support, psychosocial support programmes and women's groups programmes. Closer links are needed with existing programmes that may impact on infant <6m

malnutrition, such as reproductive health services, the Baby Friendly Initiative, Integrated Management of Childhood Illness (IMCI) and growth monitoring programmes. Strategies to treat infant malnutrition in the context of HIV should not only consider interventions that seek to avoid HIV transmission, but also those that support maternal and child survival. Access to anti-retroviral treatment (ARV) for HIV-exposed mothers and infants and safer infant feeding practices are key determinants of HIV-free child survival.

The MAMI Project has identified research needs on a range of topics, from anthropometric indicators suitable for use in the community, to breastfeeding assessment tools, to nature and effect of skilled breastfeeding counselling on severely malnourished infants. Resources needed – monetary, time, skill set – must be quantified to enable cost-benefit analysis and to ascertain the viability of scale-up of interventions.

Assessment of how well programmes are treating infant <6m malnutrition needs to be strengthened and based upon robust data. Critically, performance must capture the clinical, psychosocial and contextual complexity of infants treated and establish programme population coverage of infant <6m SAM/MAM.

Key collaborative initiatives to learn from include the SFP Minimum Reporting Standards Package, the Vermont-Oxford Network to improve neonatal care, and experiences from the rollout of the 1999 WHO guidelines. Data sharing and partnership are needed to enable continued inter-agency dialogue. Harmonised databases and coding systems would enable easier audit. In this regard, an update in the SFP Minimum Reporting Standards package to include infants <6m is recommended.

The lack of an evidence base to formulate MAMI guidelines remains a big gap and a combination of systematic reviews, high quality randomised control trial-type studies and operational research is needed. Formal frameworks, such as GRADE and the Child Health and Nutrition Research Initiative (CHNRI) might usefully guide which policies and research projects should be prioritised. More resources should be devoted to future guideline development and tools such as GRADE and AGREE used to better enhance their quality.

Conclusions

The MAMI Project has found that the burden of care for infants <6m is significant, the implications of the rollout of the 2006 WHO Growth Standards for infants <6m are important and need to be explored urgently, the current evidence base for treating malnourished infants <6m is relatively weak and that programmes struggle using current guidelines to manage malnourished infants <6m. Of most immediate concern

is the lack of explicit consideration to infants <6m in current guidelines and lack of explicit recognition of this age-group in recent statements on malnutrition treatment and 2006 WHO-GS rollout. This risks the presumption that care for older children can safely be extended to infants <6m and/or perpetuates the assumption that infants <6m are all well nourished. A valuable contribution to help address this would be a statement on MAMI that highlighted the concerns, gaps and immediate considerations for this age-group to guide practice in the short-term. Such a statement could have significant impact if made by the Global Nutrition Cluster through engagement of Nutrition Cluster members, the MAMI Project research team, RAG and IASG members.

In the future, a more radical shift in the model for MAMI is likely needed. For older children, the evolution to community based management of acute malnutrition was driven by a strong vision, a clear research agenda and well documented field experiences. The challenge now is how to improve nutritional, clinical and public health outcomes in infants <6m.



Chapter 1 *Introduction*

Chapter 1: Introduction

1.1 Background to the MAMI Project

The management of acute malnutrition in infants under six months (MAMI) is currently hampered by poor evidence on which to base guidelines. Both facility-based¹ and community-based programmes^{2,3} face challenges in their management. Such challenges have been highlighted in recent published concerns,^{4,5} documented field experiences and debate⁶, a WHO technical review of the management of severe malnutrition⁷ and in the proceedings of the Infant Feeding in Emergencies (IFE) Core Group⁸.

As a result, infants under six months are admitted to programmes with variable capacity and skill to manage them. Efforts have been made to 'stop-gap' the lack of guidance^{9,10} and operational agencies have undertaken different interventions, sometimes guided by field research. Thus a body of experience in MAMI has accumulated. However, this remains disparate and often exists as raw data or internal agency documents. Once collated and formally analysed, however, these data are valuable and worthy of use as an initial basis for investigation.

The Emergency Nutrition Network (ENN) was established in 1996 by international humanitarian agencies to accelerate learning and improve institutional memory in the emergency food and nutrition sector. Many of the challenges around MAMI have been highlighted to ENN in its flagship publication, Field Exchange, and through its involvement in the IFE Core Group. The MAMI Project was conceptualised by the ENN and implemented in collaboration with UCL Centre for International Child Health and Development (CIHD) and Action Contre la Faim (ACF). MAMI was funded by the UNICEF-led Inter-Agency Standing Committee (IASC) Nutrition Cluster.

Given the background and ENN's mandate, the MAMI Project is located in the emergency nutrition sector and speaks especially to those concerned with humanitarian response.

1.2 Aim, objectives and long term vision

The MAMI Project focuses on infants aged less than six months (0 to 5.9 months old). From hereon, this age-group is referred to as 'infant <6m' (plural 'infants <6m'). Older infants and young children aged six to 59 months are referred to as 'children 6 to 59m'.

Aim: The aim of the MAMI Project is to investigate the management of acutely malnourished infants <6m in emergency programmes, in order to improve practice by contributing to evidence-based, better practice guidelines.

Objectives: Focused on acutely malnourished infants <6m, the objectives are:

- To establish the infant burden of disease.ⁱ
- To establish what is currently advised in the form of guidelines, policies and strategies
- To determine what is carried out in practice
- On the basis of this 'field evidence' and other relevant published literature, to make recommendations for future practice and research.

Vision: Long term, all malnourished infants should receive effective, evidence-based care. There are multiple competing health needs in vulnerable populations, therefore strategies to treat this group should also be cost effective and achieve maximal possible public health impact.

Outputs: Evidence presented in the MAMI report will be used to form the basis of:

- Summary report targeted at field staff, with an emphasis on content relevant to inform better practice
- Published research

ⁱ This first objective was not in the original project objectives, but was added following initial consultations with stakeholders.

1.3 The process

It is hoped that the MAMI Project will provide a starting place for the development of a stronger evidence base through further operational and formal research, leading to more formal best practice guidelines in future.

Target audience: This report should be of particular interest to:

- a) Policy makers, programme managers and clinicians involved in MAMI in emergency contexts and nutritionally vulnerable settings.
- b) Professionals in related disciplines with indirect involvement in MAMI, such as neonatal, reproductive health, psychosocial, speech and language, breastfeeding counsellors and community development specialists.
- c) Researchers, students and others wishing to gain a rapid overview of current practices and key issues surrounding MAMI.

1.3 The process

The MAMI Project was implemented from January 2008 to July 2009. The process involved a MAMI 'core' team comprising the ENN, UCL CIHD and ACF, a research advisory group (RAG) and an interagency steering group (IASG) of UN agencies, NGOs and independent individuals with relevant experiences (see acknowledgements for members and contributors). Face to face meetings, e-mail and phone were used to establish and elaborate on the key questions to be addressed, and how to address them.

The MAMI Project has been an iterative process. Opportunities to explore further emerging key issues beyond the original remit of the project were taken, such as assessment of disease burden of infant malnutrition (Chapter 3), review of breastfeeding assessment tools (Chapter 7) and a review of antibiotic use in infants < 6m (summarised in Section 9.7).

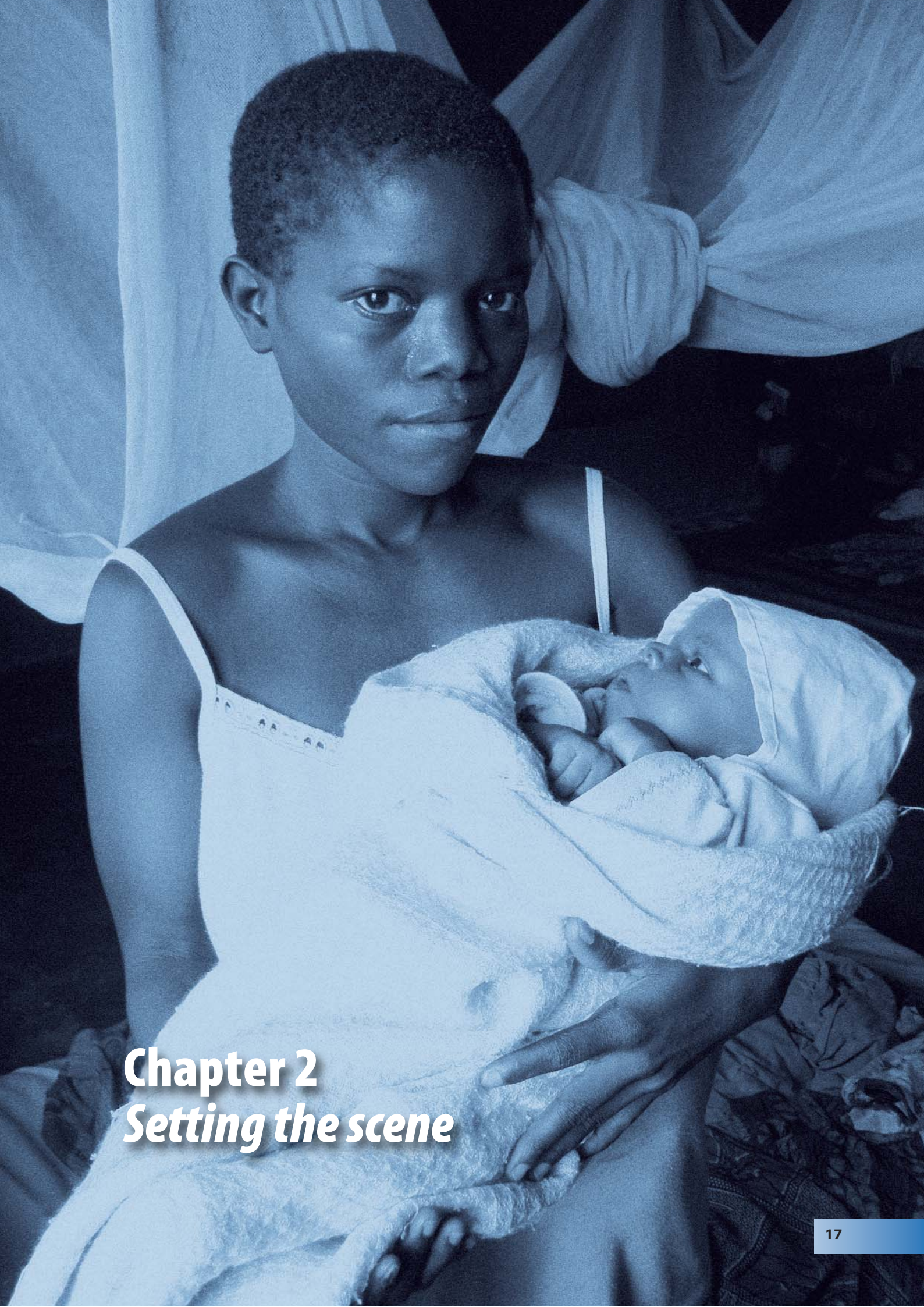
The main outputs of the MAMI Project are this report, a summary report and publication of key findings (in process and planned). Key findings of the project have been shared at a number of key meetings and a variety of for a in the UK, Malawi and Bangkok¹¹. With completion of the MAMI Project, the MAMI 'core' team will continue to actively disseminate findings.

1.4 MAMI Project Framework

From the outset of the MAMI Project, it was considered essential to locate the MAMI Project within a framework for the management of malnutrition in this age-group. An initial draft framework, modelled on the UNICEF conceptual framework, informed early discussions with RAG and the IASG, was developed during the course of the project and finalised in light of project findings (see Appendix 1).

Endnotes

- ¹ WHO. (2009) Management of severe malnutrition: a manual for physicians and other senior health workers. Geneva: World Health Organisation.
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- ³ WHO, WFP, UNSCN & UNICEF. (2007) Community-based management of severe acute malnutrition. A Joint Statement by the World Health Organization, the World Food Programme, the United Nations System Standing Committee on Nutrition and the United Nations Children's Fund.
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- ⁵ Seal, A., McGrath, M., Seal, A., Taylor, A. (2002) Infant feeding indicators for use in emergencies: an analysis of current recommendations and practice. Public Health Nutr. 2002 Jun; 5(3):365-72.
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- ⁷ WHO. (2004) Severe malnutrition: Report of a consultation to review current literature. Geneva: World Health Organisation..
- ⁸ IFE Core Group (2006) Infant and Young Child Feeding in Emergencies. Making it Matter. Proceedings of an International Strategy Meeting, 1-2 November 2006. IFE Core Group.
- ⁹ ENN (2004) Infant feeding in emergencies. Module 2. Version 1.0 Developed through collaboration of ENN, IBRAN, Terre des Hommes, UNICEF, UNHCR, WHO, WFP. Core Manual (for training, practice and reference).
- ¹⁰ ENN et al. (2009) Integration of infant and young child feeding into CTC/CMAM. Manual.
- ¹¹ MAINN (Maternal & Infant Nutrition & Nurture) Conference, UK, workshop session on MAMI led by Marko Kerac; CAPGAN (Commonwealth Association of Paediatric Gastroenterology & Nutrition), Blantyre, Malawi, August 12th to 16th 2009; Sphere Regional Consultation, Malawi, August 2009; MSF (Medecins Sans Frontiers) Scientific Day London, UK, June 11th 2009; Infant feeding in emergencies UNICEF regional training, Nairobi, July, 2009; Working Group on Nutrition in Emergencies, SCN 1 day meeting, Bangkok, 10th October, 2009; Nutrition Cluster Meeting, London, 20 October 2009; Sphere Core Meeting, London, 22-23 October, 2009



Chapter 2

Setting the scene

Chapter 2: Setting the scene

This chapter sets the context of the MAMI Project. It opens with an explanation of the importance of infants and malnutrition as a global public health priority. It explores reasons why infants <6m are an age group of particular significance. The chapter also lays out the policy framework for infant and young child feeding (IYCF) in emergencies. Finally the chapter seeks to define acute malnutrition and describe the context of emergency selective feeding programmes where MAMI is typically located.

2.1 Infants and Malnutrition: A Global Public Health Priority

Around 9.2 million children under the age of five years die each year¹², mostly from preventable causes and mostly in poor countries¹³. Generally the younger the children the more vulnerable they are; nearly 70% of under five deaths occur in the first year of life and 38% of under one year deaths occur in the first month of life¹⁴. Diarrhoea and pneumonia are the most significant infections causing death, accounting for about 20% each¹⁵.

Child malnutrition is a major global public health problem. The 2008 Lancet Nutrition Series estimated that in developing countries, out of 555 million children age 0 to five years¹⁶:

177 million (95%CI 163 to 193) or 32.0% are stunted (chronic malnutrition)
 112 million (95%CI 99 to 126) or 20.2% are underweight (mixed malnutrition)
 19 million (95%CI 10 to 29) or 3.5% are severely wasted (acute malnutrition)
 Maternal and child undernutrition is responsible for 35% of child deaths
 Malnutrition is responsible for 11% of total global disease burden.

The vulnerability of infants and young children to malnutrition, illness and death is heightened in emergencies. An emergency can be defined as “any situation where there is an exceptional and widespread threat to life, health and basic subsistence, which is beyond the coping mechanisms of individuals and the community” (Oxfam Humanitarian Policy, 2003). Mortality rates and nutritional status of children under five years are often used as an indicator of the state of crisis of such a population. Infants and young children contribute greatly to the malnutrition caseload. For example, in a large-scale therapeutic feeding programme in Niger in 2005, 95% of the 43,529 malnourished cases admitted for therapeutic care were children less than two years of age¹⁷.

Infant and young child feeding practices are a key determinant of vulnerability to malnutrition, disease and death. The recent Lancet series on Maternal and Child Undernutrition¹⁸ reinforced the importance of breastfeeding and complementary feeding in saving lives of children under five years of age. Breastfeeding support tops the table of life-saving interventions: 13% of under five deaths could be saved through exclusive and continued breastfeeding until one year of age and another 6% through appropriate complementary feeding¹⁹. The significance of feeding practice is greatest with the youngest; one-fifth (22%) of all neonatal deaths could be prevented by early initiation of exclusive breastfeeding (breastfeeding within the first hour)²⁰. Recommendations on optimal infant and young child feeding practices reflect this, aiming to maximise health and minimise morbidity and mortality (See Box 1).

2.2 Significance of infants <6m

Box 1: Optimal infant and young child feeding practices

Early initiation of breastfeeding: introducing breastfeeding within one hour of birth²¹.

Exclusive breastfeeding: an infant receives only breastmilk for the first six months of life and no other liquids or solids, not even water, with the exception of necessary vitamins, mineral supplements or medicines²².

Continued breastfeeding: sustaining breastfeeding to two years of age or beyond²³.

Complementary feeding: age-appropriate, adequate and safe solid or semi-solid food is provided in addition to breastmilk. The complementary feeding period is six months to two years. Appropriate complementary foods are those that provide sufficient energy, protein and micronutrients to meet the child's growing nutritional needs²⁴.

Infant and young child feeding in the context of HIV is an added challenge in emergency contexts:

"The HIV pandemic and the risk of mother-to-child transmission of HIV through breastfeeding pose unique challenges to the promotion of breastfeeding, even among unaffected families. Complex emergencies, which are often characterized by population displacement food insecurity and armed conflict, are increasing in number and intensity, further compromising the care and feeding of infant and young children the world over".

Global Strategy for Infant and Young Child Feeding. UNICEF/WHO, 2003.

Feeding practices are a key determinant of HIV-free child survival and an important MAMI consideration (See Chapter 9).

2.2 Significance of infants <6m

2.2.1 Infants <6m are unique

Just as a child is not merely a small adult, an infant <6m is not merely a small child. There are several reasons for considering infants <6m as a unique subgroup:

Feeding differences

Infants <6m are unique in their dependence on breastfeeding (or a breastmilk substitute in non-breastfed infants) to meet all their fluid and nutrient needs. The mother (or maternal substitute) is thus critical to his/her nourishment. This dependence on breastfeeding for survival and the challenges of managing infants where breastfeeding or breastmilk is not available have immense practical implications for the management of acute malnutrition in this age-group.

Physiological and developmental differences

Maturation, growth and development are not simple linear processes. Birth and the immediate weeks and months after birth are a time of significant change. The developmental changes of an infant between one month and four months of age are vast compared to a period of the same length in an older infant. Different infants mature at different rates, so that 'normal' progress encompasses wide differences in timing. Lucas and Zlotkin summarise the main nutrition relevant changes between 0 and six months as:²⁵

- **Mechanical:** Neuromotor development, which permits coordinated sucking, swallowing and, later on, chewing of more solid foods.
- **Physiological:** Changes in motor, digestive and absorptive functions of the gut, kidneys and other organs that equip the infant for postnatal feeding.
- **Biochemical:** Changes in enzyme activity and biochemical pathways that enable the infant to survive as an independent organism after birth, when the transplacental supply of glucose and other nutrients from the mother suddenly ceases at birth.
- **Protective:** Particularly developments in immune functions and the mucosal barrier of the gut that occur as food related exposure to potentially pathogenic organisms and antigens occurs postnatally.

These reflect how the period 0 to <6m is period of unprecedented change, and consequently, of both opportunity and risk.

2.2 Significance of infants <6m

Pathological differences

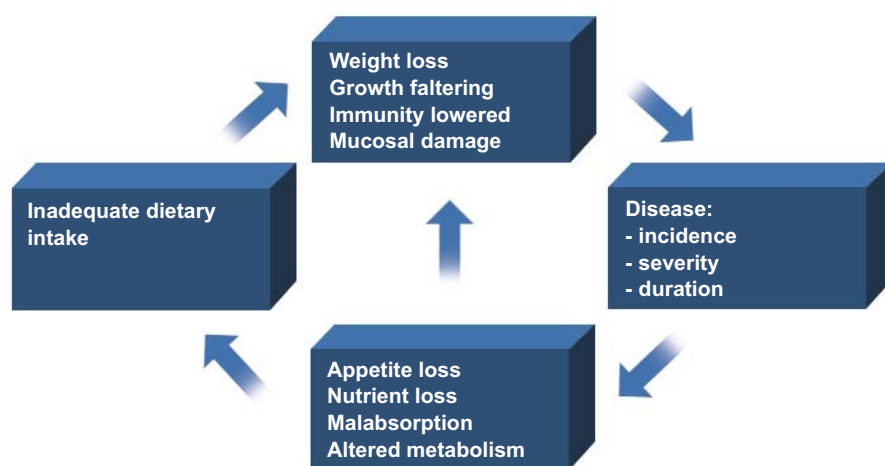
Because of underlying physiological differences and exposures, infants <6m also suffer from a different range of pathologies compared to older children:

- Some are different but overlap with older children, e.g. many bacterial infections occur at all ages but some are more common in certain ages than others.
- Some conditions are unique to infants <6m, e.g. certain types of congenital heart disease may not be compatible with life much beyond birth.
- Some conditions are relatively rare in infants, e.g. severe allergic reactions to food.

Mortality risk differences

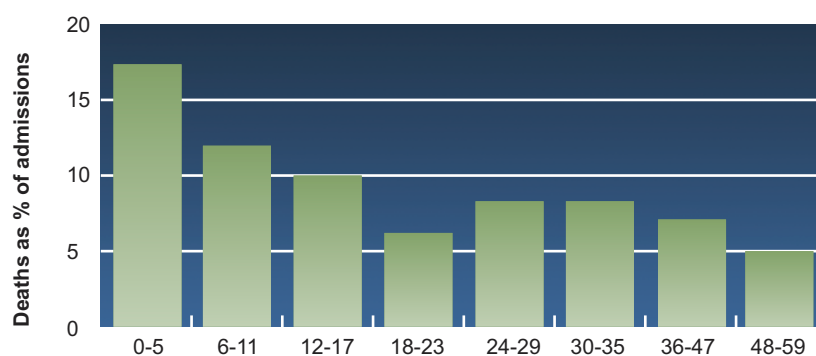
Younger infants are at greater risk of death than older children. Feeding practices in infants <6m are intimately associated with mortality in this age group, even in non-emergencies. A pooled analysis of statistics from developing countries found that not being breastfed increases the risk of mortality by six times in infants less than two months old, compared to 1.4 times in infants between nine and 11 months of age²⁶. Malnutrition increases this risk further, a reflection of the interaction between nutritional status and disease (see Figure 1). For example, in a therapeutic feeding programme in Afghanistan, the mortality rate was 17.2% amongst malnourished infants <6m admitted for therapeutic care compared to 12% in six to 11 month olds and 8.3% in 12 to 17 month olds (see Figure 2).²⁷

Figure 1: Interactions between malnutrition and disease



Source: Tomkins & Watson, ACC/SCN, Geneva 1989. (In UNICEF State of the World's Children, 1998)

Figure 2: Bar chart showing deaths by age group in a feeding programme in Kabul



Source: Golden M, 2000

2.2 Significance of infants <6m

Impact of Low birth weight

For infants <6m, birth is a more recent event in their life cycle and related issues can have a much more immediate impact. Low birth weight (LBW) (<2500g) can be a consequence of preterm birth (before 37 weeks completed gestation) or being small for gestational age (SGA) (weight-for-gestation <10th percentile), or both. Some infants can also have underlying intra-uterine growth retardation (IUGR), which is not necessarily synonymous with birth weight.²⁸ Risks associated with each of these vary. In practice, it is often only possible to determine birth weight (and often not even that in many in many developing countries), and therefore all LBW infants are treated as one group.

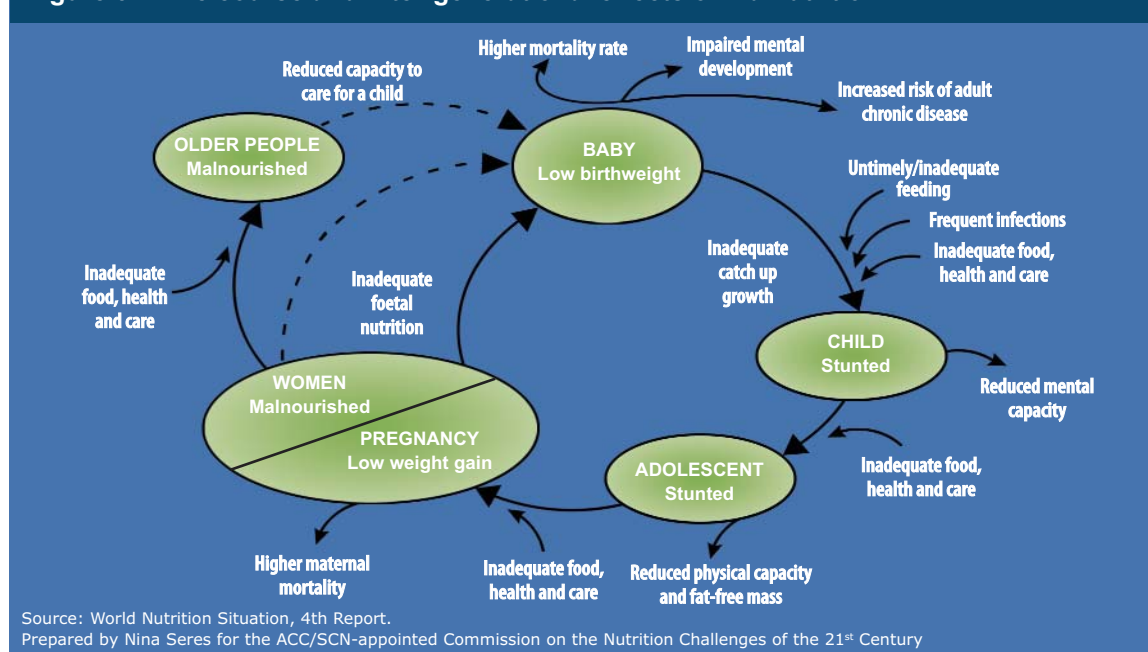
Whether or not infants admitted for malnutrition treatment are LBW is important to MAMI since:

- LBW infants have an elevated mortality risk compared to same age normal birth weight infants
- LBW may confound and complicate the diagnosis of acute malnutrition
- LBW infants sometimes require different or additional treatments. Optimal feeding of LBW infants is reviewed in detail in a 2006 WHO technical review.²⁹

2.2.2 Long term implications of infant <6m malnutrition

Studies show clear links between early life environment and risk of ill health later in life.³⁰ The period 0 to six months is part of a critical 'window of opportunity', within which the impact of undernutrition has far reaching implications³¹. These are manifested at the individual level at all stages of life (Figure 3) and at the population level through the observed 'dual burden' of malnutrition disease^{32,33,34}. The latter is often observed in settings of societal, demographic and nutritional transition. Individuals experiencing undernutrition in early life may later be exposed to nutrient excess. This appears to have particularly adverse effects.^{35,36,37,38} Adaptive metabolic responses of conserving and storing developed early on become maladaptive later on when there is chronic excess of food. Increased rates of obesity and related conditions such as coronary heart disease, hypertension, stroke and diabetes result. Optimal nutrition of infants <6m therefore makes a key contribution to health throughout the life cycle.

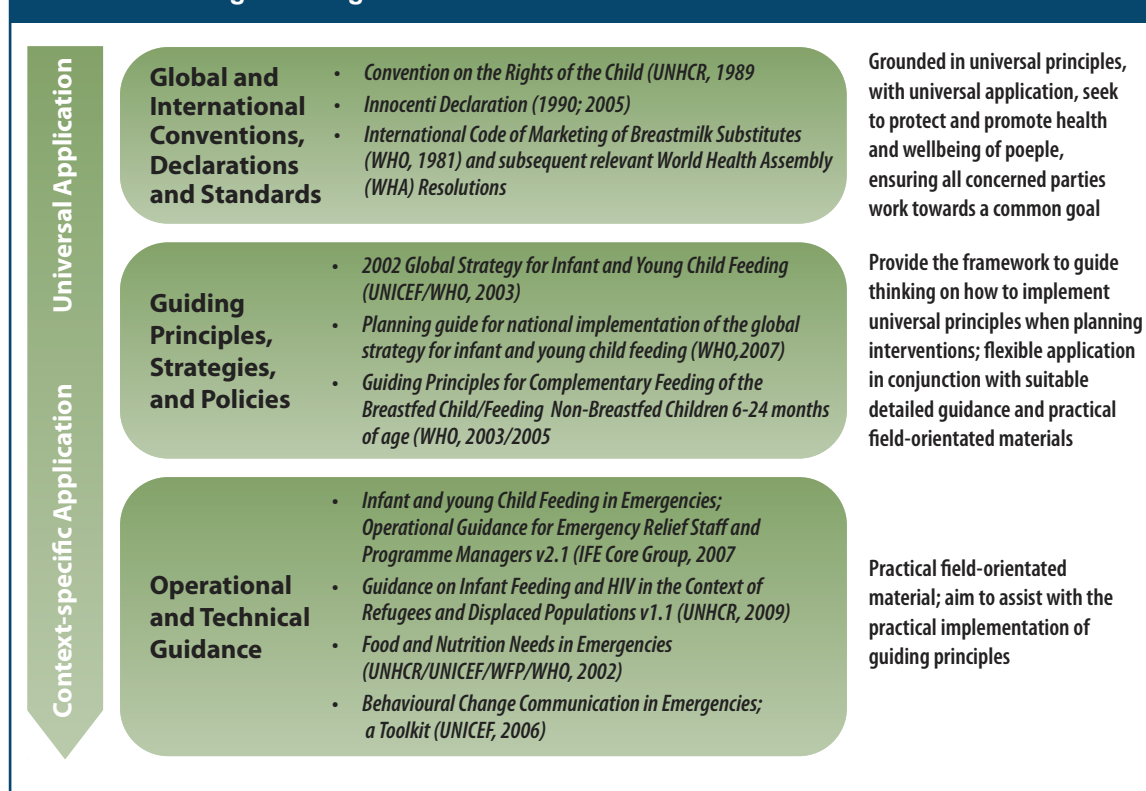
Figure 3: Life course and inter-generational effects of malnutrition



2.3 Global strategies, policy and guidance on IFE

The protection and support of optimal infant and young child feeding (IYCF) is mandated by international law. It is necessary for meeting international standards and is regulated and detailed in operational and technical guidance. Figure 4 reflects a schematic overview of key documentation relevant to the protection and support of IYCF in emergencies (IFE), with some examples of each. Several of these are particularly relevant to MAMI and are described here in more detail.

Figure 4: Key strategies, policies and guidance related to infant and young child feeding in emergencies



WHO/UNICEF Global Strategy Infant and Young Child Feeding (2002)

The WHO/UNICEF Global Strategy on Infant and Young Child Feeding³⁹ is an international strategic framework based on respect, protection, facilitation and fulfillment of accepted human rights principles. It was adopted by consensus in 2002 by all WHO Member States. The Global Strategy identifies the obligations and responsibilities of governments, organisations, and other concerned parties to infants and young children and sets operational targets. The Implementation Handbook for the Convention of the Rights of the Child recognizes the Global Strategy as a cornerstone to achieving the child's right to the highest attainable standard of health, stipulated in Article 24 of the Convention.

Of particular note to MAMI, the Global Strategy calls for appropriate feeding support for infants and young children in 'exceptionally difficult circumstances', related support for caregivers and the development of the knowledge and skills base of health workers working with carers and children in such situations. 'Exceptionally difficult circumstances' includes infants of low-birth-weight, mothers who are HIV-infected and infants in emergency situations.

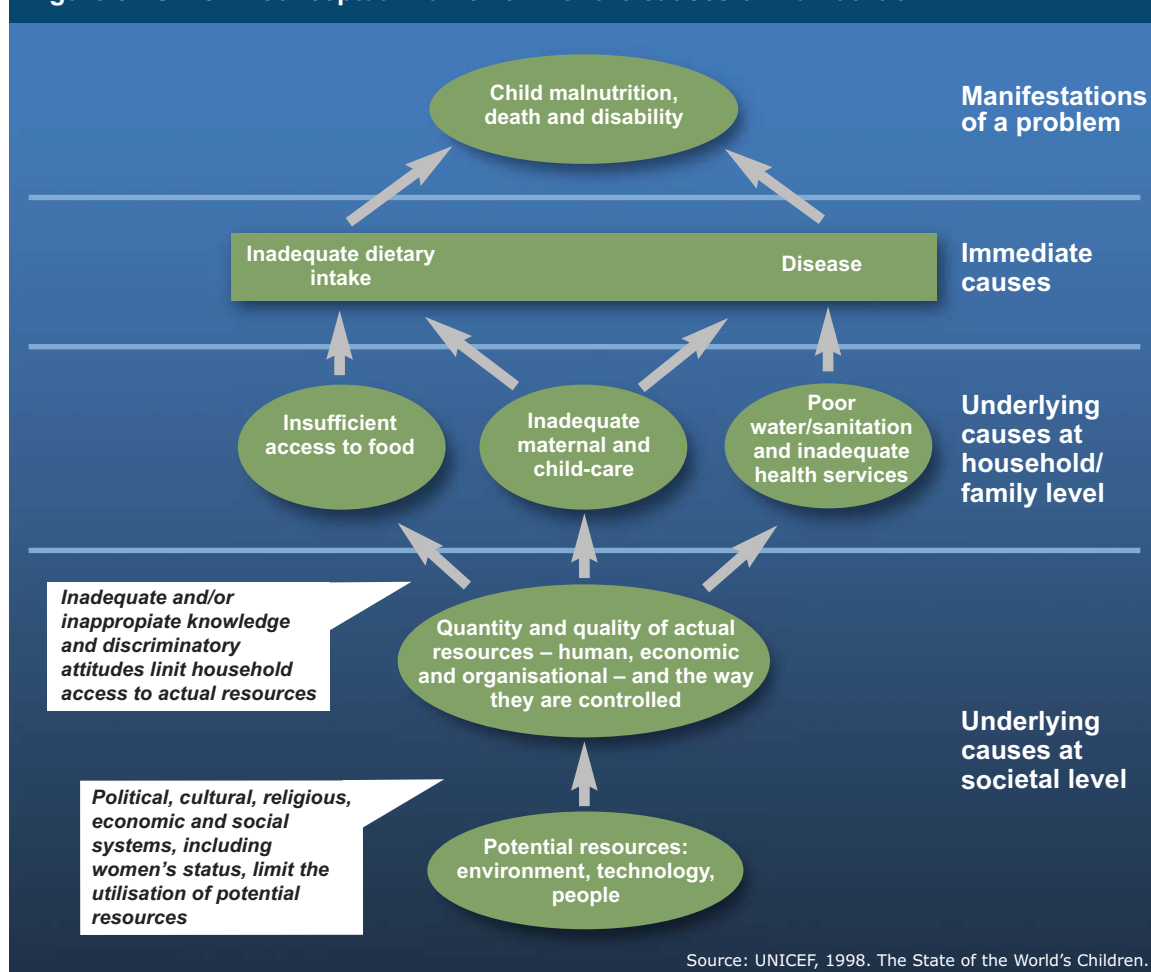
Many of the WHO Member States are already acting on their official commitment to implement the Global Strategy, and are developing national action plans based on it. Positioning interventions to treat malnutrition within the Global Strategy creates opportunities to coordinate with governments and national level plans.

2.3 Global strategies, policy and guidance on IFE

UNICEF Conceptual framework for the causes of malnutrition (1990)

The UNICEF Conceptual framework for the causes of malnutrition⁴⁰ was first developed in 1990 to guide analysis of the causes of malnutrition in a given context. Refined versions have since been produced though retaining the basic elements of the original (see Figure 5). It has been applied widely to emergency contexts. The UNICEF framework reflects how malnutrition results from a complex mix of factors at different levels. It recognises the role of IYCF and care practices. Understanding the many different influences on nutritional status and underlying causes of malnutrition in a particular context allows the development of appropriate interventions to address malnutrition and can help to transition emergency interventions into longer term development programming. This framework formed the basis of a version developed for MAMI (see Section 1.4).

Figure 5: UNICEF conceptual framework for the causes of malnutrition



Millennium Development Goals (2000)

The Millennium Development Goals (MDGs) are eight goals to be achieved by 2015 that respond to the world's main development challenges⁴¹. The benefits of treating acute malnutrition and of optimal IYCF are relevant to all eight of the United Nations Millennium Development Goals (MDGs)^{42,43} (see Table 1). At mid-point towards the 2015 deadline, progress towards some of the MDGs is off track in some regions, and MDGs 4 and 5 are particularly in danger of not being met. Improvements in MAMI will increase the changes for achievement of these MDGs.

2.3 Global strategies, policy and guidance on IFE

Table 1: Contribution of malnutrition treatment and optimal IYCF to meeting Millennium Development Goals (MDGs)

	Treatment of acute malnutrition	Optimal IYCF ⁴⁴
MDG 1 (Eradicate extreme poverty and halve hunger)	Malnutrition treatment directly addresses hunger.	Breastfeeding is a low cost, high quality, safe food which is key to infant and child nutrition. ^{45,46}
MDG 2 (Universal primary education)	Malnutrition impairs school performance. ⁴⁷	Breastfeeding and appropriate complementary feeding contribute to optimal neurological and cognitive development. ^{48,49}
MDG 3 (Gender equality)	Malnourished girls are less likely to stay in school and receive the education so vital to their empowerment. ⁵⁰	Breastfeeding enables an equal start ⁵¹ and empowers women through health and reproductive benefits, e.g. birth spacing. ⁵²
MDG 4 (Reduce child mortality).	Maternal and child undernutrition contributes to 35% of under five deaths. ⁵³	If all infants were exclusively breastfed for six months and were breastfed for one year, under five mortality would reduce by about 14%. If appropriate complementary feeding were given to children between six months and two years under five mortality would reduce by about 6%. ⁵⁴
MDG 5 (Maternal Health)	Malnourished girls not reaching their full adult physical potential are at increased risk of maternity-related problems. ⁵⁵	The Global Strategy draws attention to maternal nutritional and social needs related to IYCF ⁵⁶ , and maternal benefits, such as reduced post-partum haemorrhage through early initiation of breastfeeding, protection from anaemia and maternal depletion through lactational amenorrhoea. ^{57,58,59}
MDG 6 (Combat HIV/AIDS, malaria & other diseases)	Nutrition and infection interact. ^{60,61}	Optimal IYCF practices reduce morbidity and mortality in children. ^{62,63}
MDG 7 (Ensure environmental sustainability)	Initiatives to prevent malnutrition or intervene early, reduce the need for external supports that may have higher environmental impact, e.g. importing specialised products, less transport costs, less waste.	Breastfeeding is a sustainable, locally available feeding option without waste, packaging or fuel use. ^{64,65}
MDG 8 (global partnerships for development)	The Global Strategy framework, for example, offers an opportunity to develop global partnerships for development. ⁶⁶	

International Code of Marketing of Breastmilk Substitutes (1981)

Upholding the provisions of the International Code of Marketing of Breastmilk Substitutes⁶⁷ and subsequent relevant World Health Assembly (WHA) resolutions (collectively known as 'the Code')⁶⁸ is a key consideration in any interventions that involve infant and young child feeding. All provisions of the Code apply in emergencies and adoption of and adherence to the Code in its entirety is a minimum requirement of member states (WHA 34.22). At least 48 countries have national legislation based on the Code.

The Code is intended to protect the mothers/caregivers of both breastfed and non-breastfed infants and young children from commercial influences on their infant feeding choices. The Code sets out the responsibilities of the infant food industry, health workers, governments and organizations in relation to the marketing of breastmilk substitutes, feeding bottles and teats. The Code does not ban the use of infant formula or bottles but controls how they are produced, packaged, promoted and provided.

WHO Guiding Principles for feeding infants and young children during emergencies (2004)

Published in 2004, the WHO Guiding Principles for feeding infants and young children during emergencies⁶⁹ emphasises both optimal infant and young child feeding practices and the recognition and treatment of acute malnutrition, detailed in ten guiding principles and summarised here (Box 3).

2.3 Global strategies, policy and guidance on IFE

Box 2: Breastmilk substitute definition (the Code)

For the purpose of the Code, *breastmilk substitutes* are defined as “any food being marketed or otherwise represented as a partial or total replacement of breastmilk, whether or not suitable for that purpose.”

A common breastmilk substitute is commercial infant formula, a product that should meet technical specifications of the relevant Codex Alimentarius Standards. However, any product promoted for use in an infant under six months of age (or represented as a replacement for breastmilk from six months of age to two years or beyond), is considered a breastmilk substitute for the purpose of the Code and so fall within its scope.

Examples of products that may fall within the scope of the Code include milk products such as dried skimmed milk and condensed milks, therapeutic milks, bottled water, juices, teas, glucose solutions, cereals, ready to use therapeutic foods and any other foods and fluids marketed for infants under six months.

Box 3: Guiding principles for feeding infants and young children during emergencies (WHO, 2004)

Principle 1

Infants born into populations affected by emergencies should normally be exclusively breastfed from birth to 6 months of age.

Principle 2

The aim should be to create and sustain an environment that encourages frequent breastfeeding for children up to two years or beyond.

Principle 3

The quantity, distribution and use of breast-milk substitutes at emergency sites should be strictly controlled.

Principle 4

To sustain growth, development and health, infants from 6 months onwards and older children need hygienically prepared, and easy-to-eat and digest, foods that nutritionally complement breast milk.

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.

Principle 6

Because the number of caregivers is often reduced during emergencies as stress levels increase, promoting caregivers' coping capacity is an essential part of fostering good feeding practices for infants and young children.

Principle 7

The health and vigour of infants and children should be protected so they are able to suckle frequently and well and maintain their appetite for complementary foods.

Principle 8

Nutritional status should be continually monitored to identify malnourished children so that their condition can be assessed and treated, and prevented from deteriorating further. Malnutrition's underlying causes should be investigated and corrected.

Principle 9

To minimize an emergency's negative impact on feeding practices, interventions should begin immediately. The focus should be on supporting caregivers and channelling scarce resources to meet the nutritional needs of the infants and young children in their charge.

Principle 10

Promoting optimal feeding for infants and young children in emergencies requires a flexible approach based on continual careful monitoring.

2.3 Global strategies, policy and guidance on IFE

Sphere Humanitarian Charter & Minimum Standards in Disaster Response (2004)

During the past decade the humanitarian community has initiated a number of inter-agency initiatives to improve accountability, quality and performance in humanitarian action. Launched in 1997, the Sphere Project⁷⁰ is one such initiative. The Sphere Project comprises a humanitarian charter and a set of standards that specify the minimum acceptable levels to be attained in humanitarian response. The Sphere 2004 edition provides 17 minimum standards in food security, nutrition and food aid. Each minimum standard has a set of key indicators to signal how far the standard has been attained⁷¹.

There are a number of Sphere indicators that are particularly relevant to infants <6m, for example indicators on exclusive breastfeeding, support to non-breastfed infants and support to pregnant and lactating women. Greater clarity is needed on how such indicators can be measured, and generally around MAMI, for example, criteria for admissions of infants <6m. An update of Sphere is currently underway (2010 edition) and the MAMI Project is contributing to this process.

Operational Guidance on IFE (2007)

One of the challenges of meeting global recommendations is how to translate them into practical action. Global instruments typically do not include detailed instruction on action required, a point highlighted in the recent Lancet Series on Maternal and Child Undernutrition:

“The international system... provides much normative guidance on nutrition policy, but some of it is expressed in abstract language that does not easily translate into implementation⁷².

Lancet Maternal and Child Undernutrition Study Group, Jan 2008.

The Operational Guidance on IFE for emergency relief staff and programme managers (Ops Guidance on IFE)⁷³ is a concise policy guidance that moves towards operationalising global recommendations on IYCF for the emergency context. Mandated by global positions it draws on technical guidance, empirical evidence, and experience from past emergencies. Produced by the IFE Core Group, and ‘housed’ at ENN, the Ops Guidance on IFE is managed as a living document and supported by a range of UN agencies, NGOs and bilateral donors. Key points of the Operational Guidance on IFE are included in Box 4.

2.4 Definition of Acute Malnutrition

Box 4: Key Points of the Operational Guidance on IFE

1. Appropriate and timely support of infant and young child feeding in emergencies (IFE) saves lives.
2. Every agency should develop a policy on IFE. The policy should be widely disseminated to all staff, agency procedures adapted accordingly and policy implementation enforced.
3. Agencies should ensure the training and orientation of their technical and non-technical staff in IFE, using available training materials.
4. Within the United Nations (UN) Inter-agency Standing Committee (IASC) cluster approach to humanitarian response, UNICEF is likely the UN agency responsible for co-ordination of IFE in the field. Also, other UN agencies and NGOs have key roles to play in close collaboration with the government.
5. Key information on infant and young child feeding needs to be integrated into routine rapid assessment procedures. If necessary, more systematic assessment using recommended methodologies could be conducted.
6. Simple measures should be put in place to ensure the needs of mothers, infants and young children are addressed in the early stages of an emergency. Support for other caregivers and those with special needs, e.g. orphans and unaccompanied children, must also be established at the outset.
7. Breastfeeding and infant and young child feeding support should be integrated into other services for mothers, infants and young children.
8. Foods suitable to meet the nutrient needs of older infants and young children must be included in the general ration for food aid dependent populations.
9. Donated (free) or subsidised supplies of breastmilk substitutes (e.g. infant formula) should be avoided. Donations of bottles and teats should be refused in emergency situations. Any well-meant but ill-advised donations of breastmilk substitutes, bottles and teats should be placed under the control of a single designated agency.
10. The decision to accept, procure, use or distribute infant formula in an emergency must be made by informed, technical personnel in consultation with the co-ordinating agency, lead technical agencies and governed by strict criteria.
11. Breastmilk substitutes, other milk products, bottles and teats must never be included in a general ration distribution. Breastmilk substitutes and other milk products must only be distributed according to recognised strict criteria and only provided to mothers or caregivers for those infants who need them. The use of bottles and teats in emergency contexts should be actively avoided.

Extracted from: Operational Guidance on IFE, v2.1, 2007

2.4 Definition of Acute Malnutrition

In selective feeding programmes anthropometric measurements, namely weight and height, are typically used to identify and classify the degree of acute malnutrition. This helps to identify those requiring nutritional care.⁷⁴ Presence of bilateral oedema indicates nutritional oedema or 'kwashiorkor' that is classified as severe acute malnutrition, independent of weigh-for-height.

2.4.1 Case definitions of acute malnutrition

WHO case definitions of acute malnutrition (1999)⁷⁵ are the basis of almost all current national and international protocols managing acute malnutrition (See Table 2).

2.4 Definition of Acute Malnutrition

Table 2: WHO classification of acute malnutrition, 1999

	Classification	
	Moderate acute malnutrition (MAM)	Severe acute malnutrition (SAM)
Nutritional oedema (symmetrical)	No	Yes
Weight-for-Height	-3 ≤ Z-score < -2 (NCHS)** (or 70- 79% of median NCHS)*	Z-score < -3 (NCHS)** (or <70% of median NCHS)*

* **Weight-for-height percent of median (WHM)** is the ratio of the measured value in the individual to the median value of the reference data.

** **Weight-for-height Z-scores (WHZ)** are where -1 z-score is 1 standard deviation (SD) below the growth 'norm' median and +1 Z is 1SD above.

Weight-for-age indicators are no longer used as a measure of acute malnutrition, however they are still commonly used in growth monitoring. Related to the above definitions, GAM (Global Acute Malnutrition) is another commonly used term. GAM = SAM + MAM.

2.4.2 Evolution of case definitions

Since 1999, there have been several important evolutions of the WHO case definitions of SAM and MAM, as follows:

Mid-upper arm circumference (MUAC)

MUAC is now used as an independent case definition criterion, based on evidence of low MUAC being highly correlated with mortality. Case definitions are as follows:

- Severe acute malnutrition (SAM) = MUAC < 110mm (recently updated to <115mm)⁷⁶
- Moderate acute malnutrition (MAM) = MUAC <125mm

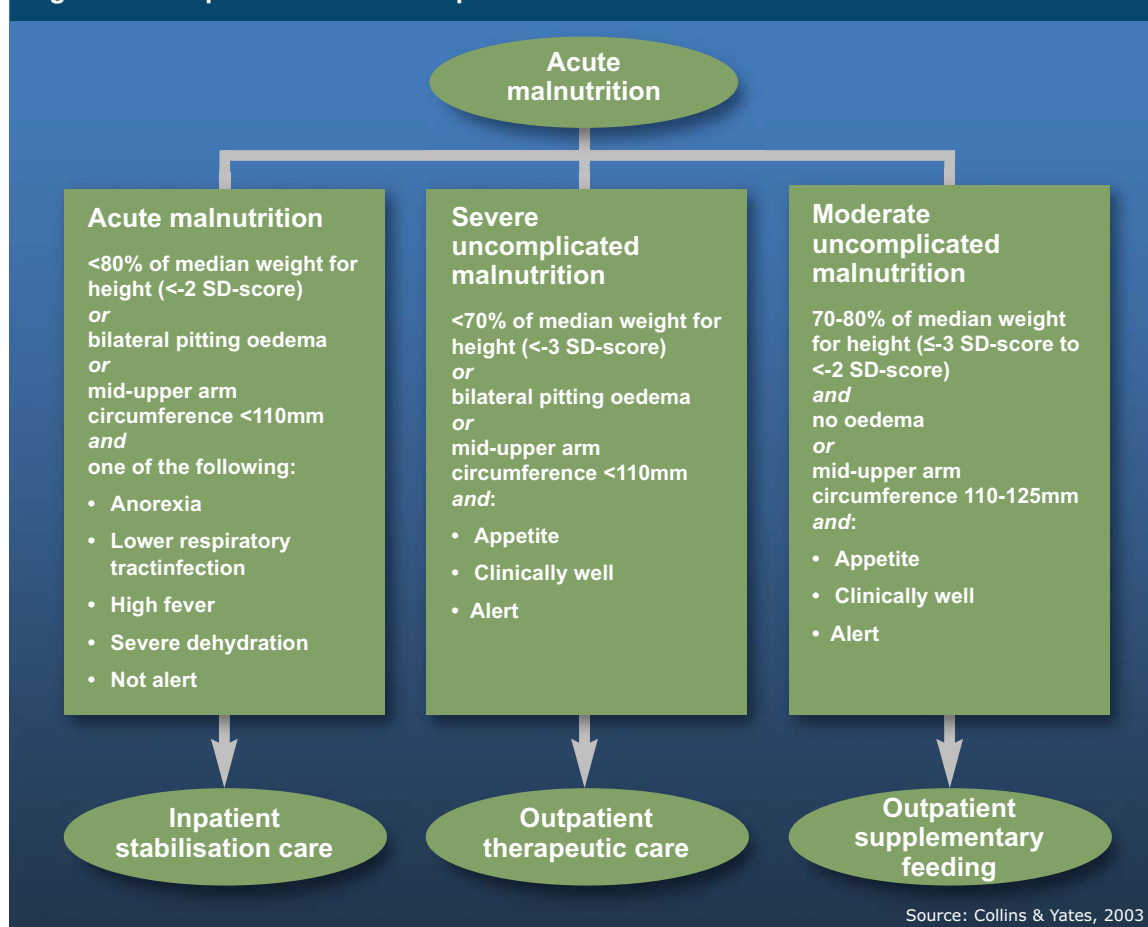
As a case detection method for use in resource poor and emergency settings, MUAC has particular advantages of age independence, simplicity, acceptability and cheapness. Arguments have been made for using MUAC as a sole admission criterion for programmes treating children six to 59 month malnutrition.⁷⁷ MUAC is not currently recommended for use in infants <6m.

'Complicated' and 'uncomplicated' malnutrition

The division of case definitions into 'complicated' and 'uncomplicated' malnutrition⁷⁸ recognises that two children with identical anthropometry do not necessarily have the same mortality/morbidity risks or treatment needs. Anthropometric status and clinical status are considered in parallel when directing children to inpatient or outpatient care (Figure 6).

2.5 Management of Acute Malnutrition

Figure 6: Complicated and uncomplicated acute malnutrition framework



Transition from NCHS to WHO-GS

The 1978 National Centre for Health Statistics child growth reference (NCHS)⁷⁹ is widely used by selective feeding programmes as the 'norm' to describe growth in infants and children. However, because of their limitations NCHS data fail to adequately describe the growth of apparently healthy, normal, breastfed infants.⁸⁰ The 2006 World Health Organisation Growth Standards (WHO-GS)⁸¹ are based on a much more broadly representative dataset and provide an international 'gold standard' of how children should grow when free of disease and when their care follows healthy practices such as breastfeeding and non-smoking.⁸² In May 2009, a joint statement by WHO and UNICEF⁸³ recommended that the WHO-GS is now used. Table 3 summarises implications of this transition.

Significant to MAMI, both the joint statement and the international consultation on which it is based⁸⁴ only address children aged six to 59 months. Implications of the transition for infants <6m are not considered.

2.5 Management of Acute Malnutrition

Acute malnutrition can be tackled at 3 levels:

- i. *Primary*: reducing the development (incidence) of malnutrition.
- ii. *Secondary*: reducing prevalence of malnutrition by earlier detection of or better treatment shortening the duration of an episode of malnutrition.
- iii. *Tertiary*: reducing the negative impacts of an established episode of malnutrition.

The MAMI Project focuses on secondary and tertiary treatment with specific reference to supplementary feeding programmes (SFP) and therapeutic feeding programmes (TFP), collectively described as selective feeding programmes. Primary prevention is critical but is beyond the scope of this investigation. SFP and TFP (both inpatient and community-based) will now be described.

2.5 Management of Acute Malnutrition

Table 3: NCHS and WHO-GS growth norms as applied to the case definition of acute malnutrition

	NCHS	WHO-GS
Key characteristics		
Type of growth 'norm'	Reference	Standard
Breastfeeding status of infants on whom the 'norm' is based	Mixed	Exclusively breast fed until at least four months of age
Acute malnutrition case definitions		
Oedematous malnutrition = SAM (irrespective of weight-for-height)	yes	yes
SAM (% of median)	<70% weight-for-height (WHM)	<i>not used</i>
MAM (% of median)	≥ 70% to < 80% WHM	<i>not used</i>
SAM (z-score)	<-3z weight-for-height (WHZ)	<-3z weight-for-height (WHZ)
MAM (z-score)	≥-3 to <-2 WHZ	≥-3 to <-2 WHZ
MUAC-defined SAM (6 to 59m children)	110mm	115mm
Implications for clinical caseload <i>relative numbers of 6 to 59 month children diagnosed with:</i>		
SAM: WHZ (NCHS) to WHZ (WHO)	1 (reference)	Increase in numbers diagnosed (2 to 4x increase) ⁽³⁶⁾
SAM: WHM (NCHS) to WHZ (WHO)	1 (reference)	Large increase in numbers diagnosed (8x increase in one study) ⁽⁴⁰⁾
MAM: WHZ (NCHS) to WHZ (WHO)	1 (reference)	Slight decrease in numbers diagnosed

Source: WHO & UNICEF (2009)

2.5.1 Supplementary feeding programmes (SFP)

Moderately malnourished children are typically treated in SFPs. They may be admitted directly or transferred from a therapeutic feeding programme (TFP) as they recover from severe malnutrition. Admissions are normally stable clinically, so outpatient-based, minimum intensity treatment is possible.

The aim of SFPs is to reduce the risk of death by restoring nutritional status through provision of foods or rations to supplement the child's home diet. Fortified foods typically distributed in SFPs include corn-soy blends (CSB), wheat soy blends and more recently, Ready to use Supplementary Foods (RUSF). SFPs may be targeted to at risk groups in a population, e.g. all children six to 59 months, or restricted to those children who are moderately malnourished.

Infants <6m who are malnourished do not qualify for supplementary food rations, on the basis they should be exclusively breastfed. In such cases, the mother of the malnourished infant may receive the supplementary food ration.

2.5.2 Therapeutic feeding programmes (TFP)

Severely malnourished children are clinically more compromised and require more intensive medical and nutritional treatment than is possible in SFPs. Such treatment can take place in inpatient and outpatient settings.

Inpatient treatment

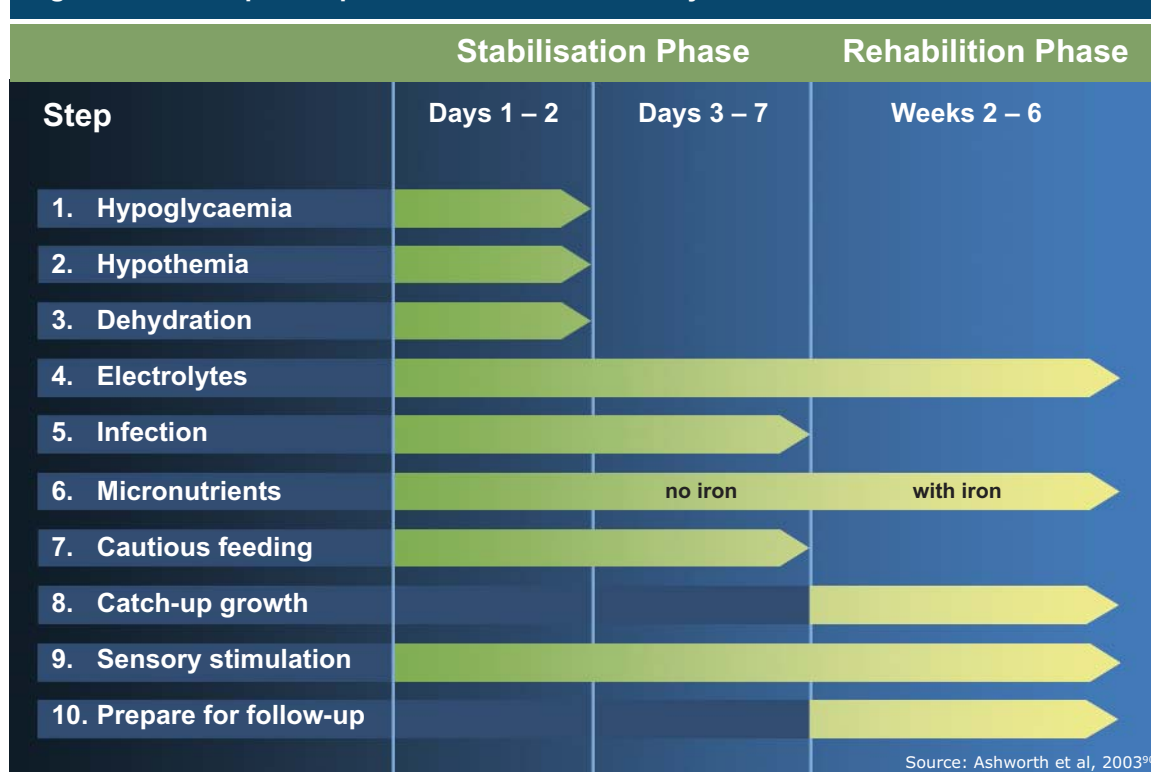
Traditionally, all children with severe acute malnutrition (SAM) were treated in 'inpatient' facilities (therapeutic feeding centres, nutrition rehabilitation units or paediatric wards). The focus of such

2.5 Management of Acute Malnutrition

treatment is to optimise the quality of care offered to individual children. This was often challenging in resource limited settings; a 1995 review found case fatality rates (CFR) to be typically 20-30% and sometimes as high as 60%.⁸⁵ Poor case management was identified as a major cause. In 1999 the WHO 'Management of severe malnutrition: a manual for physicians and other senior health workers' was produced as part of an international initiative to improve case management of SAM.^{86 87 88} Training materials support these guidelines.

According to the WHO guidelines, children with SAM are treated in two main phases, following a 'ten steps' approach to care⁸⁹ (see Figure 7). During initial treatment (stabilisation phase) therapeutic milk F75 is used; during 'rehabilitation' F100 is used following a short 'transition' period. Medical treatment include routine use of antibiotics and the importance of psychosocial support is also recognised. In the WHO (1999) guidelines, infants <6m are implicitly part of the < 5 year old group, but are not dealt with separately recognising the differences from older children (this is discussed more detail in Chapter 4).

Figure 7: Ten steps of inpatient treatment of severely malnourished children



Community based care

Community-based Management of Acute Malnutrition/ Community Therapeutic Care (CMAM/CTC) is an outpatient therapeutic feeding strategy developed on the basis of operational research over the past six to seven years^{91 92 93} and endorsed by major UN agencies in 2007.⁹⁴ CMAM/CTC classifies SAM as either complicated or uncomplicated to distinguish between sick children who need some intensive medical and nutritional treatment in an inpatient facility and clinically stable children (the majority of cases) who can be safely treated at home.

The development of ready-to-use therapeutic food (RUTF) made CMAM/CTC a practical possibility. RUTF is an energy and nutrient dense paste, a therapeutic food that is nutritionally equivalent to F100 milk, but needs no preparation and can be eaten direct from its container.

The structure and 'flow' through a typical CMAM/CTC programme is illustrated in Figure 8 and involves:

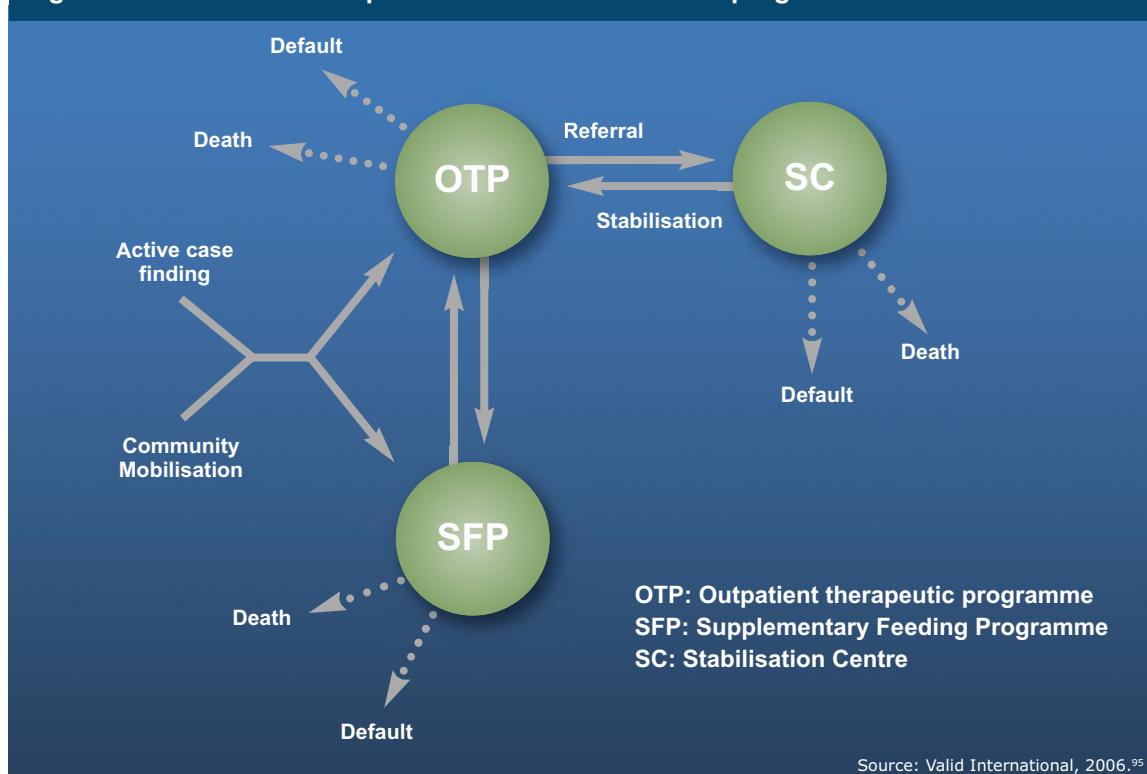
- Active case finding and community mobilization to identify malnourished children.
- Referral of children with moderate acute malnutrition to SFP programmes.
- Direct admission of children with uncomplicated SAM to outpatient treatment (OTP), using RUTF.
- The minority of children with complicated SAM are admitted first to a 'stabilization centre' (SC) which follow WHO protocol for phase one (stabilisation).

2.6 Summary Findings

- e) After 'stabilisation', patients are returned to the OTP to complete rehabilitation (phase 2) in the community.
- f) Following recovery from OTP treatment, patients are often referred to SFP (if available).

In current guidelines, RUTF is not recommended for infants <6m; infants <6m with SAM are considered 'complicated' cases and are referred for inpatient treatment (this is explored in more detail in Chapter 4).

Figure 8: Structure of and patient 'flow' within a CMAM programme



2.6 Summary Findings

Infant <6m malnutrition is an important public health problem. Maternal and child undernutrition contribute to 35% of the 9.2 million under five deaths per year; infants are vulnerable to higher morbidity and mortality, particularly in emergencies.

Infants <6m have unique characteristics and should be considered a distinct subgroup.

The protection and support of IFE is mandated by international law, is necessary for meeting international standards and is regulated by operational and technical guidance.

WHO case definitions of acute malnutrition (1999) form the basis of most protocols on the management of acute malnutrition. MUAC is now often used as an independent case definition criterion. Case definitions are now commonly divided into 'complicated' and 'uncomplicated' malnutrition.

A transition is underway from the use of NCHS growth references to the 2006 WHO Growth Standards (WHO-GS). It is shown that using WHO-GS, higher numbers of children six to 59 months will be diagnosed with SAM.

In emergencies, acute malnutrition is treated in selective feeding programmes. MAM is treated in Supplementary Feeding Programmes. SAM is treated in Therapeutic Feeding programmes. Complicated cases of SAM are treated as inpatients using WHO '10 steps' protocol and, increasingly, uncomplicated SAM cases are managed in community-based programmes that use RUTF.

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Chapter 3

How big is the problem?

Chapter 3: How big is the problem?

This chapter assesses the global burden of acute malnutrition in infants <6m. It summarises the analysis of country level datasets and examines the potential impact of a transition from the use of the National Centre for Health Statistics Child Growth Reference (NCHS) to the 2006 WHO growth standards (WHO-GS).

3.1 Why population burden of disease matters

Well defined disease burden epidemiology is important. If poorly defined, populations risk being marginalised. This chapter addresses a prevailing assumption that malnutrition in infants <6m is uncommon relative to older age groups.⁹⁶ The 1995 WHO 'Field Guide to Nutrition Assessment', for example, states that "children under 6 months of age, apart from being more difficult to measure, are often still breast-fed and therefore satisfactorily nourished".⁹⁷ These notions lead to the exclusion of infants <6m in many nutrition surveys.^{98, 99} Yet without population data, effectively tackling infant <6m malnutrition is difficult. Programmes will not know whether actual admissions reflect community disease burden, which management strategies are most appropriate and the extent of public health impact.

Efforts to improve understanding of the epidemiology of acute malnutrition in infants <6m are therefore critical. This includes estimating the potential impact of recent changes in case definitions (see Section 2.4.2). Studies examining the 2006 WHO growth standards (WHO-GS) for diagnosing wasting in children consistently show greater numbers labelled as wasted than with old NCHS references.^{100, 101, 102} A recent international consultation reviewed and endorsed the use of WHO-GS for selective feeding programmes¹⁰³ but did not address infants <6m. This chapter includes an assessment of the effect of WHO-GS-based diagnosis in this area. Key policy and research implications of findings are discussed.

3.2 Aims

This chapter aims to:

- Describe the prevalence of wasting amongst infant <6m in nutritionally vulnerable settings
- Examine how new case definitions based on WHO-GS affect the burden of disease
- Explore key characteristics of wasted infants <6m

Wasting (weight-for-height <-2 z-scores) was described rather than global acute malnutrition (weight-for-height <-2z and/or bilateral oedema) since analysis was conducted on Demographic & Health Survey (DHS) datasets that do not gather data on oedematous malnutrition.

3.3 Methods of determining population burden of disease

3.3.1 Study design, setting and population

Secondary analysis was conducted of 21 DHS country datasets.¹⁰⁴ Datasets were selected from a reference population of 36 counties identified in the 2008 Lancet 'Maternal and Child Undernutrition' series as accounting for over 90% of global malnutrition.¹⁰⁵ The 21 datasets selected were those with available anthropometric data collected in the last ten years and those considered representative of nutritionally vulnerable populations. Data were available for a total of 163,228 children 0 to 59 months (mean 7,773 per country; range 1,710 to 45,398) and included 15,534 infants <6m.

3.3 Methods of determining population burden of disease

3.3.2 Data handling

Permission to download DHS datasets was obtained from <http://www.measuredhs.com/accesssurveys/search/start.cfm>. Data management and main analyses used SPSSv.15 (© SPSS Inc USA). Weight for height Z scores (WHZ) (using both NCHS references and WHO-GS), were calculated from weight, height/length, sex and age using ENA for SMART software (version October 2007).¹⁰⁶ Cases with extreme values were cleaned according to standard criteria.¹⁰⁷ These exclude individuals with:

- | | | |
|--|-------------------------------|----|
| • Weight-for-height z-score (WHZ) | WHZ (NCHS) <-4 or > +6 | or |
| • Weight-for-age z-score (WAZ) | WAZ (NCHS) <-6 or >+6 | or |
| • Height-for-age z-score (HAZ) | HAZ (NCHS) <-6 or >+6 | or |
| • Incompatible combinations of HAZ & WHZ | (HAZ >3.09 and WHZ <-3.09) or | |
| | (HAZ <-3.09 and WHZ >3.09) | |

To ensure a balanced comparison, if a child's z-scores were valid by these NCHS criteria, then the same child's WHZ(WHO) was considered valid.

3.3.3 Data analysis

Prevalence of malnutrition was described by wasting using standard criteria applied to both NCHS and WHO-GS:

- Wasting = WHZ <-2,
- Severe wasting = WHZ <-3
- Moderate wasting = WHZ ≥-3 to <-2

Four major analyses examined age-specific effects:

- a) Prevalence of wasting by country:** To aid analysis, countries were classified using the internationally recognised 'Integrated Food Security Phase Classification' (IPC).¹⁰⁸ IPC considers food security, nutrition and livelihood information to determine the severity of an emergency and guide the need for interventions. It considers >3% to <10% prevalence of acute malnutrition as moderately food insecure; 10-15% as an acute food and livelihood crisis; >15% as a humanitarian emergency; >30% as famine/humanitarian catastrophe. We emphasize that IPC is not normally applied to single age groups, nor to anthropometric indicators alone; it serves here only to illustrate the relative magnitudes of infant/child and NCHS/WHO differences.
- b) Changes in country prevalence of wasting using WHO-GS:** Change in prevalence of moderate and severe wasting using the WHO-GS v NCHS was examined using scatter plots and simple linear regression.
- c) Caseload implications for treatment programmes:** Any changes in clinical caseloads of infant <6m and children in selective feeding programmes using NCHS v WHO-GS were investigated. For our analysis, we assumed that all eligible patients would be identified and appropriately admitted.
- d) Characteristics of wasted infants <6m:** Preliminary analysis was undertaken of key characteristics of wasted infants <6m with reference to other variables available in the DHS datasets but detailed analysis was beyond the scope of the MAMI Project. As a priority this should be explored in more detail in future work.

Data is presented for all wasted children rather than by country. The focus is on severe wasting, since mortality and morbidity risks are highest in this group.

Z-score wasting cut-offs are graphically compared for different age groups using NCHS and WHO growth norms. Reference data were derived from published NCHS¹⁰⁹ and WHO tables.¹¹⁰ The length range of 49.0 cm to 79.0 cm was used for comparison, since 49.0 cm is the lowest length included in the NCHS reference weight for height index, and 79 cm is just above the median for one year old children.

3.4 Results

3.4 Results

3.4.1 Country prevalence of infant <6m and child wasting: is it an emergency?

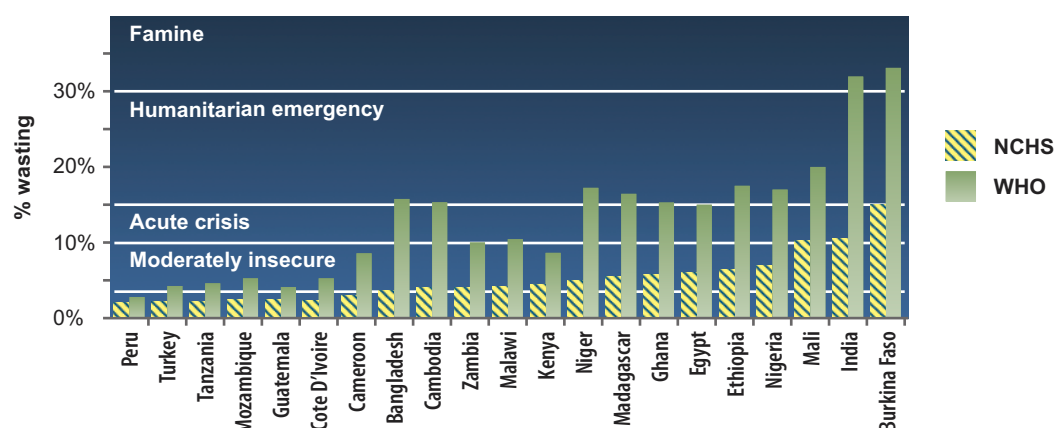
Wasting was prevalent in the countries examined, but there were large age-group and inter-country variations (see Figure 9).

Figure 9a shows infant <6m wasting. Countries are ordered by increasing infant <6m wasting prevalence (NCHS). Prevalence is lowest using NCHS growth references. Even so, only 7/21 countries have acceptably low infant <6m wasting prevalence (<3% by the IPC classification). One has prevalence of >15% and is therefore defined a 'humanitarian emergency'. Using WHO-GS for diagnosis, the prevalence of infant <6m wasting increases markedly: only 1/21 countries remain with an acceptably low <3% prevalence and 11/21 are in the 'humanitarian emergency' class.

Figure 9b, shows that NCHS/WHO changes amongst children aged six to 59 months are minimal. With NCHS-based diagnosis, 3/21 countries have a low <3% prevalence of child wasting. Two have a high 'humanitarian emergency' level. Using WHO-GS based diagnosis, the IPC classification of countries does not change.

Figure 9: Country prevalence of wasting (WHZ <-2) as defined by NCHS and WHO-GS

a) Infants <6m



b) Infants 6-59m

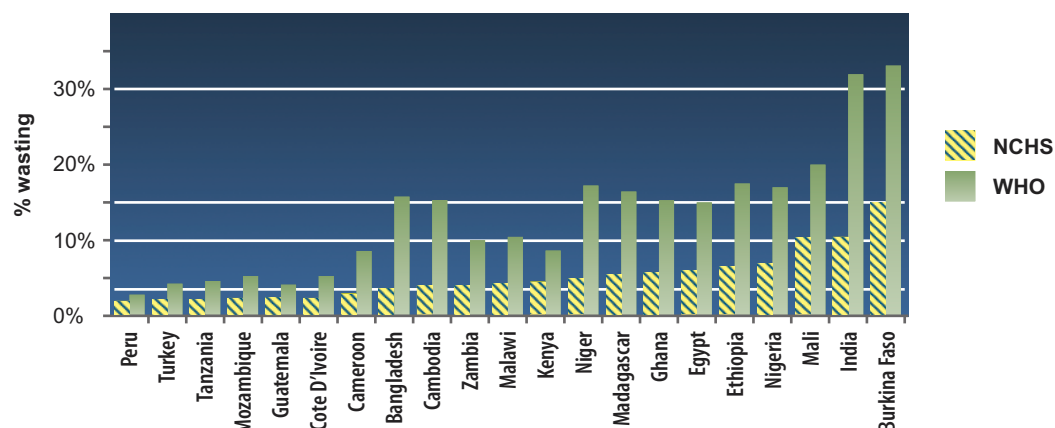


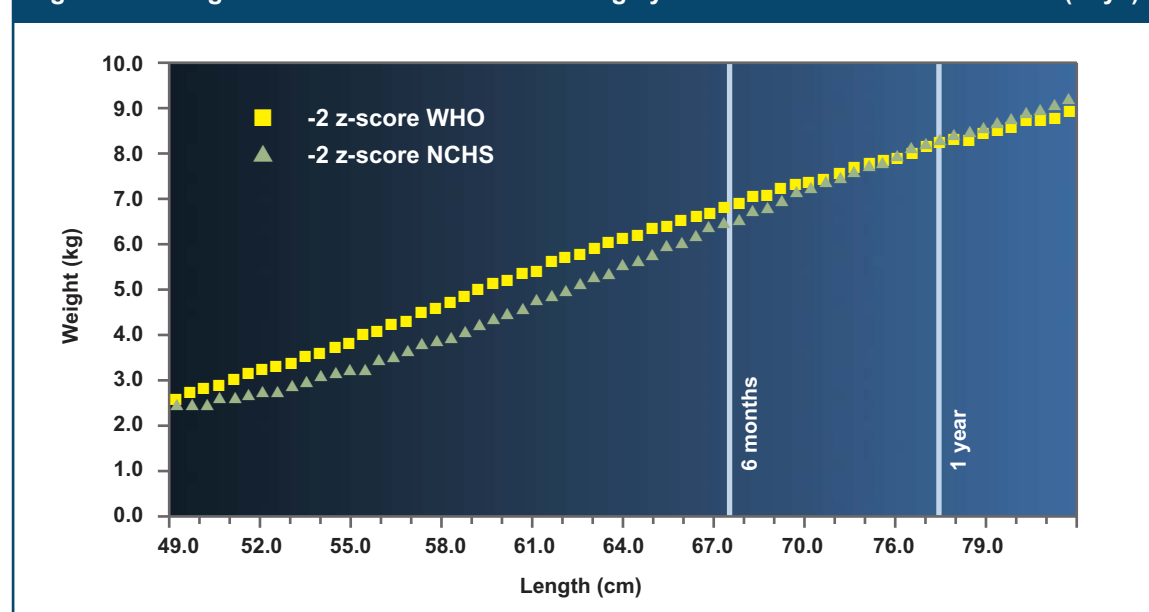
Figure key: NCHS – striped bars, WHO-GS – solid bars.

3.4 Results

3.4.2 NCHS and WHO 'cut-off curves' defining wasting

Figure 10 helps explain the age related effects seen in Figure 9. Vertical dotted lines show median lengths at age six months and one year for boys. The girl's chart follows a similar pattern and so is not included. For younger, shorter infants <6m, there is a large discrepancy between WHZ-NCHS and WHZ-WHO <-2 cut-off values. WHO-GS cut-off values are consistently higher, increasing the numbers of infant <6m diagnosed as wasted. These differences narrow as infants approach one year of age. The patterns for moderate and severe wasting are similar and are therefore not shown.

Figure 10: Weight cut-offs used to define wasting by either NCHS or WHO-GS criteria (boys)



3.4.3 Differences in severe and moderate wasting

Differences in severe and moderate wasting to overall wasting prevalence are shown in two scatter plots (Figures 11a) and 11b). Use of WHO-GS increases the prevalence of severe wasting in both infants <6m and children. The magnitude of increase is consistently greater for infants <6m. Moderate wasting similarly increases in the infant <6m age group. In contrast, prevalence of moderate wasting in children decreases when using WHO-GS.

3.4 Results

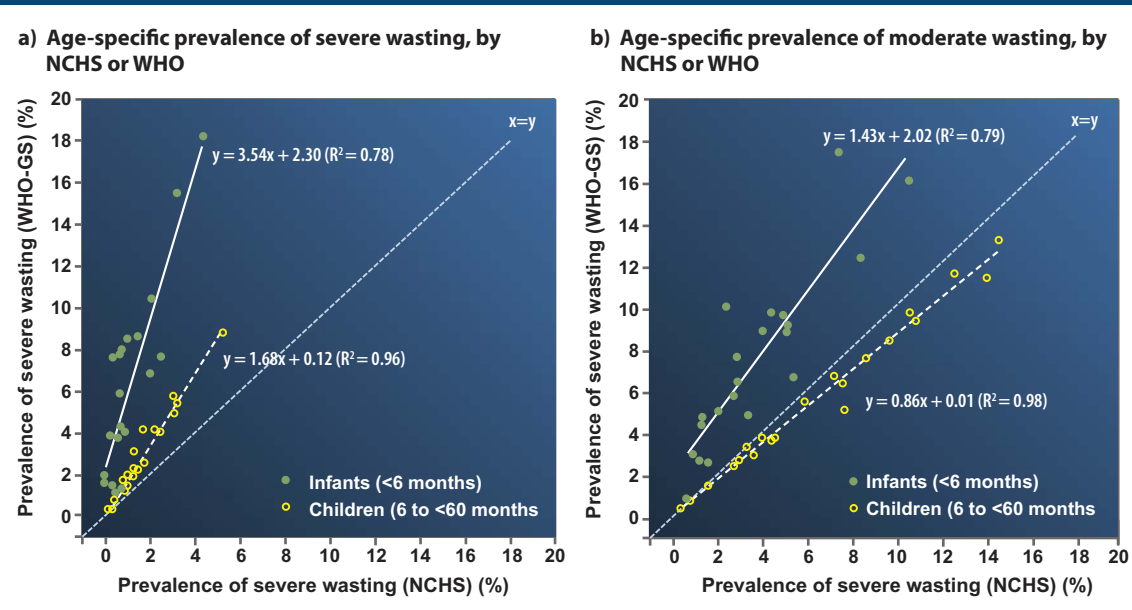
Figure 11: Scatter plots of country prevalence (NCHS v WHO) of severe and moderate wasting

Figure key: Regression and identity lines are shown. Each country survey is represented by one filled and one unfilled circle.

3.4.4 Implications of prevalence changes for treatment programmes

The use of WHZ-WHO-GS rather than WHZ-NCHS to diagnose wasting may be expected to result in large increases in the proportion of therapeutic feeding (TFP) and supplementary feeding programme (SFP) admissions who are infants <6m (see Figure 12). For TFP treatment of severe wasting (Figure 12a), there is not a clear linear trend, but nonetheless, a dramatic upward shift in the percentage of infants <6m who are eligible for admission. For SFP treatment of moderate wasting (Figure 12b) there is a significant trend with an expected increase of 1.59 fold in the percentage of admissions who are infants < 6m.

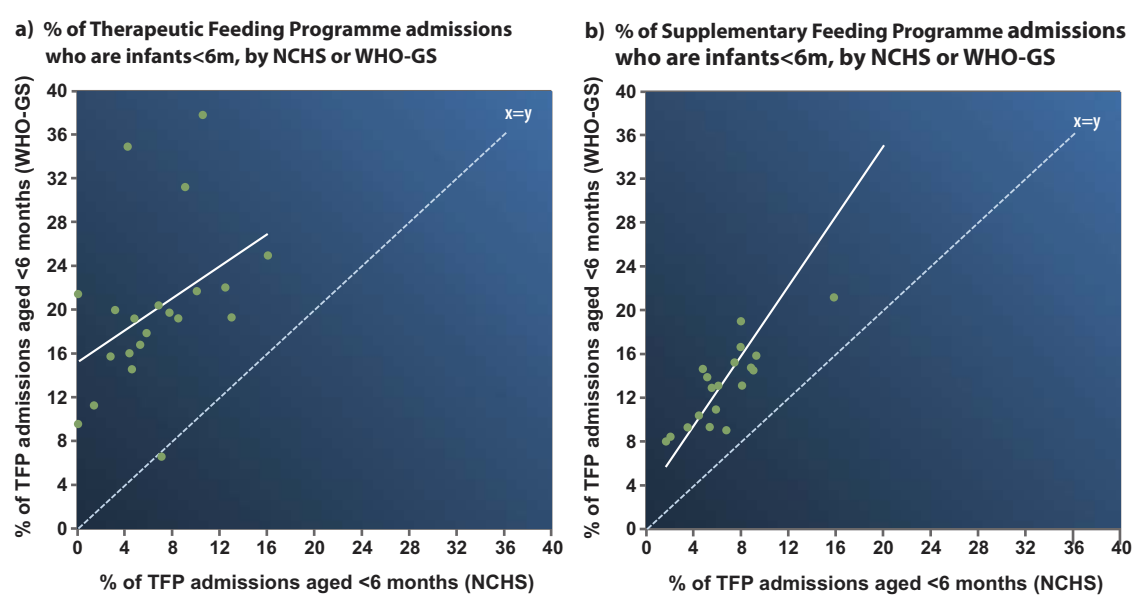
Figure 12: Scatter plot on effect of switch from NCHS to WHO-GS on age profile of selective feeding programme admissions

Figure key: Regression and identity lines are shown. Each circle represents one country survey.

3.4 Results

3.4.5 Summary of NCHS-WHO regression line equations

Linear regression relationships illustrated in the previous sections are detailed in Table 4. The larger b values, representing the slopes of the regression lines, emphasize that NCHS/WHO z -score changes are greater for the infant <6m group than for children.

Table 4: Linear regression models showing relationships between key variables

a) Infant wasting from child wasting prevalence

To predict	From		(95% C.I.)	Constant	r^2
Infant <6m wasting (NCHS)	Child wasting (NCHS)	0.56	(0.37 – 0.75)	0.23	0.66
Infant <6m wasting (WHO-GS)	Child wasting (WHO-GS)	1.42	(1.14 – 1.72)	1.53	0.84

b) Change in wasting prevalence

To predict	From		(95% C.I.)	Constant	r^2
Severe infant <6m wasting (WHO-GS)	Severe infant <6m wasting (NCHS)	3.54	(2.63 – 4.44)	2.30	0.78
Severe child wasting (WHO-GS)	Severe child wasting (NCHS)	1.68	(1.51 – 1.84)	0.12	0.96
Moderate infant <6m wasting (WHO-GS)	Moderate infant <6m wasting (NCHS)	1.43	(1.08 – 1.79)	2.02	0.79
Moderate child wasting (WHO-GS)	Moderate child wasting (NCHS)	0.73	(-0.05 – 1.51)	15.28	0.17

c) Change in admissions for feeding programmes treating wasting

To predict	From		(95% C.I.)	Constant	r^2
% infant <6m in TFP (WHO-GS)	% infant <6m in TFP (NCHS)	0.73	(-0.05 – 1.51)	15.28	0.17
% infant <6m in SFP (WHO-GS)	% infant <6m in SFP (NCHS)	1.59	(1.21 – 1.96)	3.31	0.80

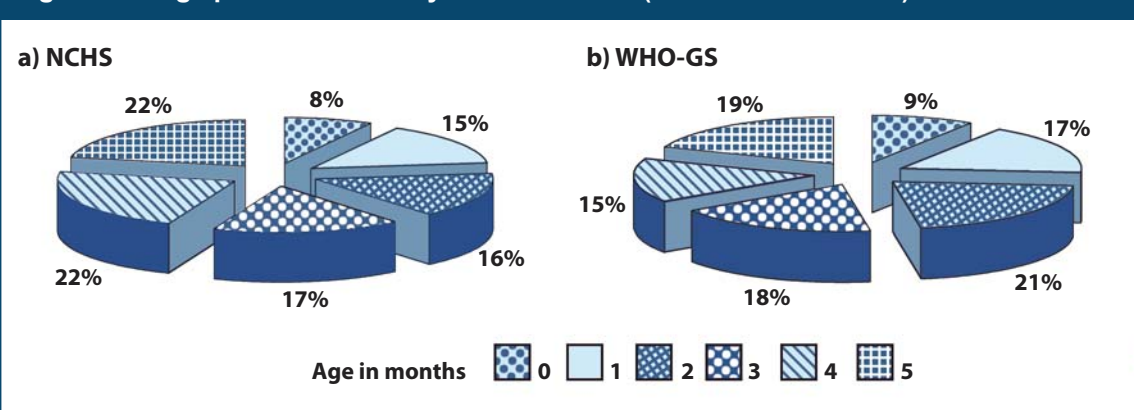
NCHS: National Centre for Health Statistics references; WHO-GS: World Health Organisation growth standards.

3.4.6 Basic demographic profile of severely wasted infants

a) Age profile

Figure 13 shows the detailed age profile of severely wasted infants <6m, classified using NCHS ($n=257$) and WHO-GS ($n=1337$). Using WHO-GS, the age bands are more evenly spread, whereas with NCHS, 44% of infants <6m are four or five months old. Patterns for moderate wasting are similar and are not shown.

Figure 13: Age profile of severely wasted infants (NCHS and WHO-GS)

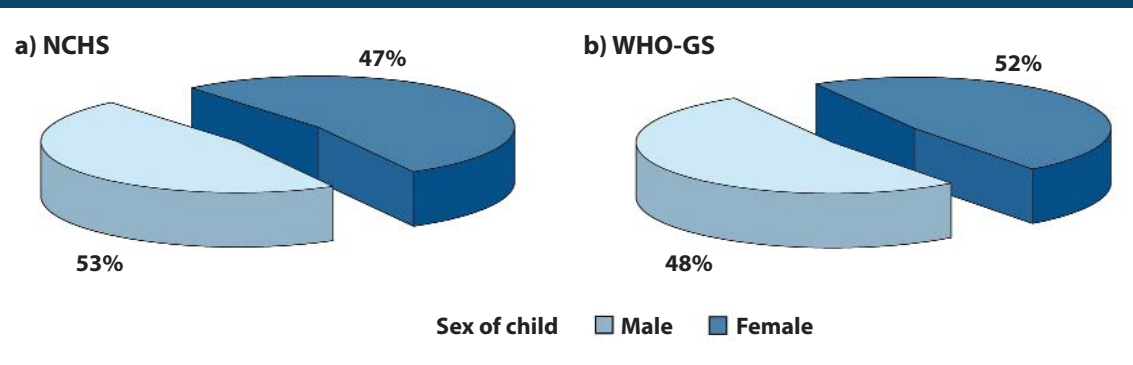


3.4 Results

b) Sex profile

Male: female ratio of severely wasted infants is reasonably balanced (Figure 14), but differs according to the growth norm used. WHZ-NCHS has a slight excess in females and WHZ-WHO an excess in males.

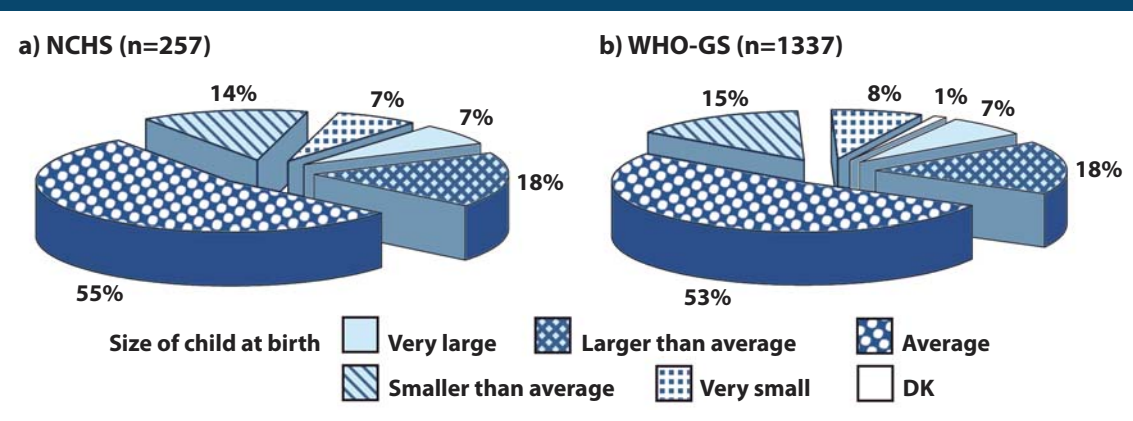
Figure 14: Sex profile of severely wasted infants (NCHS and WHO-GS)



3.4.7 Size at birth and infant <6m wasting

Figure 15 shows the reported birth size of severely wasted infants <6m based on NCHS (15a) and WHO-GS (15b). There are negligible NCHS/WHO differences. Using either case definition, over 50% of wasted infants are reported as being normal size at birth. Only a modest proportion is ex-low birth weight (LBW). Patterns with moderate wasting are again similar so are not shown.

Figure 15: Reported birth size of severely wasted infants <6m (NCHS and WHO-GS)



Although LBW does not underlie the majority of cases of infant <6m wasting, LBW infants do appear to have elevated risk of subsequently developing both severe and moderate wasting compared to normal birth weight infants (see Figures 16 and 17). Interestingly, this is most pronounced in those under six months and when using WHO-GS diagnostic criteria.

3.4 Results

Figure 16: Prevalence of severe wasting by reported birth weight category

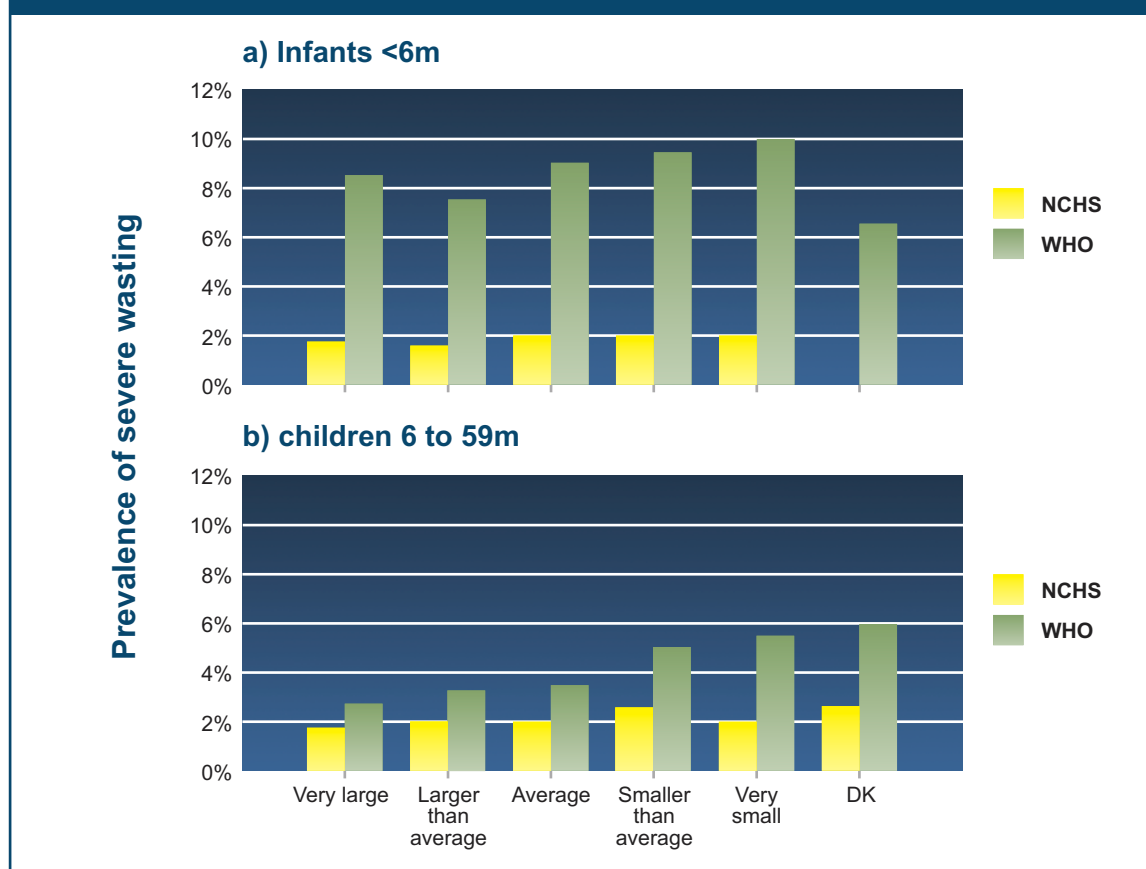
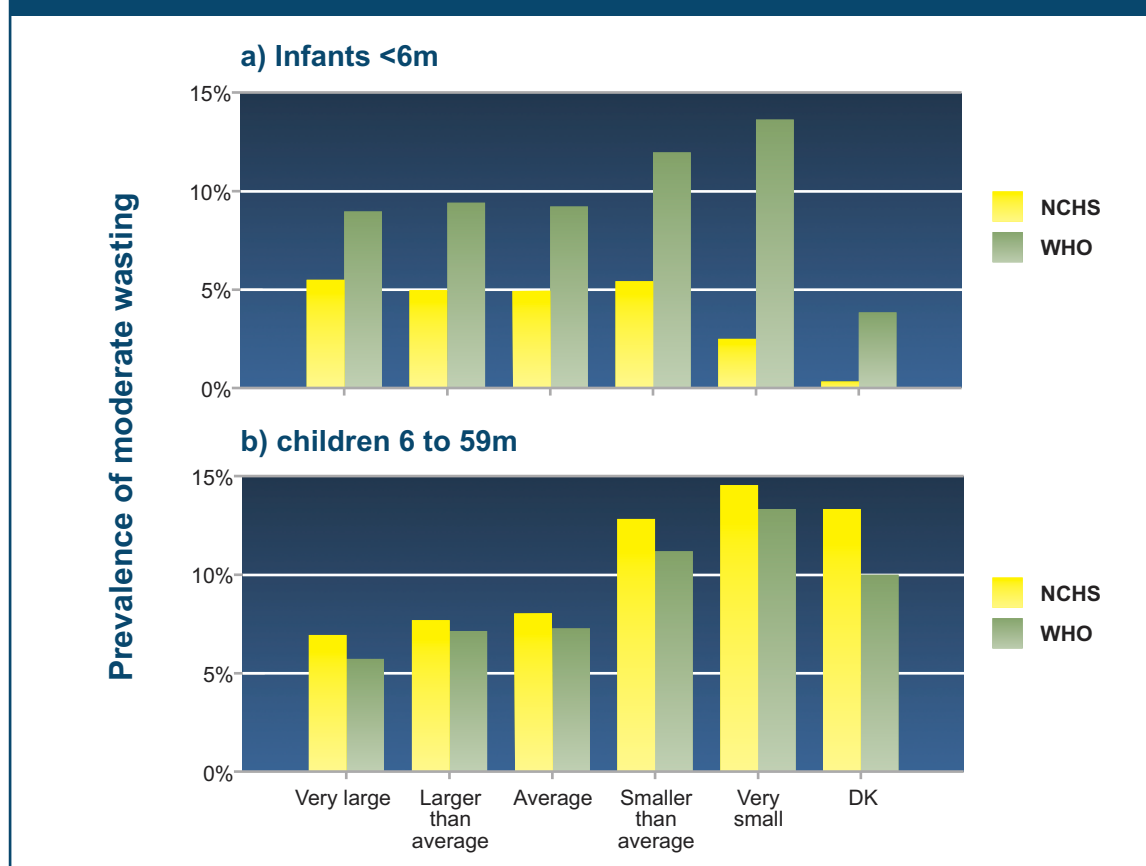


Figure 17: Prevalence of moderate wasting by reported birth-weight category



3.5 Discussion

The analysis shows that wasting among infants <6m is a prevalent public health problem. The prevalence of wasting in infants <6m is significant using both NCHS and WHO-GS. Disease burden is greatest, however, using WHO-GS for diagnosis. With forthcoming international rollout of WHO-GS for feeding programmes in emergency and other nutritionally vulnerable settings urgent follow-on work is needed to explore the reasons for and implications of our observations. Some initial ideas follow.

3.5.1 Explaining differences in NCHS v WHO-GS

We hypothesise two possible, likely co-existing, factors underlying observed NCHS/WHO differences. First, being a 'gold standard', WHO-GS are simply better at reflecting the true magnitude of population malnutrition. Exclusive breastfeeding, maternal health services, child health services and food security all impact wasting and are all known to be suboptimal in many settings.^{111 112}

Second, the methods used to construct WHO growth curves play a role. The WHO-GS technical document states that *"to avoid the influence of unhealthy weights for length/height, observations falling above +3 SD and below -3 SD of the sample median were excluded prior to constructing the standards"*.¹¹³ Given that the individuals on whom WHO-GS are based were already pre-selected from a much larger number screened to exclude health, environmental or suboptimal breastfeeding constraints to growth, small but healthy children might have been further excluded and the variation in the 'standards' greatly reduced. This may have resulted in the WHO-GS measurements having relatively small standard deviations and the z-score based thresholds identifying relatively large numbers of infants and children as malnourished.

A further consideration may be errors in anthropometric assessment. This issue has broad implications beyond NCHS/WHO-GS assessment, irrespective of which norm is used. With regard to assessment of weight, weighing scales measuring to the nearest 100g are common,¹¹⁴ and this is a relatively large percentage of infant total body weight. Random errors either side of the true value are likely to lead to misclassification of malnutrition. Small errors can make a big difference in weight-for-height z-score. An evaluation of anthropometric training of emergency nutrition staff found that, while 88% of national nursing and nutritional staff said they felt very competent at undertaking weight measurements for children aged between six months and five years, this fell to 29% for infants less than six months¹¹⁵.

The assessment of length may prove even more challenging for this age group. New WHO training materials note, *"it is not possible to straighten the knees of newborns to the same degree as older children. Their knees are fragile and could be injured easily, so apply minimum pressure"*.¹¹⁶ Since height would therefore be underestimated, weight-for-height would be falsely increased and true wasting prevalence underestimated.

3.5.2 Clinical profile differences in infants <6m in NCHS v WHO-GS

There are minor differences in clinical history between infants <6m diagnosed by NCHS and WHO-GS. The clinical implications of this are uncertain. High wasting prevalence does not appear to be explained just by LBW as has sometimes been postulated. Though individual risks of subsequent wasting do appear higher in ex-LBW infants, they do not contribute so significantly to total numbers wasted. Interventions targeted at minimising LBW (e.g. maternal micronutrients) would not therefore be alone sufficient to tackle infant <6m wasting.

The month-by-month age distribution of wasting is relatively even. Significant developmental changes during this time mean that age-tailored interventions and guidelines might have a role to play. What might be appropriate and useful for a five month old might be inappropriate for a two month old. Since different infants mature at different rates, clinical expertise and flexibility to manage individuals on a case-by-case basis would be useful.

3.5 Discussion

3.5.3 Policy implications

There are several immediate policy implications of these findings:

a) Nutrition surveys should more routinely include infants <6m

Using simple regression analysis, we have shown that high infant <6m wasting prevalence correlates strongly with high child wasting prevalence. Extrapolations and estimations are not a replacement for direct surveys, however, and infants <6m should be included routinely in surveys where this is feasible. This would require training specific to assessment in this age group to ensure data quality; equipment such as weighing scales should also be reviewed for suitability.

b) Feeding programmes should more actively consider likely prevalence of infant <6m wasting

Results offer useful interim estimates of infant/child and NCHS/WHO-GS wasting prevalence trends until wider validation is possible. Findings can be generalised, if cautiously, for a number of reasons. Countries were chosen as representative of nutritionally vulnerable settings, a full range of high prevalence to low prevalence countries were included, the strength of correlation was mostly high ($R^2 > 0.5$), overall trends were consistent for all countries, trends and absolute numbers are consistent with other research,^{117 118 119 120} and trends coherent with NCHS and WHO-GS cut-offs.

c) Formal discussion of infant <6m wasting data in local, national and international fora

Appropriate planning is necessary to optimise the rollout of WHO-GS. We have shown that the introduction of WHO-GS lead to large increases in estimates of infants <6m eligible for admission to selective feeding programmes. The risk-benefit balance of this for infants <6m should be considered separately to that of older children. For example, the risks of more 6 to 59 month children enrolling into selective feeding programmes are minimal, but benefits likely. Focus on outpatient treatment for most children means that inpatient capacity is no longer a major constraint.¹²¹ Assuming adequate resources, scale up of community-based TFPs and SFPs should be possible.

In contrast, the risks of increasing admissions of infants <6m are potentially serious. MAMI is currently inpatient focused¹²² and therefore the increase in admissions has serious resource implications. Labelling infants <6m as malnourished at the community level may introduce further risk, for example, by encouraging introduction of 'top up' foods or breastmilk substitutes to exclusively or predominantly breastfed infants.^{123 124 125} The potential benefits of more admissions are tempered by a weak evidence base underlying current treatments for infants <6m.¹²⁶ Skilled breastfeeding support is often scarce in facility and community based programmes. Inpatient management is resource intensive and cannot be easily scaled-up. SFP strategies for infant <6m with moderate wasting are not well developed and at present focus on feeding the breastfeeding mother, the efficacy of which is unknown.

Linear growth is more informative than one-off measures of nutritional status.^{127 128} However, serial growth monitoring is often lacking in infants <6m that present to selective feeding programmes; treatment protocols rely on current size rather than growth monitoring. Research is urgently needed on how caregivers and healthcare workers in resource limited settings manage and interpret growth assessment using NCHS v WHO-GS.

3.5.4 Limitations

Future work is needed to address the limitations of data presented in this chapter. TFPs admit cases of severe wasting *and/or* oedematous malnutrition. This analysis looks at wasting alone since DHS data do not include oedema. Thus the full implications for TFP admissions are not reflected here.

There is no data on the timing or nature of the observed wasting to strategise on interventions, e.g. the contribution of HIV to malnutrition in this age group. It is important to repeat these analyses in different settings to explore their wider generalisability. Age-specific effects may be very situation dependent. Further investigation is also needed into how accurately anthropometric measurement in infants <6m is conducted in routine surveys, such as DHS.

It is critical to note that these analyses have focused on z score comparisons. Z-scores are the international standard for surveys reporting on the prevalence of wasting and results are used to plan programmes. However, many selective feeding programmes use a closely related but not identical weight-for-height % of median (WHM) indicator (<70% WHM = severe wasting; 70 to <80% WHM = moderate wasting). Both z-

3.6 Summary findings and recommendations

scores (NCHS) and % of median (NCHS) are recognized in current WHO protocols for the management of acute malnutrition.¹²⁹ In contrast, tables using WHO-GS only present z-scores. The magnitude of WHM-NCHS to WHZ-WHO changes may differ from WHZ-NCHS to WHZ-WHO changes. This urgently needs to be explored to determine more accurately how the shift to WHZ-WHO will manifest at 'field level' for infants <6m.

Lastly, it is important to establish how well different anthropometric indicators predict mortality and which indicator(s) best identifies infants <6m who will benefit from selective feeding programme admission. It is also important to know the nature of the risk profile; whether there is a linear increase in mortality risk with decreasing weight, or whether there is a 'threshold' beyond which there are marked risk increases.

3.6 Summary findings and recommendations

Summary findings

Wasting in infants <6m is a prevalent public health problem. Infant <6m wasting is strongly and positively correlated with child 6 to 59m wasting and is significant using both NCHS and WHO-GS.

Use of WHO-GS increases the prevalence of severe wasting in both infants <6m and children, but the increase is greater for infants <6m. Moderate wasting in children decreases when using WHO-GS, but increases in the <6m age group.

There are minor differences in clinical profile between infants <6m diagnosed by NCHS and WHO-GS. Wasted infants <6m are not predominantly ex-LBW and include a relatively even distribution of ages from 0 to five months.

Selective feeding programme treatment protocols generally rely on current size rather than growth assessment. Used in this way, WHO-GS result in particularly large increases in estimates of the numbers of infants <6m eligible for admission to selective feeding programmes. This comparison is based on the use of WHZ; many selective feeding programmes currently use case definitions based on weight-for-height % of the median (WHM).

Summary recommendations

A risk-benefit analysis of a potential large increase in infants <6m presenting to selective feeding programmes is needed. A priority investigation is how single and serial growth measures and chart position is interpreted by health workers using NCHS v WHO-GS based charts.

Feeding programmes should more actively consider likely prevalence of infant <6m wasting, for example, nutrition surveys should more routinely include infants <6m to establish local burden of disease. This requires training specific to assessment in this age group and appropriate equipment.

The MAMI analysis could be used to *approximate* infant <6m wasting prevalence. This should only be done as a stop gap measure where there is complete absence of other information. Further validation is needed before this could be considered a reliable or precise approach.

The implications of moving from WHM using NCHS to WHZ based on WHO-GS urgently needs to be explored to determine more accurately how the shift to WHO-GS will affect individual diagnosis and outcomes for infants <6m in pre-existing programmes.

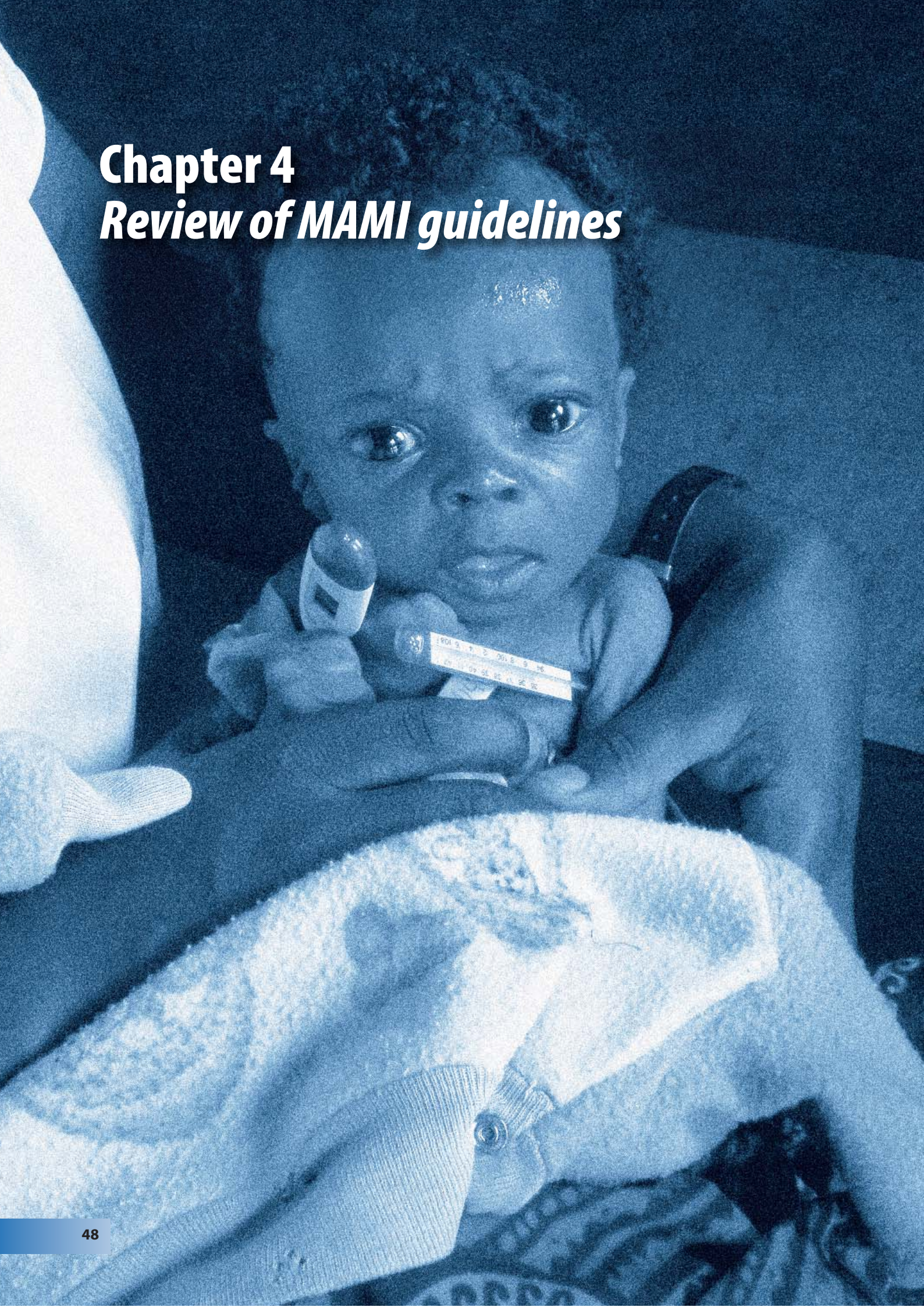
Further research is also needed into the prevalence of oedematous infant <6m SAM, whether WHZ is the best indicator for this age, how well different anthropometric indicators predict mortality, and the clinical profile of malnourished infants <6m.

Endnotes

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Chapter 4

Review of MAMI guidelines



Chapter 4: 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 <6m are treated and identifies strengths, weaknesses and gaps in guidance materials.

4.1 Why population burden of disease matters

A review of current recommended approaches to managing acute malnutrition in infants <6m was carried out to:

- Contextualise and help interpret quantitative feeding programme data (Chapter 5)
- Contextualise and help interpret qualitative data from key informant interviews (Chapter 6)
- Help set a baseline for future progress in the management of infants <6m malnutrition by:
 - Understanding the range of current practices
 - Understanding the focus and emphasis of current guidelines
 - Identifying strengths of current guidelines
 - Identifying gaps in current guidelines

4.2 Methods

SAM and MAM guidelines and protocols (collectively referred to as guidelines from heron) were identified by purposive sampling of:

- Published guidelines available in print and on-line
- Final and draft guidelines, obtained via MAMI steering group members and key informants.

Key themes and topics relevant to infants <6m were identified and tabulated. Internationally recognised AGREE (Appraisal of Guidelines for Research and Evaluation) criteria were used to appraise guideline quality¹³⁰ (see Box 5). A formal AGREE scoring was not applied to each individual guideline, as this was beyond the scope of the MAMI Project. Instead an overview discussion highlights common issues.

4.2 Methods

Box 5: 'AGREE' CRITERIA (*Appraisal of Guidelines for Research & Evaluation*)

Scope and Purpose

1. The overall objective(s) of the guideline should be specifically described.
2. The clinical question(s) covered by the guideline should be specifically described.
3. The patients to whom the guideline is meant to apply should be specifically described.

Stakeholder Involvement

4. The guideline development group should include individuals from all the relevant professional groups.
5. The patients' views and preferences should be sought.
6. The target users of the guideline should be clearly defined.
7. The guideline should be piloted among end users.

Rigour of Development

8. Systematic methods should be used to search for evidence.
9. The criteria for selecting the evidence should be clearly described.
10. The methods used for formulating the recommendations should be clearly described.
11. Health benefits, side effects and risks should be considered.
12. There should be an explicit link between recommendations & supporting evidence.
13. The guideline should be externally reviewed by experts prior to publication.
14. A procedure for updating the guideline should be provided.

Clarity and Presentation

15. The recommendations should be specific and unambiguous.
16. Different options for diagnosis and/or treatment of the condition should be presented.
17. Key recommendations should be easily identifiable.
18. The guideline should be supported with tools for application.

Applicability

19. Potential organisational barriers in applying recommendations should be discussed.
20. Potential cost implications of applying the recommendations should be considered.
21. The guideline should presents key review criteria for monitoring and audit purposes

Editorial Independence

22. The guideline should be editorially independent from the funding body.
23. Conflicts of interest of guideline development members should be recorded.

4.3 Guidelines overview

A total of 37 (14 international and 23 national) guidelines were identified for review. Table 5 presents an overview of the international organizations and countries represented. International guidelines were defined as generic guidelines, owned and written by one lead agency, UN or NGO, and intended for use in multiple settings. National guidelines were focused on one particular setting, often led by a Ministry of Health or other equivalent government body. The list presented is unlikely to be exhaustive. Other guidelines are known to be in development but were not available for this review.

Similarities between guidelines

The many similarities between documents were striking. This partly reflects common 'evolutionary origins'. The 'common ancestor' of almost all current guidelines is the 1999 WHO guideline on management of SAM.¹³¹ This formalised the 'phased' (stabilisation and rehabilitation) treatment of acute malnutrition and included a description of the 'ten steps' approach to care (see Figure 8 in chapter 2). Thus WHO (1999) is widely referenced and often directly summarised in subsequent documents. CMAM approaches represent another major step forward in the 'evolution' of treatment for SAM and many guidelines also draw on Valid (2006) as a key source.¹³²

This 'common origins' finding has several implications. If two programmes use the same guidelines then it is, in theory, possible to compare programme outcomes and assess impact of context factors, such as

4.3 Guidelines overview

quality of implementation or patient profiles. Common terminologies and shared understandings also enable global sharing of ideas and staff exchange. A possible disadvantage of having guidelines that come as a 'package', is that individual elements become 'standard' and difficult to withhold, even if the underlying evidence for them is slim.

Differences between guidelines

There are many minor inter-guideline variations. Mostly these are explanations of particular issues, rather than major differences in approach. This makes it difficult to disentangle whether guidelines themselves or other factors (e.g. severity of disease, availability of resources to implement the guidelines, willingness and ability of staff to implement the guidelines, background social circumstances impacting SAM/MAM) are responsible for good or bad patient outcomes. It is especially difficult to infer the effects of multiple minor variations.

IFE Module 2 stands out as different from the other guidelines reviewed here. Whilst created as a training tool, IFE Module 2 provides a 'stop gap' in MAMI guidance. Chapter 8 of Module 2 is specifically devoted to the management of SAM in infants <6m, the basis for which is the collation of SAM guidelines and experiences of NGOs, as well as expert authorship from relevant professionals and field teams. Consequently IFE Module 2 content on SAM largely reflects many of the NGO approaches and guidelines reviewed by the MAMI Project, with a strengthened breastfeeding component.

Evolutionary developments across the guidelines

The main development since the WHO (1999) inpatient guidelines is that outpatient approaches to SAM treatment are now widely accepted for cases without medical complications. The majority of recent guidelines recognise outpatient-based models of care as complementary to inpatient care.

Also notable is that national SAM/MAM guidelines obtained for this report are very recent, mostly from the last two to three years, the oldest being Burundi in 2002. It is not known whether there were earlier guidelines pre-dating these. Whatever the case, there is evidently a clear trend towards both global rollout of SAM/MAM strategies and increasing national ownership of SAM/MAM guidelines.

Focus on infants <6m in current guidelines

The majority of guidelines have a separate section focusing explicitly on infants <6m, which varies widely in length. A few, including WHO (1999), recognize infants <6m only indirectly as part of a broader age group, e.g. children <5 years. In the CTC Manual (Valid, 2006), one of the foundation reference materials for CMAM, infants <6m are only referred to in one small section.

4.3 Guidelines overview

Table 5: Overview of available acute malnutrition guidelines

			Guideline type					Authors / contributors					
Region	Country or Organization	Guideline	Date	CMAM or Inpatient only	SAM or MAM focus	language	draft or final	MoH	UNICEF	WHO	International NGO or consultant	Local NGO or consultant	notes
International guidelines:													
International	WHO	Management of severe malnutrition: a manual for physicians & other senior health workers*	1999	Inpatient only	SAM	English, Spanish, French, Portuguese	FIN	n/a	n/a	Y	Y	n/a	available on WHO website http://www.who.int/nutrition/publications/severemalnutrition/9241545119/en/index.html
	WHO	Guidelines for the inpatient treatment of severely malnourished children *	2003	Inpatient only	SAM	English, French, Spanish	FIN	n/a	n/a	Y	n/a	n/a	available on WHO website http://www.who.int/nutrition/publications/severemalnutrition/9241546093/en/index.html
	WHO	Manual for the health care of children in humanitarian emergencies	2008	CMAM	both SAM and MAM	English	FIN	n/a	n/a	Y	n/a	n/a	available on WHO website: http://whqlibdoc.who.int/publications/2008/9789241596879_eng.pdf
	WHO	Pocket book of Hospital care for children (Guidelines for the management of common illnesses with limited resources)*	2005	Inpatient only	SAM	English, French, Portuguese, Russian	FIN	n/a	n/a	Y	Y	n/a	available on WHO webs http://www.who.int/child_adollescent_health/documents/9241546700/en/index.html <i>Noted that this "updates & expands guidelines in WHO 2000 'Management of the child with a serious infection or severe malnutrition'"</i>
	WHO	Handbook IMCI Integrated Management of Childhood Illness*	2005	n/a	MAM (for SAM guidance is to refer to hospital)	English, French	FIN	n/a	Y	Y	Y	n/a	available on WHO web http://www.who.int/child_adollescent_health/documents/9241546441/en/index.html This is a book focused on all aspects of paediatric care at primary care level, of which assessment & treatment of malnutrition is just one chapter
	Action Contre la Faim (Claudine Prudhon)	Assessment & Treatment of Malnutrition in Emergency Situations (Manual of Therapeutic Care & Planning for a Nutritional Programme)	2002	Inpatient only	both SAM and MAM	English	FIN	n/a	n/a	n/a	Y	n/a	Book covering multiple aspects of nutrition: treatment is just one section
	MSF	Nutrition Guidelines (1st edition)	1995	inpatient only	both SAM and MAM	English	FIN	n/a	n/a	n/a	Y	n/a	Book covering multiple aspects of nutrition: treatment is just one section

4.3 Guidelines overview

Table 5 cont'd

			Guideline type					Authors / contributors					
Region	Country or Organization	Guideline	Date	CMAM or Inpatient only	SAM or MAM focus	language	draft or final	MoH	UNICEF	WHO	International NGO or consultant	Local NGO or consultant	notes
International guidelines:													
International	MSF	Nutrition Guidelines	May 2006	CMAM	both SAM and MAM	English	FIN	n/a	n/a	n/a	Y	n/a	Update of 1995 guidelines, though available in electronic version rather as a book
	MSF	Guideline Infants less than 6 months old (Benson) MSF - OCBA	Oct 2007	n/a	SAM	English	?	n/a	n/a	n/a	Y	n/a	This is a chapter ocused on infants alone and is one of a wider set of guidelines relating to malnutrition
	Valid International	Community-based Therapeutic Care (CTC), A field manual (first edition)	2006	CMAM	both SAM and MAM	English	FIN	n/a	n/a	n/a	Y	n/a	book describing multiple aspects
	UNHCR	Handbook for Emergencies (third edition)	Feb 2007	CMAM	both SAM and MAM	English	FIN	n/a	n/a	n/a	Y	n/a	Available online http://www.unhcr.org/publ/PUBL/471db4c92.html NB Interesting to note that 3rd edition has significantly more IYCF detail than 2nd
	UNHCR	The management of Nutrition in Major Emergencies	2000	Inpatient only	both SAM and MAM	English	FIN	n/a	n/a	Y	Y	n/a	book covering multiple aspects of nutrition
	IFE Core Group	Infant Feeding in Emergencies IFE module 2, version 1.1 for health and nutrition workers in emergency situations, for training, practice and reference	Dec 2007	n/a	SAM	English	FIN	n/a	n/a	n/a	Y	n/a	Training module covering extensive details of IYCF especially skilled breastfeeding support produced in UN and NGO collaboration with expert collaborators and review. Includes a chapter dedicated to management of acutely malnourished infants <6m (Chapter 8), supported by content in other chapters. Available on ENN website: http://www.ennonline.net/resources/view.aspx?resid=4
	ICRC (International Committee of the Red Cross)	Nutrition Manual for Humanitarian Action	Aug 2008	n/a		English	FIN	n/a	n/a	n/a	Y	n/a	Book covering multiple aspects of nutrition. Includes 1 chapter on Therapeutic Feeding and 1 on Supplementary Feeding Available on ICRC website: http://www.icrc.org/web/eng/siteeng0.nsf/web/html/p0820

4.3 Guidelines overview

Table 5 cont'd

			Guideline type					Authors / contributors					
Region	Country or Organization	Guideline	Date	CMAM or Inpatient only	SAM or MAM focus	language	draft or final	MoH	UNICEF	WHO	International NGO or consultant	Local NGO or consultant	notes
National guidelines													
1. a) Eastern Africa	Burundi	Protocole National de Nutrition	Aug 2002	Inpatient only		French	FIN	Y	Y	Y	Y	Y	
	Ethiopia	Protocol for the Management of Severe Acute Malnutrition	Mar 2007	CMAM	SAM only	English	FIN	Y	Y	Y	no	Y	
	Madagascar	Depistage et prise en charge de la malnutrition aigue	Sep 2007	CMAM	both SAM and MAM	French	FIN	Y	Y	Y	?	?	
	Malawi	Guidelines for the Management of Severe Acute Malnutrition (book T3)	2007	Inpatient only	SAM	English	FIN	Y	Y	Y	Y	Y	One of a set of guidelines on acute malnutrition - others focus on CMAM. Separate MAM / CMAM guidelines available
	Mozambique	Manual de Orientacao para Tratamento da Desnutricao Aguda Grave	Jun 2008	CMAM	both SAM and MAM	Portuguese	Dr	Y	Y	?	Y	Y	recently replaced 2007 protocol
	Tanzania	Management of Acute Malnutrition National Guidelines	2008	CMAM	both SAM (main focus) and MAM	English	FIN	Y	Y	Y	Y	Y	includes checklist of SAM management
	Uganda	Integrated Management of Acute Malnutrition	Nov 2006	inpatient only	both SAM and MAM	English	Dr	Y	Y	?	Y	?	reference made to separate guidelines focused on therapeutic feeding centres
	Zambia	Integrated Management of Acute Malnutrition	2009	CMAM	both SAM (main focus) and MAM	English	Dr	Y	?	?	Y	?	includes supervision checklist
	Zimbabwe	Guidelines for the Management of Severe Acute Malnutrition through Community-based Therapeutic Care (CTC)	2008	CMAM	both SAM (main focus) and MAM	English	FIN	Y	Y	n/s	Y	Y	guidelines include: 1) supervision checklist 2) indicators for assessing quality & appropriateness Reference also made to the "Zimbabwe therapeutic feeding protocol" which outlines details of infant <6m care

4.3 Guidelines overview

Table 5 cont'd

			Guideline type					Authors / contributors					
Region	Country or Organization	Guideline	Date	CMAM or Inpatient only	SAM or MAM focus	language	draft or final	MoH	UNICEF	WHO	International NGO or consultant	Local NGO or consultant	notes
National guidelines													
1.b) Middle Africa	DRC	Protocol National de Prise en Charge de la Malnutrition Aigue	Oct 2008	CMAM		French	FIN	Y	Y	?	Y	?	Acknowledgements page blank
	Sudan (Southern)	Guidelines for the Management of Severe Acute Malnutrition	Jul 2008	CMAM	SAM	English	Dr	Y	Y	Y	Y	?	references WHO (1999), Valid (2006) & Golden & Grellety as sources
	Sudan (North)	National Integrated Manual on the Management of Severe Acute Malnutrition in health facilities & at community level	Jan 2008	CMAM	SAM	English	Dr	Y	Y	Y	Y	n/s	(for medical doctors and senior health workers)
1.d) Southern Africa	Botswana	Guidelines for the Management of Severe Acute Malnutrition in Children	Jun 2007	CMAM	SAM	English	Dr	Y	Y	Y	Y	Y	noted that developed in line with WHO reference manuals, 1999, 2003
1.e) Western Africa	Burkina Faso	None yet - in draft	n/s	CMAM	both SAM and MAM	French	Dr	?	?	?	?	?	only draft outline available
	Cote D'Ivoire	Protocole National de Prise en charge de la malnutrition severe	May 2005	Inpatient only (CMAM type home treatment noted in annex		French	FIN	Y	Y	Y	Y	Y	
	Guinea	Protocole National de Prise en Charge de la Malnutrition Aigue	May 2008	CMAM	SAM and MAM	French	FIN	Y	Y	?	?	?	
	Mali	Protocole National de la prise en charge de la malnutrition aigue	Dec 2007	CMAM	SAM and MAM	French	Dr	Y	Y	Y	Y	Y	
	Niger	Protocol National de Prise en Charge de la Malnutrition Aigue	Dec 2006	CMAM	both SAM and MAM	French	FIN	Y	Y	Y	Y	Y	

4.3 Guidelines overview

Table 5 cont'd

			Guideline type					Authors / contributors					
Region	Country or Organization	Guideline	Date	CMAM or Inpatient only	SAM or MAM focus	language	draft or final	MoH	UNICEF	WHO	International NGO or consultant	Local NGO or consultant	notes
National guidelines													
	Senegal	Protocole de prise en charge de la malnutrition aigue	May 2008	CMAM	both SAM and MAM	French	FIN	Y	Y	Y	Y	Y	
	Afghanistan	Community-based Management of Acute Malnutrition programme in Aqcha and Mardyan District of Jawzjan Province Northern Afghanistan (Stabilization Centre Guidelines)	June 2008	CMAM	SAM	English	Dr	Y	Y	Y	No	Y	compiled by Save the Children UK
	India	Indian Academy of Paediatrics guidelines	2006	Inpatient only	SAM	English	FIN	Y	Y	Y	No	Y	Published in journal 'Indian Paediatrics, (2007: 44: 443-61)
	Pakistan	Protocol for the inpatient treatment of severely malnourished children in the Pakistan earthquake emergency	Dec 2005	Inpatient only	SAM	English	Dr	Y	Y	Y	Y	Y	based on WHO 1999 protocol
	Sri Lanka	None yet - in draft Management of Severe Acute Undernutrition: Manual for Health Workers in Sri Lanka	n/s	CMAM	both SAM and MAM	French	Dr	?	?	?	?	?	only draft outline available

*These WHO resources are the same guideline produced in different formats.

4.4 Guideline Comparisons

4.4.1 Case definitions of SAM & MAM (general)

See Table 6 for an overview of case definitions. All guidelines reviewed use anthropometry as the main indicator for SAM/MAM. All also acknowledge oedematous malnutrition as an indicator of SAM.

Weight-for-height vs. weight-for-age

Most guidelines use weight-for-length criteria as recommended by WHO (1999). Cutoffs for SAM and MAM are also mostly consistent with WHO (1999). Exceptions are the 2008 WHO Manual on healthcare of children in emergencies and IMCI guidelines, which both use weight-for-age as the main indicator (although IMCI also uses visible severe wasting as an alternative). This difference must be addressed.

NCHS vs. WHO-GS (in context of z-score vs. %-of-median)

NCHS growth references are still dominant in the guidelines reviewed. Only Sri Lanka and Mozambique explicitly use WHO-GS, though several other guidelines do footnote their availability alongside NCHS. It is only recently, in May 2009 that UNICEF and WHO released a joint statement formally recommending the new WHO-GS for identifying severe acute malnutrition¹³³. It is likely therefore that their use will increase in the coming years. Some of the possible implications of this change for infants are discussed in Chapter 3.

MUAC

MUAC is increasingly used in SAM/MAM guidelines. It is an independent admission criterion noted alongside weight-for-height, and in a small number of guidelines (Valid 2006, Uganda 2006), it is the major case definition criterion. No guidelines recommend its use in infants <6m.

4.4 Guideline Comparisons

Table 6: Case definitions of SAM & MAM

			Case Definitions of SAM & MAM								
Country or Organization	Guideline	Date	Growth 'norm' (alternative, if noted)	Index (WH: weight for height; WA: weight or age)	Main Recommended indicator (+ alternative, if noted)	Indicator presented in tables (if shown)	Case definition SAM (in all guidelines, oedema =SAM)	MUAC-based case definition of SAM	Case definition MAM	MUAC-based case definition of MAM	Notes
International guidelines											
WHO	Management of severe malnutrition: a manual for physicians & other senior health workers	1999	NCHS	WH	z-score (% of median)	WHZ (NCHS) boys & girls split sex tables	<-3 WHZ (<70% WHM)	not used	-3 ≤ WHZ <-2 (70 to 79% WHM)	not used	Length measured if child <85cm or <2 years. Height if >85cm or >2years
WHO	Guidelines for the inpatient treatment of severely malnourished children	2003	NCHS	WH	z-score (% of median)	WHZ (NCHS) boys & girls split sex tables	<-3 WHZ (<70% WHM)	not used	-3 ≤ WHZ <-2 (70 to 79% WHM)	not used	Length measured if child <85cm & height if >85cm
WHO	Manual for the health care of children in humanitarian emergencies	2008	n/s	WA	low weight-for-age	weight-for-age chart show in annex, but lines are not labelled	~ MUAC <110mm (>6months) ~ visible severe wasting	<110mm (if child >6 months old)	no visible severe wasting, MUAC >110mm very low weight-for-age	n/s	
WHO	Pocket book of Hospital care for children	2005	NCHS	WH	z-score OR % of median	WHZ (NCHS) boys & girls split sex tables	<-3 WHZ OR <70% WHM	not used	n/s	n/s	Length measured if child <85cm & height if >85cm
WHO	Handbook IMCI Integrated Management of Childhood Illness	2005	n/s	WA	Visible severe wasting Low weight-for-age	weight-for-age chart show in annex, but lines are not labelled	Low weight-for-age	not used	n/s	n/s	notes that on weighing child should wear light clothing
Action Contre la Faim (Claudine Prudohn)	Assessment & Treatment of Malnutrition in Emergency Situations	2002	NCHS	WH (WA is described)	% of median (z-score)	WHM (NCHS/ WHO 1982) combined sex WHZ (NCHS/ WHO 1983) split sex	<70% WHM (<-3 Z-score)	<110mm (noted as controversial if length <75cm)	WHM ≥70% and <80% (WHZ ≥-3 and <-2)	≥110mm and <120mm	Length measured if <2 years age, height if >2year (85cm a proxy if age unknown) Noted that WHM predicts death better than WHZ. Use WHZ only when WHM rejects a high risk child
MSF	Nutrition Guidelines (1st edition)	1995	NCHS	WH	% median (z-score)	WHM (NCHS/ WHO 1982) combined sex WHZ (NCHS/ WHO 1983) split sex	<70% WHM (<-3 Z-score)	<110mm (if child >12 months or >75cm length)	WHM ≥70% and <80% (WHZ ≥-3 and <-2)	<135mm referred for screen, but only enrolled if fulfils WHM or WHZ criteria	Length measured if <2 years age, height if >2years (85cm a proxy if age unknown)

4.4 Guideline Comparisons

Table 6 cont'd

			Case Definitions of SAM & MAM								
Country or Organization	Guideline	Date	Growth 'norm' (alternative, if noted)	Index (WH: weight for height; WA: weight or age)	Main Recommended indicator (+ alternative, if noted)	Indicator presented in tables (if shown)	Case definition SAM (in all guidelines, oedema =SAM)	MUAC-based case definition of SAM	Case definition MAM	MUAC-based case definition of MAM	Notes
International guidelines											
MSF	Nutrition Guidelines	May 2006	NCHS	WH	% median (notes z-scores used in some countries)	n/a	<70% WHM (<-3 Z-score)	<110mm (if child >6 months old)	WHM ≥70% and <80% (WHZ ≥-3 and <-2)	n/s	
MSF	Protocol Infants less than 6 months old (Benson) MSF - OCBA	Oct 2007	n/s	WH	% of median	WHM (NCHS/WHO 1982) combined sex WHZ (NCHS/WHO 1983) split sex	<70% WHM	n/a (focus is on infants <6m)	n/a	n/a	
Valid International	Community-based Therapeutic Care (CTC), A field manual (first edition)	2006	NCHS	MUAC*	Unadjusted MUAC % median or Z-score noted	no tables shown	<70% WHM <-3 WHZ	<110mm (if length >65cm)	WHM ≥70% and <80% (WHZ ≥-3 and <-2)	110mm to <125mm	* MUAC emphasised as primary measure (WH noted)
UNHCR	Handbook for Emergencies (third edition)	Feb 2007	NCHS*	WH	% of median OR z-score	no tables shown	<70% WHM (or <-3 Z-score)	<110mm (if aged 6 to 59 months)	70% to 79% WHM (-3 to -2 WHZ)	110mm to <125mm	also mention LBW babies (no details given) * recognised WHO & states that UNHCR is in process of assessing the new standards
UNHCR	The management of Nutrition in Major Emergencies	2000	NCHS	WA	z-score (% of median)	WHZ (NCHS) boys & girls split sex tables	<-3 WHZ (<70% WHM)	<-3 Z MUAC-for-age / MUAC-for-height	≥-3 to <-2 WHZ (70 to 79% WHM)	≥-3 Z MUAC-f-age/ MUAC-f-height to <-2z	notes that on weighing child should wear light clothing
IFE Core Group	Infant Feeding in Emergencies IFE Module 2, version 1.1	Dec 2007	NCHS	WH	% of median	tables not shown	<70% WHM (NCHS)	n/a (focus is on infants <6m)	n/s	n/s	n/s
ICRC	Nutrition Manual for Humanitarian Action	Aug 2008	NCHS	WH (describes other indices, incl WA, MUAC)	z-score (describes other indicators)	WHZ (NCHS) boys & girls split sex tables (MUAC by age Z-score tables also given)	several described, including <-3 WHZ (NCHS) and MUAC-for-height <-3z (75% median)	<110mm (<125mm also referred to as 'severe' in anthropometry chapter)		140 or 135mm to 125mm	Length measured if <2 years age, height if >2 years notes that anthropometry should not be the only basis of admission
National guidelines											
Burundi	Protocole National de Nutrition	Aug 2002	NCHS	WH	% of median	combined sex, WHM (NCHS)	<70% WHM (NCHS)	<110mm (if length >65cm)	between 70 to 79% WHM	<125mm	height <65cm equated with age <6 months no reference given for tables

4.4 Guideline Comparisons

Table 6 cont'd

Case Definitions of SAM & MAM											
Country or Organization	Guideline	Date	Growth 'norm' (alternative, if noted)	Index (WH: weight for height; WA: weight or age)	Main Recommended indicator (+ alternative, if noted)	Indicator presented in tables (if shown)	Case definition SAM (in all guidelines, oedema =SAM)	MUAC-based case definition of SAM	Case definition MAM	MUAC-based case definition of MAM	Notes
National guidelines											
Ethiopia	Protocol for the Management of Severe Acute Malnutrition	Aug 2002	NCHS	WH	% of median	combined sex, WHM (NCHS)	<70% WHM (NCHS)	<110mm (if length >65cm)	between 70 to 79% WHM	<125mm	height <65cm equated with age <6 months no reference given for tables
Madagascar	Depistage et prise en charge de la malnutrition aigue	Sep 2007	NCHS	WH	% of median	WHM (NCHS) combined sex	<70% WHM (NCHS)	<110mm (if length >65cm)	70 to 79% WHM	n/s	
Malawi	Guidelines for the Management of Severe Acute Malnutrition (book T3)	2007	NCHS	WH	% of median	WHM (NCHS) combined sex	<70% WHM (NCHS)	<110mm (ages 1 to 5 years)	70 to 79%	110 to 119mm	(NB printed as a card separate to the book)
Mozambique	Manual de Orientacao para Tratamento da Desnutricao Aguda Grave	Jun 2008	WHO-GS (2007 protocol used NCHS)	WH	% of median	* table labelled "% of median (WHO-2004) joint sex	<70% WHM	<110mm	70 to 79% WHM	110 to 125mm	* appears to have calculated weight cut-offs based on WHO (2006) boys median tables Length measured if child <85cm & height if >85cm
Tanzania	Management of Acute Malnutrition NATIONAL Guidelines	2008	NCHS	WH	% of median OR z-score	WHZ (NCHS) boys & girls split sex tables	<70% WHM OR <-3 WHZ	<110mm (6-59m or 65 to 110cm)	70-79% WHM or <-2SD	110-120mm	Length measured if child <85cm & height if >85cm
Uganda	Integrated Management of Acute Malnutrition	Nov 2006	n/s	MUAC emphasised	Unadjusted MUAC % median or Z-score noted	no tables shown	<70% WHM <-3 WHZ	<110mm (if length >65cm and/or >6months)	WHM ≥70% and <80% (WHZ ≥-3 and <-2)	110mm to <125mm	
Zambia	Integrated Management of Acute Malnutrition	2009	NCHS*	WH	% of median	no tables shown	<70% WHM OR <-3 WHZ	<110mm (6-59m)	WHM ≥70% and <80% (WHZ ≥-3 and <-2)	≥110 and <125mm	*WHO GS noted as a footnote in the introduction but not thereafter **z-score noted once in introduction but not thereafter)
Zimbabwe	Guidelines for the Management of Severe Acute Malnutrition through Community-based Therapeutic Care (CTC)	2008	NCHS	WH	% of median	WHZ (NCHS) boys & girls split sex tables	<70% WHM	<110	70 to 80%	110 to 125mm	Length if <85cm or <2 years, Height ≥85cm or >2years

4.4 Guideline Comparisons

Table 6 cont'd

			Case Definitions of SAM & MAM								
Country or Organization	Guideline	Date	Growth 'norm' (alternative, if noted)	Index (WH: weight for height; WA: weight or age)	Main Recommended indicator (+ alternative, if noted)	Indicator presented in tables (if shown)	Case definition SAM (in all guidelines, oedema =SAM)	MUAC-based case definition of SAM	Case definition MAM	MUAC-based case definition of MAM	Notes
National guidelines											
DRC	Protocol National de Prise en Charge de la Malnutrition Aigue	Oct 2008	NCHS	WH	% of median	WHM (NCHS) combined sex	<70% WHM (NCHS)	<110mm (if length >65cm)	70 to 79.9%	110 to 119mm	
Sudan (Southern)	Guidelines for the Management of Severe Acute Malnutrition	Jul 2008	NCHS	WH	% of median	WHM (NCHS) combined sex	<70% WHM (NCHS)	<110mm (for height >65cm)	70 to 79.9%	n/s	Length measured if child <85cm & height if >85cm *WHO GS noted as a footnote in the introduction but not thereafter ** z-score noted once in introduction but not thereafter
Sudan (North)	National Integrated Manual on the Management of Severe Acute Malnutrition in health facilities and at community level	Jan 2008	NCHS	WH	% of median OR z-score	draft - not yet inserted	<70%	<110mm (with length >65cm or >1year old)	≥-3 to <-2 WHZ or 70 to 79% WHM	n/s	Length if <85cm or <2 years, Height ≥85cm or >2years (tables state 85cm cutoff, text gives age OR 85cm cutoff)
Botswana	Guidelines for the Management of Severe Acute Malnutrition in Children	Jun 2007	NCHS	WH	% of median	annexes not complete (draft guidelines)	<70% WHM (NCHS)	<110mm	n/s	n/s	Length measured if child <85cm & height if >85cm equates age <6months with height <65cm *z-score noted once in introduction but not thereafter
Burkina Faso	Guidelines for the Management of Severe Acute Malnutrition in Children	Jun 2007	NCHS	WH	% of median	WHM (NCHS) combined sex	<70% WHM (NCHS)	<110mm	≥70 to <80% WHM	110 to 125mm	equates age <6months with height <65cm
Cote D'Ivoire	Protocole National de Prise en charge de la malnutrition severe	May 2005	NCHS	WH	% of median	WHM (NCHS) combined sex	<70% WHM (NCHS)	<110mm	n/s	n/s	Length measured if child <85cm & height if >85cm equates age <6months with height <65cm
Guinea	Protocole National de Prise en Charge de la Malnutrition Aigue	May 2008	NCHS	WH	% of median	WHM (NCHS) combined sex	<70% WHM (NCHS)	<110mm (if height >65cm)	≥70 to <80% WHM	110 to 125mm	Length measured if child <85cm & height if >85cm

4.4 Guideline Comparisons

Table 6 cont'd

			Case Definitions of SAM & MAM								
Country or Organization	Guideline	Date	Growth 'norm' (alternative, if noted)	Index (WH: weight for height; WA: weight or age)	Main Recommended indicator (+ alternative, if noted)	Indicator presented in tables (if shown)	Case definition SAM (in all guidelines, oedema =SAM)	MUAC-based case definition of SAM	Case definition MAM	MUAC-based case definition of MAM	Notes
National guidelines											
Mali	Protocole National de la prise en charge de la malnutrition aigue	Dec 2007	NCHS	WH	% of median	WHM (NCHS) combined sex	<70% WHM (NCHS)	<110mm (if height >65cm)	≥70 to <80% WHM	110 to 119mm	Length <85cm, Height ≥85cm equates age <6months with height <65cm
Niger	Protocol National de Prise en Charge de la Malnutrition Aigue	Dec 2006	NCHS	WH	% of median	WHM (NCHS) combined sex	<70% WHM (NHCS) (WHZ<-3 WHO is footnoted as an alternative case definition)	<110mm (for height >65cm)	70% to <80% WHM	n/s	Length if <85cm or <2 years, Height ≥85cm or >2years
Senegal	Protocole de prise en charge de la malnutrition aigue	May 2008	NCHS	WH	% of median OR z-score	WHM (NCHS) combined sex	<70% WHM OR <-3 WHZ	<110mm (if aged 6 to 59 months)	≥-3 to <-2 WHZ or 70 to 79% WHM	110 to 125mm	Length if <2 years, Height if >2 years <65cm length seen as proxy for <6months age
Afghanistan	Community-based Management of Acute Malnutrition programme in Aqcha and Mardyan District of Jawzjan Province Northern Afghanistan	June 2008	not specifited	WH	% median (z-score)	annexes not complete (draft guidelines)	<70% WHM (or <-3 WHZ)	<110mm	n/s	n/s	Length measured if child <85cm & height if >85cm if age unknown, <65cm length is proxy for <6months age
India	Indian Academy of Paeditrics guidelines	2006	NCHS	WH	% median (z-score)	not shown	<70% WHM (or <-3 WHZ)	<110mm	n/s	n/s	
Pakistan	Protocol for the inpatient treatment of severely malnourished children in the Pakistan earthquake emergency	Dec 2005	NCHS	WH	% median (z-score)	not shown (footnotes suggest that Z-score table as in WHO 1999 guidelines likely to be inserted)	<70% WHM (or <-3 WHZ)	not stated	n/s	n/s	Length measured if child <85cm & height if >85cm
Sri Lanka	Management of Severe Acute Undernutrition: Manual for Health Workers in Sri Lanka	2007	WHO	WH	z-score	WHZ (WHO) split sex	<-3Z WHZ (WHO)	no	n/s	n/s	Length measured if child <2years & height if >2years

4.4 Guideline Comparisons

4.4.2 Infant <6m SAM and MAM case definitions

See Table 7 for overview.

Infant <6m severe acute malnutrition (SAM)

In all of the guidelines infants <6m with SAM are treated as inpatients. This includes CMAM guidelines where the management strategy is referral of malnourished infants <6m for inpatient care. Weight-for-length criteria are always the same as for older children, though sometimes this is implied rather than directly stated.

Infants >6m but <3 or 4kg

There is often a 'secondary criterion' of a child >6 months but <3 or 4 kg. Some guidelines recommend these should have the same initial treatment as an infant <6m.

Infants <6m and length <65cm

Several guidelines implicitly or explicitly equate age <6 months and length <65cm, sometimes using length as a proxy for age. However confusion arises when these measures conflict, e.g. infant is known to be >6 months but length is <65cm. It is not clear which treatment protocol should be applied and if a MUAC measurement is valid if length is <65cms.

Length < 49cm

Some guidelines make an allowance for where length <49cm and so W/H cannot be measured. For example, IFE Module 2 recommends "visibly severe thinness" where measurement of W/L is not possible, and mentions that some agencies use a criterion of <2.1kg irrespective of length. WHO-GS go down to 45cm as the minimum length in length-for-height tables. This represents almost -3 z length-for-age at birth: not being able to determine a weight-for-length should therefore be much less of an issue in the future.

Measurement of weight in infants <6m

None of the guidelines draws attention to particular considerations in the anthropometric assessment of infants <6m (see Section 9.3.2). Research has shown weighing scales used in emergencies to be largely unsuitable for weighing infants <6m.¹³⁴

Assessment of age

Since birth is a recent event in an infant <6m, it is in theory easier to accurately assess age than for older children. None of the guidelines gives details of age assessment or how to best do this e.g. use of calendar to elicit exact age in months.

Infant <6m moderate acute malnutrition (MAM)

- I identifying and treating infants <6m with MAM is not specifically dealt with in any of the guidelines except one (Burkina Faso). Infant MAM is only recognized implicitly, by assuming that the same MAM weight-for-length criteria applicable to older children are applicable to infants. Management therefore requires inference from other sections of the guidelines, e.g. where lactating mothers with infants <6m are admitted to SFP. IFE Module 2 focuses on skilled breastfeeding support for moderately malnourished infants (implicitly including infants <6m).¹³⁵ Burkina Faso stands out by explicitly stating that infants with MAM should be treated by their mothers receiving SFP rations and health and nutrition education.

Further assessment recommended for infants <6m

Some guidelines recommend initial admission to an 'assessment' area where breastfeeding can be more closely observed. No current guideline differentiates complicated vs. uncomplicated infant <6m acute malnutrition.

Clinical admission criteria for infants <6m

Many guidelines recommend clinical admission criteria, in addition to anthropometry. Common criteria include "an infant who is too weak or feeble to suckle" and "mother not producing enough milk". Minor variations of emphasis and phrasing (e.g. 'not enough milk' with weight loss vs. 'not enough milk' alone) make it likely that there are significant inter-programme variations in terms of which infants <6m are admitted to care. It is also not clear whether carer reports or clinician assessments should carry the greater weight. Inter-user variations in interpreting even the very same guidelines are very likely.

4.4 Guideline Comparisons

Table 7: Infant <6m SAM & MAM case definitions

		Separate guideline for infants <6m?				Case Definition (Infants) ~ for admission			
Country or Organization	Guideline	Infant <6m SAM	Infant <6m MAM	Pages of guideline devoted to infants / total pages (excl. annexes)	% of guideline devoted to infants	Who apart from infants <6m should follow infant guidelines	Anthropometric criteria (except for MUAC, which is not used for infant <6m, assume same case definitions of SAM, MAM unless otherwise stated)	Clinical criteria	Notes
International guidelines:									
WHO	Management of severe malnutrition: a manual for physicians & other senior health workers 1999	not specifically mentioned.*		n/a	n/a	n/a	n/a	n/a	Preface states that protocol refers to "malnourished children under 5 years of age"
WHO	Guidelines for the inpatient treatment of severely malnourished children, 2003	not specifically mentioned.		n/a	n/a	n/a	n/a	n/a	
WHO	Manual for the health care of children in humanitarian emergencies 2008	not specifically mentioned		n/a	n/a	n/a	n/a	n/a	~ noted that patients needing inpatient care should be treated following "current WHO guidelines"
WHO	Pocket book of Hospital care for children 2006	yes	n/s	1/24	4%	no other groups noted	same	not specified	separate chapter on "supportive care" gives details of breastfeeding issues, including supplementary suckling
WHO	Handbook IMCI Integrated Management of Childhood Illness 2005	yes	yes	n/a		no other groups noted	n/a	n	Recommends that infants and children with severe malnutrition are referred urgently to hospital, and does not cover their specific treatment
Action Contre la Faim (Claudine Prudohn)	Assessment & Treatment of Malnutrition in Emergency Situations, 2002	yes	yes	5/58 (of section on treatment)	9%	<4kg	same	1) Too weak to suckle effectively; and/or 2) Mother not producing enough milk	~ notes that infant <6m should be nursed in a separate area of the ward ~ also suggests pressing on mothers breasts to check for presence of milk
MSF	Nutrition Guidelines (1st edition), 1995	yes	n/s	1/46	2%	no other groups noted	same	Not specifically stated	in "Infant feeding" section, infant not defined to mean infant <6m alone
MSF	Nutrition Guidelines, 2006	yes	n/s	14/191	7%	no other groups noted	WHM <70%	1) Weight loss or growth stagnation (1 to 2 weeks) 2) Too weak to suckle 3) Insufficient breastmilk 4) Inappropriate alternative infant feeding	whole chapter in the book devoted to infant <6m recognised LBW, preterm infants notes need for mechanical scales accurate to 10g

4.4 Guideline Comparisons

Table 7 cont'd

		Separate guideline for infants <6m?				Case Definition (Infants) ~ for admission			
Country or Organization	Guideline	Infant <6m SAM	Infant <6m MAM	Pages of guideline devoted to infants / total pages (excl. annexes)	% of guideline devoted to infants	Who apart from infants <6m should follow infant guidelines	Anthropometric criteria (except for MUAC, which is not used for infant <6m, assume same case definitions of SAM, MAM unless otherwise stated)	Clinical criteria	Notes
International guidelines:									
MSF	Protocol Infants less than 6 months old (Benson) MSF – OCBA 2007	yes	n/s	(10/10)	(100%)	<3kg being breast-fed	WHM <70%	1) Infant too weak or feeble to suckle effectively (independent of WHM)	one chapter from a wider set of guidelines notes need for a 'breastfeeding corner' notes no growth standards for infants whose length <49cm and that the nutrition unit is not appropriate for treating premature and LBW infants <49cm. These should be referred to nursery for appropriate care
Valid International	Community-based Therapeutic Care (CTC), A field manual (first edition) 2006	yes	n/s	0.5/13 pages on inpatient care	4%	no other groups noted	WHM <70%	visible wasting	Guideline does not attempt to directly address infant <6m treatment, referring instead to other guidelines, notably the 2001 Operational Guidance on Infant & Young Child Feeding in Emergencies, volume 1
UNHCR	Handbook for Emergencies (third edition) 2007	yes	not directly	infant U6m mentioned in several paragraphs mixed in main text		no other groups noted	same	"visible severe wasting in conjunction with difficulties in BF"	- notes that infants U6 SAM treatment is based on promotion of BF (if possible) - details not described
UNHCR	The management of Nutrition in Major Emergencies 2000	infant <6m malnutrition recognised, but not split into SAM & MAM		1/24	4%	no other groups noted	same	not specifically stated	States that "for malnourished infants <6m, it is the mother who should be included, NOT the infants (infants should be exclusively breastfed)"
IFE Core Group	Infant Feeding in Emergencies IFE Module 2, version 1.1 2007	yes	yes	17/114 pages focus just on infant with SAM (see notes)	(15%)	>6months old but <65cm ~ 4kg	WHM <70%	failure to gain weight at home or under management at a breastfeeding corner	One chapter (8) focuses exclusively on infant <6m severe malnutrition. Chapter 5 addresses low birth weight infants,"visibly thin"/moderately malnourished infants and malnourished mothers. The whole 223 page manual directly or indirectly addresses this age group through guidance on skilled assessment and support for breastfeeding.
ICRC	Nutrition Manual for Humanitarian Action 2008	no (notes TFP often restricted to <5years)	no	n/a	n/a	n/a	n/a	n/a	no separate section for care of infant <6m. Does however have a paragraph on BF. Notes it as an "absolute priority, and every effort should be made to encourage or restore it"

4.4 Guideline Comparisons

Table 7 cont'd

		Separate guideline for infants <6m?				Case Definition (Infants) ~ for admission			
Country or Organization	Guideline	Infant <6m SAM	Infant <6m MAM	Pages of guideline devoted to infants /total pages (excl. annexes)	% of guideline devoted to infants	Who apart from infants <6m should follow infant guidelines	Anthropometric criteria (except for MUAC, which is not used for infant <6m, assume same case definitions of SAM, MAM unless otherwise stated)	Clinical criteria	Notes
National guidelines:									
Burundi	Protocole National de Nutrition 2002	yes	n/s	5/33	15%	<6m or <3kg being BF	same	1) Mother does not have enough milk AND infant losing weight 2) Infant too weak to suckle and losing weight even if mother does have milk	
Ethiopia	Protocol for the Management of Severe Acute Malnutrition 2007	yes	n/s	8/81	10%	no other groups noted	WHM <70%	too weak or feeble to suckle effectively (any WH)	Protocol notes no growth standards for infants whose length <49cm and that the nutrition unit is not appropriate for treating premature and LBW infants <49cm. These should be referred to nursery and given infant formula.
Madagascar	Depistage et prise en charge de la malnutrition aigue 2007	yes	n/s	3/52	6%	<3.5kg	WHM <70%	1) Too weak or feeble to suckle effectively or 2) Mother does not have enough milk and infant is losing weight	
Malawi	Guidelines for the Management of Severe Acute Malnutrition (book T3) 2007	yes	yes (in group 'infants <6m with nutrition problems but not SAM')	10/38	26%	<3kg	WHM <70%	1) Infant not gaining or losing weight but not SAM or 2) Mother reports insufficient BM or 3) Weak or feeble and not suckling well but not SAM	Protocol notes no growth standards for infants whose length <49cm and that the nutrition unit is not appropriate for treating premature and LBW infants <49cm - should be referred to nursery for appropriate care
Mozambique	Manual de Orientacao para Tratamento da Desnutricao Aguda Grave 2008	yes	n/s	8/91	9%	<3kg	WHM <70%	1) Too weak or feeble to suckle effectively or 2) Not gaining weight at home	
Tanzania	Management of Acute Malnutrition NATIONAL Guidelines 2008	yes	n/s	1/67	1%	-	same	not stated	Protocol has only 1 paragraph which states "If the mother is breastfeeding, assist her to breastfeed or express breastmilk. Give the prescribed amount of F75 in addition to the breastmilk"

4.4 Guideline Comparisons

Table 7 cont'd

		Separate guideline for infants <6m?				Case Definition (Infants) ~ for admission			
Country or Organization	Guideline	Infant <6m SAM	Infant <6m MAM	Pages of guideline devoted to infants / total pages (excl. annexes)	% of guideline devoted to infants	Who apart from infants <6m should follow infant guidelines	Anthropometric criteria (except for MUAC, which is not used for infant <6m, assume same case definitions of SAM, MAM unless otherwise stated)	Clinical criteria	Notes
National guidelines:									
Uganda	Integrated Management of Acute Malnutrition 2006	yes	n/s	1/53	2%	2%	same	not stated	reference made to separate guidelines focused on therapeutic feeding centres reference also make to link with IMCI guidelines
Zambia	Integrated Management of Acute Malnutrition 2009	yes (but see notes)	n/s	1/35	3%	<3kg	WHM <70%	1) Infant <6m unable to breastfeed	~ Though infant <6m SAM recognised briefly as "special cases", stated elsewhere that these guidelines are targeted at 6 to 59m children. Thus no separate section or chapter for infant <6m. ~ Also references separate "National guidelines" for full details of treatment during (inpatient) stabilisation
Zimbabwe	Guidelines for the Management of Severe Acute Malnutrition through Community-based Therapeutic Care (CTC) 2008	yes (but see notes)	n/s	1/56	2%	n/s	n/s	not stated	~ reference made to separate guidelines focused on therapeutic feeding centres ~ infants <6m not otherwise focused on in this guideline in the chapter on "Stabilisation Centre" care
DRC	Guideline National de Prise en Charge de la Malnutrition Aigue 2008	yes	n/s	5/68	7%	<3.5kg	<70% WHM	1) Too weak or feeble to suckle effectively (any WH) or 2) Mother does not have enough milk to feed her child or 3) Not gaining (or losing) weight at home	
Sudan (Southern)	Guidelines for the Management of Severe Acute Malnutrition 2008	yes	n/s	7/103	7%	<3kg being breast-fed	<70% WHM	1) Too weak or feeble to suckle effectively (any WH) 2) Not gaining (or losing) weight at home	noted that RUTF inappropriate as "reflex of swallowing is not yet present"
Sudan (North)	National Integrated Manual on the Management of Severe Acute Malnutrition in health facilities and at community level 2008	yes	n/s	7/103	7%	<3kg being breast-fed	<70% WHM	1) Too weak or feeble to suckle effectively (any WH) 2) Not gaining weight at home	notes that infant <6m should be ideally be nursed in a separate area of the ward

4.4 Guideline Comparisons

Table 7 cont'd

		Separate guideline for infants <6m?				Case Definition (Infants) ~ for admission			
Country or Organization	Guideline	Infant <6m SAM	Infant <6m MAM	Pages of guideline devoted to infants / total pages (excl. annexes)	% of guideline devoted to infants	Who apart from infants <6m should follow infant guidelines	Anthropometric criteria (except for MUAC, which is not used for infant <6m, assume same case definitions of SAM, MAM unless otherwise stated)	Clinical criteria	Notes
National guidelines:									
Botswana	Guidelines for the Management of Severe Acute Malnutrition in Children 2007	yes	n/s	6/28	21%	<3kg being breast-fed	same	1) Too weak or feeble to suckle effectively (any WH) or 2) Mother does not have enough milk to feed her child	Protocol notes no growth standards for infants whose length <49cm and that the nutrition unit is not appropriate for treating premature and LBW infants <49cm. These should be referred to nursery and given infant formula.
Burkina Faso	None yet - in draft	yes	yes	5/57	9%	<3kg OR length <65cm (a proxy for age)	same	1) Mother does not have enough milk and baby losing weight 2) Infant too weak to suckle and losing weight even if mother has milk	SFP recommended for mothers of MAM infants <6m. General health and nutrition education also recommended
Cote D'Ivoire	Protocole National de Prise en charge de la malnutrition severe 2005	yes	n/s	10/65	15%	<3kg OR length <65cm (a proxy for age)	<70% WHM (NCHS) (for non-breastfed infant)	1) Mother does not have enough milk and baby losing weight (does not matter what exact WHM is at assessment) 2) Infant too weak to suckle and losing weight even if mother has milk	Protocol notes no growth standards for infants whose length <49cm and that the nutrition unit is not appropriate for treating premature and LBW infants <49cm. These should be referred to nursery and given infant formula
Guinea	Protocole National de Prise en Charge de la Malnutrition Aigue 2008	yes	n/s	8/98	8%	<3kg	<70% WHM (NCHS)	1) Mother does not have enough milk and baby losing weight (does not matter what exact WHM is at assessment) 2) Infant too weak to suckle and losing weight even if mother has milk	
Mali	Protocole National de la prise en charge de la malnutrition aigue 2007	yes	n/s	4/97	4%	<3kg	<70% WHM (NCHS)	1) Mother does not have enough milk and baby losing weight 2) Infant too weak to suckle and losing weight even if mother has milk	noted that RUTF inappropriate as "reflex of swallowing is not yet present"
Niger	Protocole de prise en charge de la malnutrition aigue 2008	yes	yes (mother referred to SFP)	7/93	8%	<3kg	<70% WHM (NCHS)	Main criterion is "failure of effective breastfeeding": 1) Too weak or feeble to suckle effectively (no matter what weight-for-height) 2) Not gaining (or losing) weight at home	notes that infant <6m should be nursed in a separate area of the ward

4.4 Guideline Comparisons

Table 7 cont'd

		Separate guideline for infants <6m?				Case Definition (Infants) ~ for admission			
Country or Organization	Guideline	Infant <6m SAM	Infant <6m MAM	Pages of guideline devoted to infants / total pages (excl. annexes)	% of guideline devoted to infants	Who apart from infants <6m should follow infant guidelines	Anthropometric criteria (except for MUAC, which is not used for infant <6m, assume same case definitions of SAM, MAM unless otherwise stated)	Clinical criteria	Notes
National guidelines:									
Senegal	Protocole de prise en charge de la malnutrition aigue 2008	yes	n/s	3/45	7%	not mentioned	<70% WHM (NCHS)	1) Too weak to suckle and losing weight even if mother has milk 2) Losing weight with mother who has insufficient milk	
Afghanistan	Community-based Management of Acute Malnutrition programme in Aqcha and Mardyan District of Jawzjan Province Northern Afghanistan 2008	yes	n/s	5/26	19%	<3kg being breast-fed	same	Main criterion is "failure of effective breastfeeding": 1) Too weak or feeble to suckle effectively 2) Not gaining weight at home	Protocol notes no growth standards for infants whose length <49cm and that the nutrition unit is not appropriate for treating premature and LBW infants <49cm. These should be referred to nursery and given infant formula
Guinea	Protocole National de Prise en Charge de la Malnutrition Aigue 2008	yes	n/s	8/98	8%	<3kg	<70% WHM (NCHS)	1) Mother does not have enough milk and baby losing weight (does not matter what exact WHM is at assessment) 2) Infant too weak to suckle and losing weight even if mother has milk	
India	Indian Academy of Paediatrics guidelines 2006	Not explicitly. Intro does mention children aged 0 to 4 years	n/s	0/14	0%	n/a	n/a	n/a	No specific details of infant <6m treatment noted in protocol summary.
Pakistan	Protocol for the inpatient treatment of severely malnourished children in the Pakistan earthquake emergency 2005	not explicitly	n/s	n/s	n/s	n/s	n/s	n/s	
Sri Lanka	Management of Severe Acute Undernutrition: Manual for Health Workers in Sri Lanka 2007	target group for protocol is 0 to 59 months	n/s	no separate section for infant <6m	n/s	not mentioned	same	not specified	Outpatient care noted as only for 6 to 59 month old children

4.4 Guideline Comparisons

4.4.3 Key medical treatments for infants <6m

See Table 8 for overview.

Admission procedures

Admission procedures for SAM and MAM include a basic medical history and clinical examination. Some guidelines annex a template 'history/examination' proforma, thereby standardizing admission practices. Few guidelines suggest significant extra or different admission procedures for infants <6m. Exceptions and possible models for future guidelines include:

- IFE Module 2 provides the most detail of various aspects of presentation, including recognizing low birth weight infants, infant feeding status (e.g. breastfed or not) and full assessment of breastfeeding (with dedicated sections and a standard checklist).
 - MSF 2006 highlights "Additional history, including feedings other than EBF; presence and attitude of the mother, state of the infant, flow of mother's milk and attachment and suckling."
 - Botswana's national guidelines note the need to observe breastfeeding "position, attachment, suckling, breast conditions"
 - Cote d'Ivoire suggests that suck can be assessed by inserting a finger into the infant's mouth.
- Adequacy of current admission procedures will be reviewed in detail in Chapter 9.

Treatment guidelines

All guidelines recognize a phased approach to care. Many go into significantly more detail on the WHO (1999) 'ten steps'. There is, however, no specific focus on infants <6m with the exception of IFE Module 2.

Specific treatments

Where sections on infant <6m exist in guidelines, they commonly recommend vitamin A, folic acid, iron (usually mixed into the therapeutic milk, but only once the child has improved and is in recovery phase) at appropriate doses. For malaria, local guidelines are referred to. Antibiotics are universally recommended. The most common first line therapy is amoxicillin, with several minor variations in dose/ dose regimen. Second line therapy is often not directly covered in the infant section of the guideline. If noted, initial ampicillin (with switch after two days to oral amoxicillin) plus gentamycin is common.

Kangaroo careⁱⁱ for nursing young / small infants is noted in many guidelines, but often only as a treatment for hypothermia rather than as a default 'ideal' position for infants <6m. One exception is IFE Module 2, where Kangaroo care is recommended to "prevent or treat hypothermia" in severely malnourished infants, and also as the default treatment of low birth weight infants, supported by detailed content¹³⁶.

HIV

Details of HIV-related issues are limited in most guidelines. Those written most recently seem to have greater detail, which probably reflects increased availability of antiretroviral treatments. Where HIV is mentioned, explicit links and references to local HIV-specific guidelines are not made. This is an area for future developers to address, to ensure closer links between services (see Section 9.9 for more HIV considerations).

ⁱⁱ Kangaroo care is a technique where the infant is held in continuous skin-to-skin contact with an adult, usually the mother. It facilitates temperature regulation, reduces infant stress, and helps establish and maintain breastfeeding.

4.4 Guideline Comparisons

Table 8: Key medical treatments recommended for infants <6m											
Country or Organization	Guideline	Treatment objective	Admission	Vitamin A	Folic acid	1st line antibiotic	2nd line antibiotic	Anti-malarial	Iron	Other	Kangaroo care
<i>International guidelines</i>											
WHO	Management of severe malnutrition: a manual for physicians & other senior health workers 1999	n/a	Clinical assessment	50,000IU (on admission) followed by small daily doses	5mg dose at admission, then daily dose of 1mg	cotrimoxazole x2 per day for 5 days	ampicillin (50mg/kg/6hrs im for 2 days) then amoxicillin 15mg/kg/8hrs orally for 5 days plus gentamycin 7.5mg/kg daily for 7 days	Recommends following national guidelines	all get iron on completion of stabilisation phase		not specified
WHO	Guidelines for the inpatient treatment of severely malnourished children, 2003	n/a	Clinical assessment	50,000IU (on admission) followed by small daily doses	50,000IU (on admission) followed by small daily doses	If no complications cotrimoxazole x2 per day for 5 days if complications amp + gent as above		not specified	3mg/kg/day (once improved)		not specified
WHO	Manual for the health care of children in humanitarian emergencies 2008	n/a	n/a	50,000IU (on admission)	not routinely	amoxicillin	not specified	according to national guideline	not routinely		not specified
WHO	Pocket book of Hospital care for children 2005	n/s	Clinical assessment	50,000IU (on admission) then small daily dose	5mg on admission then 1mg/day	cotrimoxazole x2 per day for 5 days	as above	not specified	3mg/kg/day (once improved)	also notes 2mg/kg/day zinc and 0.3mg/kg/day copper	not specified
WHO	Handbook IMCI Integrated Management of Childhood Illness 2005	n/a	n/a	n/a	n/a	n/a	n/s	n/a	n/a	n/a	n/a
ACF	Assessment & Treatment of Malnutrition in Emergency Situations 2002	Increase mothers milk supply until BM alone sufficient for growth	clinical examination mentioned but no details given	50,000IU on days 1,2 and at discharge	5mg single dose at admission	amoxicillin 20mg/kg x3 per day for 10 days	not specified	according to national protocol	in F100 dilute (once improved)		noted as part of hypo-thermia prevention
MSF	Nutrition Guidelines (1st edition) 1995	stated that BF should be promoted and continued during the whole treatment course	no additional details specified	notes that vit A should not be given due to possible toxicity	no specific details given	no specific details given	not specified	no specific details given	no specific details given		not specified

4.4 Guideline Comparisons

Table 8 cont'd

Country or Organization	Guideline	Treatment objective	Admission	Vitamin A	Folic acid	1st line antibiotic	2nd line antibiotic	Anti-malarial	Iron	Other	Kangaroo care
International guidelines											
MSF	Nutrition Guidelines 2006	reduce mortality & morbidity - discharge on EBF	- additional history: - feeds other than EBF; presence + attitude of mother; - state of infant, - flow of mother's milk, - attachment, suckling	50,000 IU (further doses if xerophthalmia)	5mg single dose at admission	not specified	treat only if infant has malaria - need for nets to prevent transmission also noted	daily or weekly supplementation described in micronutrients chapter			yes - diagram included
MSF	Protocol Infants less than 6 months old (Benson) MSF - OCBA 2007	To return infants to full EBF	no additional details specified	50,000 IU (further doses if xerophthalmia)	5mg single dose at admission	amoxicillin 35-50mg/kg x2 per day for 5 days plus gentamicin	not specified	not specified	in F100dilute (once improved)		yes - diagram included
Valid	Community-based Therapeutic Care (CTC), A field manual (first edition) 2006	n/a	no additional details specified	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
UNHCR	Handbook for Emergencies (third edition) 2007	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s
UNHCR	The management of Nutrition in Major Emergencies 2000	treat mother not infant	treat mother not infant	n/a	n/a	n/a	n/s	n/a	n/a	n/a	n/a
IFE Core Group	Infant Feeding in Emergencies IFE Module 2, version 1.1 2007		Details described	50,000IU (admission only)	5mg single dose	n/s	n/s	n/s	ferrous sulphate, in F100 dilute (once improved)	Gives extensive details of supportive care for breast-feeding	Yes, including to prevent as well as treat hypothermia
ICRC	Nutrition Manual for Humanitarian Action 2008	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
National guidelines											
Burundi	Protocole National de Nutrition 2002	n/s	no additional details specified	50,000 IU at admission	5mg single dose at admission	amoxycillin from 2kg, 20mg/kg x3 per day	not specified	not specified	ferrous sulphate, in F100dilute (once improved)		not specified
Ethiopia	Protocol for the Management of Severe Acute Malnutrition 2007	To return infants to full EBF	no additional details specified	50,000IU (admission only)	2.5mg single dose	amoxycillin from 2kg, 30mg/kg x2 per day plus gentamycin	not specified not clear whether gentamycin is 1st or 2nd line treatment	national protocol (coartem from 3 months)	ferrous sulphate, in F100 dilute (once improved)		not specified

4.4 Guideline Comparisons

Table 8 cont'd

Country or Organization	Guideline	Treatment objective	Admission	Vitamin A	Folic acid	1st line antibiotic	2nd line antibiotic	Anti-malarial	Iron	Other	Kangaroo care
National guidelines											
Madagascar	Depistage et prise en charge de la malnutrition aigue 2007	To ensure mother can produce milk of sufficient quantity and quality for infant to grow normally	no additional details specified	not specified	not specified	not specified	not specified	not specified	not specified		noted in general section on hypothermia
Malawi	Guidelines for the Management of Severe Acute Malnutrition (book T3) 2007	To stimulate BF until sufficient to allow the infant to grow properly	no additional details specified	50,000IU (admission only)	5mg single dose	amoxycillin 15mg/kg x3 / day, phase 1 + 4 days extra)	ampicillin iv and gentamycin im	not specified	in F100dil (once improved)		noted as treatment for hypothermia in general section
Mozambique	Manual de Orientacao para Tratamento da Desnutricao Aguda Grave 2008	n/s	no additional details specified	not specified	5mg single dose	amoxycillin 20mg/kg x3 per day plus gentamycin	not specified	not specified	in F100dil (once improved)	HIV-related treatments noted for exposed infants	noted in general section on hypothermia
Tanzania	Management of Acute Malnutrition NATIONAL Guidelines 2008	n/s	not stated	50,000 IU d1 (+d2, d14 if clinical signs deficiency)	5mg single dose	amoxycillin 15mg/kg x3 per day for 5 days	ampicillin plus gentamycin 7.5mg/kg daily for 7 days	not specified	3mg/kg/day elemental iron once improved		noted as a treatment for hypothermia in general section
Uganda	Integrated Management of Acute Malnutrition 2006	n/s	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Zambia	Integrated Management of Acute Malnutrition 2009	n/s	no additional details specified	50,000IU at admission	not specified	not specified	not specified	not specified	not specified	not specified	not specified
Zimbabwe	Guidelines for the Management of Severe Acute Malnutrition through Community-based Therapeutic Care (CTC) 2008	n/s	n/s	50,000IU at admission	5mg at admission	amoxycillin from 2kg, 20mg/kg x3 per day for 7-10 days		not for <4kg infants	not specified	not specified	not specified
DRC	Protocol National de Prise en Charge de la Malnutrition Aigue 2008	n/s	no additional details specified	50,000 IU at admission only (not if oedema)	not specified	amoxycillin from 2kg, 30mg/kg x2 per day	not specified	not specified	not specified	Notes 'health education and social care' (for all children)	not specified

4.4 Guideline Comparisons

Table 8 cont'd

Country or Organization	Guideline	Treatment objective	Admission	Vitamin A	Folic acid	1st line antibiotic	2nd line antibiotic	Anti-malarial	Iron	Other	Kangaroo care
National guidelines											
Sudan (Southern)	Guidelines for the Management of Severe Acute Malnutrition 2008	To improve or re-establish BF	no additional details specified (though disability, maternal illness, maternal trauma noted as problem which can affect infant feeding)	50,000 IU at admission only	2.5mg single dose at admission	amoxycillin from 2kg, 30mg/kg x2 per day plus gentamycin	not specified	not specified	ferrous sulphate, in F100dilute, once improved		not specified
Sudan	National Integrated Manual on the Management of Severe Acute Malnutrition in health facilities and at community level 2008	To return infants to full EBF	no additional details specified	50,000 IU at admission only	2.5mg single dose at admission	amoxycillin from 2kg, 30mg/kg x2 per day plus gentamycin	not specified	not specified	ferrous sulphate, in F100dilute, once improved		noted as treatment for hypothermia in general section
Botswana	Guidelines for the Management of Severe Acute Malnutrition in Children 2007	~ Treat SAM ~ Restore to health ~ Reduce mortality ~ Treat complications & associated diseases ~ Maintain or improve maternal milk production	~ Observe breastfeeding (position, attachment, suckling, breast conditions) ~ medical consultation (history, examination)	50,000 IU at admission only	2.5mg single dose at admission	amoxycillin from 2kg, 20mg/kg x3 per day	not specified	according to national guidelines	ferrous sulphate 6mg elemental iron/kg/day (once improved, growing)	Briefly mentions 'health education and social care' (for all children)	noted as a treatment for hypothermia in general section
Burkina Faso	None yet - in draft	To increase the quality and quantity of BF	no additional details specified	50,000 IU at admission only	5mg single dose at admission	amoxycillin, from 2kg 25mg/kg x3 per day	not specified	not specified	ferrous sulphate (once improved)		not specified
Cote D'Ivoire	Protocole National de Prise en charge de la malnutrition severe 2005	To re-establish effective EBF (NOT necessarily to regain 85% WHM)	Note ~ Whether preterm ~ Birth weight ~ Feeds (aside from BM) ~ Strength of infant suck (by inserting finger into mouth)	not specified	5mg single dose at admission	amoxycillin from 2kg, 20mg/kg x3 per day	not specified	no treatment if tests negative 7 days artesunate if positive	in F100dil (once improved)	Notes that risk of hypothermia & hypoglycaemia high ==> infants to be nursed close together and monitored closely	not specified
Guinea	Protocole National de Prise en Charge de la Malnutrition Aigue 2005	To supplement maternal BF and get to the point where infant growing well on BF alone	no additional details specified	50,000 IU at admission only	2.5mg single dose at admission	amoxycillin, from 2kg 30mg/kg x2 per day + gentamycin	not specified	not specified	in F100dil (once improved)		noted as a treatment for hypothermia in general section

4.4 Guideline Comparisons

Table 8 cont'd

Country or Organization	Guideline	Treatment objective	Admission	Vitamin A	Folic acid	1st line antibiotic	2nd line antibiotic	Anti-malarial	Iron	Other	Kangaroo care
National guidelines											
Mali	Protocole National de la prise en charge de la malnutrition aigue 2007	n/s	no additional details specified	50,000 IU at admission only	2.5mg single dose at admission	amoxycillin, from 2kg 20mg/kg x3 per day		not specified	in F100dil (once improved)		noted as a treatment for hypothermia in general section
Niger	Protocol National de Prise en Charge de la Malnutrition Aigue 2006	To return infants to full EBF	no additional details specified	50,000 IU at admission only	2.5mg single dose at admission	amoxycillin, from 2kg 30mg/kg x2 per day	not specified	not specified	in F100dil (once improved)		not specified
Senegal	Protocole de prise en charge de la malnutrition aigue 2008	To return infants to full EBF	no additional details specified	not noted	2.5mg single dose at admission	amoxycillin from 2kg, 20mg/kg x2 per day for 7 days	not specified	not specified	not specified		not specified
Afghanistan	Community-based Management of Acute Malnutrition programme in Aqcha and Mardyan District of Jawzjan Province Northern Afghanistan (Stabilization Centre Guidelines) 2008	To return infants to full EBF	no additional details specified	50,000 IU at admission only	2.5mg single dose at admission	amoxycillin from 2kg, 30mg/kg x2 per day	add gentamycin (do not use chloramphenicol)	according to national guidelines	in F100dil (once improved)		noted in section on hypothermia, with implication that is recommended for all children
India	Indian Academy of Paediatrics guidelines 2006	n/s	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Pakistan	Protocol for the inpatient treatment of severely malnourished children in the Pakistan earthquake emergency 2005	n/s	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sri Lanka	Management of Severe Acute Under-nutrition: Manual for Health Workers in Sri Lanka 2007	n/s	no additional details specified	"according to national protocol"	not specified	amoxycillin 15mg/kg x3 per day for 5 days	gentamycin 7.5mg/kg for 7 days plus ampicillin iv for 2 days then	not specified	3mg/kg/day once improving/gaining weight		noted in section on hypothermia as prevention/treatment

4.4 Guideline Comparisons

4.4.4 Nutritional treatments for infants <6m

“Careful attention to infant feeding and support for good practice can save lives. Preserving breastfeeding, in particular, is important not just for the duration of any emergency, but may have lifelong impacts on child health and on women’s future feeding decisions.

Every group of people has customs and traditions about feeding infants and young children. It is important to understand these and work with them sensitively while promoting best practice.”

Operational Guidance on IFE, v2.1, 2007 &
UNHCR Handbook for Emergencies, 3rd Edition

See Table 9 for summary. Most guidelines divide infants into those who have the opportunity to breastfeed and those who do not. These will be dealt with in turn.

Treatment objective

‘Restoration of effective exclusive breastfeeding’ (or similar phrasing implying the same) is a commonly stated treatment objective for infants <6m. This differs from the goal for older children, who aim for a nutritional ‘cure’ (commonly >80 or 85% weight-for-height / >-2 or -1 z-scores).

Breastfed infants

Most guidelines encourage the continuation of breastfeeding. However, details of breastfeeding support are rarely described. Exceptions are IFE Module 2 and the WHO pocket handbook of hospital care (2005). For infants <6m who can breastfeed, three hourly breastfeeding of ten to 20 minutes is generally recommended in guidelines. Some encourage more frequent feeds as demanded by the infant. Practical details of how to support and optimize breastfeeding are very limited. This makes prior specialist skills necessary to be able to implement and build on guidelines. Existing materials on breastfeeding support are rarely referenced.

All guidelines imply that infants <6m admitted to treatment would need at least short term supplemental feeds, with the exception of IFE Module 2 that gives the option of breastfeeding/expressed breastmilk alone where an infant is suckling and breastmilk supply is adequate. Diluted F100 was the most frequently recommended supplemental milk. Some guidelines mention F75 for infants with oedema. IFE Module 2 includes commercial infant formula as an option and advises against ‘home prepared’ F75 in this age-group.

The supplementary suckling (SS) technique as a means of supplemental feeding is widely referenced and thoroughly described in guidelines, including with pictures and diagrams in many¹³⁷. Using SS, weight gain criteria (20g per day cited by many guidelines) are used to signify that breastmilk production is improving. After a few days with good weight gain, the volume of supplemental milk is reduced. If weight gain continues, supplemental milk is stopped entirely and the infant is monitored to see whether he/she continues to gain weight on exclusive breastfeeding alone.

A minimum admission length is sometimes specified (e.g. nine to 11 days minimum, which includes two to three days each for phase one and two, plus five days for exclusive breastfeeding). Other guidelines urge a short as possible admission, depending on weight gain. All emphasise a need to ensure the infant is gaining adequate weight and is clinically well on exclusive breastfeeding alone, prior to discharge.

Non-breastfed infants

Possible reasons for not breastfeeding are not generally listed, with the exception of IFE Module 2. Though rare, none of the guidelines reviewed mention medical contra-indications to breastfeeding¹³⁸. The same supplemental milk recommended for breastfed infants is often recommended for this group: diluted F100 or sometimes F75 for infants with oedema, fed by cup. Only a small number of guidelines explicitly warn of the hygiene risks of bottle/teat feeding.

The major difference for non-breastfed infants <6m arises in the rehabilitation phase of treatment. Here, volume of supplemental milk doubles to enable catch-up growth. Non-breastfed infants may also require transition to an appropriate breastmilk substitute, e.g. transition from diluted F100 to a commercial infant

4.4 Guideline Comparisons

formula. Rather than an 'adequate weight gain' discharge criterion, the non-breastfed infant is typically expected to reach the same anthropometric targets as older children prior to discharge (>80% or >85% weight-for-length).

Very few guidelines go into details about the challenges of long term use of infant formula, follow-up needs and resources required, and how to source supplies. Likewise, few note alternatives, such as wet nursing or modified animal milks. No guideline suggests that complementary foods or RUTF be started before six months.

Infant and young child feeding support in older age-group

The lack of breastfeeding-specific guidance in current guidelines also has implications for older severely malnourished children, where breastmilk should continue to contribute significantly to their energy and nutrient intake. This compromises achievement of the Sphere indicator "as much attention is attached to breastfeeding and psychosocial support, hygiene and community outreach as to clinical care" (Correction of malnutrition standard 2: severe malnutrition).

4.4 Guideline Comparisons

Table 9: Nutritional treatments for infants <6m												
Country or Organization	Guideline	Division into 'breast-fed' and 'non-BF'	Breast feeding	Breastfeeding (details)	Supplemental milks (BF infant)	Supplemental milk route (BF infant)	Supplemental milk feed frequency (BF infant)	Supplemental feed amount (BF infant)	rehab phase (BF infant)	duration of phases (BF infant)	Discharge (BF infant)	No maternal breast feeding available
International guidelines												
WHO	Management of severe malnutrition, 1999	n/a	"should be continued"	Noted in section on preparation for discharge	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
WHO	Guidelines for the inpatient treatment of severely malnourished children, 2003	n/a	"breastfeed as often as child wants"	noted in section on preparation for discharge	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
WHO	Manual for the health care of children in humanitarian emergencies 2008	n/a	not noted		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
WHO	Pocket book of Hospital care for children 2005	no	"if child is breastfed, continue with this"	separate chapter on supportive care has details on supporting BF	In order of preference: 1) BM alone 2) Infant formula 3) F100 dilute	not specified (SS described in different chapter)	8 times per day	details not specified	details not specified	not specified	not specified	expressed breastmilk (if available); formula milk or infant formula; modified animal milk
ACF	Assessment & Treat-ment of Malnutrition in Emergency Situations 2002	>6month but <4kg infants are separate	Every 3 hours	~ BF for 10-20 mins ~ Give BMS one hour after BF	Diluted F100	supplemental suckling (described)	8 times per day	130ml/kg/day (=100kcal/kg/day)	~ if weight increasing for 15 days then half amount F100dil ~ stop SS after further 3 days	minimum stay would be 15 + 3 + 5 = 23 days	Once gaining weight for 5 days without SS	Diluted F100* (protocol for >6month but <4kg infants)
MSF	Nutrition Guidelines (1st edition) 1995	yes	"should be promoted and continued during the whole of treatment"	BMS AFTER each session on the breast	Reconstituted enriched formula milk (recipe given)	small spoon or syringe	5-6 times per day	105 kcal/kg/day	no specific details	not specified	not specified	Enriched formula milk (recipe given)
MSF	Nutrition Guidelines 2006	yes	Every 3 hours Every 2 hours for <1.5kg more often if infant wants	~ BF for 10-20 mins ~ Give BMS one hour after BF	SDTM (therapeutic milk)	supplementary suckling	8 times per day	100-120 kcal/kg/day	start Transition on day 10 (max.d.15). When BM output increases, weight increasing, decrease SDTM by 50%. If still gaining weight by 5g/kg/day, stop SDTM	phase 1 10-15 days then according to progress	Once gaining weight for 5 days without SS	SDTM (therapeutic milk)

4.4 Guideline Comparisons

Table 9 cont'd

Country or Organization	Guideline	Division into breast-fed and non-BF	Breast feeding	Breastfeeding (details)	Supplemental milks (BF infant)	Supplemental milk route (BF infant)	Supplemental milk feed frequency (BF infant)	Supplemental feed amount (BF infant)	rehab phase (BF infant)	duration of phases (BF infant)	Discharge (BF infant)	No maternal breastfeeding available
International guidelines												
MSF	Protocol Infants less than 6 months old (Benson) MSF - OCB 2007	yes	Every 3 hours more often if infant wants	~ BF for 10-20 mins ~ Give BMS 30-60mins after BF	F100dil (F75 if oedema)	supplementary suckling	8 times per day	100-120 kcal/kg/day	decrease to 50% of maintenance once baby gaining 20g/day stop completely once gaining >10g/day	according to progress	few more days without SS - can also go once child BF greedily if mother wishes	F100 dilute OR F75 for marasmus f75 for kwashiorkor
Valid	Handbook for Emergencies (third edition) 2007	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
UNHCR	Manual for the health care of children in humanitarian emergencies 2008	recognised but not described in detail	yes	"treatment should include support for BF	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s
UNHCR	The management of Nutrition in Major Emergencies 2000	non BF infants not recognised	discussed in annex	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
IFE Core Group	Infant Feeding in Emergencies IFE Module 2, version 1.1 2007	yes	yes	Extensive discussion of BF issues. Breast feeding or expressed breastmilk given as treatment option. Supplementary feeds may be indicated.	F75 or F100 dilute or Infant formula	supplementary suckling	at least 8x/day	volume per kg varies according to weight (tables given)	if infant gaining weight for 2-3 days, at least 20g/day then reduce SS by 1/3 and feed for further 2-3 days. Continue to reduce volumes if infant gaining weight.	if gaining weight, each reduction of BMS volume by 1/3 occurs every 2-3 days	Once gaining weight for 5 days on BF alone	F75 (preferred option) F100dil or formula also OK
ICRC	Nutrition Manual for Humanitarian Action 2008	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
National guidelines												
Burundi	Protocole National de Nutrition 2002	yes	Every 3 hours	~ BF for 20 mins ~ Give BMS one hour after BF	F100 dilute	supplemental suckling (described)	8 times per day	130ml/kg/day (=100kcal/kg/day)	decrease to 50% of maintenance once baby gaining 20g/day	not specified	Once gaining weight for 5 days without SS	F100 dilute OR F75 for marasmus f75 for kwashiorkor
Ethiopia	Protocol for the Management of Severe Acute Malnutrition 2007	yes	Every 3 hours	~ BF for at least 20 mins ~ BF more often if infant wants ~ Give BMS 30 to 60min after BF	F100 dilute or commercial formula (F75 for infants with oedema)	supplemental suckling (described)	8 times per day	130ml/kg/day (=100kcal/kg/day)	decrease to 50% of maintenance once baby gaining 20g/day, stop completely once gaining >10g/day	"as short as possible"	Once gaining weight on BM alone	F100 dilute (F75 for infants with oedema)

4.4 Guideline Comparisons

Table 9 cont'd

Country or Organization	Guideline	Division into 'breast-fed' and 'non-BF'	Breast feeding	Breastfeeding (details)	Supplemental milks (BF infant)	Supplemental milk route (BF infant)	Supplemental milk feed frequency (BF infant)	Supplemental feed amount (BF infant)	rehab phase (BF infant)	duration of phases (BF infant)	Discharge (BF infant)	No maternal breastfeeding available
International guidelines												
Madagascar	Depistage et prise en charge de la malnutrition aigue 2007	Recognised but not detailed	Every 3 hours	~ BF for 20 mins ~ Give BMS one hour after BF	F100 dilute	supplementary suckling (described)	8 times per day	130ml/kg/day (=100kcal/kg/day)	decrease to 50% of maintenance once baby gaining 20g/day stop completely once gaining >10g/day	not specified	Once gaining weight for 5 days without SS	Relaxation of other female carer (e.g aunt recommended)
Malawi	Guidelines for the Management of Severe Acute Malnutrition (book T3) 2007	yes	Every 3 hours	~ BF for 20 mins ~ BF more often if infant wants ~ Give BMS one hour after BF	F100 dilute	supplementary suckling (described)	9 times per day	130ml/kg/day (=100kcal/kg/day)	decrease F100 dilute by 1/3 the maintenance once baby gaining 20g/day, decrease by a further 1/3 if still gaining weight after 2-3 days, stop F100 dilute if still gaining weight	~ "as short as possible" ~ 2-3 days for each reduction of 1/3 F100 dilute maintenance	Once gaining weight for 5 days without SS	F75
Mozambique	Manual de Orientacao para Tratamento da Desnutricao Aguda Grave 2008	yes	Every 3 hours	~ BF for 20 mins ~ BF more often if infant wants ~ Give supplemental feed one hour after BF	F100 dilute (F75 for infants with oedema)	supplementary suckling (described)	8 times per day	130ml/kg/day (=100kcal/kg/day)	decrease to 50% of maintenance once baby gaining 20g/day stop completely once gaining >10g/day	not specified	Once gaining weight for 5 days without SS	F100 dilute (F75 for infants with oedema)
Tanzania	Management of Acute Malnutrition NATIONAL Guidelines 2008	no Relaxation of other female carer (e.g aunt recommended)	"assist to breastfeed or express breastmilk"		Give prescribed amount of F-75 in addition to breastmilk	not specified	8 times per day	as per F75 protocol	Encourage mothers to BF. Give additional diluted F-100. As BM production increases, gradually reduce amount diluted F100	not specified	as for older children, >85%WHM or >1WHZ or MUAC >125mm	not separately detailed
Uganda	Integrated Management of Acute Malnutrition 2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Zambia	Integrated Management of Acute Malnutrition 2009	not specified	not specified	not specified	Infant formula OR F100 dilute (F75 dilute for infants with oedema)	not specified	8 times per day	not specified	not specified	not specified	not specified	not specified
Zimbabwe	Guidelines for the Management of Severe Acute Malnutrition through CTC 2008	not specified	not specified	not specified	not specified	not specified	not specified	not specified	not specified	not specified	not specified	not specified

4.4 Guideline Comparisons

Table 9 cont'd

Country or Organization	Guideline	Division into 'breast-fed' and 'non-BF'	Breast feeding	Breastfeeding (details)	Supplemental milks (BF infant)	Supplemental milk route (BF infant)	Supplemental milk feed frequency (BF infant)	Supplemental feed amount (BF infant)	rehab phase (BF infant)	duration of phases (BF infant)	Discharge (BF infant)	No maternal breastfeeding available
International guidelines												
DRC	Protocol National de Prise en Charge de la Malnutrition Aigue 2008	yes	Every 3 hours	~ BF for 20 mins ~ BF more often if infant wants ~ Give supplemental feed one hour after BF	F100 dilute (F75 for infants with oedema)	supplementary suckling (described)	8 times per day	130ml/kg/day (=100kcal/kg/day)	decrease to 50% of maintenance once baby gaining 20g/day, stop completely once gaining >10g/day	not specified	Once gaining weight on EBF alone	F100 dilute (F75 for infants with oedema)
Sudan (Southern)	Guidelines for the Management of Severe Acute Malnutrition 2008	yes	Every 3 hours	~ BF for 20 mins ~ BF more often if infant wants ~ Give supplemental feed one hour after BF	F100 dilute	supplementary suckling (described)	8 times per day	130ml/kg/day (=100kcal/kg/day)	decrease to 50% of maintenance once baby gaining 20g/day, stop completely once gaining >10g/day	not specified	Once gaining weight on EBF alone	F100 dilute (F75 for infants with oedema)
Sudan (North)	National Integrated Manual on the Management of Severe Acute Malnutrition in health facilities and at community level 2008	yes	Every 3 hours	~ BF for 20 mins ~ BF more often if infant wants ~ Give supplemental feed 30-60 mins after BF	F100 dilute (F75 for infants with oedema)	supplementary suckling (described)	8 times per day	130ml/kg/day (=100kcal/kg/day)	decrease to 50% of maintenance once baby gaining 20g/day, stop completely once gaining >10g/day	as short as possible	Once gaining weight on EBF alone	F100 dilute (F75 for infants with oedema)
Botswana	Guidelines for the Management of Severe Acute Malnutrition in Children 2007	yes	as often as possible / frequently	"Educate and demonstrate proper BF technique"	F100 dilute	supplementary suckling	8 times per day	140ml/kg/day	70 ml/kg/day	10-15 days initial phase 2 days rehab phase Minimum 4 days final phase	When gaining weight (5 to 10g/kg/day) on EBF alone for 5 consecutive days after SS stopped NB some discrepancy in different sections of guideline as to lengths of stay recommended	F100 dilute (F75 for infants with oedema)
Burkina Faso	None yet - in draft	no	Every 3 hours	~ BF for 20 mins ~ Give supplemental feed one hour after BF	diluted F100	supplementary suckling (described)	8 times per day	130ml/kg/day (=100kcal/kg/day)	decrease to 50% of maintenance once baby gaining 20g/day	Not specified	Once gaining weight for 5 days without SS	not specified
Cote D'Ivoire	Protocole National de Prise en Charge de la Malnutrition Aigue 2005	yes	Every 3 hours	~ BF for 20 mins ~ BF more often if infant wants ~ Give BMS 30-60mins after BF	F100 dilute	supplementary suckling (described)	8 times per day	130ml/kg/day (=100kcal/kg/day)	decrease to 50% of maintenance once baby gaining 20g/day	"as short as possible"	Once gaining weight on EBF alone	F100 dilute (F75 for infants with oedema)

4.4 Guideline Comparisons

Table 9 cont'd

Country or Organization	Guideline	Division into 'breast-fed' and 'non-BF'	Breast feeding	Breastfeeding (details)	Supplemental milks (BF infant)	Supplemental milk route (BF infant)	Supplemental milk feed frequency (BF infant)	Supplemental feed amount (BF infant)	rehab phase (BF infant)	duration of phases (BF infant)	Discharge (BF infant)	No maternal breastfeeding available
National guidelines												
Guinea	Protocole National de Prise en Charge de la Malnutrition Aigue 2005	yes	Every 3 hours	~ BF for 20 mins ~ BF more often if infant wants ~ Give BMS 30-60mins after BF	F100 dilute	supplemental suckling (described)	8 times per day	130ml/kg/day (=100kcal/kg/day)	decrease to 50% of maintenance once baby gaining 20g/day	"as short as possible"	Once gaining weight on EBF alone	F100 dilute (F75 for infants with oedema)
Mali	Protocole National de la prise en charge de la malnutrition aigue 2007	yes	Every 3 hours	~ BF for 20 mins ~ Give BMS 60mins after BF	F100 dilute	supplemental suckling (described)	8 times per day	130ml/kg/day (=100kcal/kg/day)	decrease to 50% of maintenance once baby gaining 20g/day, stop completely once gaining > 10g/day	not specified	Once gaining weight for 5 days without SS	F100 dilute
Niger	Protocol National de Prise en Charge de la Malnutrition Aigue 2006	yes ~ non-BF protocol describes finding wet-nurse if possible	Every 3 hours	~ BF for 20 mins ~ BF more often if infant wants ~ Give supplemental feed 60mins after BF	F100 dilute	supplemental suckling (described)	8 times per day	130ml/kg/day (=100kcal/kg/day)	decrease to 50% of maintenance once baby gaining 20g/day, stop completely once gaining > 10g/day	not specified	Once gaining weight for a few days without SS	F100 dilute (F75 for infants with oedema)
Senegal	Protocole de prise en charge de la malnutrition aigue 2008	no	Every 3 hours	~ BF for 20 mins ~ Give supplemental feed 60mins after BF	F100 dilute	supplemental suckling (described)	8 times per day	130ml/kg/day (=100kcal/kg/day)	decrease to 50% of maintenance once baby gaining 20g/day, stop completely once gaining > 10g/day	as short as possible to minimise risk of nosocomial infection	Once gaining weight for 5 days without SS	not detailed
Afghanistan	Community-based Management of Acute Malnutrition programme in Aqcha and Mardyan District of Jawzjan Province Northern Afghanistan (Stabilization Centre Guidelines) 2008	no	Every 3 hours	~ for at least 20mins ~ more often if child wants	F100 dilute (F75 for infants with oedema)	Supplementary suckling	8 x per day (0.5 to 1 hr after BF)	130ml/kg/day (100kcal/kg/day) (amount NOT increased as infant gains weight)	decrease to 50% of maintenance once baby gaining 20g/day	if weight gain maintained, then stop SS	When gaining weight on EBF alone (no matter what weight or WFL)	F100 dilute (F75 for infants with oedema)
India	Indian Academy of Paediatrics guidelines on hospital based management of Severely Malnourished Children 2006	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Pakistan	Protocol for the inpatient treatment of severely malnourished children in the Pakistan earthquake emergency 2005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sri Lanka	Management of Severe Acute Undernutrition: Manual for Health Workers in Sri Lanka 2007	no	noted that "BF should be continued for all infants & young children"	no other details	not specified. By implication, infant U6 will be treated with F75	n/a	n/a	n/a	n/a	n/a	n/a	n/a

4.4 Guideline Comparisons

4.4.5 Maternal care, preparation for discharge & follow-up

See Table 10 for overview.

Maternal diet

Many guidelines recommend that lactating mothers receive increased food rations to give a total intake of 2500kcal/day, and increased fluid intake to >2 litres/day. Vitamin A for the mother is recommended by many guidelines as a single large dose if the infant is <2 months old. Mothers of older infants may be pregnant so either it is withheld or a course of low dose Vitamin A is given. A small number of guidelines mention that general maternal micronutrient stores should be replenished through a high quality diet during breastfeeding.

Psychosocial care

Play therapy and psychosocial support of the malnourished child is one of WHO's essential ten treatment steps. It is still recognized in many guidelines, often in dedicated sections, but none focus specifically on infants <6m.

The impact of severe infant malnutrition on feeding-associated interactions and feeding cues between a mother and her infant <6m, e.g. reduced demands for breastfeeding, and how to manage these are not generally addressed. IFE Module 2 does include content on this in the section concerned with breastfeeding support in malnourished infants but not specifically in the SAM chapter.

Specific psychosocial care for the mother/caregiver of either infants <6m or children, including assessment and treatment, is not included in the guidelines apart from general statements about 'being supportive', explaining treatments and avoiding blame for the infant's malnutrition. The exception is IFE Module 2 that gives a more practical description of assessment and care for mothers. Given the relevance of psychosocial aspects of care to MAMI, Chapter 8 of this report undertakes a detailed review.

Follow-up care and supplementary feeding

Follow-up on discharge from a TFP (inpatient or community-based) is almost universally recommended. SFP referral (if available) on discharge is almost universal and, by implication, this includes infants <6m where the mother benefits from supplementary food rations.

Promoting optimal infant and young child feeding

Taking advantage of a captive 'in-programme' audience to work towards prevention of future malnutrition has obvious potential. Many guidelines highlight 'health and nutrition education' as part of the discharge package, but few are specific on what topics should be covered. Very few guidelines take advantage of the large body of IYCF literature available.

Feeding programmes for pregnant & lactating mothers

SFP target groups frequently include pregnant women (in last trimester of pregnancy) and lactating women who are malnourished. However it is often not clear in guidelines whether the mothers of malnourished infants <6m should be admitted to SFPs, independent of the nutritional status of the mother.

4.4 Guideline Comparisons

Table 10: Maternal care, preparation for discharge and follow-up										
Country or Organization	Guideline	Maternal diet	Maternal (caregiver) psychosocial issues	Other	Preparation for discharge (general)	HIV noted	Follow –up visits	Extra home food ration?	Details of any IYCF guidance	Feeds for pregnant & lactating women
International Guidelines										
WHO	Management of severe malnutrition: a manual for physicians & other senior health workers 1999	not specified	not specified	not specified	Ensure child fully immunized Ensure mother or carer: ~ able to feed child appropriately ~ able to make appropriate toys & play with child ~ knows how to give home treatment & recognise signs to seek medical assistance	Yes: ~ 'should not be done routinely'; ~ 'HIV status has no role in management'; ~ 'result should be confidential, not revealed to staff	Yes 1 week, 2 weeks, 1 month, 3 months & 6 months after discharge	not noted	none	not described
WHO	Guidelines for the inpatient treatment of severely malnourished children, 2003	not specified	not specified		Show parent/carer to: ~ feed frequently with energy and nutrient dense foods ~ give structured play therapy	Yes: "recovery may take longer & treatment failure is more common" ~ 'treatment same as for HIV neg. child'	Yes "regular follow-up checks" advised	not noted	None	not described
WHO	Manual for the health care of children in humanitarian emergencies 2008	not specified	mental health and psychosocial support discussed in separate chapter		not specified	other chapter or manual is devoted to HIV	not specified	not specified	Noted, but reader referred elsewhere for details	not described
WHO	Pocket book of Hospital care for children 2005	not specified	importance of psychological factors noted		Show parent/carer to: ~ feed frequently with energy and nutrient dense foods ~ give structured play therapy	Yes Separate chapter of book details HIV issues	yes 1 week, 2 weeks, 1 month, then monthly for 6 months	not noted	breastfeeding and young child feeding described ~ WHO IYCF document not referenced	not described
WHO	Handbook IMCI Integrated Management of Childhood Illness 2005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	detailed section on infant feeding	not described
ACF	Assessment & Treatment of Malnutrition in Emergency Situations 2002	~ Drink ≥ 2l water per day ~ Eat ~ 2600kcal/day ~ Supplement with vitamins & minerals (ensure type 1 nutrient stores adequate)	To support BF: 1) Listen to any problems 2) Assess BF 3) Help during BF		If gaining wt 15days: --> halve milk --> stop BMS aftr 3 days ---> keep for 5 more days to ensure progress maintained	Yes notes that: ~ field treatments are generally inadequate ~ re-feeding treatment is same	yes, to ~ weigh infant, ~ provide supplementary food to mother	weekly (1500kcal/day) 1st month; fortnight (700kcal/day) 2nd month; monthly (350kcal/day) 3-6 months	ch 2.2: Breast milk, The practice of BF; BMS; Assessing feeding practices	Referral to SFP (but evidence of effectiveness discussed)

4.4 Guideline Comparisons

Table 10 cont'd

Country or Organization	Guideline	Maternal diet	Maternal (caregiver) psycho-social issues	Other	Preparation for discharge (general)	HIV noted	Follow – up visits	Extra home food ration?	Details of any IYCF guidance	Feeds for pregnant & lactating women
International Guidelines										
MSF	Nutrition Guidelines (1st edition) 1995	~ mentions need for extra 0.5 to 1 litre fluids/day ~ eligible for SFP if one is available	States "stress is important factor reducing the quantity of breast milk;		Protocol notes: ~ need for psychosocial stimulation	yes ~ noted that this does not alter the treatment strategy	not specified	infants are eligible for SFP after TFP care	None	SFP (in particular cases of food insecurity)
MSF	Nutrition Guidelines 2006	~ Drink ≥ 2l water per day ~ Eat 2500kcal/day	notes psychological support and encouragement to mothers; also the need for privacy and rest		~ stimulate emotional and physical development ~ prepare patient for normal feeding practices	1) Section on HIV/AIDS, focuses on nutrition; 2) Described in infant feeding & HIV section			part of infant chapter describes support for BF + alternatives to BF	SFP or TFP or supportive feeding (according to situation)
MSF	Protocol Infants less than 6 months old (Benson) MSF - OCBA 2007	~ Drink ≥ 2l water per day; ~ Eat 2500kcal per day ~ Supplement with vitamins + minerals (ensure type 1 nutrient stores adequate) ~ Vit A: 200,000 IU (single dose) if infant < 2months; else 25,000 (weekly)	~ need to engage mother with treatment programme described ~ need to reassure & support described	Need to nurse infants in quiet, separate room noted	not specified in this chapter	not discussed in this chapter	not specified in this chapter	not specified in this chapter	not specified in this chapter	not described
Valid International	Community-based Therapeutic Care (CTC), A field manual (first edition) 2006	notes need for nutritional care of mothers (details not specified)	notes need for psychological care of mothers (details not specified)		n/a	yes section in "future developments" chapter discusses HIV	not specified	SFP if available	IYCF noted, but reader referred elsewhere for details	SFP if: ~ MUAC < 210mm & pregnant (3rd trimester) ~ MUAC < 210mm & infant < 6m
UNHCR	Handbook for Emergencies (third edition) 2007	n/s	n/s		n/s	yes details about HIV and nutrition described	n/s	SFP for all discharged SAM patients	Has detailed outlining IYCF issues, including use of milk products	targeted SFP if MUAC < 22cm; blanket SFP otherwise
UNHCR	The management of Nutrition in Major Emergencies 2000	Additional supplementary ration (<i>not specified</i>) suggested	Notes that mothers/carers may need help and encouragement	Notes: "When a mother is severely malnourished or suffering from severe infection or overwork, she may produce inadequate breastmilk, leading to malnutrition of infant. Breastmilk production may also be affected by psychosocial factors"	n/a	yes ~ discussed in detail in annex, including issues of BF & HIV	n/a	SFP if available	Guiding Principles for feeding infants and young children during emergencies referenced	SFP details depend on the situation
IFE Core Group	Infant Feeding in Emergencies IFE Module 2, version 1.1 2007	~ Drink extra 1l water per day ~ Eat ~ 2500kcal/day	Separate chapter is on "mother traumatised, in emotional crisis or rejecting infant"	several chapters focus on care for mother	When BF well (if BF) Mother trained to give BMS correctly (non-BF infants)	noted in other chapters, but not in section on malnourished infant	at least weekly for a minimum of 3 month	SFP if available	Many chapters of manual focus on good IYCF practices	reference to other guidelines given

4.4 Guideline Comparisons

Table 10 cont'd

Country or Organization	Guideline	Maternal diet	Maternal (caregiver) psycho-social issues	Other	Preparation for discharge (general)	HIV noted	Follow –up visits	Extra home food ration?	Details of any IYCF guidance	Feeds for pregnant & lactating women
International Guidelines										
ICRC	Nutrition Manual for Humanitarian Action 2008		Section on psychological support focuses on child rather than carer		~ immunizations up to date	yes			Chapter is devoted to feeding infants and small children	according to nutritional state
National Guidelines										
Burundi	Protocole National de Nutrition 2002	~ Drink ≥ 2l water per day ~ Eat ~ 2500kcal/day ~ Supplement with vitamins & minerals (ensure type 1 nutrient stores adequate) ~ Vit A: 200,000 IU (single dose) if infant <2months; 25,000 (weekly if >2months)	~ need to engage mother with treatment programme described ~ need to reassure & support mother described	importance of good ward environment described	~ has had health education ~ immunizations up to date	no	at least 3 months follow-up at health centre level		Has messages on: EBF; continued BF until 2 years age; appropriate complementary foods; key childcare practices	SF for: pregnant woman in 3rd trimester if MUAC <210mm; also women with infant <6m if MUAC <210mm
Ethiopia	Protocol for the Management of Severe Acute Malnutrition 2007	~ Drink ≥ 2l water per day ~ Eat ~ 2500kcal/day ~ Supplement with vitamins & minerals (ensure type 1 nutrient stores adequate) ~ Vit A: 200,000 IU (single dose) if infant <2months	~ Explain aim of treatment/what is expected; reassure SS works; be attentive to mother & introduce her to other mothers		no specific details	yes. Details include: 1) Need for testing; 2) TB co-infection 3) ARV & start of ARV	~ monthly follow-up until aged 6 months	Mother in SFP ~ monthly until 6 months age	Annex 12 gives 9 key BF messages; Annex 13 gives 7 key messages on nutrition & growth	not described
Madagascar	Depistage et prise en charge de la malnutrition aigue 2007	not specified	not specified		~ Health & nutrition education	no	specific infant follow-up not noted	Referral to SFP recommended for all discharged SAM patients	briefly noted in a list of health and nutrition education topics	SFP for: ~ pregnant (3rd trimester) & lactating women with MUAC <210mm
Malawi	Guidelines for the Management of Severe Acute Malnutrition (book T3) 2007	~ Drink at least 2l water per day ~ Eat ~ 2500kcal/day ~ If infant <2 months, mother should have Vit A 200,000IU	need to reassure mother noted	If EBF not possible, alternatives listed include: - modified cow or goat milk - infant formula	~ need for loving care, play and stimulation noted ~ If EBF not possible, alternatives listed include: modified cow or goat milk, infant formula	noted in list of causes of failure to respond to treatment	referral for growth monitoring noted	Referral to SFP recommended for all discharged SAM patients	none	SFP for: ~ pregnant & lactating women, up to 6 months after birth, with MUAC <210mm
Mozambique	Manual de Orientacao para Tratamento da Desnutricao Aguda Grave 2008	~ Drink at least 2l water per day ~ Eat ~ 2500kcal/day ~ If infant <2 months, mother should have Vit A 200,000IU; if <2months, then 25,000IU/week ~ Need to replenish type I micronutrient stores noted	need to reassure mother and explain treatments noted		~ Has detailed chapter on psycho-social stimulation & care	yes Whole chapter devoted to HIV issues	for 3 months after discharge	Referral to SFP recommended for all discharged SAM patients	has detailed section in annexes outlining IYCF issues	SFP referral for: ~ pregnant & lactating women with MUAC <20mm

4.4 Guideline Comparisons

Table 10 cont'd

Country or Organization	Guideline	Maternal diet	Maternal (caregiver) psycho-social issues	Other	Preparation for discharge (general)	HIV noted	Follow –up visits	Extra home food ration?	Details of any IYCF guidance	Feeds for pregnant & lactating women
National Guidelines										
Tanzania	Management of Acute Malnutrition NATIONAL Guidelines 2008	not specified	not specified	not specified	Protocol describes: ~ Ensure immunizations done ~ Play therapy & sensory stimulation	mentioned in history; HIV screening is "necessary laboratory investigation"	every 2 months for 6 months (continue/complete any medications; continue BF if child BF)	not specified	None	not described
Uganda	Integrated Management of Acute Malnutrition 2006	not specified	not specified		Protocol focuses on RUTF-related messages for older children	yes, Whole chapter devoted to HIV issues, with separate guidelines for HIV+ patients. (NB focused at >6month olds)	not specified	Referral to SFP recommended for all discharged SAM patients	Need to link with other national child health and nutrition programmes noted	SFP referral
Zambia	Integrated Management of Acute Malnutrition 2009	not specified	not specified		Protocol notes:~ basic health education messages	yes	not specified	Referral to SFP recommended for all discharged SAM patients	None	SFP for: ~ All pregnant (3rd trimester) & lactating women (with infant <6m & children on PMTCT coming from food insecure households ~ MUAC <225mm
Zimbabwe	Guidelines for the Management of Severe Acute Malnutrition through CTC 2008	not specified	not specified		~ Health & nutrition education ~ Links with institutions, organizations & support groups (e.g. social welfare, home based care)	yes details given	n/s	not specified	None	SPF for P&L with MUAC <185mm; OTP for MUAC <185mm
DRC	Protocol National de Prise en Charge de la Malnutrition Aigue 2008	~ Eat ~ 2500kcal/day ~ Vit A: 200,000 IU (single dose) if infant <2months	need to reassure and support mother stated		Protocol describes: ~ Health and nutrition education ~ Play therapy & psychosocial support	no	Specific infant follow-up not detailed	Referral to SFP recommended for all discharged SAM patients.	briefly noted in a list of health and nutrition education topics, also notes that feeding bottles and artificial teats should be banned	SFP for: ~ mothers of infants with MAM ~ lactating women with MUAC <210mm
Sudan (Southern)	Guidelines for the Management of Severe Acute Malnutrition 2008	~ Drink ≥ 2l water per day ~ Eat ~ 2500kcal/day ~ Supplement with micronutrients ~ Vit A 200,000IU if infant <2 months	paragraph on supportive care for mothers mentions mental and emotional support for trauma / depression		Protocol describes: ~ Health and nutrition education ~ Play therapy & psychosocial support ~ Immunizations up-to-date	yes details given	yes "At regular intervals following discharge	Referral to SFP recommended for all discharged SAM patients.	IYCF noted, but reader referred elsewhere for details	not described

4.4 Guideline Comparisons

Table 10 cont'd

Country or Organization	Guideline	Maternal diet	Maternal (caregiver) psycho-social issues	Other	Preparation for discharge (general)	HIV noted	Follow-up visits	Extra home food ration?	Details of any IYCF guidance	Feeds for pregnant & lactating women
National Guidelines										
Sudan (North)	National Integrated Manual on the Management of Severe Acute Malnutrition in health facilities and at community level 2008	~ Drink ≥ 2l water per day ~ Eat ~ 2500kcal/day ~ Supplement with micronutrients ~ Vit A 200,000IU if infant <2 months, 25000IU weekly otherwise	need to reassure and support mother stated		~ ensure child is fully re-integrated in family & community ~ fully immunized ~ health and nutrition education	noted in list of multiple causes of treatment failure	~ after 1 week, 2 weeks, 1 month, 3 months and 6 months	Referral to SFP recommended for all discharged SAM patients. (SFP for mother in case of infant <6m)	None	not described
Botswana	Guidelines for the Management of Severe Acute Malnutrition in Children 2007	~ Drink ≥ 2l water per day ~ Eat ~ 2500kcal/day ~ Supplement with vitamins & minerals (ensure type 1 nutrient stores adequate)	need to reassure and support mother (e.g. be attentive) emphasised Mother should receive medical treatment if needed		~ counselling and health education completed ~ immunization up-to-date ~ arrangements made for follow-up	noted in list of 6 causes of poor weight gain	~ weekly for 1 month ~ fortnightly next month ~ monthly for next 2 months ~ as needed thereafter	no noted	Says "feed frequently with energy and nutrient dense foods" Feeding bottles and artificial teats should be banned	not described
Burkina Faso	None yet - in draft	~ Drink ≥ 2l water per day ~ Eat ~ 2500kcal/day ~ Supplement with vitamins & minerals (ensure type 1 nutrient stores adequate) ~ Vit A 200,000IU; Iron&folate (60mg+400mcg) for 3 months after admission	~ need to engage mother with treatment programme described ~ need to reassure & support mother described ~ importance of good environment described ~ need to engage mother with treatment programme described ~ need to reassure & support mother described ~ importance of good environment described		Protocol mentions: ~ Childcare practices ~ Parenting capacity ~ Play therapy	no	follow up noted but not detailed	Referral to SFP recommended for all discharged SAM patients.	None	SFP if MUAC <210mm or if her infant <6m has MAM
Cote D'Ivoire	Protocole National de Prise en charge de la malnutrition severe 2005	~ Drink at least 2l water per day ~ Eat ~ 2500kcal/day ~ Mother should be adequately supplemented with vitamins & minerals (type 1 nutrient stores adequate) - Vit A 200,000IU	2 pages of protocol devoted to psychosocial care & support		~ counselling and health education completed (good childcare practices are described in detail) ~ immunization up-to-date ~ arrangements made for follow-up	yes	follow up for at least 3 months post-discharge	~ Mother should have supplementary feeds to maintain quantity and quality of milk supply	None	not described
Guinea	Protocole National de Prise en Charge de la Malnutrition Aigue 2005	~ Eat ~ 2500kcal/day ~ Vit A: 200,000 IU (single dose) if infant <2months	need to reassure and support mother stated		Protocol describes: ~ Health and nutrition education ~ Play therapy & psychosocial support	no	Specific infant follow-up not detailed	Referral to SFP recommended for all discharged SAM patients.	briefly noted in a list of health and nutrition education topics; also notes that feeding bottles and artificial teats should be banned	SFP for: ~ mothers of infants with MAM ~ lactating women with MUAC <210mm

4.4 Guideline Comparisons

Table 10 cont'd

Country or Organization	Guideline	Maternal diet	Maternal (caregiver) psycho-social issues	Other	Preparation for discharge (general)	HIV noted	Follow –up visits	Extra home food ration?	Details of any IYCF guidance	Feeds for pregnant & lactating women
National Guidelines										
Mali	Protocole National de la prise en charge de la malnutrition aigue 2007	~ Drink ≥ 2l water per day ~ Eat ~ 2500kcal/day ~ Supplement with vitamins & minerals ~ Vit A 200,000IU if infant <6 weeks	has paragraph on psychosocial environment		Protocol mentions: ~ play therapy ~ health and nutrition education	yes ~ A chapter is devoted to HIV & related issues	as for older children: for 3 months ~ weekly for 1 month ~ fortnightly thereafter	Referral to SFP recommended for all discharged SAM patients.	noted within list of health and education topics for community health workers to cover	SFP if MUAC <210mm
Niger	Protocol National de Prise en Charge de la Malnutrition Aigue 2006	~ Drink ≥ 2l water per day; ~ Eat ~ 2500kcal/day ~ Supplement with vitamins & minerals (ensure type 1 nutrient stores adequate) ~ Vit A 200,000IU if infant <2months old; Iron & folate (60mg+400mcg) for 3 months after admission	~ need to engage mother with treatment programme described ~ need to reassure & support mother described		Protocol mentions: ~ play therapy ~ health and nutrition education	yes ~ Details of HIV and related issues discussed	need for regular follow-up emphasised	Referral to SFP recommended for all discharged SAM patients.	None	SFP for pregnant and lactating women (with infant <6m) if MUAC <210mm
Senegal	Protocole de prise en charge de la malnutrition aigue 2008	~ Drink ≥ 2l water per day ~ Eat ~ 2500kcal/day	~ need to engage mother with treatment programme described		Protocol mentions: ~ play therapy ~ nutritional advice to mother ~ ensure mother can recognise 'danger signs' of clinical deterioration	yes	not specified	referral to SFP (if available) recommended for all discharged SAM patients	None	SFP for pregnant and lactating women (with infant <6m) if MUAC <210mm
Afghanistan	Community-based Management of Acute Malnutrition programme in Aqcha and Mardyan District of Jawzjan Province Northern Afghanistan (Stabilization Centre Guidelines) 2008	Mother should be adequately supplemented with vitamins & minerals (type 1 nutrient stores adequate)	not specified		not specified	no	monthly until aged 6 months		None	not described
India	Indian Academy of Paediatrics guidelines on hospital based management of Severely Malnourished Children 2006	not specified	not specified		Protocol describes: ~ Health and nutrition education ~ Play therapy & psychosocial support	no	Specific infant follow-up not detailed	not specified	briefly noted in a list of health and nutrition education topics, also notes that feeding bottles and artificial teats should be banned	not described
Pakistan	Protocol for the inpatient treatment of severely malnourished children in the Pakistan earthquake emergency 2005	not specified	not specified		Protocol mentions: ~ completing immunizations ~ sensitizing carers to home care ~ play therapy	yes: ~ noted that "recovery may take longer and treatment failure is more common ~ treatment should be same as for HIV	yes ~ weekly for 1 month ~ fortnightly for 2 months ~ monthly for 3 months	not specified	None	not described
Sri Lanka	Management of Severe Acute Undernutrition: Manual for Health Workers in Sri Lanka 2007	not specified	not specified		annex has section on play therapy	no	referral for follow-up noted	guide to family foods for children aged 1 to 5 years given in annex	None	not described

4.5 An 'AGREE' appraisal of current guidelines

Using the 'AGREE' appraisal framework (boxed), these are the common issues identified in this review:

a) Scope and purpose of guidelines in addressing infant <6m malnutrition

1. The overall objective(s) of the guideline should be specifically described.
2. The clinical question(s) covered by the guideline should be specifically described.
3. The patients to whom the guideline is meant to apply should be specifically described.

Guideline objectives to address child malnutrition are generally well stated. Titles alone are often enough to determine whether all types of acute malnutrition or only SAM is the focus.

Guidelines are generally much poorer at explicitly stating the needs of infants <6m. Infant <6m MAM is almost universally neglected (except by Burkina Faso guideline and IFE Module 2). In some guidelines infants <6m are only indirectly addressed, including in the WHO 1999 and 2003 guidelines. Some guidelines usefully state the objective of infant treatment (e.g. "to restore exclusive breastfeeding"). As infant <6m management is different from that of older infants and children it seems sensible that future guidelines deal with it specifically.

b) Stakeholder involvement

4. The guideline development group should include individuals from all the relevant professional groups.

It is not possible to say which professional groups had inputs into guideline writing without detailed probing with guideline sources. Many current guidelines have minimal detail of how to clinically assess infants <6m and focus heavily on supplemental feeds as the core treatment option. This possibly reflects predominantly nutrition-focused writing groups. Other professionals that may be relevant in the writing of future guidelines on infants <6m include dietitians, paediatricians, obstetricians, nurses, midwives, speech & language therapists, HIV specialists, lactation specialists, psychologists and community health workers.

5. The patients' views and preferences should be sought.

IYCF is a family affair and a severely malnourished infant <6m needs involvement of not just the mother or primary caregiver, but the father, family and community to support treatment. It is clearly difficult for international guidelines to include users, however, this should certainly be a feature of national guidelines. Some CMAM guidelines note the importance of 'community engagement' as an essential element of SAM/MAM management. This should be encouraged and made universal. Even basic understanding of local context factors influencing malnutrition may make big differences to acceptance and acceptability of treatments.

6. The target users of the guideline should be clearly defined.

Target users are often not clear in guidelines reviewed. Many guidelines, for example, combine details of clinical management with details of programme management, which can confuse content. Future authors should consider and ideally research the pros and cons of a 'comprehensive' vs. 'targeted' approach. For example, small, clinically focused 'case management' pocket size handbooks are often liked by front line clinical staff. Managers, meanwhile, might appreciate a large file with step-by-step instructions about troubleshooting programme databases.

4.5 An 'AGREE' appraisal of current guidelines

7. The guideline should be piloted among end users.

There is a clear 'evolution' of guidelines, which suggests a process of testing and refining. However, results of piloting and testing are not clearly stated in any of the guidelines reviewed. This would be helpful for users and could be housed in a, probably web-based, repository of guidelines and evaluations for others to learn from.

c) Rigour of Development

8. Systematic methods should be used to search for evidence.
9. The criteria for selecting the evidence should be clearly described.
10. The methods used for formulating the recommendations should be clearly described.
11. Health benefits, side effects and risks should be considered.
12. There should be an explicit link between recommendations & supporting evidence.
13. The guideline should be externally reviewed by experts prior to publication.

Guidelines reviewed are 'end-products'. Separate documents outlining the guideline development process and articulating the underlying evidence base behind individual recommendations were not available. A 2004 WHO consultation to 'Review the literature on Severe Malnutrition'¹³⁹ is probably reflective of most current approaches to malnutrition guideline development. Expert consultations and critical reviews are used to identify, interpret and translate available research into policy. Guidelines for the development of guidelines (e.g. GRADE¹⁴⁰ and SIGN¹⁴¹) could be used in future.

In considering "health benefits, side effects and risks", it is important to consider the implications of therapeutic treatment of infants <6m amongst the wider infant population. For example, are there risks that 'supplemental' feeding of malnourished breastfed infants <6m will carry mixed messages to the caregiver and community regarding causes of malnutrition and benefits of exclusive breastfeeding? And, if so, how should these risks be managed? None of the guidelines reviewed address these broader issues of 'spillover' and population impact. Locating strategies to treat SAM and MAM in infants <6m within a broader infant and young child feeding framework (see Chapter 2) can help to identify wider risks and inform risk management.

14. A procedure for updating the guideline should be provided.

No guideline noted its 'expiry date'. This probably reflects the short term and uncertain nature of funding in international nutrition. However, for optimal future impact, regular guideline updates are needed and processes for this should be clearly stated.

d) Clarity & presentation

15. The recommendations should be specific and unambiguous.
16. Different options for diagnosis and/or treatment of the condition should be presented.
17. Key recommendations should be easily identifiable.

There were considerable variations in how easy guidelines were to follow and how much detail they contained. Varying formats made guideline comparisons difficult, with some recommendations often hard to find. Management of infants <6m was sometimes explicitly stated, (e.g. antibiotic choice), other times not, e.g. diagnosis of fluid overload. This issue needs to be addressed in future guidelines by stating explicitly when and how infants <6m should be treated differently throughout and when treatment is the same.

4.6 Summary findings and recommendations

18. The guideline should be supported with tools for application.

A key strength of WHO 1999 and its wide acceptance and use is that it was accompanied by a training programme to aid implementation. Limited information was available as to whether reviewed guidelines were actively promoted to target audiences and if tools were given to aid rollout.

Chapter 8 of IFE Module 2 is actually a training resource that has become a guidance material, due to the gap in formal guidance. An evaluation of IFE Module 2 amongst users (2006) found that content on SAM <6m was typically used as reference material for programmes more than a training content¹⁴².

e) Applicability

19. Potential organisational barriers in applying recommendations should be discussed.

20. Potential cost implications of applying the recommendations should be considered.

These were not directly addressed in the majority of guidelines reviewed. This is most probably because all guidelines identified were primarily targeted at front-line field staff rather than policy-makers deciding on whether or not they wanted to implement the programme in the first place.

21. The guideline should presents key review criteria for monitoring and audit purposes

A few recent guidelines (e.g. Tanzania, Zambia, Zimbabwe) include a 'checklist' to help programme managers to ensure that all factors relevant to high quality care were being considered. There is some evidence that 'checklist' strategies can have a positive impact on patient outcomes¹⁴³, so this might be useful for other guidelines to replicate in future. Ideally research should be done to develop an evidence-based checklist for infant <6m malnutrition, as well as for child malnutrition.

f) Editorial Independence

22. The guideline should be editorially independent from the funding body.

23. Conflicts of interest of guideline development members should be recorded.

Organizations like WHO and UNICEF often play dual roles as both funders of guideline development and technical experts advising on guideline details. UNICEF also contributes funds and resources to inpatient programmes in some settings. Any risk of conflicts of interest can be minimized by having independent individuals on the guideline writing team. This is currently the case for many national guidelines, which have a variety of authors involved. It would be good practice for future guidelines to name all contributing individuals and organizations.

Future guidelines would be improved by aiming towards AGREE standards at the time of writing. This will require more person-time resources for writing / guideline development but may have positive impacts in terms of individual outcomes.

4.6 Summary findings and recommendations

Summary findings

A total of 37 guidelines (14 international and 23 national) were identified for review. Most share a common origin in the WHO 1999 guideline and describe the 'ten steps' approach to care.

Community-based management of Acute Malnutrition (CMAM) is rapidly being recognised as the 'norm' for the management of acute malnutrition for children aged 6 to 59m. The Valid International field manual (2006) is a key reference.

4.6 Summary findings and recommendations

MUAC is frequently used in the guidelines as an independent admission criterion, though in no guidelines is it recommended for use in infants <6m.

There is wide variation in how current guidelines address acute malnutrition in infants <6m and some only implicitly recognise the problem.

There is inconsistency in age, weight and length cut-offs used to identify infants <6m for admission and their subsequent treatment.

All guidelines recommend inpatient care for SAM in infants <6m and focus on nutritional treatments with the aim of restoring exclusive breastfeeding. Very few guidelines give details of the MAM in infants <6m.

Few guidelines include details of IYCF/breastfeeding support. MSF guidelines 2006, ACF Assessment and Treatment of Malnutrition, 2002 and IFE Module 2 are important exceptions.

Summary recommendations

Future guidelines and guideline updates should build on and expand MAMI guidance, both SAM and MAM, and should give more details on IYCF/ breastfeeding support.

The following three guidelines could be considered a good reference/ template for future MAMI guidelines: MSF guidelines 2006, ACF Assessment and Treatment of Malnutrition, 2002 and IFE Module 2

Strategies with potential to improve outcomes of infant <6m SAM include implementation of routine kangaroo care¹⁴⁴ for inpatient 'complicated' cases of SAM.

MAMI strategies should be located within a framework of safe and appropriate IYCF; synergies in programming between <6m and 6 to 24m age groups must be better reflected in the guidelines.

In the context of international rollout of CMAM programmes, it is noteworthy that MAMI is predominantly inpatient-focused. Options for outpatient based care in infants <6m should be considered in future guidelines.

Greater clarity is needed on anthropometric criteria, measurement cut-offs and age assessment for SAM & MAM infants <6m.

More resources should be devoted to future guideline development. Tools such as GRADE and AGREE should be used to better enhance the quality of future guidelines. An open access online 'guideline library' might facilitate development of future documents.

Endnotes

¹³⁰ <http://www.gradeworkinggroup.org/>

¹³¹ WHO (1999) Management of severe malnutrition: a manual for physicians and other senior health workers. World Health Organisation. Geneva: World Health Organisation.

¹³² Valid International (2006) Community-based Therapeutic Care (CTC). A Field Manual. Oxford: Valid International.

¹³³ WHO & UNICEF (2009) WHO child growth standards and the identification of severe acute malnutrition in infants and children. A joint statement by the World Health Organization and the United Nations Children's Fund. May 2009.

¹³⁴ Angood, C. (2006) Weighing scales for young infants: a survey of relief workers. Field Exchange. 2006(29):11-2.

¹³⁵ IFE Core Group (2007) Chapter 5. Section 5.3 Babies who are visibly thin or underweight. IFE Module 2. Oxford: Emergency Nutrition Network.

¹³⁶ IFE Core Group (2007) Chapter 5. IFE Module 2. Oxford: Emergency Nutrition Network.

¹³⁷ SS involves an initial attempt at normal BF. 30 to 60 minutes later the infant tries suckling again. But the breast this time has a small nasogastric tube taped near to the nipple. The idea is that the process of suckling helps stimulate progressively increasing breastmilk production. Acknowledging that this takes time - but that infantU6m nutritional needs are urgent - BMS provides maintenance nutrients at 100kcal/kg/day.

¹³⁸ WHO (2009) Acceptable medical reasons for use of breast-milk substitutes. WHO/NMH/NDH/09.01. Available via http://www.who.int/nutrition/publications/infantfeeding/WHO_NMH_NHD_09.01_eng.pdf

¹³⁹ WHO. (2004) Severe malnutrition: Report of a consultation to review current literature. Geneva, Switzerland, 06 - 07 September, 2004.

¹⁴⁰ Jaeschke, R., Guyatt, G.H., Dellinger, P., Schunemann, H., Levy, M.M., Kunz, R., et al. (2008) Use of GRADE grid to reach decisions on clinical practice guidelines when consensus is elusive. BMJ. 2008;337:a744.

¹⁴¹ SIGN. Scottish Intercollegiate Guidelines Network. Available from: <http://www.sign.ac.uk/>.

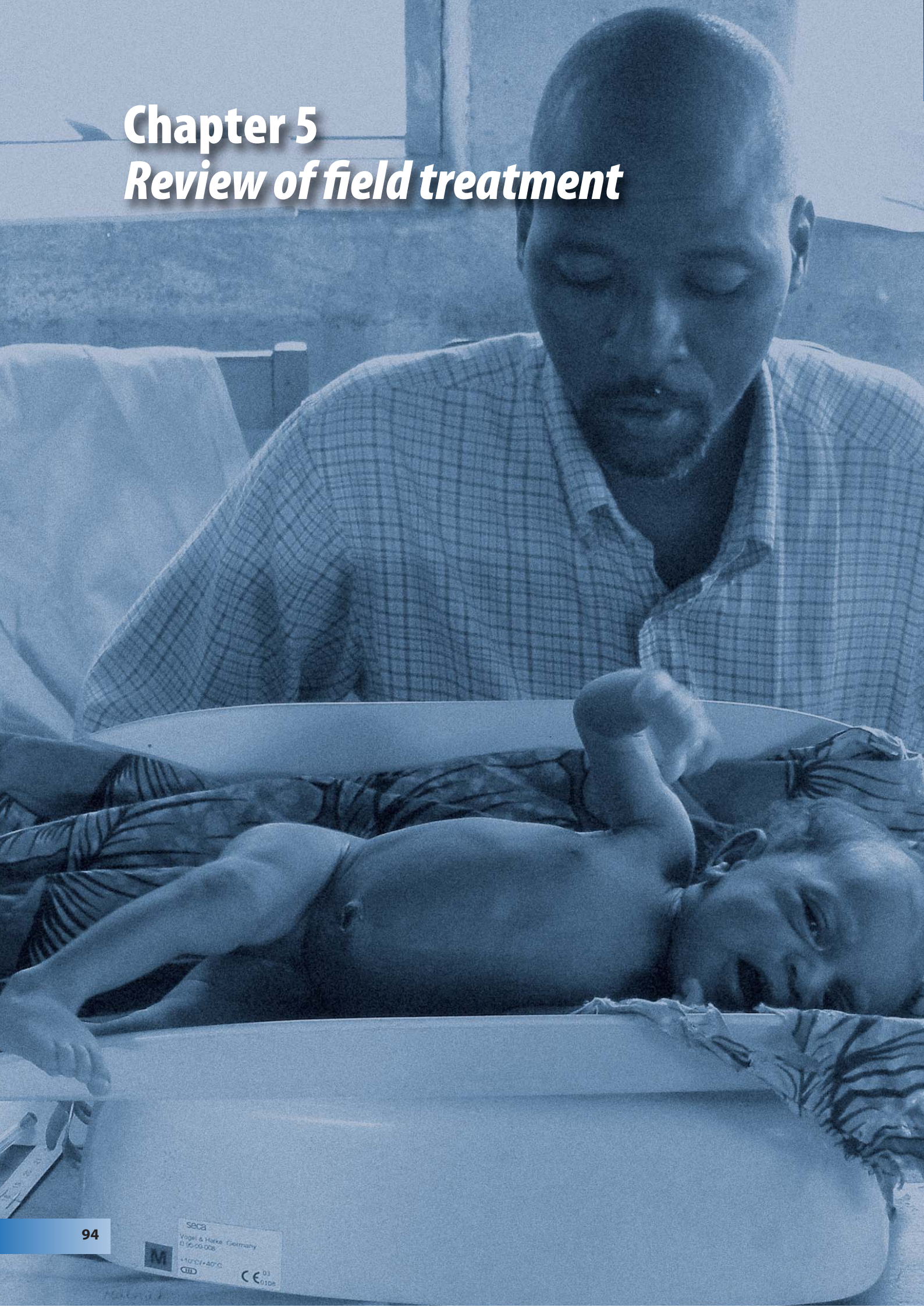
¹⁴² IFE Core Group (2007) Chapter 5. IFE Module 2. Oxford: Emergency Nutrition Network.

¹⁴³ Haynes, A.B., Weiser, T.G., Berry, W.R., Lipsitz, S.R., Breizat, A-H.S., Dellinger, E.P., et al. (2009) A Surgical Safety Checklist to Reduce Morbidity and Mortality in a Global Population. N Engl J Med. 2009 January 29, 2009;360(5):491-9.

¹⁴⁴ Kangaroo care consists of skin-to skin contact between mother and infant. Key features are continuous and prolonged skin-to-skin contact between the mother and baby, accomplished by the baby being firmly attached to the mother chest both day and night, allowing frequent and exclusive breastfeeding (or breastmilk substitute if required).

Chapter 5

Review of field treatment



Chapter 5: Review of field treatment

5.1 Rationale for field data analysis

Describing infant <6m patient profile and outcomes associated with current management is central to the MAMI Project. From analysis of field data, hypotheses can be generated, and where possible, inferences made about the effectiveness of current management strategies. This chapter presents data on infants <6m gathered from therapeutic feeding programmes (TFPs) and supplementary feeding programmes (SFPs), with a particular emphasis on individual level data. This is complemented by qualitative 'key informant' data in Chapter 6.

5.2 Aims

To analyse available TFP and SFP databases to determine:

- % of current feeding programme admissions that are infants <6m
- anthropometric and clinical profile of malnourished infants <6m
- outcomes from current programmes, that use current management guidelines, for infants <6m.

5.3 Methods

5.3.1 Identifying field data

An open invitation was given to share databases of programmes targeting acute malnutrition in infants <6m and contacts were actively pursued from May 2008 to December 2008. This generated two types of database:

a) Raw databases with individual-level data on each patient admitted for treatment

A total of 33 datasets with information on individual children and infants <6m were obtained. These were mostly from Action Contre la Faim (ACF), from 12 countries, with a total of 118,180 individuals aged 0 to 59 months. Data was available in Excel format which had been previously entered in the field, and further sorted and cleaned at organizational headquarter level. For 11 countries, a detailed description of the datasets received, grouped by country of origin, was provided. The number of individuals aged 0- 59m included in each dataset ranged from 59 to 22,473 with an average of 3,812 per dataset. This data is the main focus of the chapter.

b) Summary databases reporting overall programme outcomes by age category

Two different sources of compiled data were made available to the MAMI Project. First, routine databases compiled by MSF of various non-contiguous dates, spanning between July 2003 and December 2008, of seven programmes located in Sierra Leone (two programmes), Niger (four programmes) and Somalia (one programme). Secondly, a dataset of compiled data from 15 programmes in Burundi from various organizations, covering the period September 2001 to December 2002. These compiled data were used to assess the difference in mortality as an outcome between infants <6m and children.

5.3.2 Cleaning & processing field data

In all datasets, complete data was available for most individuals only at admission and discharge. Data from multiple follow-ups were also available, but there was large heterogeneity of values, so these were not included. Data at admission included date, age, weight, length/height, MUAC and the presence of oedema. Data at discharge included date, weight, height and MUAC and outcome. Since our main aim was to evaluate the disease burden and outcomes, only variables at admission and outcomes were selected.

5.3 Methods

All variables at admission and discharge were cleaned and coded for analysis. Data were checked for errors which may have occurred during data entry or database merging. Data cleaning was done twice by the same person, each at different times. Agreement in data cleaning results was assessed and when differences arose, corrected. Data were recoded to simplify the large number of initial outcomes described by field programmes.

Table 11: Description of the 'raw' databases of children 0-59m received for analysis by country

Country	Organisation	Year	Sites	Type of care	N	No. of datasets
Afghanistan	ACF	2002-04	Kabul	TFC, DC, SC	1,096	1
Burundi	ACF	2006-07	Buye Gikomero Kabarore Kayanza Kinini Matongo Mubuga Muhanga Musema Ngozi Rukago Ruyigi	CJ, PTA	5,481	3
Ethiopia	MSF	2006-08	Kuyera	SC	59	1
Kenya	ACF	2005-07	Banisa Malkamari Mandera Takaba	TFC, OTP, SFC	8,466	4
Liberia	ACF	2006-08	Monrovia	TFC	2,797	1
Myanmar	ACF	2006-08	Buthidaung Moungdaw	SC, HT, OTP	2,011	2
Niger	ACF	2006-08	Abalak Keita Mayahi	CRENAS, CRENI	7,110	2
DRC	ACF	2005-07	Baraka Buta Baraka Dubie Kilembwe Malemba Mitwaba Sampwe Uvira	CNT, CNS, HT	24,155	6
Somalia	ACF	2005-07	Baraka Buta Baraka Dubie Kilembwe Malemba Mitwaba Sampwe Uvira	CNT, CNS, HT	24,155	6
Somalia	ACF	2005-08	Mogadishu Wajid	TFC, OTP, SC	8,355	4
Sudan	ACF	2005-08	Nyala El Fasher Kalma Bentiu	TFC, OTP, SC	8,355	4
Tajikistan	ACF	2005-06	Kulyab Kurgan Tyube	SFC, TFC	9,329	2
Uganda	ACF	2005-07	Amuru Apac Gulu Lira Oyam	SFC, TFC, TFP, CBC	45,591	5
Total					118,180	33

DRC: Democratic Republic of the Congo;
ACF: Action Contre la Faim;
MSF: Médecins Sans Frontières;
CBC: Community-based Care;
CJ: Centre du Jour;
CNS: Centre de Nutrition Supplémentaire;
CNT: Centre de Nutrition Thérapeutique;

CRENAS: Centre de Récupération Nutritionnelle Ambulatoire pour Sévères;
CRENI: Centre de Récupération Nutritionnelle en Interne;
DC: Day Centre;
HT: Home treatment;

OTP: Out-Patient Therapy; PTA: Programme Thérapeutique Ambulatoire;
SC: Stabilisation centre;
SFC: Supplementary Feeding Centre;
TFC: Therapeutic Feeding Centre;
TFP: Therapeutic Feeding Program

5.3 Methods

Table 12: Details of the data cleaning results

Variable with errors/Type of error	Action taken		
	Deleted	Corrected*	Missing values
Double data entry/duplicates	1,389		
Age at admission	19	128	93
Admission date	6	1	
Admission weight	57	1,606	608
Admission height	160	1,047	874
Admission MUAC		2,067	13,001
Discharge date	3	1	1,919
Discharge weight	40	1,421	3,029
Discharge height	94	919	3,855
Discharge MUAC	413	2,010	12,223
Total	2,181	9,200	35,602

* See the body of the text for an explanation of the types of errors corrected.

Data cleaning

Table 12 details the distribution of errors in all variables and whether the error was deleted or corrected. From a total of 118,180, 1,389 (1.2%) individuals were found duplicated in the datasets and eliminated. All duplicates came from the same dataset. A total of 11,381 errors were found that were either corrected (80.8%) or deleted (19.2%). The large majority of errors were clustered around anthropometric measurements (9,834 or 86.4%), MUAC data being the most predominant source of error (35.8%). Common errors were incorrect use of punctuation (e.g.: 12...5, 12:5, etc.) or the combination of text and number (e.g.: 4mo, 2y4m, etc.). Additionally, missing values in the dataset (usually anthropometric measurements) were more common at discharge than at admission. MUAC at admission and discharge accounted for the greatest proportion of missing values (70.8%). These missing MUAC measurement reflect two issues:

- MUAC is not currently recommended for infants <6m so was less commonly measured in this age group
- MUAC has only been gaining widespread acceptance in the last few years; at the time these datasets were collected the main focus / admission criterion was weight-for-height.

Data coding

Three variables were coded to reduce variability and cluster similar groups, and so facilitate analysis:

a) Programme type

The type of programme was indicated in the dataset by either a separate variable or as the title of the dataset. Table 13 provides detail of the original coding provided for each programme and the new code for MAMI Project analysis. Re-coding reduced the number of categories from 14 to seven. The number of individuals included in each category is detailed in Table 13. The majority of individuals (62.9%) were admitted in Supplementary Feeding Centres (SFC), followed by Therapeutic Feeding Centres (TFC) and Out-Patient Therapy Programmes (OTP). We could not determine the type of programme for 1,020 (0.9%) enrolled individuals.

b) Age group

Individuals were classified according to their age in six categories based on the criteria defined in Table 15. Of the total of 116,791, 0.1% had missing data on age and 12.9% were classified as having an age at admission greater than 60 months. Since there was evidence of rounding up of age to 60 months, children at 60 months (n=2712) were included in some of the analysis as a separate group.

c) Discharge outcome

A total of 101 different codes were used to classify the discharge outcome. Of these 101 codes, only 31 were used in more than one country (Table 43 in Appendix C). Cured, defaulter, admission mistake, death and transfer were the outcomes more commonly used. Overall, countries varied widely in the number of discharge outcome codes used, ranging from six to 48 different codes.

5.3 Methods

The original discharge outcomes codes were grouped into Sphere-compatible discharge codes as detailed in Table 13. Where the final outcome was unclear and coded only as 'end of follow-up' discharge codes were re-coded as 'cured' if their WHM was $\geq 80\%$ or as 'non-recovery' if it was $< 80\%$.¹⁴⁵

Table 13: Programme type coding

Original*	Meaning	New	Meaning
CBC	Community-based Care	CBC	Community-based Care
CJ	Centre du Jour	DC	Day Centre
DC	Day Centre	DC	Day Centre
HT	Home treatment	HT	Home Treatment
CRENAS	Centre de Récupération Nutritionnelle Ambulatoire pour Sévères	OTP	Out-Patient Therapy
CS	Centre de Récupération Nutritionnelle Ambulatoire pour Sévères	OTP	Out-Patient Therapy
OTP	Out-Patient Therapy	OTP	Out-Patient Therapy
PTA	Programme Thérapeutique Ambulatoire	OTP	Out-Patient Therapy
SC	Stabilisation centre	SC	Stabilisation centre
SC & HT	Stabilisation centre - Home treatment	SC	Stabilisation centre
CNS	Centre de Nutrition Supplémentaire	SFC	Supplementary Feeding Centre
SFC	Supplementary Feeding Centre	SFC	Supplementary Feeding Centre
CI	Centre de Récupération Nutritionnelle en Interne	TFC	Therapeutic Feeding Centre
CNT	Centre de Nutrition Thérapeutique	TFC	Therapeutic Feeding Centre
CRENI	Centre de Récupération Nutritionnelle en Interne	TFC	Therapeutic Feeding Centre
TFC	Therapeutic Feeding Centre	TFC	Therapeutic Feeding Centre
TFC/DC/HT	Therapeutic Feeding Centre	TFC	Therapeutic Feeding Centre
TFC-HT	Therapeutic Feeding Centre	TFC	Therapeutic Feeding Centre
TFP	Therapeutic Feeding Program	TFP	Therapeutic Feeding Programme

* As it appears in the original datasets.

Table 14: Number of individuals enrolled in different types of programme

Programme type	N	%
CBC	1,091	0.93
DC	3,365	2.88
HT	1,311	1.12
OTP	11,916	10.20
SC	505	0.43
SFC	74,342	63.65
TFC	23,241	19.90
Missing	1,020	0.87
Total*	116,791	
CBC: Community-based Care; OTP: Out-Patient Therapy; Centre; DC: Day Centre; SC: Stabilisation centre; TFC: Therapeutic Feeding Centre. HT: Home treatment; SFC: Supplementary Feeding		

*1,389 records were excluded as duplicates

5.3 Methods

Table 15: Definition of age categories & frequency

Age group	N	%	Definition
Missing	112	0.10	Age data at admission missing
<6 months	5,033	4.31	Age at admission <6 months
6 to 59 months	93,929	80.42	Age at admission ≥6 months but <60 months
60 months	2,712	2.32	Age at admission = 60 months
Confirmed >60 months*	7,720	6.61	A combination of at least two values. Age at admission >60 months, weight at admission >33 kg† and height at admission >130 cm‡
Not confirmed >60 months	7,285	6.24	Age at admission >60 months
Total	116,791		

* An individual with an age value <60 months but with a combination of weight and height at admission greater than 33 kg and 130 cm respectively was considered as older than 60 months. † These values correspond to approximately 6 and 4.4 z-scores for weight and height for age respectively for a 60 months old male and 5.5 and 4.9 z-scores for a 60 months old female.

5.3 Methods

Table 16: Re-coding of original discharge codes into a Sphere-compatible code

Original discharge code*	Sphere discharge code						Total
	Admission error	New Defaulter	Died	Cured	Non-recovery	Missing	
End of CBC follow up‡				+	+		86
End of TFC‡				+	+		90
End of TFC follow up‡				+	+		2,090
End of follow up‡				+	+		711
End of transit‡				+	+		5
Fin suivi CNT‡				+	+		2,660
C				+			902
Cured				+			50,483
End OTP				+			1
End of CBC				+			3
End of OTP follow up				+			7
Guéri				+			23,921
Dead			+				294
Death			+				691
Décédé			+				35
Died			+				14
Décès			+				710
M			+				13
Autres				+			72
C.N.R				+			276
CNR				+			613
Criteria not reached							23
Critères non-atteints				+			163
D/Registration				+			9
DNG				+			45
Inconnu				+			44
Medical referral				+			1
Medical transfer				+			201
NR				+			51
Non guéri				+			47
Non répondant				+			1,645
Non respond				+			5
Non respondant				+			362
Non respondant				+			9,355
Non response				+			317
OTP transfer				+			1
Other				+			545
Others				+			15
R,Creni				+			10
R,Transfert				+			68
Refus Creni				+			6
Refus de transfert				+			2
Refus transfert				+			5
Refused to go TFC				+			1
SFC transfer				+			2
T				+			43
T, Creni				+			21
TFC				+			20
To other OTP				+			1
Transfer				+			863
Transfer CTC / TFC				+			12

5.3 Methods

Table 16 cont'd

Original discharge code*	Sphere discharge code						Total
	Admission error	New Defaulter	Died	Cured	Non-recovery	Missing	
Transfer HP				+			139
Transfer SFC				+			46
Transfer TFC				+			26
Transfer other				+			3
Transfer others				+			6
Transfer to CBC				+			101
Transfer to CTC				+			32
Transfer to Health Ce				+			1
Transfer to OPT				+			3
Transfer to OTP				+			59
Transfer to OTP / TFC				+			414
Transfer to SFC				+			249
Transfer to TFC				+			786
Transfer to other CTC				+			5
Transfer to other OTP				+			5
Transfer to other SFC				+			965
Transfert				+			584
Transfert CNS				+			1,494
Transfert CNT				+			619
Transfert CS				+			4
Transfert Centre de S				+			1
Transfert H				+			1
Transfert hôpital				+			161
Transfert medical				+			33
Transfert vers crenam				+			9
Transfert vers creni				+			31
Transféré				+			31
Transit				+			2
Unknown				+			8
Wrong discharge				+			31
non responder				+			136
Abandon		+					2,061
D		+					104
Def		+					1
Default		+					76
Defaulter		+					8,531
AM	+						5
Admission error	+						1
Admission mistake	+						449
CH	+						45
Cheating	+						36
Erreur admission	+						7
Erreur d'admission	+						283
Error	+						4
Mistake	+						6
Mistake admission	+						2
Mistake of admission	+						3
Wrong admission	+						7
Wrong child	+						14
Missing value						+	1,611
Total	862	10,773	1,757	80,174	21,614	1,611	116,791

* As originally appear in the databases. † End of follow-up were classified as either cured if weight for height at discharge was at least 80%, or non-recovery if it was less than 80%

5.4 Analysis

5.4 Analysis

5.4.1 Data selection for analysis

From an original dataset of 118,180 individuals, we excluded all duplicate records, individuals >60m or with either age or sex missing (Figure 19) leaving a sample of 100,688 individuals aged >0 to 60 months. The distribution of infants <6m, children 6 to 59m and 60m for each programme type are described in Table 17. As expected, programmes providing CBC, OTP and SFC care have none or very few infants in their datasets (0, 0.21 and 1.52% respectively). Data from these three groups were excluded from the analysis of infant acute malnutrition (Figure 18). DC, HT, SC and TFC care presented 24.67%, 9.97%, 23.91% and 14.78% of infants <6m respectively. The final sample for analysis of acute malnutrition was 25,195 children aged 0 to 60 months.

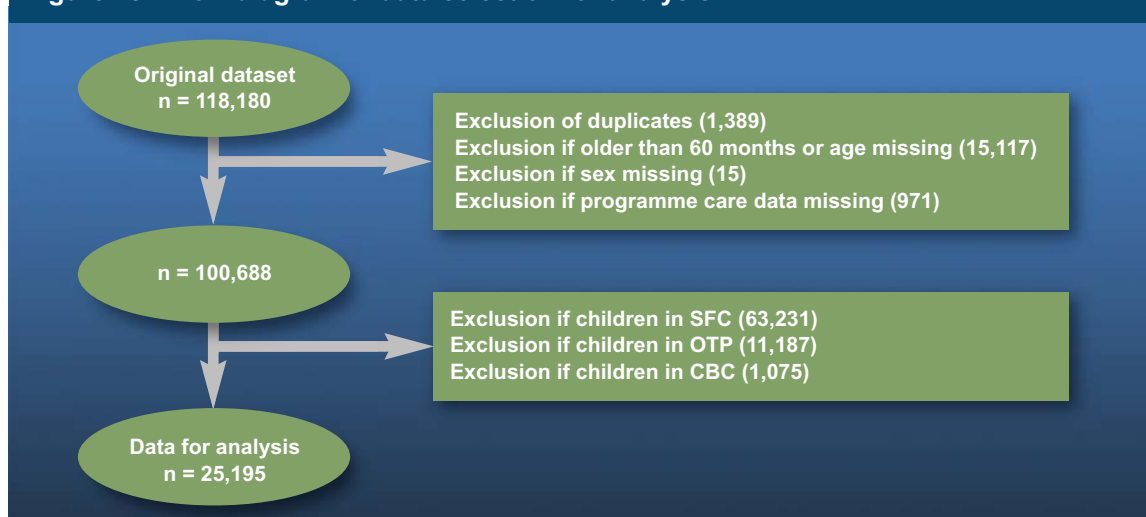
Table 17: Frequency distribution by age group and programme type

Programme type	Sphere discharge code			
		<6 months	6 to 59 months	60 months
CBC	<i>n</i>		1,071	4
	%		99.63	0.37
DC	<i>n</i>	738	2,053	201
	%	24.67	68.62	6.72
HT	<i>n</i>	114	1,009	20
	%	9.97	88.28	1.75
OTP	<i>n</i>	24	11,047	116
	%	0.21	98.75	1.04
SC	<i>n</i>	99	306	9
	%	23.91	73.91	2.17
SFC	<i>n</i>	963	60,213	2,055
	%	1.52	95.23	3.25
TFC	<i>n</i>	3,051	17,299	296
	%	14.78	83.79	1.43
Total	<i>n</i>	4,989	92,998	2,701
	%	4.95	92.36	2.68

CBC: Community-based Care;
CJ: Centre du Jour;
DC: Day Centre;
HT: Home treatment;
OTP: Out-Patient Therapy;
SC: Stabilisation centre;
SFC: Supplementary Feeding Centre;
TFC: Therapeutic Feeding Centre.

* As originally appear in the databases. † End of follow-up were classified as either cured if weight for height at discharge was at least 80%, or non-recovery if it was less than 80%

Figure 18: Flow diagram of data selection for analysis



5.5 Results

5.4.2 Data analysis

Simple comparisons were carried due to the nature and quality of the data. Meta-analysis was carried for comparison between infants <6m, children aged 6 to 59m and children=60m months for the presence of oedema and death as an outcome of the programme.

5.5 Results

5.5.1 Country and programme distribution

A total of 25,195 children, of whom 4,002 were infants <6m, were included in the MAMI Project analysis. The distribution of infants <6m and children according to the type of programme and country of origin are detailed in Table 18. The contribution to our final 0 to 60 month sample ranged, by country, from 57 (0.2%) from Ethiopia to 6,229 (24.7%) from DRC. Most of this sample of children were managed in TFCs (n = 20,646, 81.9%), and a minority in SCs (n = 414, 1.6%). A similar distribution pattern was observed for infants <6m

Table 18: Programme and country distribution of the final sample included for analysis* and the sub-sample of infants <6m

0 to 60 months	Type of programme				
Country	DC	HT	SC	TFC	Total
Afghanistan	633			460	1,093
Burundi	2,359				
Ethiopia			57		57
Kenya				539	539
Liberia				2,436	2,436
Myanmar		1,143	248		1,391
Niger				1,108	1,108
DRC				6,229	6,229
Somalia				2,997	2,997
Sudan			109	5,218	5,327
Tajikistan				373	373
Uganda				1,286	1,286
Total	2,992	1,143	414	20,646	25,195
0 to 60 months	Type of programme				
Country	DC	HT	SC	TFC	Total
Afghanistan	592			438	1,030
Burundi	146				146
Ethiopia			33		33
Kenya				37	37
Liberia				167	167
Myanmar		114	66		180
Niger				145	145
DRC				1,400	1,400
Somalia				402	402
Sudan				360	360
Tajikistan				86	86
Uganda				16	16
Total	738	114	99	3,051	4,002
DRC: Democratic Republic of the Congo DC: Day Centre HT: Home treatment SC: Stabilisation centre TFC: Therapeutic Feeding Centre					

* 92,985 records were removed from the original 118,180 sample.

5.5 Results

Table 19: Burden of disease. Age distribution by country and by programme, of the sample of children selected for analysis*

Age group					
Country		<6 months	6 to 59 months	60 months	Total
Afghanistan	n	1,030	63		1,093
	%	94.2	5.8		100.0
Burundi	n	146	2,012	201	2,359
	%	6.2	85.3	8.5	100.0
Ethiopia	n	33	24		57
	%	57.9	42.1		100.0
Kenya	n	37	494	8	539
	%	6.9	91.7	1.5	100.0
Liberia	n	167	2,249	20	2,436
	%	6.9	92.3	0.8	100.0
Myanmar	n	180	1,189	22	1,391
	%	12.9	85.5	1.6	100.0
Niger	n	145	963		1,108
	%	13.1	86.9		100.0
DRC	n	1,400	4,634	195	6,229
	%	22.5	74.4	3.1	100.0
Somalia	n	402	2,563	32	2,997
	%	13.4	85.5	1.1	100.0
Sudan	n	360	4,928	39	5,327
	%	6.8	92.5	0.7	100.0
Tajikistan	n	86	287		373
	%	23.1	76.9		100.0
Uganda	n	16	1,261	9	1,286
	%	1.2	98.1	0.7	100.0
Total	n	4,002	20,667	526	25,195
	%	15.9	82.0	2.1	100.0
Age group					
Country		<6 months	6 to 59 months	60 months	Total
DC	n	738	2,053	201	2,992
	%	24.7	68.6	6.7	100.0
HT	n	114	1,009	20	1,143
	%	10.0	88.3	1.8	100.0
SC	n	99	306	9	414
	%	23.9	73.9	2.2	100.0
TFC	n	3,051	17,299	296	20,646
	%	14.8	83.8	1.4	100.0
Total	n	4,002	20,667	526	25,195
	%	15.9	82.0	2.1	100.0
DRC: Democratic Republic of the Congo; SC: Stabilisation centre; DC: Day Centre; TFC: Therapeutic Feeding Centre. HT: Home treatment;					

* 92,985 records were removed from the original 118,180 sample.

5.5 Results

5.5.2 Burden of disease of infant <6m malnutrition: age distribution

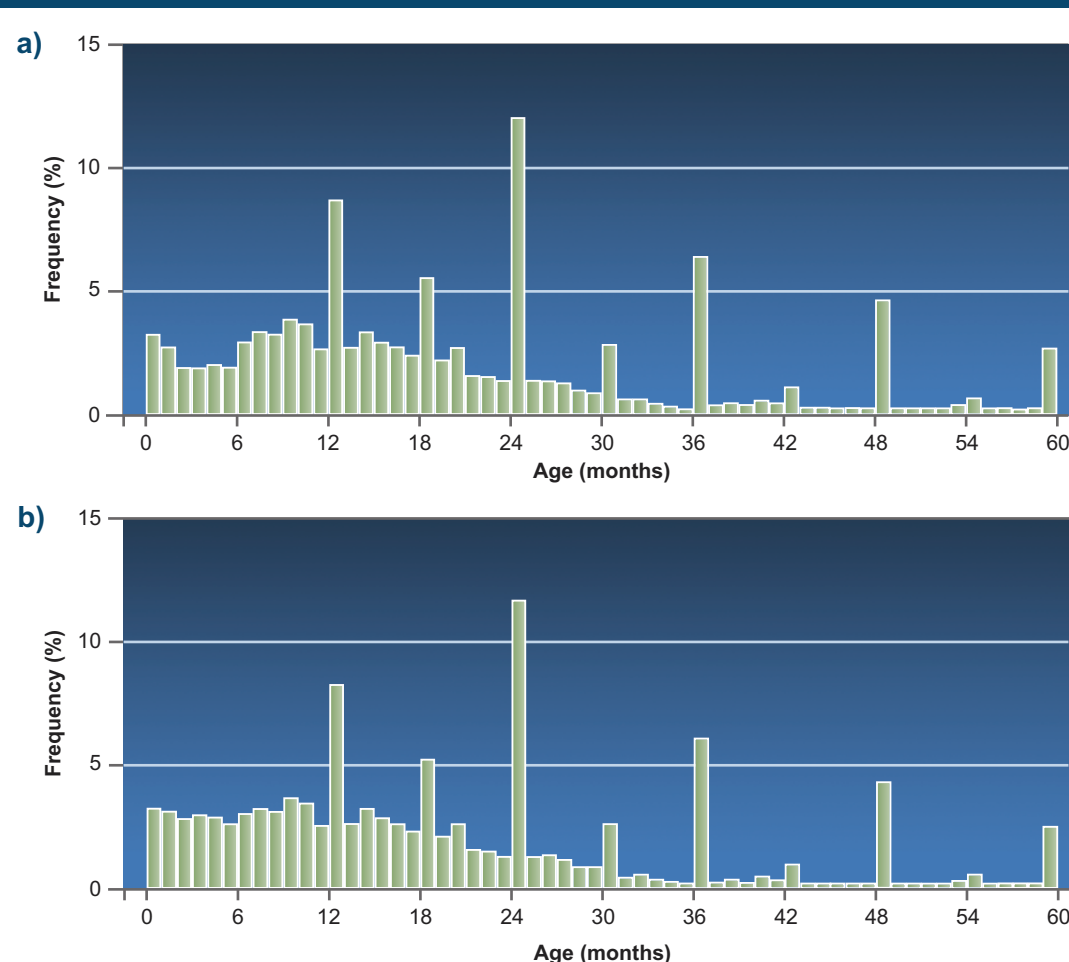
Overall 15.9% of total admissions were infants <6m, with a wide range from 1.2% in Uganda to 37% in Kenya and 94.2% in Afghanistan. By programme type, infant <6m malnutrition ranges from 10% in HT care to 24.7% in DC care.

Acute malnutrition in infants <6m forms part of the 'normal' phenomenon of malnutrition early in life, as shown from the age distribution in Figure 19. The pattern remains, even after the exclusion of Afghanistan and Ethiopia datasets where data on infant <6m is concentrated. For children ≥ 12 months, the rounding of age to the nearest three and six months period was common, with rounding to the nearest six most common. The prevalence of admissions in children decreases with age, markedly after the age of 36 months.

Figure 19: Age frequency distribution at admission

a) Excluding data from Afghanistan and Ethiopia (n = 24,045)

b) Including data from Afghanistan and Ethiopia (n = 25,195)



Infants <6m were grouped by age as <2 months, 2 to 3.9 months and 4 to 5.9 months and the distribution was analysed by country and by programme type provided (Table 20). Overall infant malnutrition is evenly distributed across the age range in infants, between 36% (< 2 months) and 31% (4.5.9 months). However, there is great variation across countries and programmes. No clear or consistent pattern was evident.

5.5 Results

Table 20: Age distribution by country and by programme type of the sample of infant selected for analysis*

		Age group			
Country		< 2 months	2 to 3.9 months	4 to 5.9 months	Total
Afghanistan	n	126	495	409	1,030
	%	12.2	48.1	39.7	100.0
Burundi	n	50	57	39	146
	%	34.3	39.0	26.7	100.0
Ethiopia	n	4	17	12	33
	%	12.1	51.5	36.4	100.0
Kenya	n	3	19	15	37
	%	8.1	51.4	40.5	100.0
Liberia	n	49	64	54	167
	%	29.3	38.3	32.3	100.0
Myanmar	n	91	73	16	180
	%	50.6	40.6	8.9	100.0
Niger	n	71	41	33	145
	%	49.0	28.3	22.8	100.0
DRC	n	832	305	263	1,400
	%	59.4	21.8	18.8	100.0
Somalia	n	5	121	276	402
	%	1.2	30.1	68.7	100.0
Sudan	n	189	93	78	360
	%	52.5	25.8	21.7	100.0
Tajikistan	n	9	29	48	86
	%	10.5	33.7	55.8	100.0
Uganda	n	2	10	4	16
	%	12.5	62.5	25.0	100.0
Total	n	1,431	1,324	1,247	4,002
	%	35.8	33.1	31.2	100.0
		Age group			
Programme type		< 2 months	2 to 3.9 months	4 to 5.9 months	Total
DC	n	138	338	262	738
	%	18.7	45.8	35.5	100.0
HT	n	65	42	7	114
	%	57.0	36.8	6.1	100.0
SC	n	30	48	21	99
	%	30.3	48.5	21.2	100.0
TFC	n	1198	896	957	3051
	%	39.3	29.4	31.4	100.0
Total	n	1,431	1,324	1,247	4,002
	%	35.8	33.1	31.2	100.0
DRC: Democratic Republic of the Congo SC: Stabilisation centre DC: Day Centre TFC: Therapeutic Feeding Centre HT: Home treatment					

* 92,985 records were removed from the original 118,180 sample.

5.5 Results

5.5.3. Burden of disease of infant <6m malnutrition: sex distribution

A slightly higher proportion of male than female infants <6m compared to older children were admitted for care (Table 21). Evaluation by country and programme type found a higher male:female ratio in infants <6m than in 6 to 59m group. No correlation was found between the sex ratio exhibited in infants <6m and older children. Grouping infants <6m by age (22) showed that overall the male:female ratio increased with age in infants. This pattern, however, was not consistent once frequency was analysed by country or programme type.

Table 21: Male to female ratio by age group, by country and by programme type

	Age groups								
	<6 months			6 to 59 months			60 months		
Country	F	M	M:F	F	M	M:F	F	M	M:F
Afghanistan	466	564	1.2	27	36	1.3			
Burundi	79	67	0.8	933	1,079	1.2	94	107	1.1
Ethiopia	18	15	0.8	18	6	0.3			
Kenya	17	20	1.2	218	276	1.3	5	3	0.6
Liberia	76	91	1.2	1,131	1,118	1.0	11	9	0.8
Myanmar	97	83	0.9	765	424	0.6	11	11	1.0
Niger	71	74	1.0	448	515	1.1			
DRC	720	680	0.9	2,234	2,400	1.1	88	107	1.2
Somalia	191	211	1.1	1,229	1,334	1.1	16	16	1.0
Sudan	160	200	1.3	2,458	2,470	1.0	23	16	0.7
Tajikistan	42	44	1.0	150	137	0.9			
Uganda	8	8	1.0	605	656	1.1	4	5	1.25
Total	1,945	2,057	1.1	10,216	10,451	1.0	252	274	1.1
	Age groups								
	<6 months			6 to 59 months			60 months		
Programme type	F	M	M:F	F	M	M:F	F	M	M:F
DC	356	382	1.1	950	1,103	1.2	94	107	1.1
HT	58	56	1.0	648	361	0.6	11	9	0.8
SC	57	42	0.7	196	110	0.6	4	5	1.3
TFC	1,474	1,577	1.1	8,422	8,877	1.1	143	153	1.1
Total	1,945	2,057	1.1	10,216	10,451	1.0	252	274	1.1
DRC: Democratic Republic of the Congo DC: Day Centre HT: Home treatment			SC: Stabilisation centre TFC: Therapeutic Feeding Centre			M: Male F: Female M:F: Male to Female ratio			

5.5 Results

Table 22: Male to female ratio by age group, by country and by programme type for infants aged <6 months

	Age groups								
	< 2 months			2 to 3.9 months			4 to 5.9 months		
Country	F	M	M:F	F	M	M:F	F	M	M:F
Afghanistan	52	74	1.4	221	274	1.2	193	216	1.1
Burundi	23	27	1.2	36	21	0.6	20	19	1.0
Ethiopia	3	1	0.3	8	9	1.1	7	5	0.7
Kenya	2	1	0.5	7	12	1.7	8	7	0.9
Liberia	21	28	1.3	34	30	0.9	21	33	1.6
Myanmar	49	42	0.9	44	29	0.7	4	12	3.0
Niger	35	36	1.0	20	21	1.1	16	17	1.1
DRC	447	385	0.9	148	157	1.1	125	138	1.1
Somalia	2	3	1.5	60	61	1.0	129	147	1.1
Sudan	84	105	1.3	44	49	1.1	32	46	1.4
Tajikistan	4	5	1.3	18	11	0.6	20	28	1.4
Uganda	2	0	0.0	5	5	1.0	1	3	3.0
Total	724	707	1.0	645	679	1.1	576	671	1.2
	Age groups								
	< 2 months			2 to 3.9 months			4 to 5.9 months		
Programme type	F	M	M:F	F	M	M:F	F	M	M:F
DC	61	77	1.3	167	171	1.0	128	134	1.0
HT	33	32	1.0	23	19	0.8	2	5	2.5
SC	19	11	0.6	29	19	0.7	9	12	1.3
TFC	611	587	1.0	426	470	1.1	437	520	1.2
Total	724	707	1.0	645	679	1.1	576	671	1.2
DRC: Democratic Republic of the Congo DC: Day Centre HT: Home treatment			SC: Stabilisation centre TFC: Therapeutic Feeding Centre			M: Male F: Female M:F: Male to Female ratio			

5.5.4. Infant malnutrition profile: Oedema

The presence of oedema was more common in children than in infants <6m (Table, Table 44, Appendix B). This difference cannot be accounted for by a difference in the proportion of missing values, as these percentages are similar between different age groups.

Based on Table and Table 44 data, forest plots were used to assess the risk ratio of presenting with oedema for infants <6m when compared with their six to 59 months olds (20). The presence of oedema in infancy ranged from 0 to 8.3%, whereas the presence of oedema in children ranged from 2% to 66%. The overall risk ratio was 0.1 (0.08, 0.12, $p < 0.001$). There was evidence of heterogeneity of the data when analysed by country or by programme type ($p < 0.01$ in both cases). When evaluated by programme, the risk of presenting oedema for infants <6m was lowest for infants admitted to DC care and greatest for those in HT care. The presence of oedema in infants <6m did not correlate to the presence of oedema in their older counterparts.

Table 23: Oedema frequency distribution among different age groups and programme types provided for the sample included for SAM analysis

	Oedema		No oedema		Missing values	
Age group	n	%	n	%	n	%
<6 months	140	3.5%	3,812	95.3%	50	1.2%
6 to 59 months	7,261	35.1%	13,077	63.3%	329	1.6%
60 months	317	60.3%	205	39.0%	4	0.8%
Total	7718	30.6%	17,094	67.8%	383	1.5%

5.5 Results

5.5.5 Infant malnutrition profile: Anthropometry

The quality of anthropometric data was evaluated. The number of missing values was used as a proxy of the quality of anthropometric data procurement and its recording. Overall, infants <6m had a higher proportion of measurements missing or wrongly recorded (Table 24). No difference was seen for weight, but missing values for length were greater in infants <6m. This meant that more infants <6m had missing HAZ indicators. Conversely, data for MUAC in infants <6m, a measurement not routinely recommended for this age group, showed to be present in almost 40% of the sample. This measurement was mostly clustered in SC and TFC programmes (Table 25).

For over 40% of the sample of infants <6m, it was not possible to calculate WHZ and WHM. This was mostly due to infants having height of <49 cm, for which there are no WHZ and WHM references. The range of missing data for infants <6m varied widely between countries and programme type (Table 25).

The number of anthropometric values that were flagged using the Epi-Info criteria was also investigated. Here, more anthropometric values were flagged for children >6m than for infants <6m (Table 26). Epi-Info flagging criteria might not be appropriate for a malnourished population, as it singles out a significant proportion of a roughly normally distributed sample of malnourished children. Flagging outliers using other criteria might be more appropriate. This is explored in Figure 20, where the Grubbs method for outlier identification was used to evaluate between true and false outliers.

5.5.6 Infant malnutrition profile: Anthropometry-based admission criteria

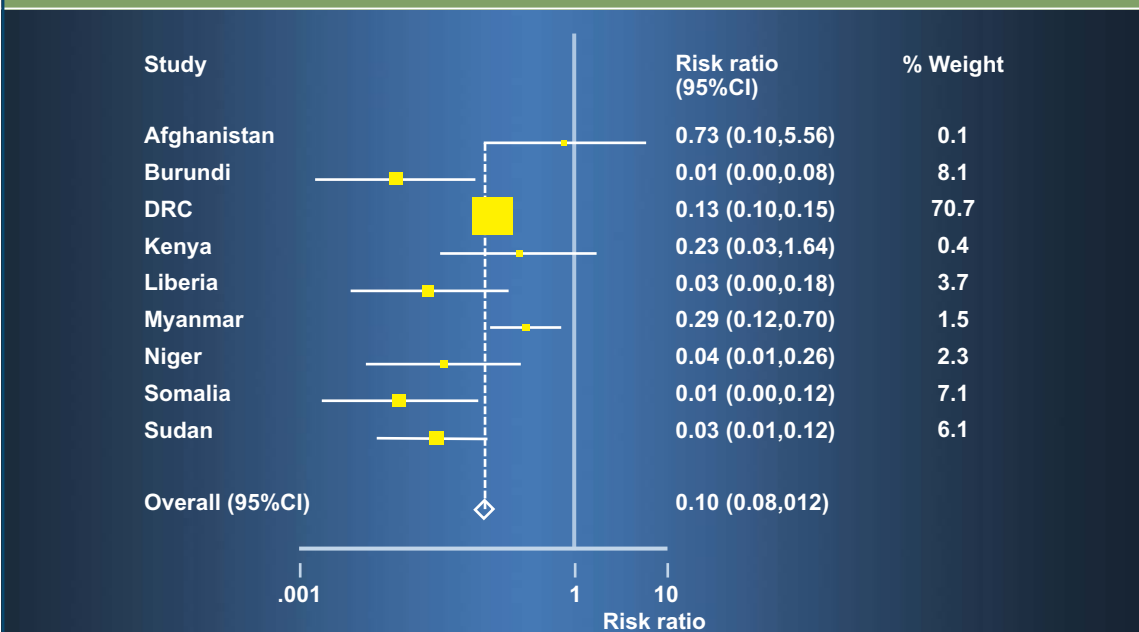
Different anthropometric criteria used for admission to different programmes were investigated (Table 27). Due to the lack of WHZ and WHM data in infants <6m, it was difficult to compare them with 6 to 59m children. More than one anthropometric indicator was used in many cases for admission of infants <6m. The majority of infants <6m did not fulfil standard anthropometric SAM criteria, (<-3 WHZ or <70%WHM) so must have been admitted to programmes on the basis of clinical or other criteria. Many guidelines noted using <4kg or <3.5kg as an admission criterion for this age group. Weight <4kg was observed in 90.5% of all infants <6m and weight <3.5kg in 81.8% (Table 27).

We did not tabulate how many infants and children had more than one criterion. More importantly, nor did we have any available data to say how many children had complications of malnutrition and other background risk factors such as decreasing weight on growth charts or recently stopped breastfeeding.

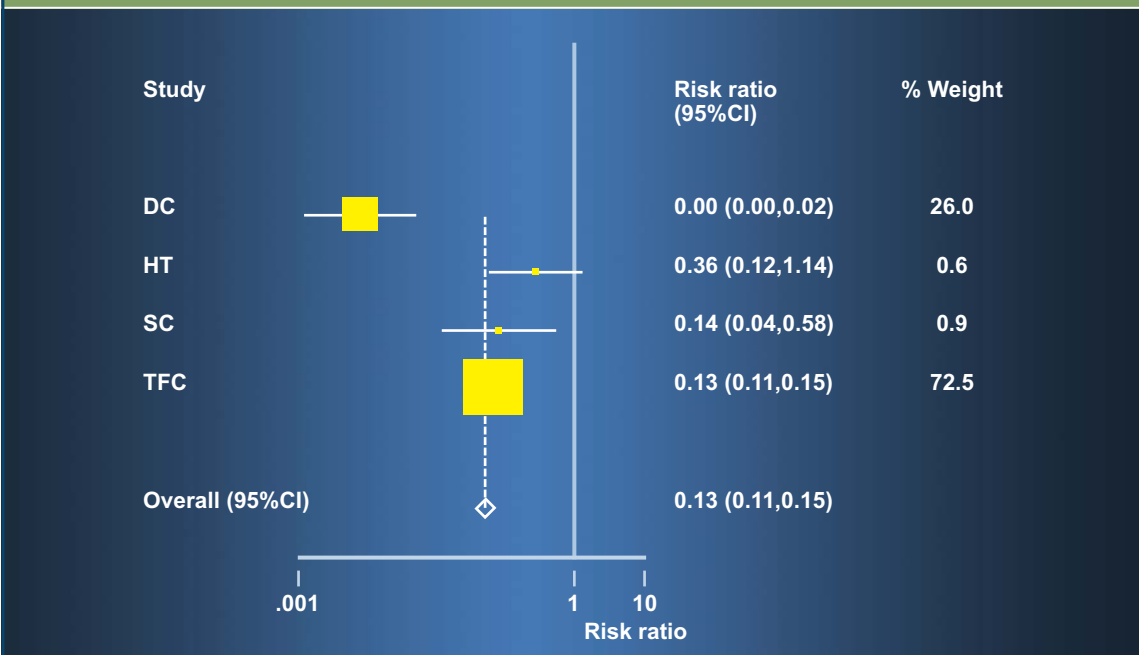
5.5 Results

Figure 20: Forest plots of the risk ratio of presenting oedema for infants <6m compared to children aged 6 to 59 months by country and by programme type

a) Country



a) Programme type



5.5 Results

Table 24: Frequency and percentage of missing values of anthropometry by age group

	Variable/Indicator missing at admission														
Age group	Weight		Length/Height		MUAC		WAZ		HAZ		WHZ		WHM		Total
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n
< 6 months	15	0.4%	227	5.7%	2,486	62.1%	19	0.5%	233	5.8%	1,607	40.2%	1,605	40.1%	4,002
6 to 59 months	130	0.6%	133	0.6%	5,156	24.9%	138	0.7%	149	0.7%	198	1.0%	192	0.9%	20,667
60 months	0	0.0%	1	0.2%	12	2.3%	0	0.0%	2	0.4%	3	0.6%	3	0.6%	526
MUAC: Mid-Upper Arm Circumference					WHZ: Weight-for-height z-score										
WAZ: Weight-for-age z-score					WHM: Weight-for-height percentage of										
HAZ: Height-for-age z-score					the median										

Table 25: Frequency and percentage of missing values of anthropometry by country and programme type in infants <6m

	Variable/Indicator missing at admission														
Country	Weight		Length/Height		MUAC		WAZ		HAZ		WHZ		WHM		Total
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n
Afghanistan	0	0.0%	1	0.1%	1,030	100.0%	0	0.0%	3	0.3%	252	24.5%	252	24.5%	1,030
Burundi	0	0.0%	4	2.7%	143	97.9%	0	0.0%	4	2.7%	72	49.3%	72	49.3%	146
Ethiopia	0	0.0%	4	12.1%	4	12.1%	0	0.0%	4	12.1%	11	33.3%	11	33.3%	33
Kenya	0	0.0%	6	16.2%	25	67.6%	0	0.0%	7	18.9%	7	18.9%	7	18.9%	37
Liberia	0	0.0%	6	3.6%	163	97.6%	0	0.0%	6	3.6%	40	24.0%	40	24.0%	167
Myanmar	0	0.0%	110	61.1%	180	100.0%	0	0.0%	111	61.7%	147	81.7%	147	81.7%	180
Niger	15	10.3%	31	21.4%	145	100.0%	15	10.3%	32	22.1%	72	49.7%	72	49.7%	145
DRC	0	0.0%	2	0.1%	27	1.9%	0	0.0%	2	0.1%	811	57.9%	809	57.8%	1,400
Somalia	0	0.0%	22	5.5%	378	94.0%	0	0.0%	22	5.5%	23	5.7%	23	5.7%	402
Sudan	0	0.0%	40	11.1%	352	97.8%	0	0.0%	41	11.4%	156	43.3%	156	43.3%	360
Tajikistan	0	0.0%	0	0.0%	34	39.5%	0	0.0%	0	0.0%	8	9.3%	8	9.3%	86
Uganda	0	0.0%	1	6.3%	5	31.3%	0	0.0%	1	6.3%	8	50.0%	8	50.0%	16
	Variable/Indicator missing at admission														
Programme type	Weight		Length/Height		MUAC		WAZ		HAZ		WHZ		WHM		Total
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n
DC	0	0.0%	5	0.7%	735	99.6%	0	0.0%	6	0.8%	235	31.8%	235	31.8%	738
HT	0	0.0%	51	44.7%	114	100.0%	2	1.8%	52	45.6%	87	76.3%	87	76.3%	114
SC	0	0.0%	63	63.6%	70	70.7%	0	0.0%	63	63.6%	71	71.7%	71	71.7%	99
TFC	15	0.5%	108	3.5%	1,567	51.4%	17	0.6%	112	3.7%	1,214	39.8%	1,212	39.7%	3,051
Total	15	0.4%	227	5.7%	2,486	62.1%	19	0.5%	233	5.8%	1,607	40.2%	1,605	40.1%	4,002
DRC: Democratic Republic of the Congo DC: Day Centre HT: Home treatment					SC: Stabilisation centre TFC: Therapeutic Feeding Centre WHZ: Weight-for-height z-score					WHM: Weight-for-height percentage of the median					

* The percentages in this table are based on the total sample of 4002 infants <6m and 20,667 children aged 6 to 59 months.

5.5 Results

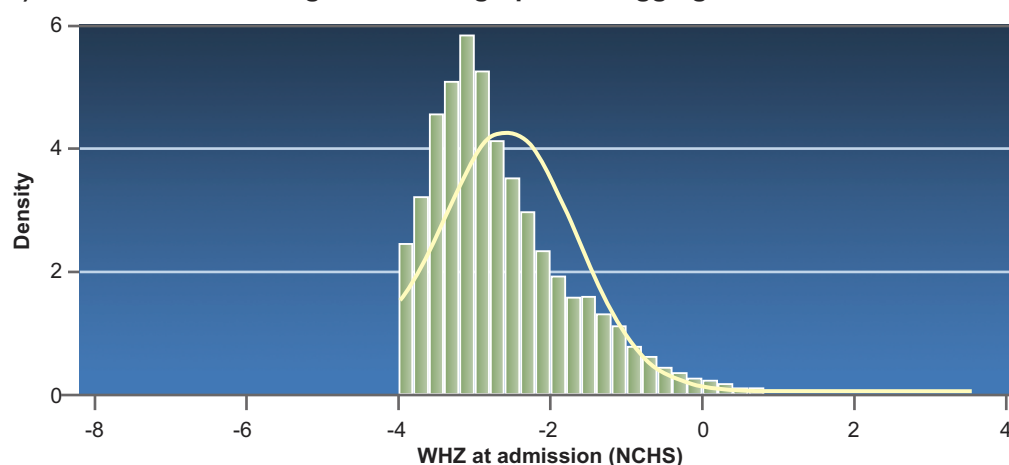
Table 26: Frequency of flagged values using Epi-info criteria by age group

Age group	Flag criteria									
	Flag 1		Flag 2		Flag 3		Flag 4		Any flag	
	n	%	n	%	n	%	n	%	n	%
< 6 months	6	0.1%	95	2.4%	62	1.5%	2	0.0%	159	4.0%
6 to 59 months	392	1.9%	626	3.0%	1803	8.7%	3	0.0%	2548	12.3%
60 months	2	0.4%	42	8.0%	23	4.4%	0	0.0%	64	12.2%
Flag 1: HAZ <-6 or >+6 Flag 2: WHZ <-4 or >+6 Flag 3: WAZ <-6 or >+6 Flag 4: HAZ >3.09 & WHZ <-3.09 or HAZ <-3.09 & WHZ >3.09										

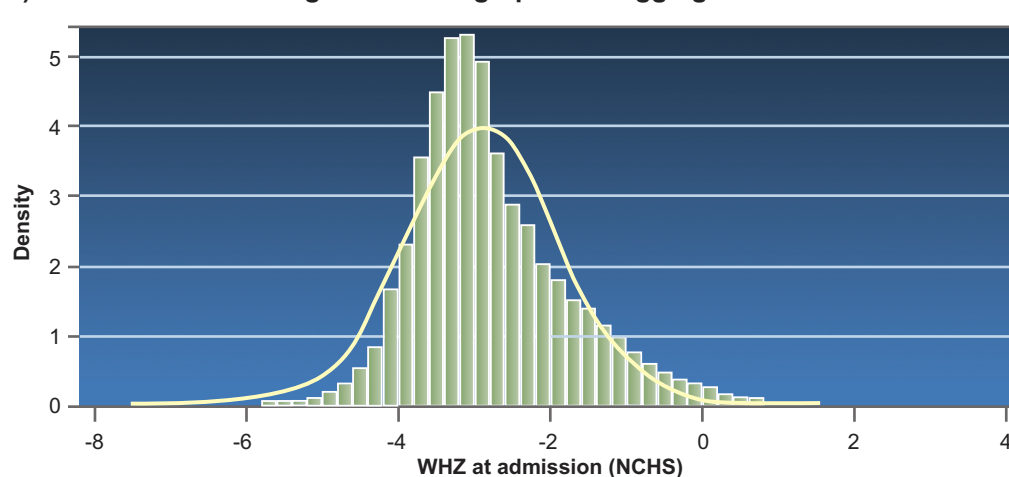
* The percentages in this table are based on the total sample of 4002 infants <6m and 20,667 children aged 6 to 59 months.

Figure 21: WHZ distribution at admission of children aged 0 to 60 months

a) Distribution excluding values using Epi-Info flagging criteria



a) Distribution excluding values using Epi-Info flagging criteria



5.5 Results

Table 27: Frequency table for different admission criteria, comparing infants <6m and children 6 to 59 months of age*

Variable / Indicator																
Country	<3 WHZ				<70% WHM				<4 kg weight				<3.5 kg weight			
	<6 months		6 to 59 months		<6 months		6 to 59 months		<6 months		6 to 59 months		<6 months		6 to 59 months	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Afghanistan	160	15.5%	16	25.4%	340	33.0%	25	39.7%	975	94.7%	62	98.4%	849	82.4%	46	73.0%
Burundi	14	9.6%	393	19.5%	28	19.2%	341	16.9%	144	98.6%	57	2.8%	141	96.6%	39	1.9%
DRC	82	5.9%	936	20.2%	293	20.9%	1,058	22.8%	1,250	89.3%	254	5.5%	1,201	85.8%	109	2.4%
Ethiopia	3	9.1%	4	16.7%	5	15.2%	4	16.7%	29	87.9%	21	87.5%	27	81.8%	16	66.7%
Kenya	7	18.9%	308	62.3%	16	43.2%	289	58.5%	25	67.6%	17	3.4%	20	54.1%	9	1.8%
Liberia	25	15.0%	1,020	45.4%	56	33.5%	872	38.8%	152	91.0%	65	2.9%	128	76.6%	23	1.0%
Myanmar	2	1.1%	590	49.6%	10	5.6%	563	47.4%	173	96.1%	58	4.9%	171	95.0%	33	2.8%
Niger	19	13.1%	414	43.0%	35	24.1%	430	44.7%	106	73.1%	89	9.2%	100	69.0%	54	5.6%
Somalia	155	38.6%	1,347	52.6%	305	75.9%	1,449	56.5%	364	90.5%	220	8.6%	292	72.6%	73	2.8%
Sudan	43	11.9%	3,326	67.5%	64	17.8%	3,225	65.4%	320	88.9%	132	2.7%	278	77.2%	49	1.0%
Tajikistan	13	15.1%	219	76.3%	24	27.9%	237	82.6%	68	79.1%	44	15.3%	50	58.1%	30	10.5%
Uganda	1	6.3%	336	26.6%	5	31.3%	292	23.2%	16	100.0%	18	1.4%	16	100.0%	6	0.5%
Programme	<6 months	%	6 to 59 months	%	<6 months	%	6 to 59 months	%	<6 months	%	6 to 59 months	%	<6 months	%	6 to 59 months	%
DC	118	16.0%	403	19.6%	213	28.9%	354	17.2%	703	95.3%	98	4.8%	626	84.8%	66	3.2%
HT	1	0.9%	523	51.8%	8	7.0%	495	49.1%	109	95.6%	46	4.6%	108	94.7%	26	2.6%
SC	4	4.0%	166	54.2%	7	7.1%	151	49.3%	93	93.9%	33	10.8%	90	90.9%	23	7.5%
TFC	401	13.1%	7,817	45.2%	953	31.2%	7,785	45.0%	2,717	93.9%	860	5.0%	2,449	80.3%	372	2.2%
Total	524	13.1%	8,909	43.1%	1,181	29.5%	8,785	42.5%	3,622	89.1%	1,037	5.0%	3,273	81.8%	487	2.4%
DRC: Democratic Republic of the Congo; DC: Day Centre; HT: Home treatment; SC: Stabilisation centre; TFC: Therapeutic Feeding Centre; WHZ: Weight-for-height z-score; WHM: Weight-for-height percentage of the median.																

* The percentages in this table are based on the total sample of 4002 infants <6m and 20,667 children aged 6 to 59 months.

5.5 Results

5.5.7 Programme outcomes

Programme outcomes were compared between infants <6m and children aged 6 to 59m by country and by programme type (Table 28 and Table 29). Overall, 75% of infants <6m (and 74% of 6 to 59m olds) were discharged as 'cured' and 4.7% of infants <6m (and 4% of 6 to 59m olds) died.

Taken as a whole, few countries met all Sphere standards (Table 28, values in italics). Only 25% (3) of countries reached the required Sphere standard of >75% cured rates in infants <6m compared to 42% (5) in children six to 59 months old. 66% (8) of countries met the mortality Sphere standard (<10%) for infants <6m, compared to 60% (9) for six to 59 month olds. Conversely, all countries met the defaulting Sphere standard (<15%) for infants <6m, compared to 75% (9) for children six to 59 months of age. In addition to the Sphere standards, only 25% (3) of the countries presented an acceptable non-recovery rate (<10%) for infants compared to 50% (6) for children aged six to 59 months. Applying the WHO inpatient guidelines on mortality standards to infants <6m, 50% (6) had mortality < 5% ('good'), 16% (2/12) had 'moderate' rates (5-10%) and 33% (4/12) had or exceeded 'poor' rates (11-20%). For children 6 to 59m, the rates were 67% (8/12), (1/12) and 3/12 for good, moderate and poor mortality, respectively.

Interestingly, this pattern changes when outcomes are grouped by programme type (Table 29, values in italics) where DC and HT programme types met the Sphere standard cured rate for infants <6m, but only DC in children aged five to 59 months. Similarly, only TFC programme type for infants <6m failed to meet the non-recovery rate while HT, SC and TFC programmes failed for older children. All different programme types met the Sphere standards for mortality.

A Forest plot (Figure 22) displays the same data (from Tables 28 and 29) by evaluating the risk ratio of death as an outcome for infants <6m compared to children aged six to 59 months. Overall, the risk of death for infants <6m is 1.3 (1.08 – 1.53) if analysed by country, and 1.2 (1.05 – 1.44) if analysed by programme. There was a significant degree of heterogeneity on the data ($p<0.01$). However, the pattern remained unchanged after controlling for random effects.

Mortality as outcome data was available in some summary databases provided to the MAMI Project. Results were analysed and are shown in Figure 23. The mortality risk seen for infants <6m in TFC programme type within Burundi (Figure 23a) was 2.2 (1.69 – 2.96, $p<0.01$). There was no evidence of heterogeneity ($p=0.16$) in the data and the pattern remain unchanged after controlling for random effects. On the other hand, the infant mortality risk from MSF compiled data was 1.1 (0.83 – 1.45; $p=0.5$), with no evidence of heterogeneity ($p=0.4$) and the pattern did not change after controlling for random effects.

5.5 Results

Table 28: Sphere discharge outcomes by country and age group
*Values in italics are those meeting the Sphere standards/MAMI indicator**

<6 month													
Sphere discharge outcomes													
Country	Cured		Died		Excluded		Non-recovery		Defaulter		Missing		Total
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
Afghanistan	769	74.7%	49	4.8%	0	0.0%	96	9.3%	115	11.2%	1	0.1%	1,030
Burundi	108	74.0%	17	11.6%	1	0.7%	8	5.5%	4	2.7%	8	5.5%	146
Ethiopia	21	63.6%	7	21.2%	0	0.0%	1	3.0%	0	0.0%	4	12.1%	33
Kenya	17	45.9%	9	24.3%	0	0.0%	6	16.2%	5	13.5%	0	0.0%	37
Liberia	117	70.1%	5	3.0%	0	0.0%	33	19.8%	12	7.2%	0	0.0%	167
Myanmar	135	75.0%	5	2.8%	2	1.1%	7	3.9%	22	12.2%	9	5.0%	180
Niger	101	69.7%	11	7.6%	4	2.8%	1	0.7%	13	9.0%	15	10.3%	145
DRC	1,099	78.5%	50	3.6%	3	0.2%	202	14.4%	46	3.3%	0	0.0%	1,400
Somalia	327	81.3%	5	1.2%	0	0.0%	4	1.0%	40	10.0%	26	6.5%	402
Sudan	245	68.1%	26	7.2%	1	0.3%	33	9.2%	34	9.4%	21	5.8%	360
Tajikistan	68	79.1%	0	0.0%	0	0.0%	7	8.1%	11	12.8%	0	0.0%	86
Uganda	8	50.0%	6	37.5%	0	0.0%	0	0.0%	2	12.5%	0	0.0%	16
Total	3,015	75.3%	190	4.7%	11	0.3%	398	9.9%	304	7.6%	84	2.1%	4,002
5 to 59 mo													
Sphere discharge outcomes													
Country	Cured		Died		Excluded		Non-recovery		Defaulter		Missing		Total
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
Afghanistan	32	50.8%	4	6.3%	0	0.0%	11	17.5%	15	23.8%	1	1.6%	63
Burundi	1,710	85.0%	38	1.9%	7	0.3%	30	1.5%	61	3.0%	166	8.3%	2,012
Ethiopia	22	91.7%	1	4.2%	0	0.0%	1	4.2%	0	0.0%	0	0.0%	24
Kenya	295	59.7%	58	11.7%	0	0.0%	43	8.7%	98	19.8%	0	0.0%	494
Liberia	1,827	81.2%	15	0.7%	2	0.1%	213	9.5%	192	8.5%	0	0.0%	2,249
Myanmar	821	69.0%	11	0.9%	46	3.9%	172	14.5%	95	8.0%	44	3.7%	1,189
Niger	555	57.6%	116	12.0%	6	0.6%	90	9.3%	77	8.0%	119	12.4%	963
DRC	3,752	81.0%	183	3.9%	23	0.5%	497	10.7%	179	3.9%	0	0.0%	4,634
Somalia	2,000	78.0%	42	1.6%	6	0.2%	142	5.5%	222	8.7%	151	5.9%	2,563
Sudan	3,329	67.6%	222	4.5%	11	0.2%	678	13.8%	498	10.1%	190	3.9%	4,928
Tajikistan	141	49.1%	4	1.4%	0	0.0%	79	27.5%	63	22.0%	0	0.0%	287
Uganda	836	66.3%	137	10.9%	4	0.3%	151	12.0%	133	10.5%	0	0.0%	1,261
Total	15,320	74.1%	831	4.0%	105	0.5%	2,107	10.2%	1,633	7.9%	671	3.2%	20,667
DRC: Democratic Republic of the Congo													

* Sphere standard exit indicators are cure, death, defaulter and transfer. For the purpose of this analysis, excluded, non-recovery and missing are also reported (MAMI Indicator).

5.5 Results

Table 29: Outcomes by programme type and age group*Values in italics are those meeting the Sphere standards/MAMI indicator**

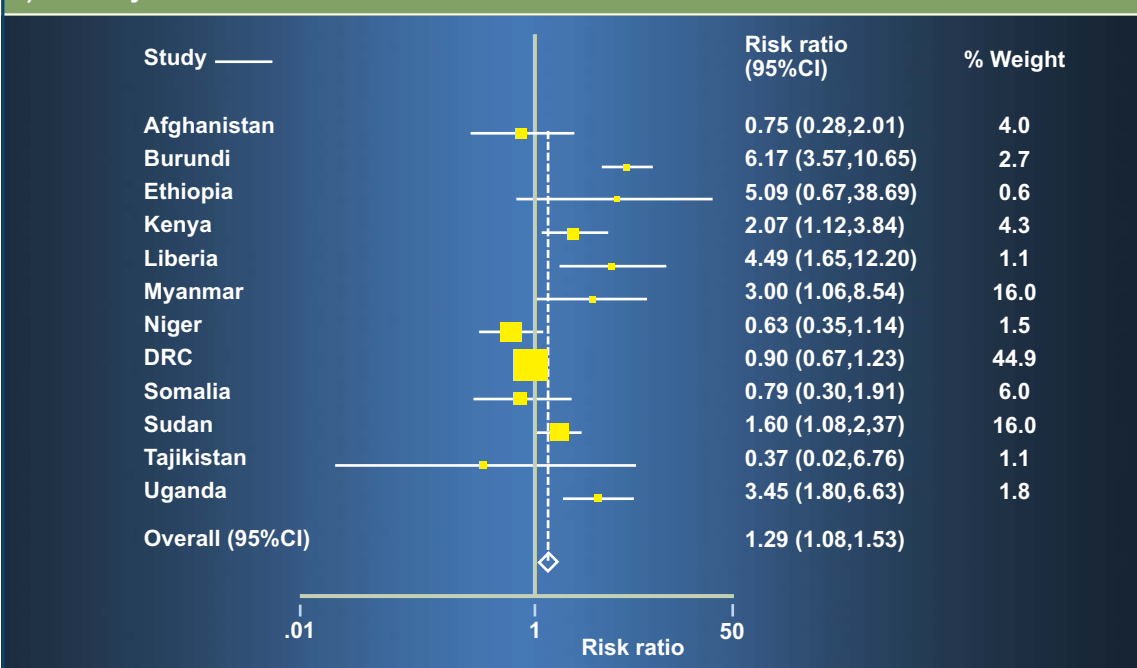
<6 months		Sphere discharge outcomes											
Programme	Cured		Died		Excluded		Non-recovery		Defaulter		Missing		Total
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
DC	605	82.0%	17	2.3%	1	0.1%	39	5.3%	68	9.2%	8	1.1%	738
HT	89	78.1%	4	3.5%	2	1.8%	6	5.3%	13	11.4%	0	0.0%	114
SC	67	67.7%	8	8.1%	0	0.0%	2	2.0%	9	9.1%	13	13.1%	99
TFC	2,254	73.9%	161	5.3%	8	0.3%	351	11.5%	214	7.0%	63	2.1%	3,051
Total	3,015	75.3%	190	4.7%	11	0.3%	398	9.9%	304	7.6%	84	2.1%	4,002
6 to 59 months		Sphere discharge outcomes											
Programme	Cured		Died		Excluded		Non-recovery		Defaulter		Missing		Total
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
DC	1,735	84.5%	38	1.9%	7	0.3%	35	1.7%	72	3.5%	166	8.1%	2,053
HT	720	71.4%	7	0.7%	44	4.4%	161	16.0%	77	7.6%	0	0.0%	1,009
SC	191	62.4%	6	2.0%	2	0.7%	32	10.5%	30	9.8%	45	14.7%	306
TFC	12,674	73.3%	780	4.5%	52	0.3%	1,879	10.9%	1,454	8.4%	460	2.7%	17,299
Total	15,320	74.1%	831	4.0%	105	0.5%	2,107	10.2%	1,633	7.9%	671	3.2%	20,667
DC: Day Centre; HT: Home Treatment; SC: Stabilization Centre; TFC: Therapeutic Feeding Centre													

* Sphere standard exit indicators are cure, death, defaulter and transfer. For the purpose of this analysis, excluded, non-recovery and missing are also reported (MAMI Indicator).

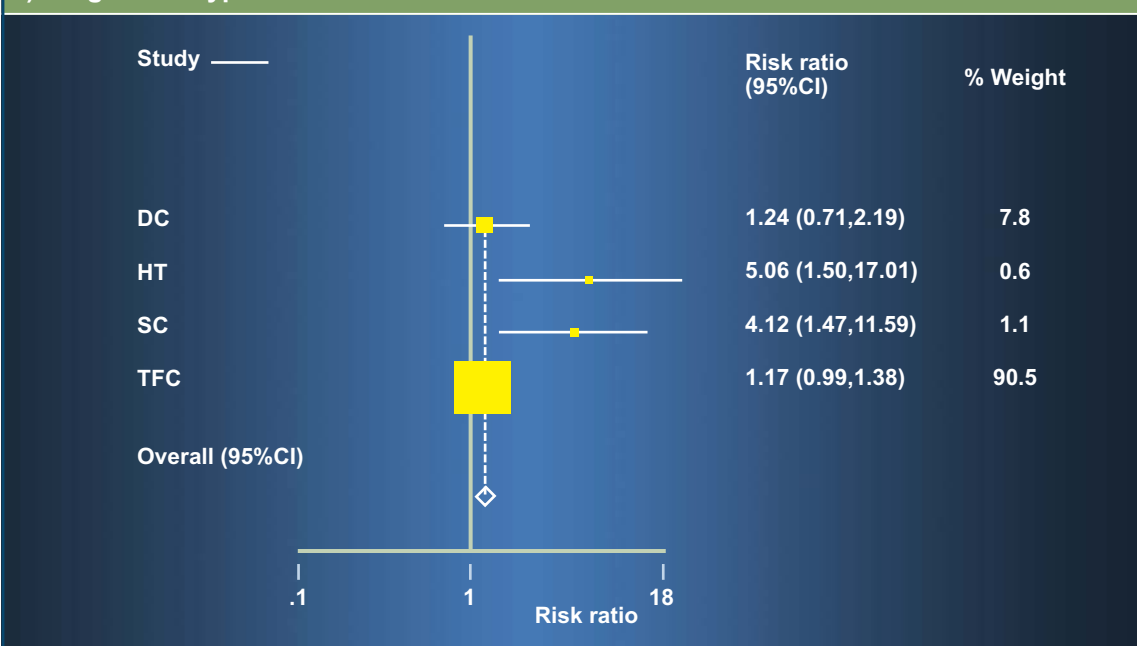
5.5 Results

Figure 22: Forest plots of the risk ratio of dying for infants <6m compared to children aged 6 to 59 months by country and by programme type using data from the 'raw' datasets

a) Country



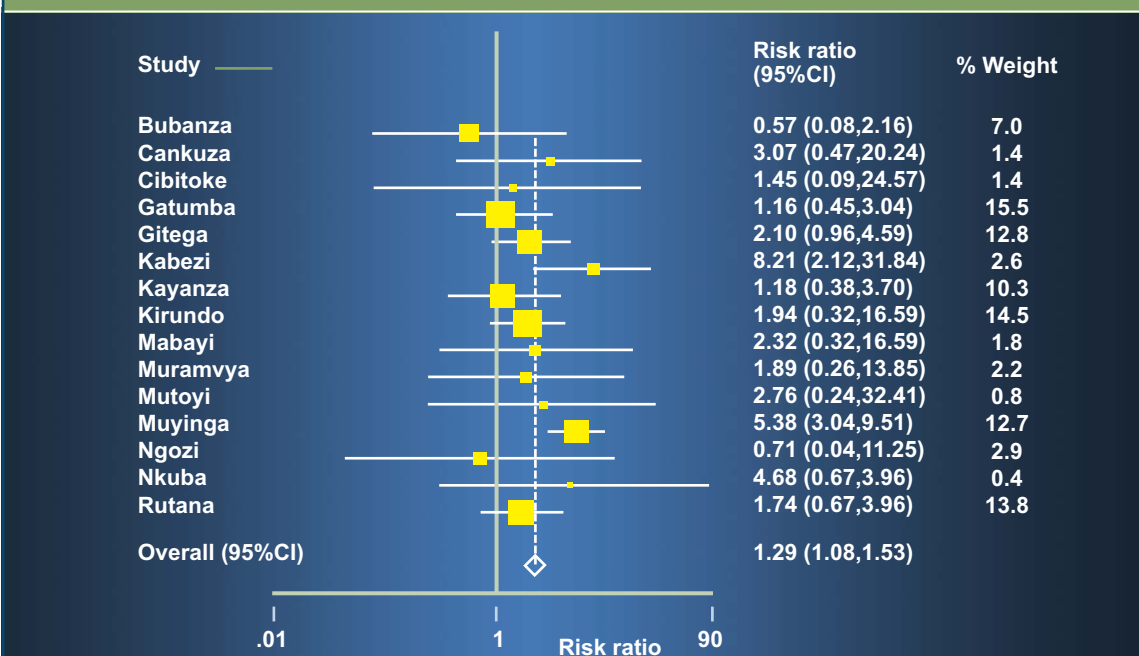
a) Programme type



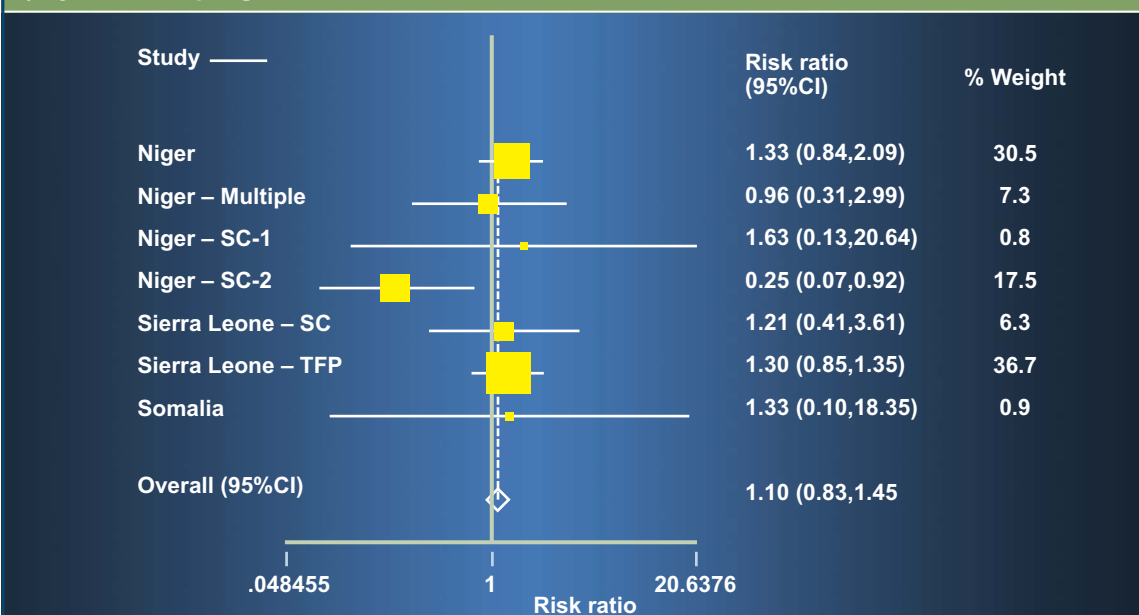
5.5 Results

Figure 23: Forest plots of the risk ratio of dying for infants <6m compared to children aged 6 to 59 months in Burundi by different TFC centres and by different programmes, using compiled data from various agencies

a) by different TFC centres



a) by different programmes



5.6 Discussion

5.6.1 Key findings

In our analysis of data from 33 datasets from 12 countries we showed that an approximate 16% of admissions for severe malnutrition care are infants <6m ranging from 10% in Home Treatment (HT) to 25% Day Centre (DC) programmes. This range of variability was greater when analysed by country. We also showed that the burden of malnutrition in infants <6m forms part of the distribution of malnutrition in children less than 60 months old, starting immediately after birth, which seems to peak between the ages of six to 24 months and presents a significant decline after 36 months of age. In addition, the proportion of severely malnourished males is greater in infants <6m than that in their older counterparts.

One significant and consistent difference found was that infants <6m are less likely to present oedema. The risk ratio for presenting oedema in infants <6m was 0.1 (ranging from 0.08 – 0.12, $p < 0.01$) when compared to children aged six to 59 months. This risk varied widely by country and programme type, but was consistently lower in infants <6m.

Operationally, we showed that even within one agency, there is a significant variation in the way data is recorded, structured, entered and coded. This makes data cleaning, analysis and interpretation resource intensive and challenging, highlighting the importance for the development and implementation of minimum reporting standards. Within this variation patterns emerged. Infants <6m in general, showed more missing variables/indicators at admission, height being the most commonly missed, clustered mostly in HT and Stabilisation Centre (SC) programme types. Weight-for-height % median (WHM) was also difficult to calculate in this group mostly due to a significant proportion having lengths of <49cm.

As expected, infants <6m presented higher rates of mortality with a risk ratio of 1.29 (ranging from 1.08–1.53, $p < 0.01$). This increased rate was also observed in compiled data from different Therapeutic Feeding Centres (TFCs) in Burundi but was not observed in MSF compiled data from various sources. It is not known how much of this difference in mortality is to be expected, due to the greater background vulnerability of this age group. It is also important to note that the lack of contextual and survey data on infants <6m meant it was not possible to compare inpatient mortality with mortality amongst infants <6m in the general population.

Few countries met all Sphere exit indicators for therapeutic care of severely malnourished infants <6m (Correction of Malnutrition Standard 2). Variations in outcome between different programmes need exploration to find out how much this reflects programme/ guidelines performance and how much patient clinical profile on admission. Current indicators to achieve Sphere Standards (2004) to correct malnutrition have their limitations with regard to infants <6m. It is not clear whether Sphere exit indicators for children under five years include infants < 6m. While a Sphere indicator is included on the importance of breastfeeding and psychosocial support in SAM treatment, there is no clear guidance on how to measure this. The staff: patient ratio (1:10) recommended may also not be applicable, given the level of support warranted for infants <6m. A process of quality improvement in programming will help inform development of Sphere Standards for infants <6m.

There is an absence of standard infant feeding indicators in programme data such as breastfeeding status on admission and on discharge. Exclusive breastfeeding has been identified as a main treatment outcome in infants <6m (Chapter 5). Continued breastfeeding to two years and beyond significantly contributes to infant and young child food security. Sub-optimal feeding practices may contribute to acute malnutrition. Therefore standardised feeding status data is needed to both inform treatment and audit.

5.6.2 Strengths and weaknesses of the analysis

The size of the database analysis in this chapter is a major strength of our work. It allowed us to compare and contrast different programmes, from different countries, from different time periods. Limitations are as follows:

- *Data source:* Data analysed is primarily from one relatively well resourced, highly experienced, technically able non-governmental organisation (NGO) whose programmes likely represents the 'top end' of a wide range of field practices.

5.6 Discussion

- *Need for intensive data cleaning with time & resource limitations:* Databases required intensive processing before analysis, which required months of dedicated person-time. This is possible within a research setting, but difficult within a field-focused organization where the time delay would limit the application of learning.
- *Validity and reliability issues:* Given the extent of cleaning and processing that were needed to harmonize the field databases, it is likely that field practices also varied significantly between sites and programmes. In an ideal analysis, quality and validity of the whole data flow system, from patient to final database, would be verified.
- *Coverage data:* There was no available data on programme coverage. This makes it impossible to assess population impact, i.e. a hypothetical programme with 100% coverage but 50% death rate makes a greater impact than a programme with 50% coverage but 10% deaths.
- *Interpretation of outcome data given limited variables:* Many programmes did not reach Sphere standards to correct severe malnutrition. However, given lack of even basic context data on clinical condition of children presenting to care, it is not possible to say how much of that shortfall represents suboptimal programme effectiveness and how much reflects a high risk patient caseload. This is presented visually in Figures 25-28.

TFP/SFP outcome = programme effectiveness x 1/risk of death at admission

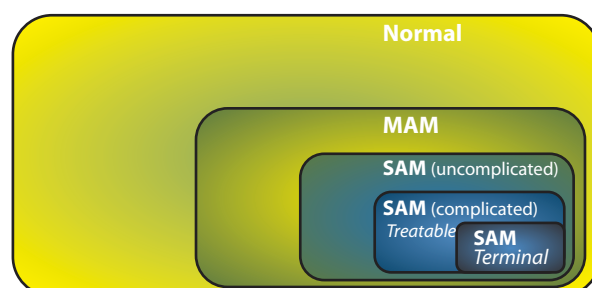
(i.e. good outcome = highly effective programme x low risk patient)

5.6 Discussion

TFP/SFP outcome = programme effectiveness x 1/risk of death at admission

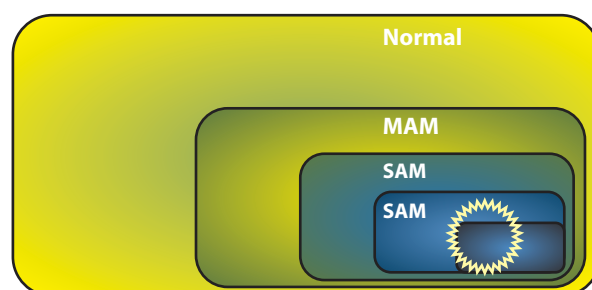
(i.e. good outcome = highly effective programme x low risk patient)

Figure 24: Hypothetical population showing the relationship between different types of acute malnutrition.



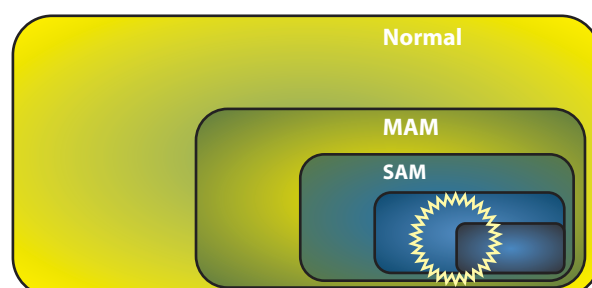
Whether or not these standards are achieved is often seen as a function of programme performance. Indeed, ensuring that humanitarian response programmes were working effectively and safely (e.g. by following accepted/acceptable clinical guidelines) was part of the original drive behind Sphere. However, it should not be forgotten – and it is of great relevance to interpretation of MAMI data – that patient caseload can also play a major part in how 'effective' a programme may appear:

Figure 25: Programme with poor outcomes



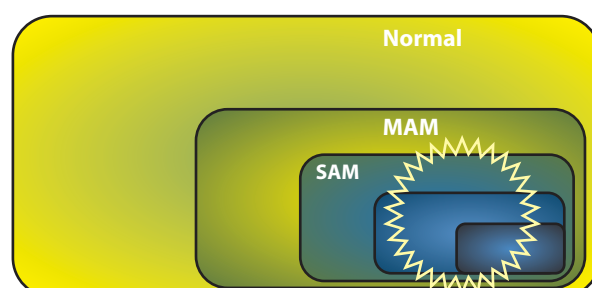
This programme may actually have very good staff/case management – yet it performs badly because patients present too late to benefit from even the best of treatments.

Figure 26: Programme with better outcomes



Staff in this programme may manage their cases of SAM worse than in the 1st programme, yet still get better outcomes simply because patients are less sick and less vulnerable at admission

Figure 27: Programme with good outcomes



Focus on uncomplicated SAM is likely lead to good outcomes. Programme coverage is also high and has higher probability of public health impact. However, numbers of deaths actually averted will vary according to risk of death in each category

Key to Figures 24-27

Normal: nourished sub-population

MAM: sub-population with moderate acute malnutrition

SAM: sub-population severe acute malnutrition (with or without complications)

SAM (terminal): SAM presenting at such a late stage that any treatment, however high quality, is unlikely to prevent mortality



Sub-population in treatment programme

5.7 Summary findings and recommendations

5.6.3 Future directions

The results provide a good baseline for future work. Future analyses are important to continue to monitor trends and patterns in MAMI and to indicate effects of future management guideline changes. However, this will require significant changes to current data systems, as follows:

- Quality of data throughout the entire system monitored and enhanced, from data collection to data entry.
- More structured, probably specially constructed, databases with validation and consistency cross-checks at data entry stage.
- Harmonised database structures and coding strategies.
- Ascertain what are the most appropriate variables to measure in infants <6m and collect routinely.

In the area of moderate malnutrition management, there is work well in progress to standardise reporting and establish minimum reporting standards in SFPs, focused on children 6 to 59m¹⁴⁶. This approach could be applied to infants <6m. In addition, an update in the SFP reporting package to include infants <6m is recommended.

Data on infants <6m must be included in nutrition surveys to assess initial needs and later programme coverage. Clinical variables should also be collected to enable better interpretation of programme outcomes.

Lastly, different approaches to field data could be considered. Rather than a long term audit of routine data, short term, more focused, periods of data collection might be considered. These would aim to answer specific operational research questions (e.g. how many malnourished infants <6m are LBW?) during a set period of time, after which normal 'minimal' data collection could resume.

5.7 Summary findings and recommendations

Summary findings

Infants <6m are admitted to feeding programmes, and do therefore warrant attention and resources.

Significant work is needed to harmonize and improve the quality of field databases. Standardisation in reporting is needed, including database structure, case definitions, outcome coding and variable formatting, to facilitate future research and routine audit.

Overall, infants <6m had a higher proportion of measurements missing or wrongly recorded. Missing values for length were greater in infants <6m. MUAC is being measured in infants <6m in SC and TFC programmes against current recommendations. Staff training and appropriate equipment are needed to improve the quality of anthropometric assessment in this age-group.

Feeding programme data should be disaggregated by age, to enable closer analysis. Routine indicators of feeding status on entry and exit to programmes are necessary.

Percentage mortality in admitted infants <6m was significantly higher than admitted children aged 6 to 59m (4.6% vs 4% respectively, $p < 0.01$). There was no data on mortality of infants <6m not admitted.

Few countries met all Sphere exit indicators for therapeutic care of infants <6m (Correction of Malnutrition Standard 2). Current indicators to achieve Sphere Standards (2004) to correct malnutrition have their limitations with regard to infants <6m.

Presence of oedema was consistently lower in infants <6m. The risk ratio of presenting oedema was 0.1 (range: 0.08 – 0.12) when compared to children aged six to 59 months.

There are significant inter-database variations in structure, coding and data entry, even within agencies. Data cleaning, analysis and interpretation is thus time intensive and challenging.

Summary recommendations

Attention and resources should be diverted to MAMI in feeding programmes and a process of quality improvement should be implemented to help programmes to reach Sphere Standards for infants <6m and to reduce the proportion of deaths in this age group.

5.7 Summary findings and recommendations

Staff training and appropriate equipment are needed to improve the quality of anthropometric assessment of infants <6m.

Feeding programme data should be disaggregated by age, to enable closer analysis. Routine indicators of feeding status on entry and exit to programmes are necessary.

Standardisation in reporting is needed, including database structure, case definitions, outcome coding and variable formatting, to facilitate future research and routine audit. Significant work is needed to harmonize and improve the quality of field databases. There are lessons to learn from the SFP Minimum reporting Standards Package under development and an update in the SFP reporting package to include infants <6m is warranted.

Few countries met all Sphere exit indicators for therapeutic care of infants <6m (Correction of Malnutrition Standard 2). Current Sphere indicators to correct malnutrition have their limitations with regard to infants <6m. The MAMI report findings should inform Sphere Standards update. A process of quality improvement should be implemented to help programmes to reach Sphere Standards for infants <6m.

Endnotes

¹⁴⁵ None of these recoded cases where WHM <80% reached the final analysis.

¹⁴⁶ Minimum Reporting Standards for SFP project. <http://www.ennonline.net/research/sfp.aspx>

Chapter 6

Key informant interviews



Chapter 6: Key informant interviews

6.1 Rationale and objectives

This chapter comprises a review of field experiences and ‘front-line’ perspectives on MAMI from qualitative data sources. The purpose is to explore priority areas for improving MAMI outcomes and to identify relevant issues not captured by the quantitative data examined in Chapter 5.

Objectives are to identify context factors that:

- facilitate good outcomes from MAMI;
- are barriers to good outcomes/underlie poor outcomes;
- are potentially modifiable vs. those which are not easily modifiable.

6.2 Methodology

6.2.1 Design

There were three distinct parts to the field experiences review:

- a) A steering group meeting of key experts and representatives of partner organizations, where key MAMI issues were identified and discussed.
- b) A series of semi-structured key informant interviews by telephone on themes identified in a).
- c) Two field visits to clinical settings (Kenya & Malawi).

6.2.2 Participants

Contributions were sought via:

- a) Individual and organizational contacts identified by ENN, UCL CIHD and ACF, and further contacts on the advice of these.
- b) Information on MAMI and a call to collaborate was posted on the following websites:
 - The UN Interagency Standing Committee Global Nutrition Cluster¹⁴⁷
 - UCL Centre for International Health & Development¹⁴⁸
 - ENN (Emergency Nutrition Network)¹⁴⁹
- c) Information was posted to E-lists and e-discussion groups including:
 - Child 2015¹⁵⁰
 - Pronut Nutrition and HIV/AIDS (ProNut-HIV).¹⁵¹

Method of approach

Contacts were followed up by telephone and email. Information about the MAMI Project and key themes to be discussed was sent in advance of an interview (see appendix C).

Sample size

The steering group meeting was of all those able to attend. Key informant interviews continued until saturation, when themes were consistently repeated and no new issues emerged. Every attempt was made to hear from a range of different staff working in different organizations.

Non-participation

Nobody approached for key informant interview declined to participate. However, not all potential interviews took place, principally due to overseas travel commitments.

Aside from the Kenya & Malawi field trips, most key informant interviews were conducted by telephone by MK lead MAMI researcher (London, UK).

6.2 Methodology

6.2.3 Data collection

A semi-structured interview questionnaire was developed by the principle researcher with input from the MAMI Project core group. This was formed around key themes identified at the initial steering group meeting (see Appendix D). The questionnaire followed a 'patient care pathway' from onset of disease to discharge and follow up. Written notes were made during interviews.

6.2.4 Data analysis

Using interview notes, key sub-themes were documented under each step of the patient care pathway. Contributors are named as members of the MAMI Project steering group, but individual quotes remain anonymous to keep the focus on common issues, rather than highlighting inter-organizational differences.

Possible research and policy implications arising from themes identified were elaborated by the MAMI Project writing team. These are not meant to be definitive but to highlight key issues for future work.

6.2.5 Limitations

It is important to note that the sample of key informants is purposive and not necessarily representative. The possibility of bias cannot therefore be excluded. Given this, quantitative analysis of interview responses was not undertaken.

6.3 Results

6.3.1 Participant profiles

(a) Steering group meeting

A meeting of key agencies involved in MAMI in emergencies took place in London on 28th May 2007. A total of 23 participants representing 16 different organizations attended. A summary of this meeting along with participants is included in appendix C.

(b) Key informant interviews and (c) field visit observations

A total of 33 key informants were interviewed (see Acknowledgements). Key characteristics (country location of programme described; interviewee position; type of organization/programme) are detailed in Table 45, appendix C. Some participants described issues in multiple settings, so that the number of countries and projects represented in the table is greater than the number of individuals interviewed.

6.3.2 Themes

Key feedback, emerging policy implications and research questions from key informant interviews and field visits are summarised in Tables 30-35:

- Prevalence & causes of infant <6m malnutrition (Table 30)
- Identification of malnourished infants <6m and admission to programme (Table 31)
- Programme details (Table 32)
- Challenges in managing infants <6m (Table 33)
- Training and support (Table 34)

More detailed feedback for each is included in Appendices D.5-D.10. Two case studies describe interesting innovations: a study on supplementary suckling in Liberia (Box 6) and pilot experiences in including disaggregated data on children less than two years in the UNHCR health information system in Dadaab, Kenya (Box 7).

6.3 Results

6.3.3 Emerging Issues

Prevalence and causes of infant <6m malnutrition

There is little information on programme coverage of MAMI, as infants <6m are not routinely included in nutrition surveys. There are many contextual factors that influence the onset of SAM in infants <6m, such as birth history and medical state, maternal psychosocial influences, community influences socio-economic factors, access to health services and HIV. There are large inter-programme variations in the perceptions of these influences. Up to date guidance on HIV is often not reflected in TFP guidelines, with outdated and sometimes risky practices result.

Identification of malnourished infants <6m and admission

Not all programmes actively seek malnourished infants <6m and instead only deal with those that present. Not all presentations or admissions of infants <6m are recorded. In some cases they are 'cleaned' from datasets as they are considered non-standard data, or 'medical' cases. In some instances, infants <6m were assessed and treated outside the TFP, e.g. in a paediatric ward. This highlights the importance of cross-clinical training and skills sharing.

A combination of clinical judgement and anthropometric indicators are often used to determine admission. The nature and relative contribution of both varies greatly by programme. Assessing growth history on admission is difficult due to lack of serial measures on admission, use of different indicators in the community (weight-for-age) for community screening (MUAC) and for admission (weight-for-height), absence of birth weight record, and quality of anthropometric measurements (e.g. staff aptitude, lack of appropriate weighing scales, lack of standardised weighing).

There appear to be two 'types' of infant <6m presentation: those who present with reported feeding problems (and may be requesting food) but are clinically stable and those who present medically unwell. Some programmes have found it beneficial to use a pre-admission 'breastfeeding corner' to observe breastfeeding in infants that present.

Programme details

Programme guidelines are not consistent and need harmonisation, allowing for local variations. Nutritional and psychosocial care for mothers/ caregivers is important and should be included in guidelines. This should include guidance on good communication between staff and caregivers and clarity of expectations.

Opinion is divided about the effectiveness of supplementary suckling (SS) and on which therapeutic milk to use for infants <6m. Clarity is needed on both. Inadequate staff time and skills to support breastfeeding in infants <6m was as one of the perceived key limiting factors in MAMI. Managing orphans and non-breastfed infants was identified as a major challenge, both in treatment and longer term follow-up.

Challenges in MAMI

Links to other clinical services need to be improved. MAMI should be seen as a cross-cutting issue. Community-based care for infants <6m, for MAM cases and those too sick to attend inpatient facilities, is poor. Guidance on CMAM for infants <6m is needed. SFP is often not available for pregnant and lactating mothers.

Some programmes reported introduction of complementary foods or RUTF in infants <6m, where there was felt to be no other option. Clarity is needed on optimal feeding where BF is not possible.

Cost data

No documented evidence were offered on the time or cost implications associated with providing skilled inpatient or outpatient breastfeeding support in inpatient or outpatient feeding programmes. Documented experiences have tended to focus on the technical aspects and challenges.

Training and support

There is very little content on infants <6m in formal training or in induction courses. 'On the job' training and support and easy access to key resources and visuals would be especially valuable to field staff. More emphasis is needed on critical thinking and reflective learning in the field. Support materials are useful and should be available to field programmes.

6.3 Results

Ways forward

Interviewees identified 'ways forward' that centred on admission criteria, guidance and 'tools' development, linking with other services and building staff capacity (see Table 35).

Table 30: Prevalence and causes of infant <6m malnutrition

Sub-theme	Synopsis of feedback	Emerging policy implication/research question
Population surveys focusing on infants <6m	<ul style="list-style-type: none"> Information often lacking on community prevalence of acute malnutrition in infants <6m Technical guidance on including infants < 6m in surveys is lacking Assumptions are sometimes made on the basis of admissions 	<ul style="list-style-type: none"> Nutrition surveys need to more routinely include infants <6m Need technical/policy guidance on inclusion of infants <6m in surveys Should determine rather than estimate programme coverage for infants <6m
Infant <6m factors underlying malnutrition	<ul style="list-style-type: none"> Common problems include twins, ex-LBW, chronic illness (TB, HIV), acute illness (diarrhoea, respiratory), disability There are large inter-site variations in what is 'common' presentation profile 	<ul style="list-style-type: none"> Future guidelines to give more details for identifying and addressing common infant related issues Better (locally adapted) guidance on infant-specific medical screening needed
Maternal factors underlying malnutrition	<ul style="list-style-type: none"> Mothers and caregivers often have problems themselves, range from medical to psychological to social Care for orphans who have no mother/nobody to breastfeed is a significant problem; their long term care is especially challenging 	<ul style="list-style-type: none"> Future guidelines to give more details for identifying and addressing common maternal/caregiver related issues Specific guidelines needed to manage orphans long-term, after discharge
Family factors underlying malnutrition	<ul style="list-style-type: none"> Family environment sometimes un conducive to good infant feeding practices 	<ul style="list-style-type: none"> Future guidelines to give more details for identifying and addressing common family related issues
HIV	<ul style="list-style-type: none"> Up-to-date HIV diagnosis and management guidelines, especially for infants <18m are limited Some outdated and potentially dangerous practices persist (e.g. blanket use of replacement feeds) 	<ul style="list-style-type: none"> Where prevalent, HIV should be described in TFP/SFP guidelines and/or clear reference made to latest locally appropriate HIV guidelines Urgent dissemination of latest recommendations for infant feeding in HIV exposed infants needed
Health services	<ul style="list-style-type: none"> Access can be difficult There are poor links with other services that might have prevented malnutrition 	<ul style="list-style-type: none"> Emphasise coverage of services and improve access (e.g. CMAM-type approach) Improve communications with other services, especially those focusing on primary prevention of malnutrition e.g. Baby Friendly Initiative
Societal and cultural factors underlying malnutrition	<ul style="list-style-type: none"> A wide variety of social and cultural factors influencing malnutrition Some positively impact infant nutritional status/increase chances of successful treatment for malnutrition Some adversely impact nutritional status/decreased changes of successful treatments Many factors and issues are common to many situations, though prevalence and impact varies widely by setting 	<ul style="list-style-type: none"> Immediate term: Ensure Operational Guidance on IFE is disseminated and implemented in all emergencies (e.g. prevent inappropriate distribution of breastmilk substitutes); rapid assessment to understand local contextual factors contributing to malnutrition. A quantifiable Sphere indicator needed to ensure these steps done. Medium term: Engage with local communities/ advocacy to address relevant social and cultural factors (encourage positive practices; discourage negative ones) Longer term: Build on medium term actions, addressing indirect/structural factors affect infant feeding, e.g. insecurity, access to food, need for mothers to work, protection at a policy level. Cross-sectoral protection of and support for optimal infant feeding are essential to complement and support therapeutic interventions.

6.3 Results

Table 31: Identification of malnourished infants <6m and admission to programme

Sub-theme	Synopsis of feedback	Emerging policy implication/research question
Case finding in the community	<ul style="list-style-type: none"> Not all programmes actively seek to identify malnutrition in infants <6m Clinical judgement is often involved in determining which infants <6m to refer/admit 	<ul style="list-style-type: none"> Active case finding of infants <6m with clear diagnostic criteria would be more consistent with CMAM strategies Clearer diagnostic criteria/checklists are needed, in particular to help community level health workers to identify cases in the community: <ol style="list-style-type: none"> Anthropometric (e.g. use of MUAC) Clinical criteria (including breastfeeding assessment)
Growth Charts	<ul style="list-style-type: none"> Utility of growth monitoring to support the diagnosis of acute malnutrition is variable between settings. Issues include: lack of birth-weight record, validity of previous weights, different anthropometric indicators used in growth monitoring v feeding programmes (weight for age v weight-for-height or MUAC) 	<ul style="list-style-type: none"> Harmonise growth monitoring tools with entry criteria to therapeutic and supplementary feeding programmes
Assessment logistics and practicalities	<ul style="list-style-type: none"> Many current guidelines not clear on infant-specific issues to look for, so child criteria are used, often supported by clinical judgement (this often includes assessment of mother) Several centres found 'pre-admission' assessments useful (e.g. admit first to 'breastfeeding corner' prior to full admission) 	<ul style="list-style-type: none"> Clarify admission criteria for infant <6, and include assessment of relevant factors such as maternal/caregiver health
Anthropometry, measuring	<ul style="list-style-type: none"> There is variation in how much importance different programmes attach to clinical and anthropometric criteria for admitting infants <6m Many field scales are not sufficiently precise for infants (accurate only to 100g) Technical problems with measuring sometimes occur (e.g. uncalibrated scales, infants clothed, 65cm cut-off confusion) 	<ul style="list-style-type: none"> Better evidence needed into 'ideal' case definition for TFP/SFP admissions Programmes should have scales accurate to 10-20g (NB University of Southampton is currently developing new infant scales) Tighter quality control of existing anthropometry guidelines
Reasons for presentation to feeding programme	<p>Two main patterns of presentation occur:</p> <ol style="list-style-type: none"> Infants with reported breastfeeding problems/wanting 'food' (often to well resourced NGO projects), but clinically relatively stable Infants with clinical complications (often to less well resourced projects/established (government) hospitals) 	<ul style="list-style-type: none"> Better case definitions needed to identify those whose anthropometry is acceptable but who report feeding problems Active case finding and community engagement along lines of CMAM strategy would encourage appropriate presentation
Ward layout/assessment environment	<ul style="list-style-type: none"> Programmes with a separate assessment/pre-admission area found it helpful 	<ul style="list-style-type: none"> As far as is possible, ensure this space is available

6.3 Results

Table 32: Programme details

Sub-theme	Synopsis of feedback	Emerging policy implication/research question
Caregiver expectations	<ul style="list-style-type: none"> Caregivers usually expect receipt of something from the programme (food, medicine etc.) Caregiver expectations not always clear Short admission usually preferred 	<ul style="list-style-type: none"> Guidelines should emphasise asking all caregivers basic clinical history questions: "What do you think is the problem?/what do think is the solution?/what do you think we can (or will) do?" This would reduce any expectation/reality mismatch.
Guidelines	<ul style="list-style-type: none"> Many guidelines are currently in use Large agencies tend to use own guidelines, government settings use international guidelines 	<ul style="list-style-type: none"> Need to harmonize guidelines, allowing for local variations as appropriate (see Chapter 4)
Staff time	<ul style="list-style-type: none"> Staff time often major limiting factor in treating infants <6m (much more time-intensive than other groups to care for, especially when providing breastfeeding support) 	<ul style="list-style-type: none"> Programmes need to budget and plan for infant-specific staff (~1 full time support staff per 5-10 nursing mothers)
Staff supervision	<ul style="list-style-type: none"> Good support and supervision are vital for high quality care 	<ul style="list-style-type: none"> Invest time and resources into optimizing organizational leadership and management
Medical treatments	<ul style="list-style-type: none"> Not a major problem in most programmes Drug dosing can be difficult Some uncertainty regarding drug choice (antibiotics, micronutrients) 	<ul style="list-style-type: none"> Ideally would have medications in syrup as well as tablet form Review guidelines and, where infant/child differences apply, clarify guidelines
Maternal issues	<ul style="list-style-type: none"> Direct support (food, psychosocial) to mother was well received if available Care for infant and self (notably drinking enough water) sometimes suboptimal Kangaroo care worked well in some settings 	<ul style="list-style-type: none"> Assessment and care for mother needs to be better highlighted and detailed in new guideline editions (extra resources / specialist staff may be needed) Ensure infant feeding education/support in place
Feeding methods	<ul style="list-style-type: none"> Opinion was sharply divided on supplementary suckling (SS) as key nutritional intervention; either worked very well or hardly at all Expert support often helped solve difficult feeding problems 	<ul style="list-style-type: none"> Training package needed for centres wanting to use SS Research needed to distinguish SS field effectiveness from its efficacy in 'ideal'/'expert-led' setting Improve availability of expert support/more infant-specific training
Type of milk used for therapy	<ul style="list-style-type: none"> Lots of confusion regarding best therapeutic milk for various phases (F100 dilute, F75 most common used). Modified animal milks rarely used. Major challenge is longer term feeding for orphans and others not breastfed 	<ul style="list-style-type: none"> Randomised controlled trials needed to explore which milk is best Need better systems to manage infant formula supplies when needed as last resort
Physical space on ward	<ul style="list-style-type: none"> Having areas dedicated to infants worked well 	<ul style="list-style-type: none"> Programmes to ensure that as far as possible, infant areas are available
Length of stay	<ul style="list-style-type: none"> Average ~10days, often discharged on feeding criteria rather than anthropometric criteria Mothers prefer shorter stay 	<ul style="list-style-type: none"> Long term follow-up studies needed to ensure safety of current discharge criteria Community based programmes would be more in line with CMAM/caregiver preferences/ would better ensure safety if discharged when weight still low
Follow-up	Can be difficult, especially for orphans	Integrate infants <6m into community (CMAM) systems set up for 6 to 59m children

6.3 Results

Table 33: Challenges in managing infants <6m

Sub-theme	Synopsis of feedback	Emerging policy implication/research question
Links to other clinical services	<ul style="list-style-type: none"> Initial assessment often done in other clinical areas outside of nutrition ward Breastfed infant referred to paediatric ward rather than managed in nutrition ward in some programmes 	<ul style="list-style-type: none"> Local guidelines should emphasise smooth links between different clinical services Need to emphasise in all child health training and practice that optimal nutrition is a cross cutting issue relevant to all
Community care	<ul style="list-style-type: none"> Services were poor for moderately malnourished infants/those not sick enough to warrant immediate admission 	<ul style="list-style-type: none"> Develop community based models of care for infants <6m
SFP	<ul style="list-style-type: none"> Whilst many guidelines specify SFP for pregnant and lactating women (and those whose infants have MAM), it is not often available 	<ul style="list-style-type: none"> Research and greater clarity re optimal care for mothers/MAM infants and ensure care is universally available if shows to be cost-effective
Non-admissions	<ul style="list-style-type: none"> Often referred to paediatric ward or local primary healthcare services, but difficult to know what final outcomes are 	<ul style="list-style-type: none"> Better documentation and shared audit/clinical records between various child health services (perhaps greater use of patient-held health records)
Unsolicited donations	<ul style="list-style-type: none"> No donations of breastmilk substitutes were noted in sample of key informants 	<ul style="list-style-type: none"> Ensure Operational Guidance on IFE implemented (include as a quantifiable Sphere standard)
Treating infants <6m as if older	<ul style="list-style-type: none"> Some programmes report early introduction of complementary food (including RUTF) in exceptional cases where breastfeeding is not possible 	<ul style="list-style-type: none"> Optimal feeding for infants <6m who cannot be breastfed needs to be formally explored in clinical studies (ideally randomised controlled trials)
Reporting issues, Audit	<ul style="list-style-type: none"> Records and databases were often poor quality, so any audit is difficult Not all databases and reporting systems capture infants <6m Infants with medical or structural causes of malnutrition (e.g. cleft palate) sometimes 'excluded' from reports 	<ul style="list-style-type: none"> Ensure high quality data systems (including staff to ensure they function well) Ensure databases record infants <6m as a subgroup Ensure all malnutrition is reported. Either qualitative additional report or extra column on database could identify numbers with complications likely to affect final outcomes (this would affect programme performance judged by Sphere standards)

Table 34: Training and support

Sub-theme	Synopsis of feedback	Emerging policy implication/research question
Formal training	<ul style="list-style-type: none"> Overall there is very little training in formal nutrition courses (MSc, diploma, other) on infants <6m 	<ul style="list-style-type: none"> Greater engagement with training institutions to add infant feeding material to course syllabus
Induction courses	<ul style="list-style-type: none"> Sometimes limited in clinical content, infants <6m covered briefly if at all 	<ul style="list-style-type: none"> Induction could be longer (or where not possible in emergency could be replaced by early supervision visit) 'Induction' pack could be given to all new feeding programme staff for self directed learning/reference. Would contain key manuals, books, instructional DVDs and other support material
Field visits by supervisor or other 'expert' (on-the job vs. workshop type training)	<ul style="list-style-type: none"> On-the-job training and support found to be useful Workshops can divert valuable staff away from field duties and are arguably not as effective as field-based training 	<ul style="list-style-type: none"> Close supervision and support of field programmes should be a priority (some guidelines have a programme 'checklist' – this could be initial basis of field assessment and support strategy) More field support, less workshops
Critical thinking and reflective learning	<ul style="list-style-type: none"> Needs to be more emphasis on critical thinking rather than blind 'guideline following' 	<ul style="list-style-type: none"> More field-based training around real scenarios and real patients
Useful materials	<ul style="list-style-type: none"> WHO guidelines found useful Posters and other visual materials found useful (especially when adapted for local situation) 	<ul style="list-style-type: none"> Ensure support materials are readily available to field programmes (e.g. via central library, online or via organizations such as TALC – Teaching Aids at Low Cost)

6.3 Results

Table 35: Ways forward: Key informant feedback

Sub-theme	Synopsis of feedback	Emerging policy implication/research question
Identification of infants <6m for admission to TFP/ SFP	<ul style="list-style-type: none"> • Better assessment tools and guidelines needed • More emphasis on active case finding and early identification of malnourished infants (this facilitates CMAM-style outpatient care by finding infants with uncomplicated SAM/at high risk of SAM) • Need to link more with other related clinical services (e.g. growth monitoring, post-natal services) 	<ul style="list-style-type: none"> • Explore use of more detailed and wider ranging assessment framework: infant factors (better clinical, better anthropometric guidance needed), maternal factors and social/family factors • More direct community engagement on infant <6m malnutrition • Establish regular forum for information exchange/cooperation
Guidelines	<ul style="list-style-type: none"> • Need to move towards community-based models of care • More guidance needed in specific areas (e.g. which milk product, what to do for orphans, HIV issues) yet need to avoid 'guideline overload' by having too many different guidelines covering same topics • Need for simple and easy-to-follow guidelines (poster materials, flow charts) • Can be difficult to manage breastmilk substitutes and get the balance right between being available for those few who need them and ensuring no leakage/spillover to infants who do not need them 	<ul style="list-style-type: none"> • Modify guidelines to be more consistent with CMAM 'uncomplicated/complicated' SAM • Strengthen guidelines in these areas. • Link more closely to existing initiatives such as IMCI, BFI, growth monitoring programmes and country-specific HIV guidelines • Emphasise 'support tools/materials' alongside guideline books • Clearer guidelines/stronger systems for managing those infants who cannot be breastfed and who need breastmilk substitutes
Links with other services	<ul style="list-style-type: none"> • Need to create more opportunities to link with related services which would both enhance treatment of established malnutrition and play a role in primary prevention of malnutrition 	<ul style="list-style-type: none"> • Ensure coordination and dialogue between different programme coordinators at field level • Set common targets
Staff	<ul style="list-style-type: none"> • Motivation, training, prioritization of clinical workload are all important • Some staff overburdened with work/ cannot realistically fulfil all current duties to a high standard 	<ul style="list-style-type: none"> • Programme leadership, organization and management (including field supervision) should be given greater emphasis • Task shifting could lead to increased productivity/ efficiency

Box 6: Case history: Successful supplementary suckling in Liberia**Infant feeding in a TFP****MSc Thesis^a by Mary Corbett, Concern, HQ Nutritionist**

The benefits of breastfeeding are widely-known. In conditions characteristic of most emergencies breastfeeding becomes even more important for infant nutritional health and survival. However there are times when alternatives to breastmilk are necessary. It is important that they are used appropriately and do not replace breastmilk unnecessarily. Up until about 6 months breastfed infants' nutritional security is critically linked to the maternal supply of milk. This is why it is so important to protect that supply. However mothers and health workers' confidence in breastfeeding is often shaken when they see a malnourished infant attached to the breast. If there is a rush to rehabilitate the infant forgetting about the mother then there is a risk of discharging a healthy infant with no secure supply of 'food'. Mary Corbett as part of her MSc thesis carried out a study to assess the effectiveness of rehabilitating malnourished infants while maintaining or improving maternal milk supply.

This study was conducted in a therapeutic feeding centre run by Action Contre la Faim (ACF) in Liberia between mid May and mid July 1998. Twenty-five severely malnourished infants with weight for length less than 70% and less than 6 months of age were included in the study. A combination of breastmilk and supplemental milk was used to rehabilitate these infants using a special technique adapted for the study: -the "Supplemental Suckling" technique. This technique has been used previously in well babies.

On admission a detailed history was taken to ascertain the main reasons why the infants were not gaining weight. Routine medications were commenced as per protocols used for malnourished children over six months old. These included Vitamin A and a broad spectrum antibiotic.

The infant was started on three hourly breastfeeds. A supplemental feed was given after one hour following each breast feed. The tip of a naso-gastric tube was attached to the mother's breast at the nipple with the other end of the tube in the cup of supplemental milk (F100 diluted). The breast was offered to the infant. When the baby was attached to the breast it was important to ensure that the tip of the naso-gastric tube was in the infant's mouth. When the baby suckled at the breast the milk was sucked up the tube and then ingested by the infant. The amount given was calculated individually for each infant as per body weight (see below for calculations).

All supplemental milk consumed was recorded. Infants were weighed daily. Records were maintained of any vomiting or diarrhoea. It was assumed that the extra suckling at the breast would stimulate an increase in breastmilk output.

To estimate required caloric intake from breastmilk it was necessary to calculate energy needs for body maintenance, Basal Metabolic Rate (BMR), and expected weight gain for each infant. It was assumed that 110 kcal/kg were required for BMR but for infants with high fevers it was estimated that extra energy was required, increasing the BMR to 120 kcal instead of 110kcal. It was assumed that five calories were required for each gram of weight gained. The calories supplied by the supplemental milk (enough for maintenance) were established. It was assumed that the balance of calories taken was from breastmilk and would be used for catch-up growth. Finally deductions were made for any vomiting or diarrhoea. Once the infants reached 85% weight for height the supplemental milk was reduced by half the amount for one day and then stopped completely.

The infants remained in the centre for a minimum of 4 more days and were exclusively fed breastmilk.

Results

Of the 25 patients admitted one was excluded from the study as the mother was dead while three others were subsequently excluded due to insufficient data as they had been admitted late in the study. During the study a total of 16 infants were discharged exclusively breastfeeding and gaining weight while five were transferred to the local hospital.

With the combined supplemental milk and breastmilk the mean of all the infants maximum daily weight gain was 17.9g/kg/day. Normal weight gain for this age group would be 2g/kg/day while 5g/kg/day would be the minimum weight gain for catch up growth for malnourished infants with 10g/kg/day being the target to aim for. The mean weight gain for the period when the infants were receiving both supplemental feeding and breastfeeding was 14.7g/kg, while the mean weight gain for the period on exclusive breastfeeding was 9.4g/kg/day. This suggests that the weight gain although reduced on exclusive breastfeeding was still adequate for maintenance and catch-up growth. The mean breastmilk output on exclusive breastfeeding reached 204ml/kg (sd 31) with the volume ranging from 390ml to 1131mls but this considerable difference was due to differences in weights of the infants. The mean number of days on supplemental feeding was 13 days.

^a Corbett M. Severe Malnutrition in the Infant less than 6 months: Use of Supplemental Suckling Technique. Department of Medicine & Therapeutics. Fosterhill, Aberdeen.

6.3 Results

Box 6 cont'd

Tips

Supplemental Suckling Technique

- The cup is kept at least 20-30cms below the level of the baby's mouth so that the baby can control the flow of milk from the tube. If the presence of the tube is discouraging the baby from attaching: slip the tube into the mouth once the infant is suckling.
- Be patient: it may take one to two days for the mother and baby to adapt to this technique.

Calculating the amount of supplemental milk given

Calorie requirements for infants <6months:

For body maintenance without growth requirements = 110kcal/kg/day

For each additional gram of weight gain an extra 5kcal are required

Feed amount required:

Breast-milk or supplemental milk contains 70Kcal per 100mls approx.

Therefore amount of breastmilk/supplemental milk required = $(110 \times 100) / 70$ 160mls/kg/day

Calculate enough supplemental-milk needed for body maintenance (BMR) to allow for situations where breast milk is extremely low.

Example of Supplemental-milk calculation:

Infants weight = 3.5 kg

Supplemental milk required = $160 \times 3.5 = 560$ mls in 24hrs

Amount of Supplemental-milk per feed = $560 \text{mls} \div 8 \text{ feeds} = 70 \text{mls per feed}$

As the infant's weight increases the calorie requirements will increase but the supplemental feed will remain the same. The breast-milk produced will increase due to stimulation using the supplemental suckling technique. The infant will receive the calories needed to grow and catch up from the breastmilk.

Feeding Practices

- Mothers should offer breastfeeds to babies at least three hourly.
- Make sure that baby is attached correctly and mother is comfortable.
- Baby should empty one breast before the second is offered so that both the fore and hind milk is removed. (Emptying the breast stimulates the production of more milk thus improving breastmilk output.)
- Mothers should offer alternate breasts at the start of each feed. (This ensures both breasts are emptied at each alternative feed).
- Monitor breastfeeds encouraging and supporting mothers and checking the babies' position and attachment.
- Give first time mothers extra support to build up their confidence in their ability to breastfeed

Confidence building

- Explain the benefits of breastfeeding to the mother. Spend time with the mother encouraging and answering questions.
- Explain to the mother the principle of breastmilk quantity being determined by the demand/supply mechanism.
- Reassure mothers, informing them that most mothers in fact can produce adequate milk supply (more than 99%), even if underweight.
- Other mothers in the TFP using this supplemental suckling technique are of great support and encouragement to new admissions.
- Encourage women to talk about experiences.
- Regularly update mothers on their infant's progress in the programme.
- Ensure all health staff working in the centre are well informed of the principles and techniques of breastfeeding and supportive to the mothers. Regular training and support for staff is essential

6.3 Results

Box 7: Case history: Using dedicated infant <6m data to support an innovative IYCF programme**Synergies between information & action: UNHCR Health Information System (HIS) & Infant and Young Child Feeding**

HIS is a multi country reporting package which is currently being rolled out by UNHCR. The package consists of training materials; standardized data & tally sheets; a system of monthly data entry; standardized indicators and reporting / recording requirements; a central database at central HQ with data across 16 different countries. A key feature of this HIS tool is collecting age disaggregated data on infants <6m. This provides invaluable data because:

- 1) Infant <6m mortality is likely high, as is infant acute malnutrition prevalence (see MAMI Chapter 3). So monitoring is justifiable in public health terms.
- 2) Reducing infant mortality is a key part of making progress towards MDGs.
- 3) In terms of normal physiology, nutritional needs and common pathologies, there is large variation in the 0 to 59m age group. Therefore, grouped data can easily be confounded by age profile and is not nearly as informative as age-specific data.
- 4) Acute malnutrition prevalence will increase with new WHO-GS - with unknown effects on what both carers and health workers do in response, so now is more important than ever to keep on top of infant <6m admissions and outcomes.
- 5) BF status (whether EBF or not) will have the greatest impact for outcomes for <6m infants. Improving % EBF is itself very important, but in high mortality settings, it matters most in this youngest age group, and it is important to see whether BF promotion and support programmes are having this intended 'end effect'
- 6) In terms of nutrition, infants are managed very differently from older children in nutrition guidelines, so again, to assess the effect of this separate management you really need to disaggregate.
- 7) The age disaggregated database allows indirect audit of a groundbreaking programme improving infant and young child feeding through a multifaceted intervention. This CARE-USA led initiative includes community support groups; training health workers and community health volunteers. It provides the critical link between preventing acute infant malnutrition and a community-based support network to which malnourished infants <6m who need support but not necessarily admission can be referred:

Though there is large monthly variation, monitoring overall admission patterns of infants to therapeutic feeding gives some indication of the overall impact of the IYCF programme. Because numbers of infants are low, it can be particularly important and informative to audit individual cases and reflect on whether might have been prevented, or whether future treatments can be further improved.

Admissions to therapeutic feeding centres, Daddab camp, Kenya

	Age Group		
	<6m	6 to <60m	% <6m
August – 07	6	34	17.6%
September – 07	1	5	20.0%
October – 07	8	52	15.4%
November – 07	1	25	4.0%
December – 07	8	32	25.0%
January – 08	3	24	12.5%
February – 08	4	79	5.1%
March – 08	1	17	5.9%
April – 08	0	14	0.0%
May – 08	0	17	0.0%
June – 08	4	15	26.7%
July – 08	1	14	7.1%
August – 08	0	6	0.0%
October – 08	0	19	0.0%
	37	353	10.5%

Source: UNHCR HIS data

6.4 Conclusions and recommendations

A large number of challenges and issues related to the management of infants <6m have been noted. All are consistent with issues noted in previous chapters of this report. The following are particularly important points:

There are aspects of current care which work well. These can be learnt from and replicated elsewhere. The 'breastfeeding corner' to aid pre-admission assessment is one such simple measure. Supplementary suckling has also been reported to work well in many settings. Agencies could consider including such examples as 'models for success' in programme planning.

There are some aspects of care which need to be improved and evolved in future guidelines. Often discussions can focus more on technical aspects, such as which therapeutic milk to use. Whilst still important, this did not come across as central in key informant interviews. Predominant issues included the need for development of guidelines on MAMI with specific components to address key issues (e.g. support for caregivers/ mothers, therapeutic milks, supplementary suckling, care for orphans and HIV) and for greater staff capacity and skills. On the job training, formal training, 'tools' and materials alongside guidelines and on the job supervision and support were all seen as important. Further research is needed to determine the efficacy of supplementary suckling, the best therapeutic milks to use and the efficacy of community-based models of care for infants <6m.

Key informants suggested guidelines for infants <6m move towards community-based models of care (CMAM), to bring consistency with the 'complicated'/'uncomplicated' approach, to improve active case finding and community follow-up. A shift in this direction may be timely given the increase in admissions likely as a result of the new WHO-GS. The availability and quality of community-based care for MAM cases in this age group also needs to be addressed.

No data or evidence were identified on the time and costs associated with providing skilled inpatient or outpatient breastfeeding support in inpatient or outpatient feeding programmes – documented experiences in topical areas like supplementary suckling have tended to focus on the technical aspects and challenges. It is critical that a move towards improving inputs to support infants <6m in inpatient care and developing outpatient support is informed by the costs and resource implications of such developments.

6.5 Summary findings and recommendations

Summary findings

Many therapeutic feeding programmes struggle in treating malnourished infants <6m.

Good examples of MAMI exist, such as the use of 'breastfeeding corners' to assess breastfeeding pre-admission and supplementary suckling. Experiences with supplementary suckling varied; staff time and experience were important limiting factors.

Information is lacking on community prevalence of malnutrition in infants <6m, as this group is not included in surveys. Not all programmes actively seek to identify malnutrition in this age group and admission criteria are often unclear.

Assessment of growth history of infants <6m is complicated by use of different indicators in the community vs for admission, and poor quality of anthropometric measurements.

Guidelines for MAMI are inconsistent and lack information on supporting mothers/ caregivers and on specific issues (e.g. supplementary suckling, therapeutic milks, orphans and HIV).

Managing orphans and non-breastfed infants was identified as a major challenge, both in treatment and longer term follow-up.

There is a lack of staff capacity and skills to support breastfeeding and an absence of formal MAMI training and staff induction.

Links to other clinical services are often not smooth.

Community-based care for infants <6m and mothers with MAM, for non-admitted infants <6m and discharged infants <6m are generally lacking.

6.5 Summary findings and recommendations

Summary recommendations

The identification of infants <6m for admission must be improved. Technical guidance for the inclusion of infants <6m in nutritional surveys is needed. Better assessment tools for the mother-child pair are also needed. Guidance and better equipment will enable anthropometric assessment of infants <6m e.g. better weighing scales. Growth monitoring tools could be harmonised with entry criteria to feeding programmes.

Strategies with potential to improve SAM assessment and management in infants <6m include 'breastfeeding corners'/ separate mother and baby areas where skilled breastfeeding support is available and peer-to-peer support is facilitated.

Guidelines for MAMI must be improved that include guidance on specific 'problem' areas and make links with relevant initiatives.

MAMI training should be integrated into formal courses and 'on the job' training and support provided to field staff with simple tools and materials.

Further research is needed to determine the efficacy of supplementary suckling, the best therapeutic milks to use, and the efficacy of community-based models of care for infants <6m.

The cost and resource implications of interventions should be included as a key element of investigations into expanded models of inpatient and outpatient care.

Endnotes

¹⁴⁷ <http://www.humanitarianreform.org/humanitarianreform/Default.aspx?tabid=74>

¹⁴⁸ <http://www.ucl.ac.uk/cihd/research/nutrition/mami>

¹⁴⁹ <http://www.enonline.net/research/mami.aspx>

¹⁵⁰ Child 2015 is an independent forum to stimulate debate and propose pragmatic solutions for improving child healthcare worldwide <http://www.dgroups.org/groups/child2015/>

¹⁵¹ Pronut Nutrition and HIV/AIDS (ProNut-HIV) is an electronic forum which aims to share up-to-date information, knowledge and experiences on nutrition and HIV/AIDS. <http://www.pronutrition.org/discgroups-hiv.php>

¹⁵² Mary Corbett (2000). Infant feeding in a TFP. Field Exchange, 9, p7. <http://fex.enonline.net/9/ftp.aspx>



Chapter 7

Review of breastfeeding assessment tools

Chapter 7: Review of breastfeeding assessment tools

Many malnourished infants present with reports of breastfeeding problems (Chapter 6) and exclusive breastfeeding in infants <6m is the treatment goal of most guidelines (Chapter 4). Therefore breastfeeding assessment to identify feeding problems and monitor recovery is an important part of MAMI. Since most current SAM guidelines do not include or refer to specific breastfeeding assessment tools, this chapter reviews those tools currently available and their potential application to the MAMI contextⁱⁱⁱ.

7.1 Scope of review

Existing reviews, focused on developed countries, have identified a number of breastfeeding assessment tools with none clearly identified as a gold standard.¹⁵³ This chapter identifies areas of consensus between tools, gaps in coverage and advantages and disadvantages in different settings. To do so, a framework is used that identifies three aspects or settings of severe acute malnutrition (SAM) care: community screening/case detection, case finding in clinical contexts, and diagnosis in clinical contexts.¹⁵⁴ We conceive that there is a gradient of importance of different tool characteristics from community to clinical contexts. For example a community-health worker (CHW) with responsibility for treating malnourished infants would want a highly sensitive tool to identify women experiencing breastfeeding problems, but a clinician diagnosing a reported breastfeeding problem in a hospital-setting would benefit from using a tool with higher specificity so that 'false positives' did not result in unnecessary inpatient admission.

Objectives of the review are as follows:

- To identify published breastfeeding assessment tools, and document which breastfeeding domains are covered and which omitted (adapted from Hall Moran, 2000¹⁵⁵).
- To consider tool value in emergency settings and other nutritionally vulnerable contexts, looking at performance characteristics for identifying breastfeeding problems in community and clinical settings (adapted from Myatt et al, 2006¹⁵⁶).
- To grade the tools based on the quality and level of evidence underlying their development and validation.

When talking about 'case-finding', we envisage that the tools would be used in combination with anthropometric assessment. Exact use will depend on context. In MAMI, their main importance is identifying the immediate cause of poor anthropometric status. The better the diagnosis, the faster and better the patient can be directed to treatment services. For example, a young infant may be identified in the community as having a simple breastfeeding problem due to poor positioning. He/she might benefit from early referral to a breastfeeding support group before severe malnutrition and clinical complications develop. Another infant may have a low weight-for-length but no identified breastfeeding problem; in this case clinical referral and assessment is needed. Other approaches, such as establishing HIV status, should be considered. Maternal factors may also determine breastfeeding 'success' and other strategies will be needed as a result, e.g. a severely malnourished mother who is exclusively breastfeeding will require nutritional rehabilitation of the mother to enable adequate nourishment of her infant; children of HIV-infected mothers who are ill or die are more likely to die themselves, independent of the HIV status of the infant¹⁵⁷.

ⁱⁱⁱ This review was carried out as an additional activity beyond the scope of the original MAMI Project, undertaken by Jenny Saxton and supported by the MAMI Research Team. We acknowledge valuable feedback from Felicity Savage and Ann Ashworth on content, to inform this and future write-up of this work.

7.2 What should a breastfeeding assessment tool include?

7.2 What should a breastfeeding assessment tool include?

Effective breastfeeding can be divided into several essential elements that are important for overall success. One study that critically analysed six breastfeeding assessment tools identified the following elements: baby's behaviour, mother's behaviour, positioning, attachment, effective feeding (e.g. audible swallow), health of the breast, health of the baby and mothers' perception of the breastfeeding experience.¹⁵⁸ Other elements, such as severe maternal wasting and maternal HIV status, are important considerations in emergency settings. Determining the main issues for an individual mother/infant dyad matters: more precise diagnoses will direct infants and their carers to more tailored and ultimately more effective treatment. Simple issues can be pinpointed and rapidly resolved (e.g. attachment difficulty). More complex issues can be referred for further care (e.g. breastfeeding support alone is unlikely to address maternal depression). Good assessment can also help rule out breastfeeding problems as the main cause of infant SAM (e.g. an infant may be breastfeeding well yet be malnourished due to underlying HIV disease).

Table 36: Importance gradient of key properties of breastfeeding assessment tools from community to clinical contexts

Tool Property	Context (score) ^a			Reasons for grading
	Community screening/case detection	Case finding in clinical contexts	Diagnosis in clinical contexts	
Simplicity (for CHWs ^b & doctors)	3	2	1	Simplicity is important in community settings as CHWs have lower education/training. Simplicity is less important in clinical contexts unless there is a high caseload & limited time/resources.
Acceptability (by mothers)	3	2	1	BF ^c assessment by definition is intimate. Male CHWs or insufficient privacy/comfort are likely to be unacceptable. Some tools rely on questions alone, not assessment, and are likely to be more acceptable to mothers.
Cost/Time	3	2	1	Resource-poor settings would demand that assessment be cost & time-effective in all contexts, although at diagnosis there is potentially more time to spend identifying specific problems.
Objectivity	1	2	3	Most tools are observational & will be subjective. Objectivity may be more crucial in diagnostic settings if decisions about admission are being made.
Quantitativeness	1	2	3	Assessment scores give useful indication of risk (e.g. BF cessation). A total score is less useful for diagnosis as specific problems would be masked, but may be helpful in making decisions about admission. Some scoring systems are arbitrary & could detract from finding ways to overcome specific problems.
Precision (reliability)	1	2	3	Important that a tool can pick out specific BF problems in a reliable consistent way, although CHWs may just refer all SAM infants with a breastfeeding problem to more specialised care, or for specific diagnosis of a breastfeeding problem.
Accuracy (Validity)	1	2	3	Very important to be able to pinpoint which aspects of BF are causing problems in order to provide simple solutions. Timing of feed & emotional state could affect the ability to pinpoint a problem if only one assessment is made.
Sensitivity (Identifying true cases)	3	2	1	Sensitivity is less important in clinical contexts because the infant is already present at hospital.
Specificity (identifying true negatives)	1	2	3	'False positives' could overload the health system; make mothers feel inadequate & unlikely to resume BF. Unnecessary inpatient care could increase risk of infection, & may cause mother to leave other children unattended, or lose money through not being able to go to work.
Predictive value	1	2	3	Important that assessments predict infant nutritional outcomes & preventable mortality. For a CHW involved in referral to more specialist BF services, predictive value is less important, better that they identify as many potential true cases as possible to refer for further help.

^a Scoring: 1=least important 2=medium importance 3=most important

^b Community Health Worker;

^c Breastfeeding

Table and scoring system adapted from Myatt et al, 2006¹⁵⁹

7.3 Methods

7.3.1 Literature search strategy

Pubmed was systematically searched for articles with no date parameters set using AND/OR combinations of the following key words and MeSH (medical subject headings) terms:

- Breastfeeding, breastfeeding problems, breastfeeding technique, breastfeeding performance assessment, breastfeeding skill, breastfeeding ability, breastfeeding assessment tool, breast milk, human, actual or perceived milk insufficiency, insufficient milk supply, latch, root, suck, swallow, position, milk transfer.
- Needs assessment, risk assessment, nutrition assessment, psychometrics, nursing diagnosis, index, checklist, questionnaire, diagnostic tools, guidelines.
- Infant nutrition disorders, infant nutritional physiological phenomena, infant very low or low birth weight, infant welfare, infant behaviour, infant premature, infant postmature, infant newborn, infant small for gestational age, infant diseases, infant care, infant growth, developing countries.

Reference lists of breastfeeding assessment tools fitting the inclusion criteria were searched for further relevant tools. Due to the small number of tools identified that were designed for use in developing countries and emergency contexts, a purposive search of WHO/UNICEF and initiatives on infant and young child feeding in emergencies (IFE) in the emergency nutrition sector was conducted. A secondary search was conducted to identify any studies attempting to validate or examine the underlying properties and predictive value of these tools.

7.3.2 Tool inclusion/exclusion criteria

Criteria for inclusion in the current review were articles written in English that described the development of breastfeeding tools applied in clinical or community contexts that were designed to assess breastfeeding performance of the mother-infant dyad through observations or questionnaires. Tools were excluded if they were designed to assess bottle-feeding or breastfeeding problems of women who have undergone breast surgery. Tools using complex assessment methods (e.g. analysis of feeding behaviour with direct linear transformation¹⁶⁰) were also excluded on the basis that these would be unavailable in developing country settings. Single item and survey questions seeking population-level data about infant feeding were not considered to function as diagnostic tools and were also excluded. Tools assessing frenulum function were considered beyond the scope of this review. Maternal self-reported questionnaires assessing maternal perceptions of breastfeeding are summarised in this paper but not explored in detail.

7.4 Results and Discussion

Fifteen tools were identified in the literature search. The Lactation Assessment Tool (LAT™) fitted our inclusion criteria, however we were unable to obtain sufficient information about the development and validation of the tool to include it in the final review. Generally, the methodological quality of studies was suboptimal. At best, tools were tested in observational studies; at worst tools were not tested at all. There was some consensus between tools about breastfeeding domains for inclusion in assessment, but few tools achieved comprehensive coverage and particular domains were frequently neglected. Most were designed for newborn infants, often preterm, whose breastfeeding problems are likely to differ from those of SAM infants. In terms of suitability of tools for different contexts, no single tool would be suitable for use without adaptation.

7.4.1 Development and validation of tools

The majority of tools (9/15) have not been tested against short or long-term nutritional or breastfeeding outcomes and it is therefore difficult to make recommendations for their use. Five were developed purely from existing literature and clinical experience, whilst a further three have been internally assessed for inter-rater consistency and test re-test reliability with results ranging from poor to excellent (Table 37). Overall, just three tools were designed for use by CHWs in developing settings and the majority were developed for North American neonatal populations for use by highly trained health professionals (e.g. NOMAS), although some were also used by mothers (e.g. LATCH). None of the tools was developed for or tested on acutely malnourished infants.

7.4 Results and Discussion

Table 37: Theory-based breastfeeding assessment tools

BF Tool*	Author(s) & Date	Tool Description	Country, setting	Sample size & participants	Infant age (mean, sd)	Infant/maternal outcomes	Statistical Analysis	Results Summary	Author Comments /notes	Our comments
IFE Module 2 - (SRA^a & FA^b of BF^c).	IFE Core Group (2004)^d	SRA: Age appropriate feeding, BF ease, baby's condition. Refer problems for FA: observe: attachment, suckling, mother's confidence, feed end. Listen/learn from mother re BF practices/beliefs/worries. Observe artificial feed if relevant.	Training material developed on the basis of 'existing best practice & published evidence where it exists. Where it does not it draws upon extensive experience & a broad base of expert opinion.' BF assessment sections based extensively on the WHO 40 hour breastfeeding counselling course (2004).						Field workers should systematically record & identify most effective methods.	Requires module 1 training (1-3 hours) & module 2 (5 hours). Developed for CHWse in emergency/developing country settings.
Mother-infant BF assessment tool	Johnson et al, 1999¹⁶¹	Mother & infant scored on 8 items to indicate BF failure risk: latch (2 items), suck, nipple type, frequency of nursing/wet nappies, previous success w/ BF, supportive partner.	USA, home visit	n=981; not stated	Not stated	Re-admission rate w/ BF problems.	Compared % readmissions w/ BF problems of women receiving home visits vs not.	Re-admission rate higher if no home visit was made.	Tool is a useful guide for novice nurses.	
A BF Evaluation & Education Tool (BEET)	Tobin, 1996¹⁶²	8 sub-scales: Feedings, positioning, latch, suck, milk flow, intake, output, weight gain.	Tool based on 2 published & 4 unpublished BF references. No reference to clinical experience or attempted validation of tool against measurable outcomes, or internal reliability.						Can use tool prenatally, by phone or in hospital.	Rationale for items discussed but not tested against measurable outcomes.
Mother-Baby Assessment (MBA)^f	Mulford, 1992¹⁶³	5 steps in BF assessed: signalling, positioning; fixing; milk transfer; ending. Scores for mother & infant separately.	USA, not stated	Limited information given re evidence MBA items based on. Positioning, fixing & milk transfer items from published work describing common signs. Tool not validated in this study, although was in a further study.					Tool tracks BF in hospital triage/referral or research	
Systematic Assessment of the Infant at the Breast (SAIB)	Shrago & Bocar, 1990¹⁶⁴	Observation of: alignment; areolar grasp; areolar compression; audible swallowing. No scoring system.	USA, not stated	Instrument based on scientific understanding of lactation & clinical experience. Not psychometrically tested or validated against maternal or infant nutritional or BF outcomes.						

7.4 Results and Discussion

Table 37 cont'd

BF Tool*	Author(s) & Date	Tool Description	Country, setting	Sample size & participants	Infant age (mean, sd)	Infant/maternal outcomes	Statistical Analysis	Results Summary	Author Comments /notes	Our comments
UNICEF b-r-e-a-s-t observational checklist	WHO/ UNICEF, 1993¹⁶⁵	27 items/6 scales: signs that BF going well vs possible difficulty: Body position, Responses, Emotional Bonding, Anatomy, Suckling, Time suckling.	Not stated, although designed for CHW w/ WHO/UNICEF BF training.						None stated	Tool covers wide range of BF domains, but no evidence of development/ validation against external outcomes.
Mother-Infant Breastfeeding Progress Tool (MIBPT)	Johnson et al, 2007¹⁶⁶	8 items observe: responsiveness to feeding cues; timing of feeds; nutritive suckling; positioning/latching factors; nipple trauma, infant behaviour state & mother/parent response to infant.	USA, hospital	n=62; Healthy mother & baby; 35-42 weeks GA7.	2 hours to 5 days old	n/a	% agreement between raters	Inter-rater agreement 79-95%.	Caution if relying upon single scores because mother/infant progress with BF over time.	Rationale for items discussed but not tested against nutritional/BF outcomes.
Pre-term Infant Breastfeeding Behaviour Scale (PIBBS)	Nyqvist et al, 1996¹⁶⁷	6 items assess pre-term infants on: rooting, areolar grasp; duration of latch; suckling; longest sucking burst; swallowing.	Sweden, hospital	n=24; Full/preterm infants in neonatal intensive care, transitional/maternity units.	Not stated	n/a	Inter-rater reliability of observers, & mothers. Unclear analysis testing tool ability to detect different GA/maturity of infant BF.	Good inter-rater reliability for observers (0.64-1.00), but poor for observers vs mothers (0.27-0.86). Poorer items revised.		
BF Support guidelines for a Baby-Friendly Hospital: BF Observation Aid	UNICEF, 2006¹⁶⁸	21 dichotomous items: signs that BF going well vs possible difficulty. General items and items assessing: breast condition, positioning, attachment, suckling.	Material field tested in Zimbabwe	Not stated					None stated	Tool is revised UNICEF checklist. Piloting in Sierra Leone early 2009.

* Includes tools developed on the basis of expert opinion and literature searching; tools may have been 'internally' validated

7.4 Results and Discussion

Table 38: Breastfeeding assessment tools validated against maternal and infant outcomes

BF Tool*	Author(s) & Date	Tool Description	Country, setting	Sample size & participants	Infant age (mean, sd)	Infant/ maternal outcomes	Statistical Analysis	Results Summary	Author Comments /notes
BF^a Assessment Score (BAS)	Hall et al, 2002¹⁶⁹	Risk of BF cessation (first 7-10 days). 5 items: mother's age, previous BF experience, latching problems, BF interval, formula bottles. 2 extra items: breast surgery, hypertension, vacuum vaginal delivery.	USA, hospital	n=1108; No information on maternal or infant health indicators.	Mean 40 hours (sd=13)	BF cessation rate 7-10 days after birth	Single variable logistic regressions identified candidate predictors. Predictors entered into multiple logistic model; evaluated with OR ^b & RR ^c to give optimal ROC ^d	10.5% of mothers reported cessation of BF; All BAS items sig ^e predicted BF cessation.	
	Gianni et al, 2006¹⁷⁰	Usefulness of an assessment score to predict early EBF ^f cessation.	Italy, hospital	n=175; Mothers of healthy EBF infants. Birth weight ≥2500g, GA ^g 37-42 weeks.	Not reported. Mean hospital stay 2.2 days	BF cessation, introduction of complementary feeding, continued EBF at 1 month	Chi ² & Mann-Whitney U Tests to test for differences in BAS scores by BF behaviour 1 month postpartum.	Baseline scores of EBF mothers at 1 month sig lower than non-EBF. NS ^h difference if complementing BF at 1 month vs no BF. Latching problems & no prior BF success negatively associated w/ BF duration.	
Infant Breastfeeding Assessment Tool (IBFAT)	Matthews, 1988¹⁷¹	6 items measure 4 infant behaviours: readiness to feed, rooting, fixing & sucking. Two non-scoring items: infant state & maternal satisfaction w/ BF.	Canada, hospital	n=60; Spontaneous delivery. APGAR ⁱ score ≥8 after 5 mins; appropriate weight for GA.	Early neonatal period ^j	BF status at 4 weeks	inter-rater reliability (%) agreement)	IBFAT scores did not predict BF status at 4 weeks. Limited variability as 80% still BF. Inter-rater agreement 91%.	IBFAT scores did not predict BF status at 4 weeks. Limited variability as 80% still BF. Inter-rater agreement 91%.
	Furman, 2006¹⁷²	Evaluation of VLBW ^k ; can we use the IBFAT?	USA, hospital	n=34; Mothers of VLBW infants	35 weeks corrected GA	Milk intake (test-weighting)	Correlation of IBFAT scores w/ milk intake, compared with association of a feeding observation form designed to assess efficiency of BF vs bottle feeding.	IBFAT positively correlated w/ feeding observation & milk intake; IBFAT sucking score sig correlated w/ % time sucking/suck bursts.	IBFAT does not discriminate between adequate/ inadequate milk intake.

7.4 Results and Discussion

Table 38 cont'd

BF Tool*	Author(s) & Date	Tool Description	Country, setting	Sample size & participants	Infant age (mean, sd)	Infant/maternal outcomes	Statistical Analysis	Results Summary	Author Comments /notes
Infant Breast-feeding Assessment Tool (IBFAT) (cont'd)	Schlomer, 1999 ¹⁷³	Evaluating the association of two BF assessment tools with BF problems & satisfaction.	USA, hospital	n=30; First time BF mothers of term infants	12 hours & 1 week postpartum	Maternal satisfaction & BF problems	Paired t-tests to assess score improvement 12 hours-1 week postpartum. Compared correlation strength of IBFAT & LATCH w/ maternal satisfaction & BF problems	Low predictive validity for maternal satisfaction & BF problems (ns=0.06-0.50) w/ both tools.	
	Riordan, 1997 ¹⁷⁴	Reliability & validity testing of 3 BF assessment tools.	USA, hospital & home visit	n=28; Mothers of healthy, term new borns.	1st week postpartum	n/a	Compared validity & reliability (inter-rater & test/re-test) of IBFAT, MBA & LATCH w/ Spearman's correlations.	Inter-rater correlations: IBFAT (r=0.27-0.69), LATCH (0.11-0.46), MBA (0.33-0.66). Test-re-test correlations 0.64-0.88).	Methodological issues using taped BF sessions.
LATCH[®] Assessment	Jensen et al, 1994 ¹⁷⁵	5 items: Latch; Audible swallowing; Type of nipple; Comfort of mother's breasts/nipples; Help needed to hold baby to breast.	USA	This instrument was based on scientific understanding of lactation & clinical experience. It was not psychometrically tested or validated against any maternal or infant nutritional or BF outcomes, although it has since been tested.					
	Riordan, 2001 ¹⁷⁶	Predicting BF duration using the LATCH BF assessment tool.	USA, hospital	n=133; Mothers of healthy singletons (38-42 weeks GA) intending to BF ≥6 weeks	39 hours	Not BF at 8 weeks (no BF in past 24 hours)	Fisher's Exact test: LATCH scores of women BF vs not BF at 6 weeks. Stepwise regression to id variables associated w/ BF duration.	Regression model: LATCH score, mother's age, intended BF duration & delivery type all sig related to BF at 6 weeks.	Audible swallowing not a viable variable until day 4.
	Kumar, 2006 ¹⁷⁷	LATCH scoring system & prediction of BF duration.	USA, hospital	n=182 (4 days) n=188 (6 weeks); Mothers of healthy term new borns	Newborn	Maintenance of BF at 4 days & 6 weeks	Wilcoxon Rank Test to compare LATCH scores of BF vs not BF women at 6 weeks. ROC analysis & Youden's J to evaluate specificity/sensitivity. Correlation of mother/nurse ratings to assess validity/subscale independence.	Sig diff LATCH scores 0-48 hours postpartum in BF vs not BF at 6 weeks. ROC analysis: score of 9 at 16-24 hours =1.7* more likely to BF at 6 weeks. Nurse/mothers scores sig correlated & w/ BF duration. Subscale independent except audible swallow/latch on.	
	Adams, 1997 ¹⁷⁸	Maternal & professional assessment of BF	USA, hospital	n=35; First time BF mothers	First 2 weeks postpartum	n/a	Inter-rater reliability of lactation consultants using LATCH & correlation w/ mothers LATCH scores.	85-100% agreement of lactation consultants. Correlation w/ maternal reports very low-moderate	Mothers evaluate BF experience somatically, not by observation.

7.4 Results and Discussion

Table 38 cont'd

BF Tool*	Author(s) & Date	Tool Description	Country, setting	Sample size & participants	Infant age (mean, sd)	Infant/ maternal outcomes	Statistical Analysis	Results Summary	Author Comments /Notes
Neonatal Oral-Motor Assessment Scale (NOMAS)	Palmer et al, 1993 ¹⁷⁹	28 items: nutritive/ non-nutritive sucking. Outcomes: normal, disorganised or dysfunctional. Latter two graded by severity (mild, moderate, severe)	USA, hospital	n=35; Infants 35-49 weeks GA, ≥ 1900g.	35-49 weeks PMA ^a ; term & preterm	n/a	% percentage agreement of 3 coders	Inter-rater reliability: 80% agreement.	
	Howe, 2007 ¹⁸⁰	Psychometric characteristics of NOMAS in healthy pre-term infants	USA, medical centre	n=147; mothers of pre-term, but otherwise healthy infants	32-36 weeks PMA	Infant feeding performance: transitional rate & volume of milk consumed from bottle.	Reliability of normal/disorganised scales & correlation w/ infant feeding skills. NOMAS ability to detect change in feeding skills over time (SRMS ^m) & sig of change scores.	Acceptable reliability of normal category (32-35 PMA) & disorganised category (32 weeks PMA). All categories moderately correlated w/ transitional milk rate.	Moderate convergent validity for normal & disorganised categories.
	da Costa, 2008 ¹⁸¹	The reliability of NOMAS	Holland, not stated	n=75; Healthy & VLBW infants. Some risk of other health problems	26-36 PMA.	Inter-rater agreement.	Cohens Kappa reliability coefficient	Test-retest of NOMAS with 4 raters=moderate-near perfect (0.33-0.94)	Adjust tool to improve reliability & incorporate new knowledge of infant suck/swallow
Checklist from paper: 'BF & the use of pacifiers'	Righard, 1997 ¹⁸²	16 observations: breast offering (3 items), sucking at the breast (8 items), after feeding (2 items), & conclusions (2 items)	Sweden, hospital	n=82; EBF mothers w/ intention to BF ≥6 months. Healthy mothers /infants, normal delivery/birth weights.	4-5 days postpartum	BF rate & pacifier use (hours/day) at 2 weeks, 1, 2, 3 & 4 months	Group comparisons (Chi2 or Fisher's exact test) of BF technique & duration.	Pacifier-users sig higher BF at 4 months in correct vs incorrect sucking groups but sig lower than non-users. Non-users no difference in BF at 4 months in correct vs incorrect sucking groups.	Incorrect sucking technique may not be corrected if pacifiers used.
	Ingram, 2002 ¹⁸³	8 guidelines to guide mothers in 'hands off' way to position & attach baby. Includes leaflet w/ pictures & explanations about BF	UK, hospital	n=395; Mothers were BF on discharge.	Not reported	BF (any BF/EBF) 2 & 6 weeks post partum	Chi2 to identify factors sig associated w/ BF at 6 weeks. Logistic regressions to identify independent variables associated w/ BF & factors associated w/ BF at 6 weeks & BF assessment scores.	High BF technique score associated w/ BF at 6 weeks.	Short, pragmatic training for midwives to teach good BF technique.
<p>^a BF = Breastfeeding; ^b OR = Odds Ratio; ^c RR = Relative Risk; ^d ROC = Receiver Operating Characteristic;</p> <p>ⁱ APGAR = Appearance, Pulse, Grimace, Activity, Reflexes; score used to assess the health of newborns; ^j VLBW = Very Low Birth Weight; ^k LATCH was assessed against external outcomes by 2 further assessors.</p> <p>^l PMA = Postmenstrual age; ^m SRMS = Standardised Response Means.</p>									

7.4 Results and Discussion

Six tools have been validated against a range of outcomes, although none of these include infant nutritional status (Table 38). Outcomes include immediate assessment of milk transfer through test-weighing, cessation of breastfeeding from the first days of life up to four months, introduction of complementary feeding, maternally reported breastfeeding satisfaction and problems. On the basis of consistency and volume of existing evidence, the NOMAS and BAS emerge as the strongest tools. NOMAS categories have been associated with transitional rate of milk, and its key properties (Table 37) are adequate. In two studies, BAS scores predicted early breastfeeding cessation in newborns. However, these tools include the least comprehensive coverage of breastfeeding domains and the NOMAS is arguably the most complex and least user-friendly tool overall. The Hands-off technique checklist technique score was associated with breastfeeding at six weeks, therefore this may be a good way to teach newly delivered mothers good breastfeeding technique. Interventions from this checklist are also more empowering to the mother as she corrects her own technique and there are pictures to help identify problematic aspects of the feed.

The LATCH should be considered a weaker tool because of contradictory findings and questionable reliability and validity. Similarly, the IBFAT (Infant Breastfeeding Assessment Tool) lacks predictive validity for a range of outcomes and is unable to adequately discriminate between sufficient and insufficient milk intake. Righard's assessment¹⁸⁴ of correct vs incorrect sucking was associated with breastfeeding status at four months if pacifiers were used, but not in the non-pacifier group.

7.4.2 Coverage of breastfeeding domains

It is striking that only one tool (BEET (Breastfeeding Evaluation and Education Tool)) achieves full coverage of domains (Table 39). The tools that achieve the widest coverage (IFE Module 2, BEET, UNICEF b-r-e-a-s-t and UNICEF Breastfeeding Observation Aid) are generally those that have been developed with developing country settings in mind. However, although these tools are based on extensive clinical and field experience, they suffer from a lack of validation, and some miss important domains (e.g. IFE Module 2 misses 'positioning', UNICEF b-r-e-a-s-t misses 'health of the baby'). These shortfalls could be addressed with appropriately designed studies and modifications. Furthermore, tools would need to take into account whether and how acute malnutrition in the infant affects assessment of any of the breastfeeding domains.

There is general consensus among the tools for inclusion of 'attachment' and 'effective feeding' domains. What is not clear, however, is the best way to assess these aspects of the breastfeed given the lack of validation against measurable outcomes. The important domain 'health of the baby', is only captured by 4/15 tools. It is crucial that this be included as an infant can be effectively breastfed but malnourished for another reason (e.g. HIV infected, severe wasting in the mother). Only half of the tools assess mothers' own behaviour towards the baby, which may be very telling about her psychosocial status and could help guide appropriate management. Furthermore, the influence of severe malnutrition on the mother's interaction with her infant is not addressed in any tool reviewed.

7.4 Results and Discussion

Table 39: Tool coverage of breastfeeding domains and value of use in different contexts										
BF Tool	Domains covered ^a							Extra domains that may be important		Contexts in which BF assessment tools may be applied ^b
	Baby Behaviour	Mother Behaviour	Position	Attachment	Effective Feeding	Health of Breast	Health of Baby	Mother's Experience of feed	Number, timing or duration of feeds	other
BF Assessment Score (BAS)				✓					✓	previous BF experience
General: Pros - simple, acceptable, cheap & quick to administer. 3/5 items objective, quantitative. Some predictive validity. Cons: non-comparable setting; does not assess nutritional status; only aimed at 1st 7-10 days of life. Diagnosis: Does not discriminate underlying causes of not BF.										
Infant BF Assessment Tool (IBFAT)	✓			✓	✓			✓		
General: Pros - simple (includes definitions), acceptable, cheap, & quick to administer. Scores weakly associated w/ milk intake. Cons - only 1/6 items objective. Some items vague. Limited predictive value & variable reliability. Diagnosis: Does not discriminate underlying causes of not BF.										
LATCH Assessment			✓	✓	✓	✓				
Pros - simple, quick, cheap & quantifiable. Identifies specific BF problems. Mother can use modified version for self-monitoring. Some predictive validity. Cons - Reliability/validity inconsistent. Audible swallow n/a to colostrum. Acceptability of nipple stimulation is questionable. No objective items.										
Mother-infant BF assessment tool				✓	✓	✓	✓		✓	previous BF experience, supportive partner
General: Pros - cheap & quick to administer. Quantitative 'risk' score generated. 2/8 objective items re milk intake, (e.g. wet nappies-but misleads if infant given other liquids). Cons - some items subjective/ unclear descriptions of behaviours. Validity/reliability unknown. Diagnosis: General items do not allow specific diagnosis or treatment decision.										
Neonatal Oral Motor Assessment Scale (NOMAS)				✓	✓					
General: Pros - Identifies specific sucking problems. Cons: designed for neonates; sole focus on oral-motor patterns, does not assess overall BF. Only 5/28 items objective. Complex & time-consuming. Categorisations potentially unacceptable to mother (e.g. dysfunctional). Variable reliability, no validity data. Community setting: Not simple to use, complex terminology.										
Checklist from paper: 'BF & the use of pacifiers'	✓	✓	✓	✓	✓			✓	✓	
General: Pros - acceptable, cheap, quick to administer; covers different stages of BF from before starts to after finish. Some predictive validity. Cons - 1/16 items objective, not quantitative. Relevance of sucks/minute is unclear & difficult to count. Community setting: medical terminology needs clarification, not simple to use.										

7.4 Results and Discussion

Table 39 cont'd

BF Tool	Domains covered ^a							Extra domains that may be important			Contexts in which BF assessment tools may be applied ^b
	Baby Behaviour	Mother Behaviour	Position	Attachment	Effective Feeding	Health of Breast	Health of Baby	Mother's Experience of feed	Number, timing or duration of feeds	other	
Checklist from paper: 'BF & the use of pacifiers'	✓	✓	✓	✓	✓			✓	✓		General: <i>Pros</i> - acceptable, cheap, quick to administer; covers different stages of BF from before starts to after finish. Some predictive validity. <i>Cons</i> - 1/16 items objective, not quantitative. Relevance of sucks/minute is unclear & difficult to count. Community setting: medical terminology needs clarification, not simple to use.
IFE - Simple, rapid & full BF assessment	✓	✓		✓	✓	✓	✓	✓	✓	Mixed feeding, feed end, pacifier use	<i>Pros</i> - designed for developing/emergency settings. Clear & suitable for use by CHW ^a w/ 1 training day. Acceptable. Identifies underlying causes of BF problems & promotes maternal confidence. Mixture of objective questions (13/32) & subjective assessment. <i>Cons</i> - Time-consuming, training costs, no reliability/validity data, not quantitative.
A BF Evaluation & Education Tool (BEET)	✓	✓	✓	✓	✓	✓	✓	✓	✓	signs of milk transfer in mother	General: <i>Pros</i> - 13/36 objective items. Many items indicate milk transfer, could reassure mother about milk adequacy; acceptable; <i>Cons</i> - Not simple/quick to administer. Some items need accurate self-report of quantifiable items. No reliability/validity data. Some items monitor infant over weeks, but in our setting only 1 opportunity to assess. Hospital setting: Easier to monitor in-patient on some items on hospital chart compared to CHW.
Mother-Baby Assessment (MBA)	✓	✓	✓	✓	✓	✓				signs of milk transfer in mother	<i>Pros</i> – simple & quick to administer. Quantitative, meaningful items (e.g. odd number score indicates progress of one of the dyad but not the other) Acceptable. <i>Cons</i> - contains only 1 objective item (amount of areola that infant should take into mouth). Poor to moderate reliability. No validity data.
Systematic Assessment of Infant at Breast (SAIB)	✓		✓	✓	✓						General: <i>Pros</i> - Simple, acceptable & quick to administer. Identifies specific BF problems. Positioning diagrams provided could be an adjunct to assessment & to mothers. <i>Cons</i> - No reliability/validity data. No quantifiable/objective items. Community setting: Medical terminology would need clarification (e.g. iliac crest, mandible etc).
UNICEF B-R-E-A-S-T observational checklist	✓	✓	✓	✓	✓	✓			✓		General: <i>Pro</i> - quick, simple, cheap & acceptable. Identifies specific BF problems. <i>Con</i> - developed for intensive training module & involves cost & time. No reliability/validity data. Not quantitative, only 1 objective item. Community setting: some items need clarification for CHWs. Hospital setting: identifies specific BF problems & treatments that could ease e.g. nipple pain.

7.4 Results and Discussion

Table 39 cont'd

BF-Tool	Domains covered ^a							Extra domains that may be important			Contexts in which BF assessment tools may be applied ^b
	Baby Behaviour	Mother Behaviour	Position	Attachment	Effective Feeding	Health of Breast	Health of Baby	Mother's Experience of feed	Number, timing or duration of feeds	other	
Mother-Infant BF Progress Tool (MIBPT)	✓	✓	✓	✓	✓	✓		✓	✓		General: Pros - Acceptable, cheap & quick to administer. Good reliability. Cons - Items need defining. Tool tested w/ mothers w/ good BF so may not identify problems well. 1/8 items objective. Some ambiguous items (e.g. 'redness' to identify nipple trauma). No validity data or quantitative scoring. Community setting: May not be suitable for CHWs. Hospital setting: could identify specific problems & treatments (e.g. attachment advice; nipple care).
Pre-term Infant BF Behaviour Scale (PIBBS)	✓			✓	✓				✓		General: Pros - identifies specific BF problems. Assesses BF from start to finish. Acceptable & quick to administer. Reliability is good between health professionals. Cons - only 3 objective/quantifiable items. No clear scoring. Reliability between mothers & health professionals is poor. No validity data. Community setting: Designed for premature infants & neonates in hospital & n/a to general populations. Hospital setting: Maybe useful in specialised nursery setting.
UNICEF 2006: BF Observation Aid	✓	✓	✓	✓	✓	✓	✓	✓			General: Pros - simple, acceptable, quick & cheap to administer. Identifies problems that directly translate into intervention (e.g. nipple cream for nipple trauma). Cons - some items vague (e.g. 'mother looks healthy'). Not quantitative. No reliability/validity data, but tool being used in Sierra Leone 2009 & may provide relevant data. Community setting: need to clarify 'oxytocin reflex'
Hands off technique (HOT)	✓	✓	✓	✓	✓						Pros - simple, acceptable & quick to administer. Includes leaflet w/ pictures to aid BF assessment & for mothers to keep. Good predictive validity & identifies specific BF problems. Cons - cost of leaflets (if used), training required. Assumes optimal surroundings & relaxation

^a adapted from Hall Moran et al (2000)^b adapted from Myatt et al (2006) to include: population screening (by community volunteers of primary level healthcare workers) case finding in clinical context & diagnosis in clinical contexts^c Breastfeeding^d Community Health Worker

7.4 Results and Discussion

7.4.3 Tool performance characteristics

We were unable to apply a formal grading procedure (e.g. GRADE¹⁸⁵) to the tools, given the largely observational study designs of which none would have achieved higher than a GRADE 2, or the complete lack of tool testing. Other reviews of breastfeeding assessment tools have excluded studies on the basis of design and validation issues. We, however, deliberately included as many tools as possible, though this meant we were unable to assign formal grades. Instead, we analyse here a number of performance characteristics:

a) Community-based care

Community-based management of acute malnutrition (CMAM) is increasingly the approach of choice for the management of SAM in children six to 59 months with no co-existing medical complications. If such a model of care was extended to infants <6m, breastfeeding assessment tools to help CHWs identify, resolve and refer breastfeeding problems would be needed. Such tools should also benefit children to two years or beyond, to support sustained and continued breastfeeding.

Eight of the tools are either not relevant to a community setting or would require adaptation for use by a CHW. Many items also involve complex medical terminology, so some adaptation or the provision of clear definitions would be of benefit. Training lasting several days would be necessary for some of the tools, which is a time and financial cost that may not be feasible in an emergency setting. However one tool, the BAS, could be a useful basis to help CHWs to decide on referral to a facility. A study to test the BAS tool in a community based setting for managing acute malnutrition would be valuable.

b) Hospital-based care

Eight of the tools appear to be useful in a clinical context. One tool, the BAS, was considered to be of limited use in a hospital setting as it would not provide extra information about specific elements of the breastfeed to diagnose specific problems. Currently most cases of SAM in infants <6m are managed in inpatient settings. We suggest a study to evaluate a tool(s) for breastfeeding assessment and problem identification in a clinical setting where MAMI takes place.

The recent implementation of a checklist to ensure simple guidelines were followed during surgery resulted in significant reduction of patient mortality and morbidity.¹⁸⁶ We believe a breastfeeding checklist as part of admission assessment could operate in a similar way by highlighting simple problems that could be easily overlooked.

Overall, few of the tools were sufficiently versatile to be used across community and hospital contexts without substantial modification.

c) Lack of 'gold standard' treatment of malnourished infants <6m

The success of a breastfeeding assessment tool in relation to nutritional/mortality outcome is dependent on the interventions available to address the problems identified. As stated in earlier chapters, there is currently no gold standard treatment for MAMI. Intensive, inpatient programmes as suggested in current guidelines might be enhanced by a tool that identifies breastfeeding problems and appropriate remedial action. Community-based programmes have a larger potential capacity for provision of treatment; the question remains which infants <6m with SAM can be managed in the community.

d) Continued breastfeeding in older infants and children

Breastfeeding assessment and support is not just a consideration for infants <6m. Actions to support and sustain breastfeeding as part of complementary feeding should feature in the therapeutic management and rehabilitation of children up to two years of age and beyond. One promising initiative is the development of a training content to integrate training on infant and young child feeding into CTC/CMAM programming, piloted in Sierra Leone Feb/March 2009 (ENN/Valid/UNICEF) and in Zimbabwe in June 2009 (ENN/SCUK/UNICEF) (personal communication, Mary Lung'aho).¹⁸⁷ Reliable and valid breastfeeding assessment tools developed for infants <6m could have wider application in children up to two years of age and build upon current initiatives to address shortfalls in infant and young child feeding support available to this older age-group.

7.5 Limitations

This review was systematically conducted, but it was not exhaustive due to time and resource constraints. Formal grading of each of the breastfeeding assessment tools was not possible due to a lack of appropriately designed study, and no gold standard for treatment of SAM in the <6m age group. The review is therefore more subjective than ideal, which limits any strong recommendations about which tools perform best in each context.

7.5 Limitations

7.6 Conclusions

This review highlights the need for simple, accurate and valid assessment tools predictive of breastfeeding and infant nutritional outcomes. Different tools, or different versions of the same tool, are necessary for several related but separate purposes:

- A short, sensitive and quick version to identify breastfeeding problems and actions at community level.
- A more specific, detailed tool to aid diagnosis and appropriate treatment in an inpatient/clinical context
- A tool with intermediate balance of sensitivity and specificity for use in diagnosis and management for outpatient primary healthcare services

At present, there is no single tool or set of tools that meets these ideals. Many existing tools are too narrow in scope or have not been robustly validated, especially in nutritionally vulnerable developing country / emergency settings. This is an important gap that warrants future research.

In the interim, UNICEF b-r-e-a-s-t, the UNICEF 2006 BF observation aid and the aids described in IFE Module 2 offer the most promise for field use in programmes managing infants <6m. Operational research could be useful in confirming their utility as 'best currently available' tools. They could also form the basis of future tools optimised to meet the needs of malnourished infants <6m. There is a need to identify the most appropriate outcome(s) for validating new tools (e.g. rate of weight gain after stabilisation).

7.7 Summary findings and recommendations

Summary findings

15 breastfeeding assessment tools were identified in the literature search. No single tool or set of tools was identified for use in MAMI. Many tools are either too narrow in scope or have not been robustly validated against nutritional or health outcomes, or applied in nutritionally vulnerable developing country/emergency settings.

The influence of infant SAM on the mother's interaction with her infant is not addressed in any tool reviewed.

The Breastfeeding Assessment Tool (BAS) could be tested for its suitability to community settings (e.g. use by community health workers for case finding and assessment). Half of the tools reviewed could be useful for inpatient assessment.

There is no tool that is sufficiently sensitive for community use or specific for use in inpatient settings. It is likely that different tools will be needed for each setting, and possibly a third that is a balance of both for use in primary healthcare services.

In the interim, UNICEF b-r-e-a-s-t, the UNICEF 2006 breastfeeding observation aid and the aids described in IFE Module 2 were identified as most useful to assess breastfeeding in programmes managing infants <6m.

Summary recommendations

There is a need for simple, accurate and valid assessment tools that are predictive of breastfeeding and infant nutritional outcomes. Such tools could also have wider application for children up to two years.

Quality research studies to test the validity of existing breastfeeding assessment tools are needed. For example, the Breastfeeding Assessment Tool (BAS)¹⁸⁸ could be tested for its suitability to community settings (e.g. use by community health workers for case finding and assessment). Half of the tools reviewed could be useful for inpatient assessment.

New tools should be developed, possibly based on existing tools, to meet the needs of malnourished infants <6m, suitable for use in case finding in the community, inpatient settings and outpatient primary healthcare programmes.

The success of a breastfeeding assessment tool and how it relates to nutritional/morbidity outcomes is dependent on the interventions available to address problems identified. The lack of a 'gold standard' treatment for infants <6m is a limiting factor in this regard.

Severe maternal wasting and maternal and infant HIV status are important considerations in assessing breastfeeding effectiveness.

7.7 Summary findings and recommendations

Endnotes

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Chapter 8

Psychosocial aspects of malnutrition management



Chapter 8: Psychosocial aspects of malnutrition management

The chapter opens with a review of the scientific basis and feasibility of stimulation activities in the treatment of malnutrition, with particular reference to the WHO 1999 guidelines. The chapter then explores child care practices and some key influences of the maternal-child relationship on child malnutrition. It concludes with a look at the influence that maternal depression has on child malnutrition, building upon a recent review of maternal depression and child growth and again, considering implications for emergency programmes and infants <6m specifically. Overall recommendations are included at the end.

Much of the evidence base is not specific to infants <6m and/or emergency contexts – a reflection of the evidence gap to guide programming in this age group - but shares and applies relevant evidence from malnourished children and their mothers/caregivers.

8.1 Psychosocial stimulation in the treatment of malnutrition

8.1.1 WHO guidelines on psychosocial stimulation in the treatment of SAM

Children hospitalized for severe malnutrition have low levels of cognitive development and low school performance which last into adolescence.¹⁸⁹ Section 5.3 of the WHO 1999 guidelines¹⁹⁰ recommends integrating both emotional and physical stimulation into the treatment of severely malnourished children to reduce the risk of permanent mental retardation and emotional impairment, to promote the development of the child's motor skills and to enhance growth in the rehabilitation phase. Sections 5.4 and 5.5 deal with teaching parents the importance of preventing recurrence, as well as preparing for discharge and return home.

The following is a summary of the recommendations:

- The mother/ caregiver is a key resource person and partner with the medical team and should remain with the malnourished child.
- Sensory deprivation should be avoided.
- Centres should be decorated with the interests of children in mind.
- The number of adults interacting with the child should be kept at a minimum and contacts should be warm and affectionate.
- Local toys should be available.
- There should be both informal group play and individual play activities.
- Physical activity should be encouraged.
- Parenting skills should be taught to help prevent malnutrition.
- The home should be visited by medical or paramedical personnel before discharge to prepare for the child's reintegration into the home.

Both sections are relatively short and contain little information on how to provide the different activities, particularly staff training. The appendix contains examples of toys created out of ordinary and inexpensive materials that families can find easily at home. The WHO "Guidelines for the Inpatient Treatment of Severely Malnourished Children"¹⁹¹ provide a much more comprehensive list of activities. There is also added information in the appendix with more suggestions of games and activities that could be used. From here on we will call the activities recommended by WHO "*Stimulation and support activities*"

8.1 Psychosocial stimulation in the treatment of malnutrition

8.1.2 Scientific basis for the WHO recommendations

Relevant studies and experiences are few and often dated. For studies prior to 1990, we will use the Grantham-McGregor literature review. After 1990, only studies that use stimulation activities in the treatment of severely malnourished children are discussed. Two studies met our criteria: The 14 year follow-up study of a cohort of severely malnourished children by Grantham-McGregor¹⁹² and research recently conducted in Bangladesh.¹⁹³ The two studies compared the development of severely malnourished children that did and did not have stimulation activities included in their treatment, though the full WHO recommendations on psychosocial stimulation were not implemented in either.

The question of the scientific basis for the WHO recommendations is best answered when considered according to outcomes expected from implementation of the recommendations. Outcomes include:

- Improvements in the effectiveness treatment for severely malnourished children.
- Reduced risk of irreversible mental retardation and emotional impairment and to promotion of motor skills development in the child.
- Parents taught how to prevent a recurrence through a better understanding of what causes malnutrition.
- Preparation for discharge and return home.

Improvements in the effectiveness of the treatment of severely malnourished children

According to WHO, one of the goals of introducing stimulation and support is to promote growth during the rehabilitation phase, and if we delve further, to improve the treatment of severely malnourished children. Indicators of this may be increased weight gain, decreased duration of treatment and fewer children being discharged before full recovery.

The two studies that incorporated stimulation in the treatment for severely malnourished children did not specifically take these indicators into consideration. Nahar¹⁹⁴ shows a similar length of stay for the intervention group of children as for the control group, but the return home is explained by the mother's tasks at home and not by the child's recovery criteria. More children from the intervention group were lost to the study compared to the control group (39 versus 14%, $P = 0.006$). In spite of the fact that the overall treatment led to significant change in the children's nutritional status (weight at six months of age), 64% of the children remained severely malnourished ($WAZ < -3$ SD) and another 25% had $WAZ < -2$ SD at the six month follow-up. The intervention group improved more than the control group by a mean of 0.4 ($P=0.029$; 95% CI: 0.1, 0.8) weight-for-age z scores, controlling for background variables.

In the Grantham-McGregor cohort,¹⁹⁵ malnourished children had the same height-for-age ratio 24 months after admission, whether they received stimulation or not. They were also smaller than the children in the group hospitalized for other causes (control). This difference from the control group was still significant at 72 months after admission. The three groups showed no difference in their weight-for-height ratio at 24 and 72 months after admission.

It is important to consider programmes that apply all of the WHO recommendations (these above studies did not). A holistic program introduced in Afghanistan by Action Contre la Faim (which includes numerous psychosocial activities, individual psychological support and upgrading of training for personnel) has led to a net improvement in nutritional program results. These include a decrease in those stopping their treatment and an increase in those recovering, though it is still impossible to identify the specific factors causing the improvement. (See Box 8). Other countries have included stimulation activities and support but these have not led to such a clear improvement in the rehabilitation of the child. None have been the subject of rigorous research to identify determining factors and resulting changes.

Additional research is needed to measure the impact of stimulation and/or support activities on the child's growth during the rehabilitation phase and on the effectiveness of the medico-nutritional treatment.

8.1 Psychosocial stimulation in the treatment of malnutrition

Box 8: Case history: Integrating mental health and care practices in Afghanistan

Integrating mental health and care practices in the treatment of SAM: A project by Action Contre la Faim in partnership with the Afghan Ministry of Public Health

Background

ACF has treated severe acute malnourished children in Afghanistan since 1997. The country has suffered from decades of armed conflicts, displacements of the populations, human and material losses. Few months after the 11th September 2001 and the fall of the Taliban Regime, the situation became more peaceful in most of the country; refugees started to return to Kabul. The economic situation was poor. In Kabul, ACF was running three therapeutic feeding centres in hospitals and 12 day-cares for about 1700 children per year.

At the End of 2002, the mission requested the visit of a psychologist to assess the mental health situation of the mothers in the nutrition centres: they were described as very sad and crying a lot. The evaluation confirmed that many of the women were suffering from psychological distress for many reasons including the war and its consequences in terms of loss of personal belongings, loss of landmarks, change of life, family separation, deaths, bombings, shootings, terror, the poor economic situation and job insecurity, feelings of powerlessness, and the powerful role of the mother-in-law. Poor mental health status of the population was confirmed by different surveys published in the following years.

Two other important facts were noted during the initial visit: 20% of the families defaulted before the end of treatment; this rate was described as the minimum rate because of cultural barriers that limit the access of the women to the health structures (especially at night). About 30% of children admitted for severe malnutrition were infants <6m, explained by mothers as due to their 'lack of milk'.

These findings were surprising since breast-feeding usually protects the infant and severe malnutrition appears after the age of six months, following weaning. In Afghanistan this protection does not seem to function properly. One hypothesis for this was that mothers who complain about insufficient milk are in fact trying to say something else about their relationship with their child, their isolation, or other factors affecting their mental health.

Description of the research programme

The project in Afghanistan has become a pilot project for a holistic approach for these children and their families, in combination with surveys to better understand the problem and assess the impact of the intervention. The research project includes:

- a nutrition survey on infants <6m in Kabul (n = 507 ; 2004)
- a KAP survey to compare maternal mental health, care and breastfeeding practices of mothers in three groups: mothers without lactation difficulties and well-nourished infants, mothers with lactation difficulties and well-nourished infant and mothers with lactation difficulties and wasted infants (n=105 per group; 2005).
- 2204 psychosocial files completed by the psychosocial workers for children admitted in the TFC
- 480 files on breastfeeding that were filled by the psychosocial workers for the infants <6m admitted in the centres
- focus group discussions on different topics
- collection of data from the psychological interviews that have been put in place in the TFC
- a study for assessing the survival and nutrition situation of children one year after discharge from treatment (n=100)

Main research outputs

The prevalence of severe acute malnutrition was small in the general population, demonstrating an over-representation of this age-group in the centres. However, 40% of women interviewed complained of lack of milk. 'Lack of milk' was accepted by communities and not associated with a depreciation of the recognition of the caring capacity of the mothers. When confronted with milk insufficiency (real or perceived), all the women applied the same coping strategies: no advice seeking and the introduction of, or increase in quantity, of other milks and complementary foods. The level of hygiene used (clean bottle and teat and boiled water) and knowledge (number of spoons of powder to add, etc) were determinant factors for malnutrition.

Care practices and breastfeeding practices were not optimum for the continuation of breastfeeding: the early initiation of breastfeeding is rarely done, infants are not always fed on demand, mothers don't know that production of milk increases with the stimulation of the breast by babies, skin-to-skin contact is not facilitated (children are swaddled, women wear a burka), etc. The medical staff and the mullah don't understand lactation mechanisms and recommend artificial milk when women encounter difficulties. All these factors were important and should be addressed but were not different in the three groups.

8.1 Psychosocial stimulation in the treatment of malnutrition

Box 8 cont'd

Many children that were malnourished had been low-birth weight babies according to their mothers or presented handicaps. These points might directly affect their capacity of suckling, but also their capacity to attract their caregiver. The child might as well not correspond to the wishes of the parents, who might, consciously or not, neglect him.

Finally, the criteria that distinguished the groups from each other the most was level of family support (through the organisation of the workload at home, the support provided to the mothers for her to be able to take care of the baby and to breastfeed), family violence and the family conflict and maternal depression, all of which were interconnected.

Programme changes on the basis of research

At the national level, a close collaboration with the Nutrition Department of the Ministry of Public Health and UNICEF was established. A training of trainers of the WHO Breastfeeding Counselling Course was organised and trainers disseminated new knowledge to medical teams. Breastfeeding campaigns were carried out using very specific messages regarding milk production and mother milk insufficiency.

In the feeding centres, psychosocial workers were recruited to complete the medico-nutrition team. Their activities were:

- Systematic use of the suckling technique.
- Psychological assessment for all women and children admitted
- Permanent support to mothers and psychological follow-up when needed
- Support for breastfeeding and during feeding time
- Family interviews to reduce risk of defaulting, to explaining the treatment to the fathers and to the rest of the families, in case of family conflict. These interviews were also very important to help the families find solutions for organising their stay in the centre with the malnourished child and taking care of the rest of the family at home in the same time
- Relaxation sessions for women
- Stimulation of the babies through massages and play sessions that reinforce the mother-child bond

These interventions were combined with a reinforcement of the training of the medical staff, a closer collaboration with the hospitals and the Ministry of Health, a constant reflection and adjustments of the guideline, and the progressive development of home-treatment.

Results

At the national level, psychosocial aspects of malnutrition were recognized as important by the different partners and the Department of Nutrition in the Ministry of Public Health. The breastfeeding counselling course has been disseminated to more than 100 professional staff.

In nutrition centres, most of the fathers and the families invited came to the centres. They become partners in the treatment of their children. This partnership greatly reduced defaulting and helped families find solutions for treating the malnourished child without creating risk for the rest of the family.

Women used the opportunity to talk and to share their daily life and problems with the psychosocial workers and amongst themselves. Very good results were observed in terms of maternal mental health and mother and child relationships, even if it is very difficult to attribute this improvement to the child recovery and/or to the psychosocial support.

The impact of these interventions was also clearly observed in the nutrition indicators:

- The proportion of cured beneficiaries increased from 74% between April to August 2004 to 95% between September 2004 and March 2005.
- Percentage of defaulters has decreased from 19% to 3.8% in the equivalent periods.
- The death rate has decreased from 8% to 1.3% in the equivalent periods.

To assess the longer term impact of the treatment on the children, the team searched for 100 children that were severely malnourished when <6m and cured one year before. 75 families were found. Amongst them, 11 children were dead, four moderately malnourished and one severely malnourished. As the study was retrospective, it was not possible to establish clearly the reasons of the death of the children. These findings have to be put in perspective with the infant mortality rate in Afghanistan; they question the mid-term impact of treatment for severely malnourished children on survival (even without taking into consideration the consequences on child development). The recommendation is to develop and ensure an adequate follow-up of the children <6m and their mothers after the discharge of the nutrition centres, focusing on lactation support and other-child bonding.

Source: C.Bizouerne, ACF France

8.1 Psychosocial stimulation in the treatment of malnutrition

Reduced risk of irreversible mental retardation and emotional impairment, and promotion of motor skills development in the child

In order to measure the impact of stimulation and support activities on the medium and long term child development, it is necessary to compare two groups of severely malnourished children receiving the same medico-nutritional treatment with, or without stimulation.

The impact of short stimulation programs during malnutrition episodes is temporary, and this is not surprising given the conditions of extreme poverty to which these children return.¹⁹⁶ Results are better when both parents and children are involved rather than the children by themselves.

To study the long term impact and to control for the hospitalization variable, Grantham-McGregor compared three groups of hospitalized children between the ages of six and 24 months:

- 16 severely malnourished children received the standard nutritional rehabilitation treatment in the hospital and took part in a three-year home visit program. (The intervention consisted of daily structured play while in hospital and then weekly at home. Mothers were also taught how to play with their child.)
- 18 severely malnourished children received only the standard nutritional rehabilitation treatment in the hospital.
- 20 well nourished children hospitalized for other illnesses.

Hospitalized malnourished children had a lower development quotient (measure of the child's development compared to others of the same age) than children hospitalized for other illnesses. Children of all three groups showed improvement in performance while in hospital, however, there was still a marked difference between the groups of severely malnourished children and children hospitalized for other illnesses.

The non-stimulated malnourished group of children demonstrated a markedly low development score while in hospital as well as six months after discharge from hospital compared to the group of children hospitalized for other illnesses. The non-stimulated group did not improve during the 14 year follow-up, while 24 months after being admitted to hospital, the score for the stimulated group of children continued to improve and was even higher than the control group. During the third year (when home visits were down to every 15 days), the development score for the stimulated group began to decline and then remained stable, maintaining a middle position with the other two groups. After the 14 year follow-up, scores for the stimulated severely malnourished group of children remained significantly higher than the malnourished group who did not receive stimulation, and significantly lower than the control group, once the initial differences were taken into consideration and adjusted for.

Once socio-economic and hospitalization variables were controlled for, the stimulation program had a significant impact on the mental development of the severely malnourished child. This improvement lasted beyond the intervention itself, without however reaching the level of children hospitalized for other causes or compensating for the benefits of a better socio-economic status. This last point was underscored in studies of children who had been adopted and who had regained their development in a better socio-economic and loving environment.¹⁹⁷

The Bangladesh study aims to show the impact of a shorter stimulation programme integrated into the treatment of severe malnutrition. Forty-three severely malnourished children aged six to 24 months (weight-for-age <50% or weight-for-length <70% or with nutritional edema) were enrolled in the study and received the standard medico-nutritional treatment. An intervention group of 54 children were also exposed to individual play sessions during their two weeks in hospital followed by visits at home for six months (two visits in the first month and then monthly; total of 18 supervised play-sessions). Meetings were held daily with mothers during the hospital stay. 27 children were lost to the study. Among the remaining children, the two groups had equivalent developmental scores and anthropometric results. After six months, the intervention group had improved more than the control group by a mean mental development score of 6.9 ($P < 0.001$; 95% CI: 3.9, 10.0), by a motor development score of 3.1 ($P = 0.024$; 95% CI: 0.4, 5.7) and a mean weight-for-age z score of 0.4 ($P = 0.029$; 95% CI: 0.1, 0.8) controlling for other variables. The mental development of children remains extremely low in the two groups, which is not the case when the same tests are used for a population of well-nourished children. No difference has been noted on child behaviour.

The results of these two studies underscores the fact that a stimulation protocol improves the development of severely malnourished children well into adolescence, compared to severely

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malnourished children not receiving stimulation, even if development levels remain low. These results correlate with those of the more numerous studies conducted with chronically malnourished children. Studies conducted by Pelto, Dickin et al¹⁹⁸ Engle, Black et al¹⁹⁹ consistently demonstrate that the most effective programs are those that combine nutritional supplements with psychosocial activities, that treat children early, that are based on several types of interventions, and integrate children-led activities with a parental guidance component.

There are sufficient data to confirm the necessity of incorporating stimulation interventions into medico-nutritional programs in order to reduce the risk of developmental delay of severely malnourished children. The intervention must not be limited to the duration of the medico-nutritional treatment and must include parents in the activities. More study is needed to gain a better understanding what are the best stimulation and support activities, the length of the intervention, the factors at play, how long the developmental changes last, and what aspects of development are most affected, etc.

To assess the impact on the social and emotional development of the child we need to look at more qualitative and empirical data based on observations. Geber²⁰⁰ insists on the different levels of recovery of the children, whether they are nutritional or emotional recovery: "The improvement in behaviour does not correspond exactly to the physical or biochemical improvement. Some children who are hospitalized for severe malnutrition remain sad and woeful despite their physical improvement. Others exhibit normal behaviour in spite of the fact that there is no physical improvement. They interact well with others and are able to feed themselves without difficulty. Nevertheless, it is important to keep monitoring the appetite of these children" (p. 19).

The quality of the mother-child relationship at the time of first testing is a prognostic indicator of nutritional recovery and development into the adolescence stage of seven children with kwashiorkor in South Africa.²⁰¹

These differences alert us to a too simplistic understanding of the links between malnutrition and child development for a more complex comprehension where the severe malnutrition appears in a broader context of social, emotional and material deprivation.

If it is necessary to integrate stimulation within the treatment of severely malnourished children, it is urgent that research be conducted on the effect it has on mental, emotional and social development, on more holistic approaches to strengthen mother-child bonding, on parental skills and/or attachment and/or the capacity to care for the child's immediate surroundings.

Better parental understanding of malnutrition, how to prevent its recurrence, and how to prepare for discharge and return home.

No studies have been found that evaluate whether or not the development support activities recommended by WHO actually improve families' understanding of the causes of malnutrition, which would prevent recurrence and prepare for the return home. Grantham-McGregor²⁰² demonstrate that in spite of including mothers in stimulation programs, the latter give little stimulation or objects to play with. Children who had received a stimulation program attended school earlier than the group of children who had no stimulation. The programs resulted in significant improvement in the mental performance of 0 previously malnourished children but without any real changes in the maternal behaviour.

Studies that measure the impact of nutritional programs on the medium and long term nutritional status of the child are rare. There are two possible methodologies:

- 1) Do a follow-up of a cohort after treatment for a given period of time, or search after a few months or years for children who were previously treated for an episode of severe malnutrition,
- 2) Keep track of children who have a recurrence and who need to be treated again for an episode of severe malnutrition. This approach involves children returning to the same centre where they had been admitted previously.

There is no explicit mention in the previously cited studies of differences in recurrences between children who had received stimulation or not. Nahar²⁰³ indicates only that many children remained severely malnourished six months after hospital discharge.

A study was conducted in Afghanistan on the outcome of a psychosocial approach in combination with medico-nutritional treatment given to severely malnourished children under six months of age.²⁰⁴ Seventy-five out of 100 families included in the sample were located six to 12 months after the end of the

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treatment (children who had recovered by the time they left hospital). Among them, 11 children had died, representing 14% of the total sample, four children were moderately malnourished, and one was severely malnourished.

In the Sudan,²⁰⁵ 21.5 % of families with children admitted to the nutritional centre for severe malnutrition already had the same child or another sibling admitted before for severe malnutrition, even though health education sessions were suggested daily during the child's treatment. Recurrences correlated with the quality of the mother-child relationship at admission and with the presence of family conflict.

There are almost no data on whether or not mothers change their practices at home in order to prevent recurrences of malnutrition after receiving advice during the course of treatment. Very often, the advice consists of basic standard health messages given to groups. To what extent this transmission of information promotes changes in the home and prevents recurrences, remains an area to be explored.

8.1.3 Feasibility of the WHO recommendations for psychosocial stimulation

Existing data on feasibility

Few articles recount the inclusion of play or stimulation programmes in the treatment of acute malnutrition. Articles describing the set up of treatment programmes for SAM, particularly in public services, do not mention integrating psychosocial support into treatment and some specifically mention not having included them.

The only studies which describe stimulation activities in treatment programmes of severe acute malnutrition are those whose aim is assessment of their impact on child development. These have set up systems which exceed the medico-nutritional protocol framework by a minimum of six months' home follow-up. Grantham-McGregor's approach²⁰⁶ consisted of a long follow-up of three years after discharge from hospital with home visits once a week for two years then twice a month during the third year. In the Nahar study, the stimulation programme was adapted to the length of mothers' stay in hospital (around two weeks) and home-visits for six months. Activities revolved mainly around mothers and the inclusion of development activities into daily care such as bathing or preparing the meal. The intention is to offer a service which could be set up within the existing health system. No difference has been observed between children discharged from hospital when this was the case after six months intervention, which emphasises the necessity of conducting other investigations to find out the respective influence of inpatient or clinic intervention where mothers regularly attend or home visits. In addition, the control group did not receive any home visits. It would also be important to determine whether it is the play activities in themselves which have had an impact or regular home visits.

Investigations regarding the feasibility stimulation programmes are essential to find out how best they can be integrated, costs, which staff are more qualified to implement, staff training required and how best to ensure follow-up of children and their families.

Transition from hospital care to community-based management

WHO's recommendations are based on inpatient treatment of malnutrition. In rare studies on the inclusion of stimulation, children were inpatients for long periods, which is no longer the case in the community-based treatment of acute malnutrition. In CTC programmes, children come with their mothers once per week to a follow-up site for medical consultation, anthropometric checks and collection of RUTF. At times, some programmes add home visits particularly for specific subgroups such as children who have not attended the weekly visit or who are losing weight despite treatment.

The recent recommendations of the United Nations agencies on CMAM²⁰⁷ make no mention of stimulation and support programmes. How can stimulation be included into community care of malnutrition against the humanitarian background context and/or in the health systems? There is probably not a single model that can be adapted to all situations. CMAM varies according to type of living conditions, standard of health services, etc. Above and beyond published literature, some NGOs such as ACF²⁰⁸ IMC (International Medical Corps) and probably some government health services include play activities and health education for mothers in nutritional care. These systems are possible but require modifications in organisational, equipment and human terms. For example, play activities can be offered at the clinic during the weekly visit, home visiting teams can be trained in psychosocial support and criteria on the mother-child relationship can be included in referral criteria to different aspects of the

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programme. Participating in groups set up in the community can be suggested to families of malnourished children to prevent malnutrition or encourage child development and to train mothers in the community to support mothers of malnourished children.²⁰⁹ Projects must be developed and tested to assess the method in which stimulation and support programmes are feasible in the home-based treatment of malnutrition.

8.1.4 Adaptation of WHO recommendations for infants under 6 months of age and emergencies

Adaptations for infants <6m

MAMI concentrates on infants <6m. Is there a particular effect of an acute severe episode of malnutrition for this age group? As early as 1995, Grantham McGregor summarised, "It is not clear whether age of onset of the severe episode affects the outcome because there is little data from children under six months of age". Few things have changed since and it would be useful to assess the longer-term effects of an acute severe episode of malnutrition in the first six months of life on survival, development and the child's growth. Studies have demonstrated that serious malnutrition in utero increased the risk of schizophrenias²¹⁰ and hospitalisation for major affective disorders in adulthood.²¹¹ On the other hand, no correlation has been demonstrated between IQ when entering the army and antenatal nutritional deficiencies.^{212, 213} Studies on nutritional supplementation and stimulation have shown a better outcome from early intervention (before the birth and throughout early childhood).

From the activities recommended by the WHO (1999), some may benefit infants under the age of six months: constant maternal presence, design of the centre, limit of the number of nursing personnel, advisors and mother's education on childcare. On the other hand, toys and the example of treatment through play in annex 7 all refer to children over the age of six months. Could there be more specific activities to offer infants under the age of six months? One can imagine that appropriate carrying, holding and handling, the way in which treatment is given, massage and mobiles are stimulation adapted to the age of the child. What is most striking during this crucial period of development is the possibility of building a stable relationship with a person in the family circle and a focus of support and stimulation for infants <6m is most likely to reinforce the dyad between the mother (or maternal substitute) and infant.

Adaptations for emergencies

If environmental conditions are greatly impaired, the effects of SAM may be more serious. In war or conflict situations, family break-ups and displacements, the ability to care for the child, respond to their needs, stimulate them and show affection may be hindered.²¹⁴ Problems such as breastfeeding difficulties are likely to come to the fore in these circumstances and put newborn babies in danger and risk of malnutrition. Published evidence on stimulation in the treatment of acute severe malnutrition is even scarcer in emergency situations. However, it is without doubt that in this kind of situation, that a package of care is required to overcome environmental deficiencies, stimulate the infant, and support the parents in their role. Programmes of this nature do exist; it is important to assess their nature and impact.

8.1.5 Conclusions

WHO recommends including stimulation and support activities for the care of the severely malnourished child. The expected effects of stimulation and support are numerous, including accelerated growth during the recovery phase, reduced risk of mental retardation and irreversible affective disorders, and encouraging development of the child's motor skills. They teach parents how to anticipate a relapse and avoid recurrences by better understanding of the causes of malnutrition, and prepare for discharge and return to the family.

Review of literature has revealed the virtual absence of scientific data to confirm whether stimulation and support activities enable set objectives to be achieved. Only two studies have been considered. These two studies have focused on limited stimulation activities, without developing all activities recommended by the WHO and have assessed the effect on infant development (particularly intellectual). Both of them demonstrate that children receiving stimulation have significantly superior intellectual development than children who have not received any stimulation. These results are sufficiently significant to recommend the routine inclusion of stimulation in the care of the severely malnourished children during and after

8.2 Psychosocial aspects of malnutrition

medico-nutritional treatment. A large number of studies are still to be carried out to find out which activities are the most effective, when should they be started, the minimum duration of intervention, the impact on social and emotional development of the child and/or on the mother-child relationship, and how to adapt these activities to the community care of malnutrition.

We have not found any studies confirming or invalidating the other anticipated effects from stimulation and support programmes recommended by the WHO but empirical experiments and more qualitative studies^{215, 216} describe the feasibility. However, these are scarce and are rarely published.

Stimulation and support can be adapted to suit infants <6m by focusing on strengthening the quality of the family-infant relationship and breast-feeding support when mothers wish to breast-feed. Specific and comparative studies on more holistic approaches of malnutrition in infants <6m are required to confirm their effect on growth, survival and infant development, on milk produced and on the mother-child relationship.

There are few examples of psychosocial support integrated into SAM treatment programmes. Some activities are relatively easy to establish in hospital settings and are likely to bring improved well-being to severely malnourished children. Their adaptation to community-based treatment is more complex but different strategies can be considered, such as including stimulation activities during clinic visits or home visits and setting up patient group sessions.

8.2 Psychosocial aspects of malnutrition

The psychosocial causes of malnutrition are dependent on geopolitical, cultural, social and psychological contexts. In general, it is the mother-child relationship that is the main determinant of childcare practices and which relationship is especially important in infants <6m. In general, the mother-child relationship is influenced by six main (overlapping) elements: the infant/child, the mother or caregiver, relationship of the child to his caregivers, support system, resource constraints and cultural beliefs and practices. Considerations around child care practices and some of the influences of and on the mother-child relationship are explored here.

8.2.1 Child care practices

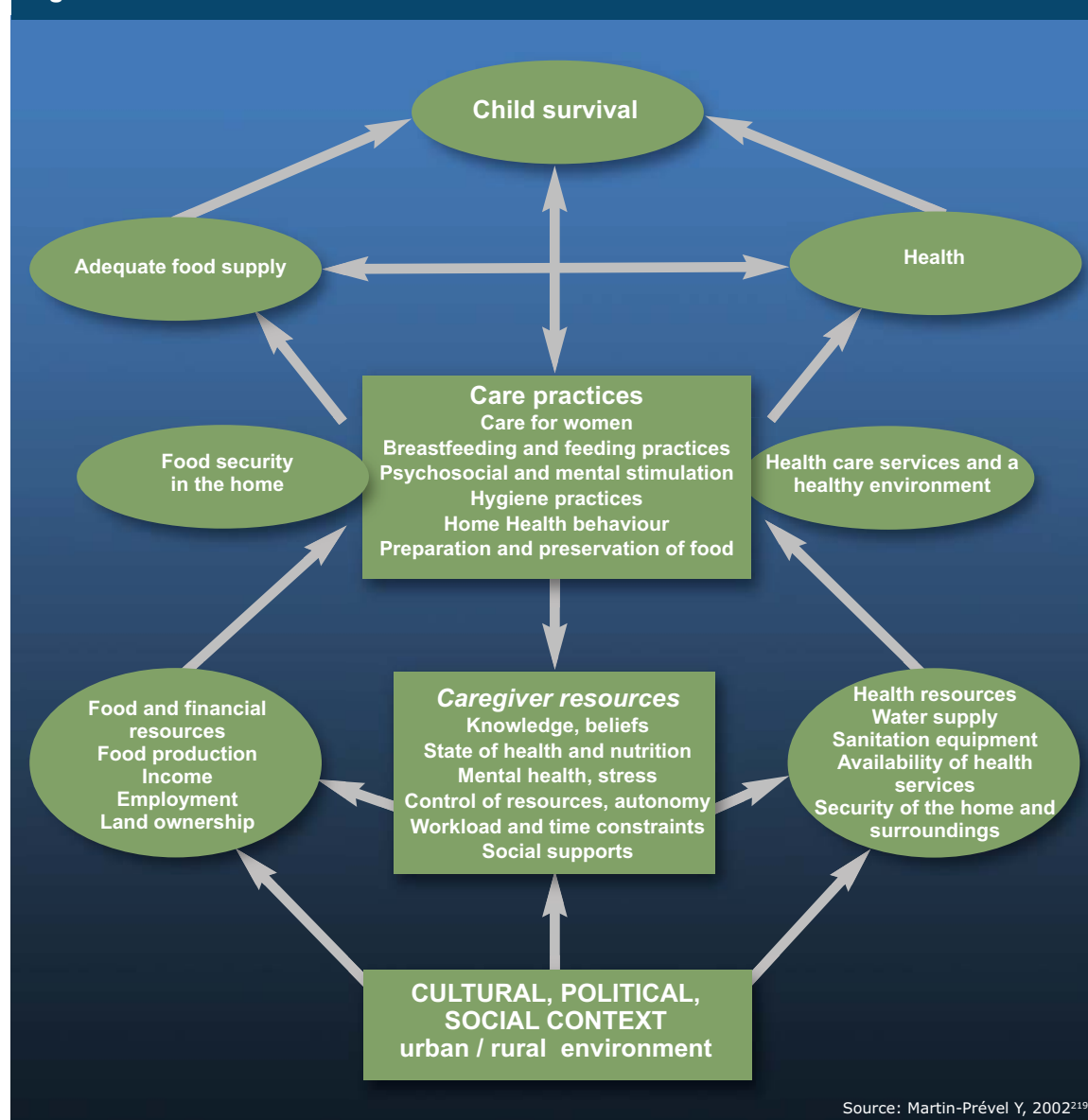
Child care practices are recognized as a key consideration in the causes of malnutrition, which scope is reflected in this comprehensive definition.²¹⁷

“the behaviours and practices of those who provide care (mothers, siblings, fathers and all other caregivers) that ensure that the child is fed and receives the stimulation and emotional support necessary for growth and development. These practices ensure that food security and health services result in the well-being of the child. It is not only the practices that are essential for the survival, growth and development of the child, but it is also the way they are implemented (with attention and adequately meeting the needs of the child). It is impossible for caregivers to provide care without sufficient resources such as time and energy”.

Such considerations are reflected in a model for the extended care of infants (Figure 29) where child care practices are considered alongside food and health security and also influenced by social, psychological, or cultural factors, etc.²¹⁸ This reflects how malnutrition is not an isolated medical-nutritional problem, but a consequence of factors related to context, environment, and family, amongst others (reflected in Figure 30). Its causes and treatment especially concerns the child's caregivers, particularly for infants < 6m whose survival depends entirely on their caregiver (usually their mother).

8.2 Psychosocial aspects of malnutrition

Figure 28: Model of extended care



8.2 Psychosocial aspects of malnutrition

Figure 29: Psychological and sociological factors implicated in malnutrition

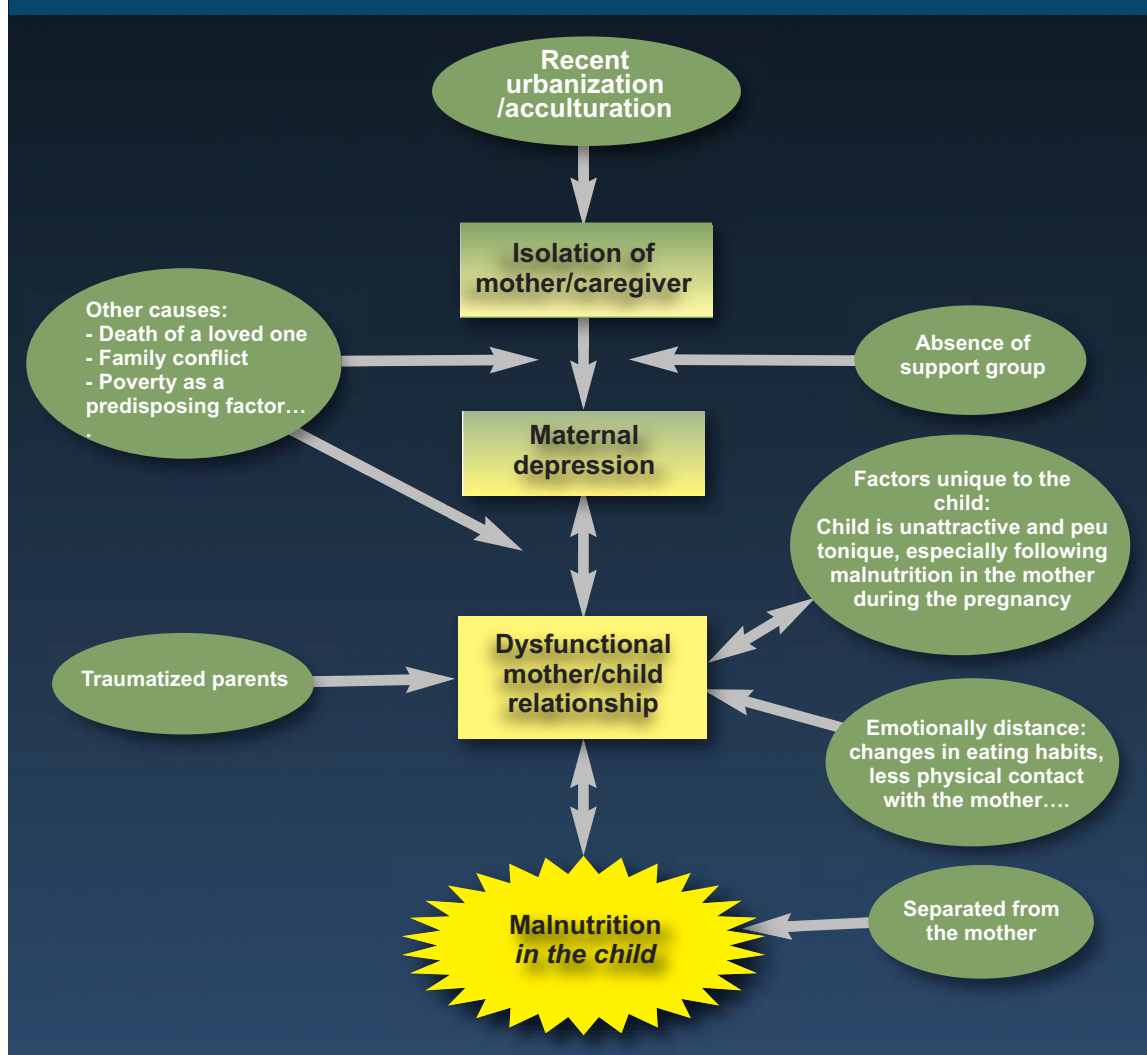
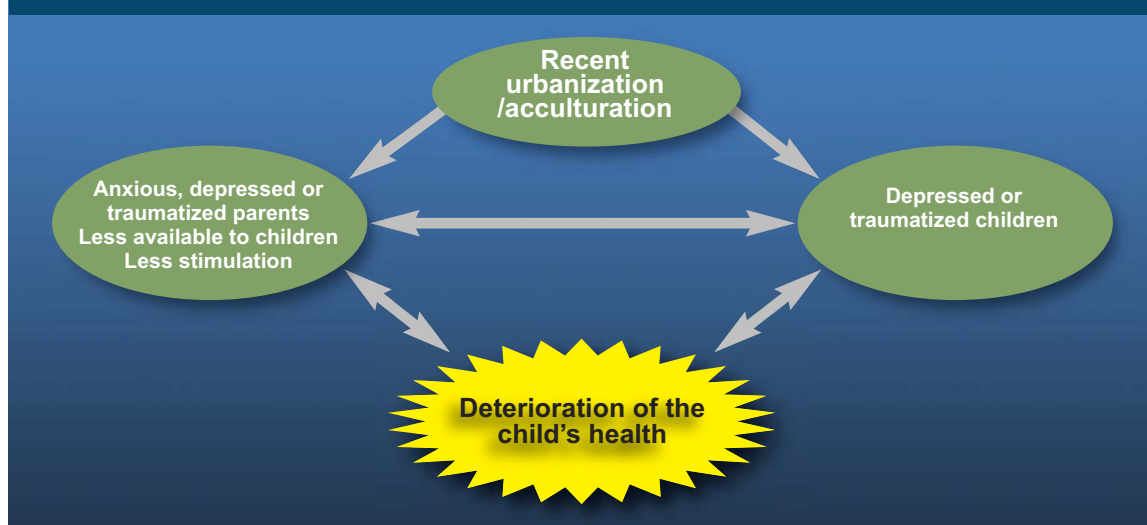


Figure 30: Psychosocial factors that aggravate malnutrition



8.2 Psychosocial aspects of malnutrition

Child care practices during emergencies

Individuals treated in humanitarian programmes are often socially and psychologically vulnerable. They have often suffered recent losses, including homes, loved ones, families and communities, and have often experienced or witnessed violence. Mental health problems are common in these situations, for example, anxiety, post-traumatic stress and depression. Social and family structures are often shattered and people may find themselves isolated, without the support of the community or extended family that they usually rely on. We can hypothesize that emergency situations have a negative impact on the mother-child relationship and thereby on nutrition. The infant no longer finds in his mother the partner he or she needs to communicate with and develop. The infant's problems reflect the mother's difficulties and also those of the father, family and community.

Such factors can severely limit or hamper the capacity of the support circle to give care, particularly to children.²²⁰ In Juba, in the Sudan, in the late 1990s and early 2000s, for example, recurring conflicts and insecurity forced families to become displaced and separated. Many men joined the military as the only means of earning income and were away from home. Women were forced to work by selling wood and grass to sell at the local market. Older children had to look after the youngest during the day and mothers spent very little time on childcare.²²¹ Children born of rape in conflict situations can also present difficulties, as the will of the parent to provide adequate childcare can be compromised.²²² We can hypothesize that conflict situations, crisis, and traumatic events have a negative impact on the caregiver-child relationship and thereby on nutrition. Children themselves are directly impacted by war and conflicts and also have to live with their parents' sufferings and their inability to protect them. **The infant reflects the problems experienced by its mother, father and family.**²²³

*"Traumatizing a population can affect child care practices dramatically during and after emergencies. Social and caring behaviour can have a critical impact on the nutritional well-being of dependants following an emergency when physical resources are no longer a limiting factor. In addition, societies need to be mentally healthy to make optimal use of rehabilitation resources that are available from agencies during emergencies to improve nutritional and food security"*²²⁴

8.2.2 Providing nutrients is not enough to nourish infants

What a baby cannot vocalize will be expressed by the body, for example in sleep disturbances, eating problems, skin problems and repetition disorders. Mother/child bonding and the feeding relationship are interconnected. Simply providing care to infants in a mechanical way is not enough for proper development.²²⁵ Attachment to the mother, or another maternal figure, is as essential a need for the child's survival as daily care. Attachment is described as "secure" when a child feels confident and secure enough to explore the outside world and to try new experiences.^{226, 227} Feeding provides special times of interaction between a child and its mother figure and how it is carried out is important. Feeding represents a vital issue around which difficulties can crystallize. A malnourished infant <6m (excluding sick children) should alert us to consider relationship difficulties.

8.2.3 Malnutrition and attachment: cause or effect?

An attachment problem can be a risk factor for malnutrition (or 'failure-to-thrive'), and changes in the relationship are possible if the child demonstrates delayed development or malnutrition. Research into 'cause' (prospective studies) and 'effect' on malnutrition in infants <6m specifically was not identified. However research in malnourished infants and children is of relevance and key work is summarized here.

Insecure attachment as a cause of malnutrition

During systematic longitudinal observations in a part of Abidjan with a high level of malnutrition,²²⁸ 'insecure' attachment seen in children was linked to the relative unavailability of the attachment figure, an insistence by the infant on remaining close to the mother (refusing to leave the breast) and anger and opposition (anorexic behaviour). This contributed to the onset of ongoing symptoms of light and moderate malnutrition. Children with 'secure' attachment were able to use their mother as a secure base from which to explore their surroundings, including a variety of foods. Other research has found that mothers of malnourished children responded less to their child, and were less affectionate and communicative even before the onset of malnutrition.²²⁹

8.2 Psychosocial aspects of malnutrition

Attachment issues in the malnourished child

There is a lot of research available on the link between attachment issues, emotional deficit and malnutrition. Grappe²³⁰ found an increase in acute malnutrition in north-east Brazil when there were attachment issues between mother and child. Geber²³¹ shows how changes in the mother-child relationship can affect the onset and prognosis of malnutrition. Buffet et Mazet²³² recount the story of a malnourished child who presented with anaclitic depression (childhood depression caused by separation from mother following a normal relationship in the first few months of life).

Ainsworth²³³ observed 28 children in Uganda, 16 of which had 'secure' attachment, seven 'insecure' attachment and five no attachment. Unattached children had mothers who were absent for long periods of time, while the mothers of children with 'secure' attachment remained with their children. Unattached children overall received the least care. In terms of feeding, none of the unattached mothers reported finding pleasure in breastfeeding, whilst 14 out of 16 mothers with 'secure' attachment did. Similarly, the mothers who believed they had enough milk were mainly those whose child had a 'secure' attachment.

Miquel-Garcia²³⁴ compared 30 pairs of mother-malnourished children to 30 pairs of mother-healthy children in Mali. Amongst mother-malnourished child pairs, children had difficulty separating from their mothers and interactions were sporadic, rarely mutual, tinged with sadness and indifference, and even hostility. Interactions between mother-healthy child pairs, interactions were mutual and pleasurable.

Pollitt et al.²³⁵ compared mothers of healthy children to mothers of children with delayed development ('failure-to-thrive'). Mothers of children with delayed development had less verbal interaction and socialized less.

Interacting with malnourished children

Bouville²³⁶ cites several studies that examine the specifics of behaviours and interactions of malnourished children in their natural environment. In India, time spent breastfeeding was the same for malnourished and healthy children, but breastfeeding was more frequent for moderately malnourished children and there was less stimulation, such as speaking, playing with the child, or fondling. In Mexico, malnourished infants over six months were clingier, more passive and explored less, attracting less parental attention as children who were well. In Cameroon, early weaning was noted among malnourished children who were entrusted to younger mothers figures who were distant relatives. Malnourished children had less social interaction, but would seek their mother's attention more through looks and verbal sounds during meals. These children showed very little interest in food.

These studies show that mother-child interactions are few and less positive even before the onset of malnutrition in the child, or during the course of the malnutrition episode. Some authors talk about 'negligence' in cases of malnutrition. This may often be due to social interpretations of malnutrition which give parents a sense of 'powerlessness' and inhibit positive reactions.²³⁷ Multiple risk factors may be at work. In considering the issue of 'negligence', however, it should be remembered that inferring blame for having a malnourished infant (especially for infants <6m where mothers may be considered responsible) is important to avoid, particularly in the context of therapeutic programmes.

8.2.4 Malnutrition and the psychopathology of the child

Some authors go further and suggest that malnutrition should be regarded as a psychopathology syndrome (or form of mental illness) (Guedeney, 1986, 2000). An accurate differential diagnosis must be based on in-depth analysis of individual situations and their progression. The nature of interactions between the child and caregiver may provide a good diagnostic and prognostic indicator.²³⁸ The diagnosis will help to decide whether or not to incorporate a psychological approach to the classic medical-nutritional treatment.

8.2.5 Mother-child support system

Mental health and social support are inter-related and therefore the social support system of mothers seems to be particularly important for their mental health and therefore the care of their children. Various studies highlight this, for example:

Risk factors for malnutrition identified in Mali²³⁹ were an unwanted child born in an unhappy marriage serious economic crisis, moving death of a close parent, and the number of hardships since the child's conception.

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Studies of medical records of malnourished children in Senegal²⁴⁰ showed that kwashiorkor can result from changes in the social, familial, and cultural environment that occur when having to adapt to urban surroundings following recent migration from rural communities. Similarly a study from Burkina Faso²⁴¹ showed that amongst people who migrate to urban settings, for those who are not adapted to modern life, the loss of traditional family life can lead to poverty and depression for the mother and child malnutrition.

Mothers with a malnourished child in the Ivory Coast²⁴² were either very young and rejected by their family due to early pregnancy, had had to leave their mother abruptly without severing emotional ties, were mature with many children and pregnant again, or abandoned, divorced or in the midst of family conflicts. All did not have the usual extended family support. This is reinforced by research in the Congo on reasons why mothers are not properly bonded with their children.²⁴³

So what appears to be irresponsible or negligent behavior on the part of the mother, may actually reflect her suffering experienced in a social situation that has become unbearable.

8.2.6 Control of resources, autonomy, workload and time constraints

Caregivers require resources to provide for the children in their care. Mothers often also have limited access to financial resources and have limited budgets from which all family needs must be provided for. The needs of individual children can be lost in this. Caregivers also require a level of autonomy to make decisions about their welfare. Research in Kabul showed extended family members to be very involved in decisions made about childcare practices, which some mothers found difficult when there were points that they didn't agree on, but were powerless to change.²⁴⁴

Society also imposes norms that families follow (consciously or not). For example, if malnutrition is thought to be the result of a transgression of a sexual taboo²⁴⁵ or as the result of a djinn (spirit) intervention, then the family will seek help within that framework, for example from local traditional healers²⁴⁶ and will go to the hospital only as a last resort. Research on mothers and children hospitalized in Niger²⁴⁷ reveals a popular belief that malnutrition is caused by djinns and witch doctors attempting to make the 'essence' the person disappear, thus the loss of weight. In addition, hunger can be synonymous with shame, as it shows the family network to be dysfunctional. In this context it is easy to understand the difficulties of seeking treatment for the malnourished child.

Workload and time constraints of mothers also influence their ability to adequately care for their children. For Longhurst²⁴⁸ childcare refers to the time, attention and support given in the household and community to provide physical, emotional, intellectual and social needs for the development of the child. According to Longhurst, it is important for the community to ensure the well-being of its children. Community activities can have a positive impact on childcare practices at the household level, for example, through programmes that generate revenue to allow women to have more control over that income, family literacy and nutrition education. The presence of such psychological and sociological factors underscores the importance of considering the surrounding environment of the child in order to target appropriate support and treatment for recovery.

8.2.7 Conclusions

Current humanitarian programs should incorporate child care practices and psychosocial causes of malnutrition in their knowledge base and intervention plans.

8.3 Maternal depression & infant malnutrition

Post-natal depression is inadequately detected and treated in developed countries as well as in developing countries. Its impact on child development is widely recognised^{249, 250} but its role in physical development and malnutrition has been researched to a lesser degree. Stewart²⁵¹ recently published an exhaustive review of the literature on maternal depression and child growth. Here we build on this with the articles that have appeared since, and then refocus on the treatment of severely malnourished infants <6 m in emergency situations.

8.3 Maternal depression & infant malnutrition

8.3.1 Methodology

A Medline search was carried out using the following criteria of inclusion: articles published in French or English between 1993 and 2009. The keywords and number of articles referenced are shown in Table 40.

Table 40: Number of articles by keywords (Medline, February 2009).

Keywords	Number of articles
"Maternal mental health" and infant malnutrition	0
Maternal mental health and infant malnutrition	3
"Maternal mental health" and "infant growth"	9
"Maternal mental health" and growth	10
Maternal mental health and infant growth	218
Maternal depression and infant growth	186
Maternal depression and infant malnutrition	28

The titles and summaries are graded first. A small number of articles corresponded to our research theme. As many articles as possible were included despite the methodological differences and variations in the definition of maternal mental health and malnutrition. Although the MAMI project mainly focuses on acute malnutrition as determined by anthropometric assessment, research studies using malnutrition indicators other than weight/height were kept. Similarly, we have broadened the review of the literature to include research on infants over six months. Lastly, the mother's mental health has generally been based on scales of maternal depression but research that has used more general scales of psychological distress have also been retained. The authors concentrate mainly on maternal depression because depressive symptoms are the most common on the international level and a number of studies have highlighted that they constituted a major risk factor in child development^{252, 253}. These differences necessitate a certain amount of prudence in the analysis of the results and the recommendations.

In all, 11 research items were included in this review of the literature; the indicator and target populations are listed in Appendix F (Table 41).

8.3.2 Results

Two types of approach are implemented in the studies on maternal depression and child growth:

- In cross-sectional studies, the children are recruited (in general in primary health care centres) and classified according to their nutritional state (malnourished v not malnourished). In the majority of studies, a certain number of variables are checked: the age, gender of the child and socio-economic level. Then the prevalence of maternal depression is assessed and compared between both groups. This type of methodology does not enable identification of causes of maternal depression. For example, maternal depression could result in child malnutrition or indeed malnutrition and maternal depression may be the result of a third variable not assessed in the study (poverty, family isolation, family conflicts, etc.).
- Longitudinal studies try to avoid this bias by recruiting mothers during pregnancy or in the first months following the birth of the infant. The prevalence of maternal depression is assessed and compared to different periods of growth of breastfed infants of both depressed and non-depressed mothers.

The results of the different studies are presented in Tables 47 and 48 (see Appendix E, for detailed analysis of this data, refer to Stewart²⁵⁴). In South Asia, research has shown correlations between perinatal mental disorders and child malnutrition, including after allowing for confounding factors, particularly birth weight. A single prospective study in Pakistan²⁵⁵ specifically took ante-natal depression into consideration. Children of mothers who were depressed during pregnancy were four times more at risk of being underweight (CI: 2.1-7.7) and 4.4 times more at risk of being stunted at six months of age (1.7-11.4). This risk was increased when the mothers were depressed at each assessment (chronic depression).

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The results are less congruent in studies carried out in other continents. A cross-study in several countries²⁵⁶ did not find significant correlations between psychological distress of mothers and malnutrition of their children between six and 18 months of age, in Peru and in Ethiopia. If a correlation was observed between maternal depression and malnutrition in Jamaica²⁵⁷ it was diminished after taking into account unanticipated factors revealing poverty as a risk factor. In Brazil²⁵⁸ 30% of children with depressive mothers were stunted compared to 18% of children of non-depressed mothers but no significant association was observed between maternal depression and child growth. The longitudinal study conducted in South Africa²⁵⁹ also highlights that post-natal or present depression was not correlated significantly at two months, once the variable birth weight was accounted for, nor at 18 months. The sample from this study is relatively small, which limits its impact. On the other hand, De Miranda²⁶⁰ found more depressive mothers in the group of malnourished children than in the children in the control group, a difference which persisted after taking into account the confounding factors. A longitudinal study in Nigeria²⁶¹ found that children of depressed mothers at six weeks post-partum had breastfed infants more underweight and stunted at three and six months of age. In Malawi,²⁶² the height-for-age Z-score of the child and the presence of current maternal mental problems correlated significantly, including after adjustment of confounding factors. The average weight-for-age of children of mothers experiencing mental health problems was smaller than that of children whose mothers were not experiencing mental health problems, but this difference was not significant.

8.3.3 Discussion

While the impact of maternal depression on child development is well established, especially in developed countries, the number of studies published on the impact of maternal depression on physical development and child growth remains low. However there is increasing interest in this problem. Research in South Asia strongly correlates maternal depression and infant malnutrition. The results are less clear in other continents and require more research. The heterogeneous nature of the results may be explained by methodological differences, factors linked to local specificities of malnutrition and to cultural data,²⁶³ and on interpretation of the links between maternal depression and malnutrition.

There were methodological differences between the studies, for example indicators of malnutrition. The majority of studies rely on the weight-for-age ratio but some also take into account height-for-age or even weight-height ratios. The thresholds separating children in good health from malnourished children also vary between studies. Similarly, mental health of mothers sometimes refers to pre- or post-natal or chronic maternal depression and sometimes to common mental problems. Finally, the age of the child, method of assessment of the mental health of the mother and the confounding factors retained also differ widely.

Associations between maternal depression and malnutrition may be explained by three different mechanisms:

1. Contextual factors

Poverty undoubtedly plays an important role since it leads both to an increase in depressive symptoms and is a risk factor for infant malnutrition. Other variables such as endemic infections or, for example, certain deficiencies in micronutrients could cause psychological distress and child growth delays. More contextual factors also contribute. For example, mothers recently arrived in urban environments may be unaccustomed to one-to-one contact with their baby without extended family support. Isolation may have a negative psychosocial impact and may also lead to resource constraints.²⁶⁴

2. Maternal depression as a direct and indirect cause of malnutrition

Maternal depression is a risk factor for child malnutrition. The depressed mother stimulates her child less, has more difficulty quickly and adequately meeting his needs and seeks less help from health services. More indirectly, depressed mothers have more risk of having babies of low birth weight or babies which are premature, who for their part may have suckling problems, making breastfeeding more difficult and a tendency for the mother to wean their child earlier.

3. Low birth weight as a cause of maternal depression

The child with a low birth weight, or with difficulties sucking or who cries a lot, presents certain risk factors which can lead to and/or contribute to maternal depression.²⁶⁵

This method of exploring the links between maternal depression and child malnutrition risks implies a linear causality. However malnutrition and psychological problems in the mother are explained much

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better by circular causalities. We can envisage, for example, a child experiencing a period of partial anorexia at the time of the introduction of additional food. The mother then feels a little depressed and does not manage to adequately respond to her child's difficulties. The latter then starts to refuse more foods, the mother worries and her depression increases in the face of her child's refusal to eat. This concept of circular causalities may help us to better understand differences observed between different countries and regions and may help to pinpoint appropriate interventions.

8.3.4 Implications for MAMI

These findings have important application for MAMI in emergency situations, where the context is highly pressurised (for example, social and family networks have been lost) and where infants are extremely vulnerable and highly dependent on their mothers. In these circumstances the psychological availability of the mother and her ability to care for and breastfeed her infant is critical and therefore, we believe the relationship between maternal depression and child growth may be even more marked.

Detection of maternal depression

Although perinatal depression is insufficiently detected and treated in developed and developing countries, detection tools and appropriate treatments do exist.²⁶⁶ What are these tools and can we use them within the framework of interventions of prevention and/or treatment of child malnutrition?

Ideally, identification of women with post-natal depression should be done through an in-depth clinical interview carried out by qualified personnel. Unfortunately, this approach is rarely possible and screening remains the most common method for early detection. Several depression screening tools exist but they have limited use in screening pre and post-natal depression, as some questions (e.g. concerning sleep difficulties and lack of appetite) can be lined to normal changes connected with pregnancy and birth.

Among the tools specifically developed for the detection of post-natal depression²⁶⁷ the EPDS (Edinburgh Post-Natal Depression Scale) is the most widely-used in the research. It is a self-report scale of ten questions²⁶⁸ (Cox, 1996). Each item is coded from 0 to three with a total ranging 0 to 30. A threshold of 12/13 suggests major depressive symptomatology but it is recommended that all women with a score of 9/10 are considered for an in-depth clinical interview. EPDS scores do not constitute diagnosis but rapid identification of potential cases. The scale has been translated and adapted in numerous contexts; the thresholds vary depending on the country.^{269, 270} Its use is relatively easy, interview time is short and it is well accepted by the women.

Whilst many studies report positively on the impact of EPDS, a recent review of the literature²⁷¹ shows that detection of depression (not only post-natal depression) does not result in improved recognition of depression by medical teams, or increased treatment of depression. On this basis the author recommends not systematically including screening for depression in routine treatment procedures. These conclusions are comparable to those defended by Dennis,²⁷² "currently, there is limited information about the harms of screening and despite a wealth of studies concerning the prevalence of postpartum depression and screening accuracy, key elements of the evidence base for screening remains insufficiently developed. As such, a strong recommendation to implement procedures cannot be justified until further research has been completed." A review of over 16 recent studies also resulted in a lack of conclusive evidence for recommending the use of systematic screening in pre-natal treatment. It is therefore necessary to specify with extreme precision the depression screening framework so that screening is effective and results in suitable treatment.

Treatment of maternal depression

Effective treatments exist and may even be integrated into the routine services. In a recent study, Rahman²⁷³ compared the impact of a cognitive-behavioural approach versus routine follow-up by the primary health agents in the rural communities of Pakistan. At six months, 23% of the women of the intervention group and 53% of the women of the control group still had a diagnosis of major depression (significant difference between the intervention group and the control group). These effects would endure at 12 months. This study illustrates the feasibility of integrating treatment for pre-natal depression with primary health services.

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8.3.5 Interventions on maternal depression and child malnutrition

Several types of intervention can be envisaged depending on whether detecting and treating developing depression in order to prevent child malnutrition, or detecting and treating maternal depression and child malnutrition simultaneously.

Detecting and treating maternal depression to prevent child malnutrition

The aim of this type of intervention is to intervene even before the appearance of malnutrition in order to prevent it developing. This requires the identification of risk factors and suitable responses. Since depression constitutes a risk factor of infant malnutrition, we can make the assumption that the treatment of maternal depression will decrease the risk of infant malnutrition. To our knowledge, only one study has tested this hypothesis. In Rahman's study²⁷⁴ the cognitive-behavioural approach in the primary health care services had an impact on the rate of maternal depression, but no significant difference was observed on the growth of the child at six and 12 months. However, the number of children stunted at 12 months was much greater in the control group compared to the intervention group. Analysis of the intervention group revealed that children whose mothers were still depressive at six months had a weight-age and height-age ratio significantly lower at six and 12 months of age than children whose mothers had recovered. Untreated maternal depression contributed substantially and independently to infant malnutrition even in cases of cognitive-behavioural intervention. The intervention had by contrast positive effects on the number of episodes of diarrhoea and on vaccination. The mothers were more willing to use a means of contraception and the parents reported that they played with their child more.

These data are insufficient, however, to draw recommendations from and further research is needed. Research into the effect of treatment for maternal depression and of other potential risk factors, such as maternal support, is required. Independently of its impact on malnutrition, perinatal depression is a public health challenge for women and populations and justifies appropriate management.

Detecting and treating maternal depression and child malnutrition simultaneously

This type of approach aims to treat both infant malnutrition and maternal depression in a combined way. It poses however certain methodological problems. Severe malnutrition in the child can be a cause of maternal depression, caused by anxiety. In such cases, the mother's depressive symptoms are likely to disappear as the child's health improves. Chronic and reactive depression both require psychological support but the methods and length of treatment will vary. Here follow a number of interventions published in the research.

Celia and Nudelman²⁷⁵ describe a programme of global treatment of malnourished children and their depressed mothers in a favela in Brazil that included dissemination of information and paediatric, psychological and social monitoring at home. The first results are positive for maternal depression and the nutritional and psychological condition of the babies.

Médecins Sans Frontières (France) has put in place a programme of individual malnourished mother-baby psychological support in addition to nutritional monitoring in Hebron (Palestine). The results show a very positive impact, on the baby in the first instance, then on the mother-child interaction and finally on the mother herself. The baby recovers quicker and then contributes to his mother's recovery.²⁷⁶

Buffet and Mazet²⁷⁷ report the case of a child under two years of age hospitalised for anaclitic depression. The child presented characteristics of marasmus. Medical staff worked with the family to understand the difficulties and value the mother and managed to end hospitalisation, following which the child's appetite returned and psychological health improved.

Miquel-Garcia,²⁷⁸ following research on maternal depression and child malnutrition, offered to mothers psychological treatment and medical treatment. The authors note "a parallel development of mother and child. Within three weeks, the latter became active and sociable; interacting profoundly with his mother, even though the nutritional recovery still appeared incomplete" (p. 223).

Psychological support programmes, in addition to medico-nutritional treatment of severe malnutrition, have positive effects both on maternal depression and on the nutritional and psychological health of the children. However, research studies are still too few. Further research is needed to discover the most effective psychological aids (psychotherapies for the mother, mother-baby psychotherapies, drug treatment, etc.) and how these can be adapted to the extreme environments of humanitarian emergencies.

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8.3.6 Conclusions and recommendations

Maternal depression has an impact on child growth in the countries of South-East Asia. The results are more contradictory in other continents. The mechanisms between depression and malnutrition are probably multiple and are both direct and indirect. A better understanding is necessary to identify the processes and factors at play. However, the consequences of maternal depression on breastfeeding, child development and the ability to seek treatment are sufficient to recommend detection and appropriate treatment of maternal depression within the framework of management of infant malnutrition.

Additional studies are to be undertaken to assess the most effective methods and tools of intervention in both the prevention and treatment of severe acute malnutrition. The feasibility of the treatment of maternal depression and/or treating jointly malnutrition and maternal depression in developing countries has been demonstrated in different programmes.

It is unlikely that a single model is suitable for all contexts. The causes of maternal depression and/or malnutrition vary, as do available resources. Qualitative analyses also including socio-anthropological data are recommended for devising appropriate interventions in different circumstances (possibly also including other social players as well as mothers). The specificity of infants <6m and emergency situations are not taken into account in the studies which we have come across but the assumption can be made that breastfeeding constitutes a cornerstone between maternal depression and infant malnutrition and that the interventions facilitating starting and continuing breastfeeding are crucial.

More research is needed in the following areas:

- Longitudinal research on maternal depression and child growth in different countries to assess the causality of maternal depression on infant malnutrition and better grasp geographical and contextual differences.
- Differentiating the impact of pre- or postnatal depression and common mental disorders to see if there are notable differences on child growth.
- Synthesis of qualitative research to better understand the causal links and risk factors of maternal depression on infant malnutrition.
- Research study on the impact of treatment of maternal depression on child growth and the prevention of malnutrition.
- Several programmes have shown the relevance of managing maternal depression and infant malnutrition simultaneously, but data are lacking to understand the most effective interventions and their objectives.

8.4 Summary findings and recommendations

Summary findings

WHO 1999 guidelines on treatment of SAM include guidance on psychosocial support and stimulation for children and mothers.

Evidence shows that stimulation during and after treatment improves the development of severely malnourished children well into adolescence compared to non-stimulated children, even if development levels remain low.

Evidence is lacking on the medium and long term impact of stimulation programmes on child's growth and effectiveness of SAM treatment, on mothers' practices at home and on the impact on malnourished infants <6m. Most of the experience and evidence to date comes from inpatient settings.

Impact of severe malnutrition in infants <6m is not known, there is little guidance on specific stimulation activities for this age group and little evidence of the long term effects of psychosocial support on this age group.

Psychosocial stimulation is not currently integrated into CMAM recommendations and not routinely integrated into emergency programmes of all kinds.

The mother-infant relationship is vital for the proper health and development of the child. This is compromised in emergencies and is both a cause and consequence of malnutrition. Mothers need support to protect this relationship.

8.4 Summary findings and recommendations

Postnatal depression has a negative impact on child development and an association between maternal depression and infant malnutrition can be inferred.

Summary recommendations

Psychosocial support for mothers and infants should be routinely included in both inpatient and outpatient programmes on the treatment of SAM.

Projects should be developed and tested to assess appropriate methods of providing social support and stimulation in community-based management of acute malnutrition programmes.

Existing emergency programmes that incorporate psychosocial elements should be described and assessed for effectiveness.

A large number of studies are needed to explore which psychosocial support activities are the most effective, when should they be started, the minimum duration of intervention, the impact on social and emotional development of the child and/or on the mother-child relationship, how to adapt these activities to the community care of malnutrition.

Studies are also required on the nature and impact of treatment of maternal depression on infant malnutrition.

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Chapter 9

MAMI Considerations



Chapter 9: MAMI Considerations

Informed by the key investigations of the MAMI Project outlined in Chapters 3-8, a number of additional considerations were explored to contribute towards identifying ways forward in MAMI. The concept of a community-based approach to managing acute malnutrition is raised, and in turn, consideration given to issues around admission criteria, inpatient and outpatient breastfeeding support, and clinical criteria to identify high risk infants. Two other topics – choice of therapeutic milk and antibiotic treatment in infants <6m – are considered as flagged in MAMI discussions and guidelines review. HIV is relevant in many contexts where emergency programmes operate but was found to have limited coverage in current guidelines. Hence some key considerations around infant feeding recommendations and HIV-free child survival, antiretroviral treatment and the impact of HIV on the burden of acute malnutrition in infants <6m are introduced.

9.1 Conceptual model of management: Inpatient and Outpatient MAMI

The population burden of acute malnutrition in infants <6m suggests a radical shift in the model for management of acute malnutrition in infants <6m is needed. A move towards community-based management of acute malnutrition in infants <6m is an appropriate option to consider, and would have a number of advantages. First, it would increase programme capacity. Secondly, it would broaden opportunities to tailor care according to exact problem underlying the malnutrition: admission is unlikely to be universally needed and for some patients may even post more risks than benefits. Thirdly, it would harmonise acute malnutrition management for infants <6m with that of older children. Lastly it would also offer a more appropriate and safe setting to manage infants <6m that present earlier and with more manageable feeding problems ('uncomplicated' cases). Inpatient care could be reserved for those infants needing specialist clinical and dietetic care ('complicated' cases).

Learning from the evolution of CMAM for older children is useful. Before such a shift in the paradigm of therapeutic care can happen, research is needed to explore the safety, practicality and cost-effectiveness of this approach.

9.2 Admission criteria: why they matter

Many current guidelines recommend using clinical admission criteria in addition to anthropometric criteria in infants <6m. These focus on breastfeeding problems, however details of how to define these are often not given. The same anthropometric criteria is usually recommended for infants <6m as for older children, however, this is not the case with MUAC, which is not suitable for the <6m age group.

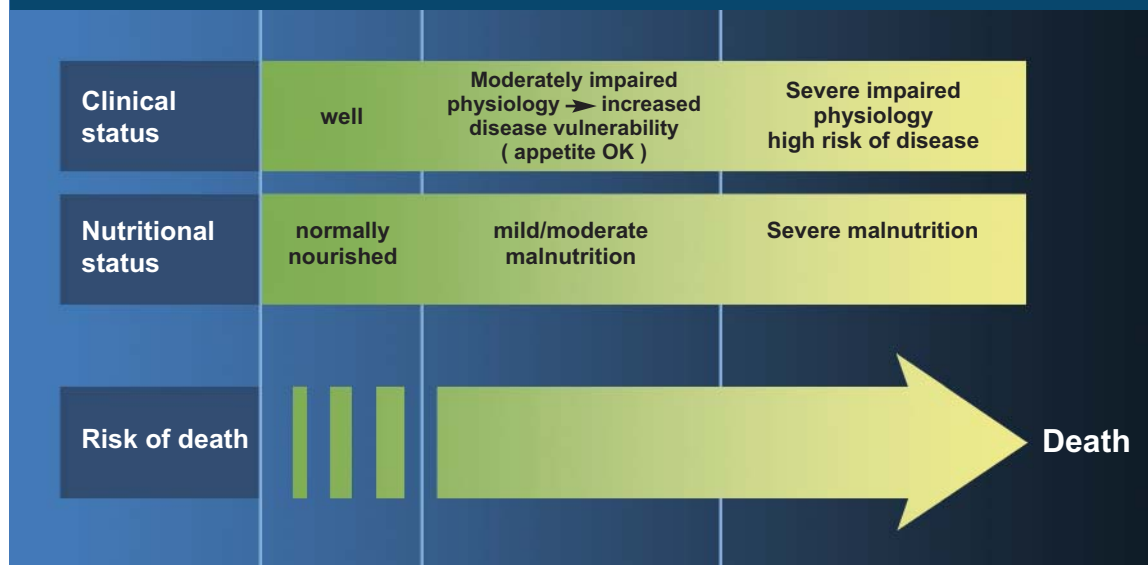
As discussed in Chapter 3, with the rollout of the new WHO-GS, numbers of infants <6m admitted is likely to rise substantially. A change in anthropometric cut-offs may be warranted in this context. WHO-GS rollout may also warrant the adoption of the 'complicated' vs 'uncomplicated' model and a shift to community-based approaches to management of 'uncomplicated cases' of acute malnutrition in infants <6m along with other age groups. This in turn has implications for admission criteria to community v inpatient care. Such considerations are dealt with in this section.

9.2.1 Admission criteria as a screening tool

Both anthropometry and clinical status have limited intrinsic relevance. They matter because they reflect other more important risks, the most important of which is death. Risk of death is linked to progressively declining physiological and clinical status. This is strongly related to but not synonymous with declining nutritional state (see Figure 31).^{279, 280} Defining continual processes in distinct categories is challenging.

9.2 Admission criteria: why they matter

Figure 31: Conceptual illustration of the difficulties of categorizing continual processes in 'malnutrition'



The arrow indicates the progressive nature of the risks. The boxes indicate that for practical programme use, categories are necessary, yet they do not truly reflect the continuum.

Admission criteria are best seen as screening tools to identify patients whose death will be averted by particular therapeutic interventions. This is different to a prognostic tool that simply identifies patients at high risk of death. In the former, the characteristics of treatment are also critical in determining optimal approach. To illustrate, if a treatment is associated with very high risks compared to the potential benefits, then specificity of admission criteria should be prioritized. Though some cases may be missed, it is important not to wrongly expose a patient to treatment they do not need. In contrast, treatments with low risks compared to benefits can prioritise sensitivity. It does not matter so much if some wrongly receive treatment they do not need. It is more important to ensure that nobody misses out on a treatment.

The many possible clinical symptoms and signs and combinations of anthropometric indicator, cut-off and growth 'norm' should thus be judged against screening strategy criteria (see Box 9).²⁸¹

Box 9: Choice of screening strategy

Are the recommendations valid?

- 1) Is there randomized trial evidence that earlier intervention works?
- 2) Were the data identified, selected and combined in an unbiased fashion?

What are the recommendations and will they help you in caring for your patients?

- 3) What are the benefits?
- 4) What are the harms?
- 5) How do these compare in different people and with different screening strategies?
- 6) What is the impact of people's values & preferences?
- 7) What is the impact of uncertainty?
- 8) What is the cost-effectiveness?

Barrat et al, JAMA 1999

9.2 Admission criteria: why they matter

Assessing current criteria against this framework reveals important issues for future discussion and research:

1) *Is there randomized trial evidence that earlier intervention works?*

This is a biologically plausible assumption, based on increased mortality risk with declining nutritional status in -all known observational studies.^{282, 283, 284} The nature of the increased risk, whether it is linear or whether there is an important mortality 'threshold' effect, can still be debated. A randomized trial to firmly settle the issue would be unethical to do since it would not be possible to withhold treatment. However, as a next best proxy, trials could potentially be done whilst, for example, rolling out the 2006 WHO-GS, which are more inclusive than NHCS.

2) *Were the data identified, selected and combined in an unbiased fashion?*

This would be important to verify. The problem with some studies on anthropometry and risk is that they are based on samples of children already admitted to a nutrition programme.^{285, 286} Declining anthropometry measures that predict death for these children are different from the question of which indicator and cut-off would best select children for admission/non-admission to programme.

3) *What are the benefits?*

TFP / SFP admission has an implicit objective of reducing the mortality risk through restoring normal nutritional status. This is plausible for both infants <6m and children. However, since there has been less research on infants <6m, the benefits for this group of current interventions on offer are less certain than for older children, for whom well delivered treatment programmes (both inpatient ten steps²⁸⁷ and outpatient CMAM²⁸⁸) have been shown to be consistent with good final outcomes.

4) *What are the harms?*

The risks of outpatient care for children >6m are minimal. In contrast, inpatient admissions (as currently recommended for all infants <6m with SAM) are potentially serious. Infants treated as inpatients are exposed to risks of nosocomial infection and carers have to spend precious time away from home. In addition, introduction of therapeutic feeds as routine treatment for all infants <6m introduces potential risks (e.g. mixed feeding increases risk of HIV transmission) but may not always be warranted (e.g. a mother presenting with reported milk insufficiency that may need skilled breastfeeding support alone). Defining potential harms is a key step in reviewing current and possible interventions.

5) *How do these compare in different people and with different screening strategies?*

It might be possible to look at historical data to see how outcomes varied prior to use of current weight-for-height criteria. Given the current homogeneity of anthropometric criteria it is not possible to compare different screening strategies. Future, prospective work would be needed.

6) *What is the impact of people's values & preferences?*

Key informants and experience from CMAM generally indicate that carers prefer outpatient treatment (or at very least, short inpatient treatment). With this move towards community-based models of care, criteria aimed at selecting infants <6m for inpatient admission are likely to be different to those aimed at selection for admission to a community based approach.

7) *What is the impact of uncertainty?*

Given the need to rely on observational evidence rather than that from intervention studies, there is considerable uncertainty about ideal admission criteria.

8) *What is the cost-effectiveness?*

To our knowledge, this has not been formally evaluated for the treatment of infant <6m malnutrition.

9.2.2 Anthropometry

Are current anthropometric criteria a good 'screening' tool for admission to TFP care?

It is beyond the scope of the MAMI Project to address this question in detail, however it is a question that needs to be formally reviewed.

There are practical advantages in using the same criteria across all age ranges. However, there are pathophysiological arguments for believing that equivalent weight-for-heights do not reflect the same mortality risk across all age ranges. Similar confounding may occur with different heights-for-age or weights-for-age. Historically such complex, combined risk indices would not have been practical for field use, especially in a resource poor and busy emergency settings. However, this may be changing with the increasing use of electronic data capture devices. Perhaps there is future potential for more sophisticated, specific admission indicators.

9.3 Community based models of breastfeeding support

Treatment capacity allowing, a move towards managing more complicated v uncomplicated model of care would facilitate a more conservative inpatient admission threshold where the focus is on 'complicated' cases to admit.

Linear growth vs. body size

Linear growth over time and cross sectional measures of body size must be distinguished. In early infancy, linear growth often moves across centile lines as infants either catch up or catch down to a stable centile from a low or high birth weight. Such moves can be entirely normal and do not necessarily imply underlying problems. This makes purely anthropometric indicators of adequate growth more difficult to interpret in infants <6m. Clinical skills of staff assessing and screening infants are therefore important.

Novel indicators: MUAC, chest circumference, head circumference

MUAC is increasingly used as an independent case definition criterion to diagnose malnutrition in children six to 59 months.²⁸⁹ There is increasing evidence of its utility as a predictor of mortality. Combined with its simplicity and suitability for community-based health workers in CMAM settings, MUAC is ideal for and increasingly popular in TFP/SFP settings. It was beyond the scope of this report to comment on the utility of MUAC in infants <6m. This work is however being done and is in process of being published (J. Berkley, personal communication²⁹⁰). An adequately simple, specific and sensitive MUAC-based TFP/SFP admission criterion would be a critical step forward and would harmonize infant <6m care with CMAM for 6 to 59m programmes.

Weight, height and age are the most commonly used indicators, though other anthropometric measures have been used. For example, chest circumference and foot circumference are sometimes used as proxy indicators of LBW when actual birth weight is unavailable. In one study, among LBW infants, chest circumference measures <30.3 cm were 91% sensitive and 83% specific. Similar levels of sensitivity for foot length were achieved only with considerable loss of specificity (<45%). Foot length measurements <6.9 cm were 88% sensitive and 86% specific for the identification of VLBW infants.²⁹¹ Head circumference is often routinely measured in western neonatal units to classify LBW type. Intra-uterine growth retardation (IUGR) of certain types will result in 'symmetrical' growth retardation, where weight and HC are both low. Other types of LBW will result in 'asymmetrical' growth retardation whereby brain (head) growth is preserved relative to the body. This may have prognostic as well as diagnostic implications.

There is need for systematic review of such studies before recommendations can be made for widespread use. There is also a need for closer links to maternity services to ensure that actual birth-weights (and day ten weights²⁹²) are available.

9.3 Community based models of breastfeeding support

This section explores community-based support of breastfeeding mothers as a treatment option for uncomplicated cases of malnutrition in infants <6m.

It is important to note at the outset that the focus here is on breastfeeding counseling, not on merely advising mothers how to breastfeed. A trained breastfeeding counsellor has clinical skills (e.g. to attach a baby to the breast, to express milk, and to cup feed, and to overcome common difficulties), knowledge of safe and appropriate feeding patterns to inform, guide and reassure mothers, and counselling skills to build mother's confidence. Counsellors do not tell mothers what to do, but help them to come to their own decision. In some contexts, counselling may be new concept that is not easily translated.

There is a large community burden of disease of acute infant <6m malnutrition (Chapter 3). Many key informants have reported that programmes are struggling to find the time, space and staff to give infants <6m the necessary support, even before the expected increase in cases when the WHO-GS are applied (Chapter 6). Currently guidelines recommend that all acutely malnourished infants <6m are treated as inpatients. However, there is a strong argument for applying the complicated vs. uncomplicated (inpatient vs. outpatient) treatment model to this age group. Possible benefits include:

- Better nesting of infants <6m treatment within overall CMAM model of acute malnutrition care
- Greater programme coverage for infants <6m
- More sensitive case detection/screening tools to be used in the community
- Earlier detection and diagnosis of acute malnutrition, ideally before onset of complications, and therefore raised probability of successful outcomes.

A review of the evidence of effectiveness of community-based breastfeeding support follows, to assess its viability as a treatment option in this context.

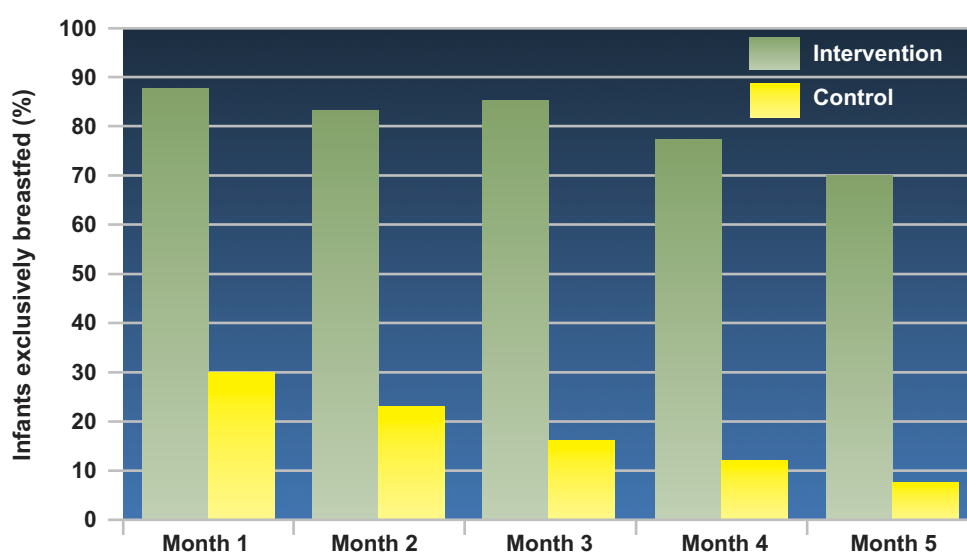
9.3 Community based models of breastfeeding support

9.3.1 Evidence of effectiveness of community-based breastfeeding support

Several reviews suggest that community based support improves rates of exclusive breastfeeding. Exclusive breastfeeding (EBF) is a 'cure' criterion for discharge from TFP in several guidelines, and is a key target outcome. These findings are therefore relevant to MAMI.

One study in Bangladesh used peer counsellors delivering 15 home-based counselling visits, two before birth, one within 48 hrs of birth, one on day five, another on days ten to 14 and fortnightly thereafter until the infant was aged five months.²⁹³ The results were dramatic, even more so when one considers that the counsellors were local mothers who had received only ten days training (See Figure 32).

Figure 32: Effect of community based peer support on exclusive breastfeeding



Source: Haider et al, Lancet, 2000

Other studies have demonstrated similar effects, such as one from Ghana.²⁹⁴ This used two intervention groups where "Group 1 (IG1) received exclusive breastfeeding support pre-, peri-, and postnatally (n = 43) and Group 2 (IG2) received EBF support only peri- and postnatally (n = 44). Both groups had an equal amount of contact with breastfeeding counsellors. A control group (C) received health educational support only (n = 49). Two educational sessions were provided prenatally, and nine home follow-up visits were provided in the six month postpartum period. Infant feeding data were collected monthly at the participant's home. The three groups did not differ in socio-demographic characteristics. At six months postpartum, 90.0% in IG1 and 74.4% in IG2 had exclusively breast-fed during the previous month. By contrast, only 47.7% in C had (P = 0.008). Similarly, the percentage of EBF during the six months was significantly higher (P = 0.02) among IG1 and IG2 (39.5%) than among C (19.6%)."

Work in the area of infant feeding and HIV has also yielded evidence of increasing exclusive breastfeeding rates through community support. For example, in South Africa, intensive support was given to mothers of infants <6m in the community (with the aim of improving exclusive breastfeeding rates in HIV-infected women who chose to breastfeed, and in HIV uninfected women). High rates of exclusive breastfeeding were achieved. Of 1034 mothers who initiated breastfeeding, 82% initiated exclusive breastfeeding at birth, 67% exclusively breastfed for at least three months and 40% for six months. One of the conclusions was that optimal feeding practices were achievable with good support.²⁹⁵

There is limited data on increasing exclusive breastfeeding rates in emergency contexts. One example does come from Indonesia post earthquake, amongst non-malnourished infants <6m. Here a cascade method of breastfeeding support was developed by UNICEF/MOH to minimise the risks of untargeted distribution of breastmilk substitutes in the emergency response. Trainers were located in the community

9.4 Inpatient models of breastfeeding support

to train counsellors who, in turn trained mothers as peer educators. The training was modelled on the WHO four hour breastfeeding counselling course. Follow up of fifty-four mothers who gave birth after the earthquake and who received the counselling revealed that almost all of these mothers initiated breastfeeding in the first hour after birth and 63% were exclusively breastfeeding regardless of access to free BMS. In November 2006, 247 mothers with babies born after the earthquake (all infants under six months of age) were assessed on their breastfeeding practices. Amongst the mothers surveyed, the rate of exclusive breastfeeding rate was 49.8%, higher than pre-earthquake rates in the population²⁹⁶.

9.3.2 Determinants of effectiveness of community-based breastfeeding support

A recent review highlighted key elements of successful community based programmes to improve breastfeeding practices²⁹⁷:

- The community offers essential resources for breastfeeding promotion and support.
- Continued reinforcement to sustain changes in breastfeeding practices.
- Effective communication and advocacy to set priorities, influence community norms, and improve household practices.
- Training in interpersonal counselling skills.
- Partnerships, leadership, evidence-based programmes, resources to facilitate scale up.
- Monitoring and evaluation to measure progress, identify successful and unsuccessful strategies, and make appropriate programme adjustments.

Not every breastfeeding support programme will necessarily be successful. Failures of well delivered, plausible interventions have also been noted alongside the many successes^{298, 299}. Learning from the failures as well as the successes is important.

9.3.3 Relevance to MAMI

Research is needed to determine the effectiveness of community based breastfeeding support programmes in treating established malnutrition in infants <6m. This might be different to preserving or re-establishing exclusive breastfeeding and preventing new onset malnutrition. What is clear is that overlaps between prevention and treatment are likely to be significant. Breastfeeding support should also extend to and benefit older children through the complementary feeding period and who comprise a considerable burden of malnutrition.

Investigations of new interventions need to include costings. There are likely considerable resource implications in terms of staff skill set, staff time and training needs. Lack of cost data will hinder rollout of community-based support.

9.4 Inpatient models of breastfeeding support

Breastfeeding support is a key indicator of therapeutic treatment in the Sphere Standards. Yet significant details of who should provide this or how it should be provided are not given. Furthermore, breastfeeding support rarely features in the treatment guidelines for acute malnutrition for infants <6m or children six to 24 months. Yet there is evidence that skilled breastfeeding counselling can have significant added value in improving exclusive breastfeeding rates and outcomes in sick infants (see Box 10).³⁰⁰

9.5 Clinical identification of high risk infants

Box 10: Breastfeeding counselling in a hospital in Bangladesh

"125 mother-infant pairs received at least three lactation counselling sessions on the benefits of exclusive breastfeeding. Researchers compared data on these 125 pairs with data on 125 other mother-infant pairs who were also at ICDDRDB due to diarrhoea but did not receive any counselling. Infants in the intervention group had a shorter hospital stay than those in the control group (4.3 vs. 3 days; p .001). The controls left before diarrhoea ended, while cases were discharged after diarrhoea ended. At discharge, mothers in the intervention group were more likely than controls to be predominantly breast feeding (breast milk plus oral rehydration solution [ORS]) (30% vs. 19%) as well as exclusively breast feeding (60% vs. 6%) (p .001). Two weeks after discharge, when ORS was stopped, mothers in the intervention group were more likely to be exclusively breast feeding than those in the control group (75% vs. 8%), while those in the control group were more likely to bottle feed than cases (49% vs. 12%) (p .001). Infants in the control group were more likely to have another episode of diarrhoea within two weeks than those in the intervention group (15 vs. 4; p = .05; odds ratio = 2.92). These findings indicate that individual lactation counselling had a strong influence on mothers to begin exclusive breastfeeding during hospitalization and to continue to do so at home. Thus, staff at maternal and child health facilities should integrate lactation counselling into their program to improve infant feeding practices."

Haider et al, Bull WHO, 1996

It is plausible that skilled breastfeeding counselling and support would also be effective for malnourished infants, though this needs to be tested. It is essential that cost data are gathered. Several key informants (Chapter 6) noted that time and staff skills were sometimes limited. Breastfeeding support was implicitly seen as a 'non-core' activity that could be dropped when resources and time were tight. This also suggests that the resource implications were not considered in programme planning. Budgeting for extra staff with sufficient time and skills to provide breastfeeding support as a core resource is needed, but there is a currently a gap in knowledge of what are the costs to factor in.

9.5 Clinical identification of high risk infants

There is a need to consider clinical criteria for admission to treatment programmes for infants <6m, in order to:

- Make fair inter-programme outcome comparisons by accounting for severity of illness at admission (i.e. taking out the confounding effect of differing patient profile)
- Triage patients with different needs, and different urgency of need.
- Ensure infants are not unnecessarily exposed to risk through inappropriate or disproportionate interventions, e.g. introducing therapeutic milks where skilled breastfeeding support only is warranted.
- Enable development of a complicated v uncomplicated (inpatient v community) based model of care.

To date, tools aiding clinical identification have been mainly focused on older age groups. It is important to adapt these to infants <6m. One major criterion for uncomplicated SAM in older age-groups poses particular problems: the 'appetite test' using ready-to-use therapeutic food (RUTF). Breastfeeding assessment would be an infant equivalent. The need for well validated breastfeeding assessment tools is therefore all the more urgent, if outpatient treatment for uncomplicated infant <6m SAM is to be a viable treatment option.

As a first step, it is perhaps easier to identify very high risk infants with immediate risk of death and definite need for inpatient admission and intensive care/monitoring. A recent paper from Kenya although not focused on infants <6m, highlights clinical signs which might also be useful for this age group.³⁰¹ Future infant adaptations are needed, particularly to aid non-specialist front-line health workers (see Box 11).

9.6 Antibiotic treatment in infants <6 months

Box 11: Triage system for children with severe malnutrition to improve identification of high risk groups

Immediate risk of early death and greatest requirement for close observation and monitoring

- Depressed conscious state
 - Prostration (inability to sit up) or
 - Coma (inability to localize a painful stimulus)
- Bradycardia (heart rate 80 beats per minute)
- Evidence of shock with or without dehydration (see below)
 - Capillary refill time \geq 2 s or
 - Temperature gradient
 - Weak pulse volume
- Hypoglycaemia, 3 mmol/l

Moderate Risk - Need for close supervision

- Deep acidotic breathing
- Signs of dehydration (plus diarrhoea: 3 watery motions /24 h)
 - Sunken eyes or
 - Decreased skin turgor
- Lethargy
- Hyponatraemia (sodium, 125 mmol/l)
- Hypokalaemia (potassium, 2.5 mmol/l)

Low Risk - Limited requirement for close supervision

- None of the above

Note: In-hospital mortality in the three groups at Kilifi, where this study was set, were:

- | | |
|-------------------|-----|
| • high-risk group | 34% |
| • moderate-risk | 23% |
| • low-risk | 7% |

Matiland et al, PLoS 2006.

9.6 Antibiotic treatment in infants <6 months

All current guidelines recommend empirical antibiotics for infants and children with SAM. However, it is not clear to some key informants whether these recommendations are still valid today, nor whether this regimen is suitable for infants <6m. In response, the prevalence of bacterial infections and associated antibiotic sensitivity patterns were reviewed.

Review methodology

MEDLINE & Embase were searched for all studies reporting on the prevalence of bacterial infection in malnourished infants <6m. Differentiating urinary tract infections (UTI), pneumonia and septicaemia, we examined all available data on causative organisms and antibiotic sensitivity patterns. Initial results were presented at the CAPGAN meeting (Commonwealth Association of Paediatric Gastroenterology and Nutrition), Malawi, 2009.³⁰² A full report will be released separately and is available from the MAMI group.

Key findings

- Most studies identified were old and few focused exclusively on malnutrition.
- Only one study reported on infants <6m; the rest presented aggregate data on infants and children of varying ages and varying nutritional status.
- Prevalence of UTI in 14 studies ranged from 3.3-38%. Of 197 positive cultures, 51.8% were E.coli and 17.3% Klebsiella sp. Gram negative bacteria accounted for 92.4% of isolates.
- Prevalence of pneumonia in ten studies ranged from 11-63%. Of 167 isolates, 61.1% were Gram negative bacteria. Staphylococcus aureus made up the majority of Gram positive isolates (21.6%)

9.7 Choice of therapeutic milk

- Prevalence of bacteraemia ranged from 5.5-36%. Commonest organisms were *Salmonella* sp.(20.3%), *Staphylococcus aureus* (12.6%), *Klebsiella* sp.(12.3%), *E.coli* (12.1%) and *Streptococcus pneumoniae* (10.5%).
- Outcomes in malnourished children with bacteraemia were poor, with CFR(cumulative fraction of response) ranges reported as 13-78% and 22-31% compared to 5-11% in non-bacteraemic children.
- Younger children were more at risk of bacteraemia in one study, children <1 year having a relative risk of 1.77(95% CI 1.43-2.18) of bacteraemia compared to older children.
- Of the studies reviewed, median in vitro sensitivity of isolates was 24% for amoxicillin, 25% for ampicillin.

Key conclusions

The evidence base on antimicrobial treatment must be urgently updated. The evidence base on anti-microbial treatment for infants <6m is lacking. The evidence base on antimicrobial treatment for malnourished children is also limited. It is concerning that even in these old studies, sensitivity to amoxicillin, which is the commonest currently recommended antibiotic, is low. New trials are needed which use current case definitions of acute malnutrition rather than the heterogeneous mix of definitions noted in this review. New evidence is especially vital in settings where HIV is now prevalent.

There is a paucity of and a need for intervention studies. Whilst observational work is useful to guide and plan an intervention and to monitor microbial resistance trends, the strength of evidence is not the same from the two types of study design. In-vitro antibiotic sensitivities are not always the same as in-vivo effects. Randomised control trials (RCTs) would offer the strongest evidence for informing future guidelines and intervention strategies.

There are likely to be geographical variations. International guidelines on antibiotic use are likely to benefit from local adaptations considering local pathogen prevalence and sensitivity patterns.

9.7 Choice of therapeutic milk

Infants <6m have less mature kidney function and therefore cannot handle as high a 'renal solute load' (RSL) as older children. This creates a dilemma about which therapeutic milk to use in this age group.

Box 12: Estimated potential renal solute loads (PRSL) of human milk and infant formulas

Type of milk	Estimated PRSL (mOsmol/L)
Human milk	93
Milk-based infant formulas	135-177
F75	154
F100	360
Diluted F100	238

Source: WHO (2004)²⁸⁵

The lower the renal solute load (RSL) the better, to lessen the risk of hypernatraemic dehydration. However, this must be balanced against the need for adequate protein for growth; it is the protein metabolite, urea, which contributes most to RSL. Whilst therapeutic milk like F100 may be best for growth, it is also the riskiest in terms of hypernatraemic dehydration. Many programmes use F100-dilute, perhaps as a compromise between growth and RSL. More evidence is needed.

At a 2004 WHO consultation on management of SAM,³⁰³ more research on optimal milk was recommended. Data are so far limited. To our knowledge, only one RCT has been done: a "Comparative study of the effectiveness of infant formula and diluted F100 therapeutic milk products in the treatment of severe acute malnutrition in infants under six months of age".³⁰⁴ Though a very well designed study, the final sample size ended up markedly underpowered. Group sizes of 74 and 72 children were well below the 150 per group originally planned. No significant differences in weight gain (g/kg/day) or length of stay were observed, but a false negative effect cannot be ruled out.

In the absence of new evidence, the conclusions of WHO 2004 should still stand and are repeated verbatim here for the purpose of informing future guideline development (see Box 13).

Box 13: WHO consensus on milks for therapeutic feeding in infants <6m

“Stabilization phase. The Consultation proposed that until definitive data are forthcoming, the guidelines set out for stabilization with F75 should be followed for infants under six months of age. Diluted F100 was considered inappropriate because its PRSL is marginal and its higher protein, sodium and lactose content is disadvantageous. Where available, expressed breastmilk was seen as a possible alternative to F75.

Rehabilitation phase. The actual renal solute load is related to the rate of weight gain. The PRSL is high for F100 and some members of the Consultation felt it should not be used, as its PRSL exceeds the upper limit recommended by LSRO. Some felt that F100 should not be used for infants < 4 months of age. Expressed breastmilk, infant formula or diluted F100 were seen as possible alternatives. Others considered that F100 may be appropriate if weight gain is rapid. The results of comparative randomized trials will guide future decisions about appropriate formulations for feeding infants under six months of age.

Breastfeeding. The Consultation agreed that human milk is the preferred food for young infants, although in HIV-affected populations decisions about breastfeeding are complex. The Consultation agreed that in infants with severe malnutrition, who are acutely and severely ill, resuscitation and stabilization with therapeutic milk take precedence over breastfeeding. Participants reported that in Bangladesh and Sierra Leone, exclusive breastfeeding in managing severe malnutrition had been unsuccessful, resulting in the deaths of infants. Experience has also shown that when no effort is made to re-establish successful lactation, infants often end fully weaned, which can compromise their longer-term survival. Therapeutic feeding combined, where appropriate, with supportive care to re-establish successful lactation, is recommended. Supportive care is described in IMCI.

Low-birth-weight infants. The Consultation clarified that low birth- weight infants who are not severely wasted or oedematous should be managed according to guidelines provided by WHO specifically for such infants”: *Management of the child with a serious infection or severe malnutrition: guidelines for care at the first- referral level in developing countries (99–104).*

Source: WHO (2004)

The MAMI Project found that diluted F100 is most commonly used by operational agencies in stabilization of infants <6m. During rehabilitation, options used include breastmilk, infant formula, and diluted F100. IFE Module 2 includes breastfeeding and expressed breastmilk as ‘therapeutic milk’ options, in addition to infant formula, F75 and F100-dilute. The option of breastfeeding as a first line nutritional treatment in IFE Module 2 reflects consideration of ‘uncomplicated’ cases admitted to feeding programmes; the WHO guidelines may be more tailored to treatment for ‘complicated’ SAM infants <6m.

9.8 HIV

Guidelines for the management of acute malnutrition, reviewed in Chapter 4, vary in their coverage of HIV. This may in part reflect different prevalence in different countries. The influence of infant feeding practices and use of anti-retroviral treatment (ARV) are key determinants of HIV-free child survival. Feeding practices and HIV status of infants and mothers are key considerations in HIV prevalent populations where infants <6m present acutely malnourished. Strategies to treat infant malnutrition in the context of HIV should not only consider interventions that seek to avoid HIV transmission, but also those that support maternal and child survival.

9.8.1 What is the risk of HIV transmission through breastfeeding?

Appreciating and assessing the relative risks and benefits of different infant feeding practices in the context of HIV is essential in any programme involved in MAMI. Inappropriate practices will contribute to the burden of acute malnutrition, morbidity and death.

Risk of HIV transmission depends on breastfeeding pattern, use or not of anti-retroviral drugs and the health and nutritional status of the mother and baby. The risk of HIV transmission through breastfeeding is about 5-20% if a baby were to receive any breastfeeding for two years and neither the baby nor the mother received any antiretroviral drugs³⁰⁵. The risk of HIV transmission has been found to be as low as 2% in infants <6m, with exclusive breastfeeding and anti-retroviral treatment^{306, 307}.

HIV-free child survival considers the combined risk of HIV infection and death from any other cause. While breastfeeding by an HIV-infected mother or caregiver carries a risk of HIV transmission, not breastfeeding, poor breastfeeding practices, and the use of breastmilk substitutes all carry risks of illness and death, especially for people living in poverty. Poor breastfeeding practices increase risks of both HIV transmission and illness in HIV-exposed infants:

- Mixed feeding before six months (combining breastfeeding and formula feeding and/or too-early introduction of complementary foods) increases both the risk of HIV transmission and infections due to other causes, like diarrhoea.^{308, 309, 310}
- In one study, mixed breast and formula feeding before or after 14 weeks nearly doubled HIV transmission risk and the addition of solids increased the risk 11-fold.³¹¹

With complete breastfeeding avoidance, the risk of HIV transmission is nil. Replacement feeding is feeding infants who are receiving no breastmilk with a diet that provides the nutrients infants need until the age at which they can be fully fed on family foods. During the first six months of life, replacement feeding should be with a suitable breastmilk substitute, usually infant formula. After six months this should be complemented with other foods. But in resource limited settings and in emergency contexts, the risks of death from other causes, like diarrhoea, rise when infants are not breastfed. Studies in non-emergency settings have found that:

- Avoidance or early cessation of breastfeeding in children of HIV-infected mothers has been associated with increased morbidity, especially from diarrhoea.³¹²
- Mortality by three months of age for replacement-fed babies was almost double that of those who were exclusively breastfed.³¹³
- In a study of the survival of 182 infants born to HIV-infected mothers in Uganda, by one year of age, 18% of replacement fed infants were likely to die, compared to 3% of breastfed infants.³¹⁴
- Children who are HIV-infected have better chance of survival if they are breastfed.³¹⁵

The risks of replacement feeding in resource limited settings are reflected in experiences from Botswana in 2005/06 and in a study from rural Uganda (2008) (See Box 14). The Botswana experience highlights the extreme vulnerability of non breastfed children when conditions deteriorate. In Uganda, heightened household level support was provided to mothers of infants already established on replacement feeding. Even then, mothers failed to follow critical guidelines on hygiene, preparation and storage to minimize risk of artificial feeding in this context. This reflects the reality of meeting and sustaining acceptable, feasible, affordable, sustainable and safe (AFASS) conditions for replacement feeding in resource-limited settings, even with support.

Box 14: Case studies**Botswana**

In Botswana, replacement feeding using infant formula was offered to all HIV-infected mothers as part of a national programme to prevent transmission of HIV from mother to child (PMTCT). But flooding led to contaminated water supplies, a huge rise in diarrhoea and national under five mortality increased by at least 18% over one year. An investigation by the Centre for Disease Control (CDC) into admissions in one hospital found that non-breastfed infants were 50 times more likely to need hospital treatment than breastfed infants, and much more likely to die. Many of the children admitted had developed severe acute malnutrition during or after bouts of diarrhoea. Use of infant formula 'spilled over' to 15% of HIV-uninfected women, exposing their breastfed infants to unnecessary risk. (Creek et al, 2006)³¹⁶

Uganda

In a study of the survival of 182 infants born to HIV infected mothers according to feeding mode, the cumulative 12 month probability of mortality was 18% in artificially fed infants, compared to 3% in breastfed infants (adjusted for maternal age and use of ARVs). The survival of HIV-infected infants was severely compromised by artificial feeding. All 3/69 artificially fed infants who tested HIV positive at one month of age had died by one year of age but all 12/92 breastfed HIV infected infants were alive at one year. (Kagaayi et al, 2008)³¹⁷

9.8.2 WHO infant feeding and HIV recommendations (2007)

Considerations on HIV-free child survival and the balance of risks and benefits of different feeding options are reflected in the most recent WHO recommendations (2007)³¹⁸ (see Box 15). Early initiation, exclusive breastfeeding for six months, continued breastfeeding and safe and appropriate complementary feeding are recommended, unless replacement feeding meets all the AFASS conditions (see Box 16). When an infant reaches six months of age, *it is no longer recommended to rapidly or abruptly cease breastfeeding*, because of the possible negative effects on both the mother and infant.

The WHO recommendations reflect that breastfeeding, particularly optimal breastfeeding practices such as exclusive breastfeeding, has an important role to play in HIV-free child survival. These recommendations, in turn are reflected in the Operational Guidance on IFE v2.1, Feb 2007) and UNHCR Guidance on Infant Feeding and HIV (v1.1, June 2009). Infant feeding guidance and counselling by health workers needs to be consistent with current WHO recommendations.

Box 15: Summary of WHO Recommendations on infant feeding and HIV (2007)**HIV status of the mother is unknown or she is known to be HIV-negative:**

- Exclusive breastfeeding for the first six months of life. At six months, introduce nutritionally adequate and safe complementary foods while breastfeeding continues for up to two years of age or beyond.

For a HIV-infected woman:

- Exclusive breastfeeding for the first six months of life *unless* replacement feeding* is **acceptable, feasible, affordable, sustainable and safe (AFASS)** for a woman and her infant before that time.
- At six months, if replacement feeding is still not **acceptable, feasible, affordable, sustainable and safe**, *continuation of breastfeeding* with additional complementary foods, while the mother and baby continue to be *regularly assessed*.
- When replacement feeding is acceptable, feasible, affordable, sustainable and safe, avoidance of all breastfeeding by HIV-infected women is recommended.
- The most appropriate infant feeding option for a HIV-infected mother should continue to depend on her individual circumstances, including her health status and the local situation, but should take greater consideration of the health services available and the counselling and support she is likely to receive.
- Whatever the feeding decision, health services should follow-up all HIV-exposed infants, and continue to offer infant feeding counselling and support, particularly at key points when feeding decisions may be reconsidered, such as the time of early infant diagnosis and at six months of age.
- Breastfeeding mothers of infants and young children who are known to be HIV-infected should be strongly encouraged to continue breastfeeding.

Box 16: AFASS Conditions

The first alternative to prolonged breastfeeding consists of the complete avoidance of breastfeeding, which is then usually replaced by commercial infant formula (WHO, 2007). AFASS = acceptable, feasible, affordable, sustainable and safe.

UN definitions of AFASS conditions:

- **Acceptable:** The mother perceives no barrier to replacement feeding. Barriers may have cultural or social reasons, or be due to fear of stigma or discrimination. According to this concept, the mother is under no social or cultural pressure not to use replacement feeding - she is supported by family and community in opting for replacement feeding, or she will be able to cope with pressure from family and friends to breastfeed, and she can deal with possible stigma attached to being seen with replacement food.
- **Feasible:** The mother (or family) has adequate time, knowledge, skills and other resources to prepare the replacement food and feed the infant up to 12 times in 24 hours. According to this concept, the mother can understand and follow the instructions for preparing infant formula, and with support from the family can prepare enough replacement feeds correctly every day, and at night, despite disruptions to preparation of family food or other work.
- **Affordable:** The mother and family, with community or health-system support if necessary, can pay the cost of purchasing/producing, preparing and using replacement feeding, including all ingredients, fuel, clean water, soap and equipment, without compromising the health and nutrition of the family. This concept also includes access to medical care if necessary for diarrhoea and the cost of such care.
- **Sustainable:** Support for adequate replacement feeding is needed throughout the period for which breastmilk is normally recommended and during which the child is at greatest risk of malnutrition that is for the first two years of life (WHO, 2007). Availability of a continuous and uninterrupted supply and dependable system of distribution for all ingredients and products needed for safe replacement feeding, for as long as the infant needs it. According to this concept there is little risk that formula will ever be unavailable or inaccessible, and another person is available to feed the child in the mother's absence, and can prepare and give replacement feeds.
- **Safe:** Replacement foods are correctly and hygienically prepared and stored, and fed in nutritionally adequate quantities, with clean hands and using clean utensils, preferably by cup. This concept means that the mother or caregiver:
 - has access to a reliable supply of safe water (from a piped or protected-well source)
 - prepares replacement feeds that are nutritionally sound and free of pathogens
 - is able to wash hands and utensils thoroughly with soap, and to regularly boil the utensils to sterilise them
 - can boil water for preparing each of the baby's feeds
 - can store unprepared feeds in clean, covered containers and protect them from rodents, insects and other animals.

Sources: HIV and infant feeding. 2003. A guide for health-care managers and supervisors. UNICEF, UNAIDS, WHO, UNFPA, 2003. WHO, 2007. HIV and infant feeding update

9.8.3 Areas of high HIV prevalence

Irrespective of the prevalence of HIV in the population, where the HIV status of individual mothers is unknown or the mothers is HIV negative, then recommended feeding practices are the same optimal feeding practices as for the general population (Box 16).

In an emergency situation, it is likely that the risks of not breastfeeding and of replacement feeding to infant survival outweigh the risks of HIV transmission:

"The risks of infection or malnutrition from using breastmilk substitutes are likely to be greater than the risk of HIV transmission through breastfeeding. Therefore, support to help all women to achieve early initiation and exclusive breastfeeding for the first six completed months and the continuation of breastfeeding into the second year of life are likely to provide the best chance of survival for infants and young children in emergencies." (Ops Guidance 5.2.8, v2.1, Feb 2007)

The contribution of HIV-infected infants and mothers to the burden of nutrition and medical care in feeding programmes is significant in areas of high HIV prevalence. In a hospital-based HIV prevalence study in Southern Malawi, for example, 40% of the malnourished children were HIV infected and HIV infection contributed to over 40% of all paediatric deaths.³¹⁹ HIV infection may contribute to malnutrition in an infant <6m either directly through the HIV infection of the infant and associated morbidities, through associated risky feeding practices, e.g. replacement feeding where AFSS is not in place, and/or by HIV infection compromising the mothers capacity to feed and care for her infant.

Where malnourished infants <6m present to programmes, it is therefore important to investigate whether HIV-associated feeding practices (e.g. replacement feeding) are a contributing factor. The current absence of breastfeeding status as a standard indicator in treatment programmes, highlighted in Chapter 5, makes it difficult to determine the contribution of replacement fed infants to admissions.

9.8.4 Testing for HIV in young infants

'Rapid tests' are increasingly cheap and available for field use. These detect HIV antibodies in a finger prick sample of whole blood.³²⁰ Because maternal antibodies can persist in the circulation of an uninfected infant and thus give a false positive result, some programmes have been reluctant to use the tests for infants <18m. After 18 months maternal antibodies should have cleared and the test therefore will represent true infant HIV sero-status. PCR, the definitive test in young infants, is expensive and often unavailable in resource poor settings.

Latest HIV-specific guidance should be sought as to how to manage these HIV exposed infants. It should also be noted that any positive test is more likely to be a true positive in malnourished infants than in the general population. This is because the background prevalence of HIV is higher among malnourished than normally nourished infants and thus the positive predictive value of a test is higher.

For guidance on testing of infants, visit,

http://www.who.int/hiv/paediatric/EarlydiagnostictestingforHIVVer_Final_May07.pdf

9.8.5 Use of antiretroviral (ARV) drugs and cotrimoxazole

Strong evidence supports early treatment strategies using antiretroviral drugs that treat both the mother and infant. Early treatment of HIV-infected pregnant women and lactating mothers and their infants³²¹ reduces the risk of infant HIV infection by lowering breastmilk viral load and so reducing vertical transmission.³²² Maternal ARV treatment also improves the health and chance of survival for the mother, which is fundamental to the survival of her infant; children of HIV-infected mothers who are ill or die are more likely to die themselves, independent of the HIV status of the infant.³²³

Recent WHO recommendations state that all infants (<12 months) with confirmed HIV infection should be initiated on ARV, regardless of clinical or immunological stage. Where PCR is unavailable, infants with "clinically diagnosed presumptive severe HIV" should start ARVs, and confirmation of HIV status should be obtained as soon as possible.³²⁴ There are indications from recent research that a specific combination of ARV provided in late pregnancy and until six months into breastfeeding is likely to further reduce HIV-transmission through breastfeeding. Updated recommendations are expected by end 2009³²⁵. ARV treatment in already malnourished infants poses several challenges and questions for future research, including optimal timing of ARV start and optimal drug dose. Nevertheless, early ARV treatment for mothers and infants is beneficial to both and should be a priority response.

Cotrimoxazole (when ARVs are not available)

Infants with a positive rapid test for HIV should start long term cotrimoxazole treatment. Cotrimoxazole is low risk, low cost, and is widely available. It is especially useful in settings without ARVs or other HIV-specific resources. In spite of the proven benefits, it is currently underused.^{326, 327} This could also prove critical in situations where ARVs are temporarily unavailable, by extending life until supplies resume.

To keep abreast of the latest recommendations in a quickly evolving technical area, management guidelines should direct to key sources, e.g. WHO, rather than propose to update content in detail that may become quickly outdated.

9.9 Individual v population based feeding recommendations

For a long time, international WHO guidelines recommended exclusive breastfeeding for the first four to six months of life, before moving to the current recommendation of six months. A key document justifying the shift to six months systematically reviewed the evidence that breastmilk alone can provide for adequate growth from four months onwards.³²⁸ The conclusion was:

"We found no objective evidence of a 'weanling's dilemma.' Infants who are exclusively breastfed for 6 months experience less morbidity from gastrointestinal infection than those who are mixed breastfed as of 3 or 4 months, and no deficits have been demonstrated in growth among infants from either developing or developed countries who are exclusively breastfed for 6 months.."

It also stated that:

"Infants should still be managed individually so that insufficient growth or other adverse outcomes are not ignored and appropriate interventions are provided... Large randomized trials are recommended in both types of setting to rule out small adverse effects on growth and to confirm the reported health benefits of exclusive breastfeeding for 6 months."

To our knowledge, no such RCTs have been done.

Current optimal infant feeding recommendations reflect practices that maximize population benefits and risks. They inform but should not dictate or limit individual management.³²⁹ It is conceivable that an individual five month old, for example, may fail to adequately gain weight whilst exclusively breastfed. Similarly, an extended period of exclusive breastfeeding beyond six months may benefit another child. Trials to determine the effectiveness of various feed options in individual management for this borderline age group would therefore be important and relevant to MAMI. It is important to consider that individualized treatment that seems to contradict optimal feeding recommendations may send out the wrong message to the wider community and undermine public health recommendations. Actions will be needed to protect against this risk.

A priority group to trial interventions on (and may help minimize the risk of undermining optimal feeding practices in the community) is infants who have no possibility of being breastfed, e.g. orphans with no wet nurse available. This group were identified by all key informants as a major challenge.

9.10 Summary findings and recommendations

Summary findings

Admission criteria are screening tools to identify patients whose death will be averted by particular therapeutic interventions. There is uncertainty about admission criteria for malnourished infants <6m. Many current guidelines recommend the same anthropometric admission criteria for infants <6m as for older children, with the exception of MUAC. Benefits of current interventions on offer are less certain for infants <6m than for older children. Cost effectiveness of treating malnourished infants <6m has not been formally evaluated.

A shift to the 'complicated' vs 'uncomplicated' model of treatment in this age group would require revised inpatient admission criteria for 'complicated' cases and new criteria for outpatient treatment of 'uncomplicated' cases.

Based on current evidence, it is plausible that skilled breastfeeding counseling and support would also be effective for malnourished infants; this needs to be tested in both inpatient and community-based settings.

There is a lack of clinical assessment strategies to diagnose and address underlying infant or maternal disease, and breastfeeding problems that are primarily maternal/ infant related.

The evidence base for current guidelines on antibiotic treatment in infants <6m with SAM is largely absent and for malnourished children is lacking. Resistance to amoxicillin is of concern.

There is uncertainty and varying practice in which therapeutic milk to use in the infant <6m age group. Research is so far limited.

9.10 Summary findings and recommendations

The evidence base for current guidelines on antibiotic treatment in infants <6m with SAM is largely absent and for malnourished children is lacking. Resistance to amoxicillin is of concern.

There is uncertainty and varying practice in which therapeutic milk to use in the infant <6m age group. Research is so far limited.

The contribution of HIV-infected infants and mothers to the burden of nutrition and medical care in feeding programmes is significant in areas of high HIV prevalence. Access to ARVs for HIV-exposed mothers and infants and safer infant feeding practices are key determinants of HIV-free child survival.

Where malnourished infants <6m present to programmes, risky feeding practices (e.g. replacement feeding where AFASS^{iv} conditions are not in place) may be a contributing factor.

Current optimal infant feeding recommendations reflect practices that maximize population benefits and risks; they inform but should not limit individual management. It is important to consider that individualized feeding practice could send out mixed messages to the wider community on optimal feeding practices.

Summary recommendations

Key areas of research include:

- Systematic review of studies of different anthropometric indicators suitable for use in the community in infants <6m, including a review of the suitability of MUAC for this age group.
- Investigate the nature and effectiveness of skilled breastfeeding counseling and support in inpatient treatment of severely malnourished infants <6m.
- Review of the effectiveness and costs of community-based breastfeeding support, to assess its viability as a treatment option for uncomplicated cases of SAM in infants <6m.
- Review the effectiveness of breastfeeding assessment tools for use in the community to identify 'uncomplicated' and 'complicated' cases of SAM in infants <6m.
- Develop a triage tool based on a set of clinical signs for 'complicated' cases, to identify those with urgent need.
- Update the evidence base on antimicrobials through randomised controlled trials to update guidelines.
- Research the choice of therapeutic milk for infants <6m.

An alternative to the 'appetite test' used in CMAM is needed for the <6m age group; validated breastfeeding assessment tools could enable this.

Access to HIV counselling and testing and early ARV treatment for mothers and infants is a priority in HIV prevalent areas. Cotrimoxazole should be used when ARVs are not available.

To keep abreast of the latest recommendations on HIV, guidelines should direct to key sources.

Infant feeding counselling in the context of HIV needs to be consistent with current WHO recommendations.³³⁰ Strategies to treat infant malnutrition in the context of HIV should not only consider interventions that seek to avoid HIV transmission, but also those that support maternal and child survival.

Trials of programme interventions need to include and report on costs, staff time and skill sets to inform programme planning. This is especially important in considering the cost-benefits and viability of scale-up of interventions.

^{iv} Acceptable, feasible, affordable, sustainable, safe.

9.10 Summary findings and recommendations

Endnotes

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Chapter 10

The way forward

Chapter 10: The way forward

The MAMI Project has shown that the burden of care for infants <6m is significant, the implications of the rollout of the 2006 WHO Growth Standards for infants <6m are important and need to be explored urgently, the current evidence base for treating malnourished infants <6m is relatively weak and that programmes currently struggle using current guidelines to manage this age-group.

Some recommendations are made throughout the MAMI report in response to identified gaps, in particular by highlighting key resources, good practices, and complementary initiatives to consolidate and build on. To highlight here:

- Existing guidelines with strong MAMI components are MSF guidelines 2006, ACF Assessment and Treatment of Malnutrition, 2002 and Module 2 on IFE and are good reference tools (see Annex A).
- Strategies with potential to improve inpatient outcomes of 'complicated' infant <6m SAM include review of current first and second line antibiotic choices, implementation of routine Kangaroo care, 'breastfeeding corners'/ separate mother and baby areas where both skilled and peer-to-peer breastfeeding support is available, and psychosocial support of the malnourished infant, the mother-infant dyad and support to families.
- Strategies with potential for effective outpatient-based care of infant <6m MAM & 'uncomplicated' SAM include community-based breastfeeding support, psychosocial support programmes & women's groups programme and routine community-mobilization and identification of context-specific factors underlying infant <6m malnutrition.
- Closer links are needed with existing programmes that may impact on infant <6m malnutrition, particularly reproductive health services (e.g. recording birth weight and follow-up weight at first immunisation), existing interventions promoting exclusive breastfeeding (e.g. Baby-Friendly Initiative), those improving quality care to sick children (e.g. Integrated Management of Childhood Illness), and growth monitoring programmes.
- The MAMI Project findings should inform the update of Sphere Standards, currently underway (due out 2010).

The MAMI findings have also highlighted key research areas to consider, including:

- Systematic review of studies of different anthropometric indicators suitable for use in the community in infants <6m, including a review of the suitability of MUAC for this age group.
- Review of the effectiveness of community-based breastfeeding support to assess its viability as a treatment option for uncomplicated cases of SAM in infants <6m.
- Review the effectiveness of breastfeeding assessment tools for use in the community to identify 'uncomplicated' and 'complicated' cases of SAM in infants <6m.
- Develop a triage tool based on a set of clinical signs for 'complicated' cases in need of urgent inpatient treatment.
- Investigate the nature and effectiveness of skilled breastfeeding counselling and support in inpatient treatment of severely malnourished infants <6m.
- Research into the choice of therapeutic milk for infants <6m.
- Studies on the therapeutic treatment and follow-up of malnourished non-breastfed infants.
- Intervention studies into antibiotics to use in infants <6m and older children.
- Studies to explore which psychosocial support activities are most effective, and their timing, duration, impact and adaptation to community models for malnutrition treatment.

There are undoubtedly resource implications to strengthened inpatient and expanded outpatient treatment of malnourished infants <6m. This is reflected in reported field experiences but not supported by formal cost data. Trials of programme interventions need to include and report on cost to inform programme planning. This is especially important in considering the cost-benefits and viability of scale-up of interventions.

Assessing programme performance treating infant <6m malnutrition needs to be strengthened. Critically, performance should not be judged solely on core outcomes (e.g. death rate, nutritional cure rate) but needs to:

- Capture the clinical, psychosocial and contextual complexity of infants treated
- Ensure robustness of data, audit and management systems to identify problems that may occur, and
- Establish programme population coverage of SAM. MAM in infants <6m.

Key initiatives that may provide lessons in taking initiatives forward include the SFP minimum reporting standards project (MRP), the Vermont-Oxford Network to improve neonatal care,³³¹ and experiences from the rollout of the 1999 WHO guidelines.

- The MRP is an ENN-led interagency initiative that involves developing and implementing a standardised Minimum Reporting Package on SFPs, including data collection tools, training and multi-agency data collection.³³²
- The mission of the Vermont-Oxford Network³³³ is “to improve the quality and safety of medical care for newborn infants and their families through a coordinated programme of research, education and quality improvement projects”. (see Box 17)
- Long-term follow up of hospitals involved in the 1999 WHO guideline piloting showed marked discrepancies in outcomes.³³⁴ Systems, staff and leadership were key influences on the effective implementation of the guidelines. This need to address systems factors came out strongly in MAMI key informant interviews. Tools supporting management quality would benefit not only malnourished infants <6m, but all patient groups.

Box 17: Vermont-Oxford Network

The Vermont Oxford Network was set up to address a poor evidence-base with which to formulate effective guidelines and any common practices between different treatment centres, yet also important differences of unknown effectiveness.

The network has a membership of over 700 neonatal units worldwide. It has a unique and confidential database on care and outcomes of high-risk newborn infants, used for quality management, process improvement, internal audit and peer review.

Member institutions participate in clinical trials, long-term follow-up studies and epidemiologic and outcomes research. Results are widely disseminated through network publications, scientific articles in peer reviewed medical journals, web site postings and an annual meeting.

Use of core approaches and standardised paperwork across multiple sites enables pooling data, analysis by strata (or similar) and exploration of inter-site variations.

The lack of an evidence base to formulate MAMI guidelines remains a big gap. Key research questions include medium and long-term survival of the treated infants, effectiveness of different feeding regimens and impact of psychosocial and community interventions. A combination of systematic reviews (e.g. of current guidelines), high quality RCT-type studies (e.g. on antibiotic choice; what type of breastfeeding support programme has maximal impact) and operational research is needed to strengthen guidelines. More resources should be devoted to future guideline development and tools such as GRADE and AGREE used to better enhance their quality.

Our review suggests that formal frameworks might usefully guide which policies and research projects should strongly (and more urgently) be recommended, and which might be less critical. With this in mind, two frameworks – GRADE (introduced in Chapter 4) and Child Health and Nutrition Research Initiative (CHNRI)³³⁵ – may be of particular use (see Box 18).

Box 18: GRADE & CHNRI frameworks

Using the GRADE framework, factors influencing the strength of recommendation for action are:

- **Balance between desirable and undesirable effects:** The larger the difference between the desirable and undesirable effects, the more likely a strong recommendation is warranted. The narrower the gradient, the more likely a weak recommendation is warranted
- **Quality of evidence:** The higher the quality of evidence, the more likely a strong recommendation is warranted
- **Values and preferences:** The more variability in values and preferences, or more uncertainty in values and preferences, the more likely a weak recommendation is warranted
- **Costs (resource allocation):** The higher the costs of an intervention (that is, the more resources consumed) the less likely a strong recommendation is warranted

Using Child Health and Nutrition Research Initiative (CHNRI), all possible research options are listed and assigned scores in the following categories:

- Is the question answerable in an ethical way?
- Is the intervention likely to be effective?
- Is the intervention likely to be deliverable, affordable & sustainable?
- What is the likely disease burden reduction?
- Is the intervention equitable?

To enable continued inter-agency dialogue, data sharing and partnership is needed. In particular:

- Focused prospective audits are needed – interpreting retrospective data is challenging and yields relatively limited information.
- Age-disaggregated data collection on infant <6m, currently implemented in the minority of cases, should be rolled out and continue.
- Harmonised databases and coding systems would enable easier audit. In this regard, an update in the MRP to include infants <6m in SFP reporting is recommended.
- A mechanism for data sharing and 'lesson' learning forums should be established to inform future field guidance.

MAMI strategies should be located within a framework of safe and appropriate IYCF; programme synergies between IYCF support of infants <6m and child 6 to 24m must be better reflected in the guidelines. Locating interventions to treat infant and child malnutrition within global policy frameworks, e.g. the WHO/UNICEF Global Strategy on IYCF, creates opportunities to coordinate with governments and national level plans and to synergise interventions that treat malnutrition with those that seek to prevent it. Such strategic approaches may be possible in many emergency contexts.

Of most immediate concern is the lack of explicit consideration to infants <6m in current guidelines or their explicit recognition in recent statements on malnutrition treatment³³⁶ and 2006 WHO GS rollout.^{337, 338} This risks the presumption that care for older children can safely be extended to infants <6m and/or perpetuates the assumption that infants <6m are all well nourished. *A valuable contribution to help address this would be a statement on MAMI that highlighted the concerns, gaps and immediate considerations for this age-group to guide practice in the immediate term.* Such a statement would be well placed as an output of the Global Nutrition Cluster through engagement of Nutrition Cluster members, the MAMI Project research team, RAG and IASG members.

In the future, a more radical shift in the model for MAMI is likely needed. A move towards community-based management of acute malnutrition in infants <6m is an option that should be actively considered. Further applied and operational research is required to provide the evidence base for such a transition. For older children, the evolution to community based management of acute malnutrition was driven by a strong vision, a clear research agenda and well documented field experiences. The challenge now is how to improve nutritional, clinical and public health outcomes in infants <6m.

Endnotes

³³¹ <http://www.vtoxford.org/home.aspx>

³³² See www.ennonline.net/research

³³³ <http://www.vtoxford.org/home.aspx>

³³⁴ Puoane et al, 2008. Why do some hospitals achieve better care of severely malnourished children than others? Five-year follow-up of rural hospitals in Eastern Cape, South Africa. HPP 2008;23(6):428-37.

³³⁵ <http://www.chnri.org>

³³⁶ Community-based management of severe acute malnutrition A Joint Statement by WHO, WFP, the UNSCN and UNICEF. http://www.who.int/nutrition/topics/statement_commbased_malnutrition/en/index.html

³³⁷ WHO Child Growth Standards and the identification of severe acute malnutrition in infants and children. A Joint Statement by WHO and UNICEF. http://www.who.int/entity/nutrition/publications/severemalnutrition/9789241598163_eng.pdf

³³⁸ IASC Global Nutrition Cluster, and Standing Committee on Nutrition (SCN) Task Force on Assessment, Monitoring, and Evaluation. Fact sheet on the implementation of 2006 WHO Child Growth Standards for emergency nutrition programmes for children aged 6-59 months. March 2009.

<http://oneresponse.info/GlobalClusters/Nutrition/publicdocuments/WHO%20GS%20Factsheet%20English.pdf>

Appendices

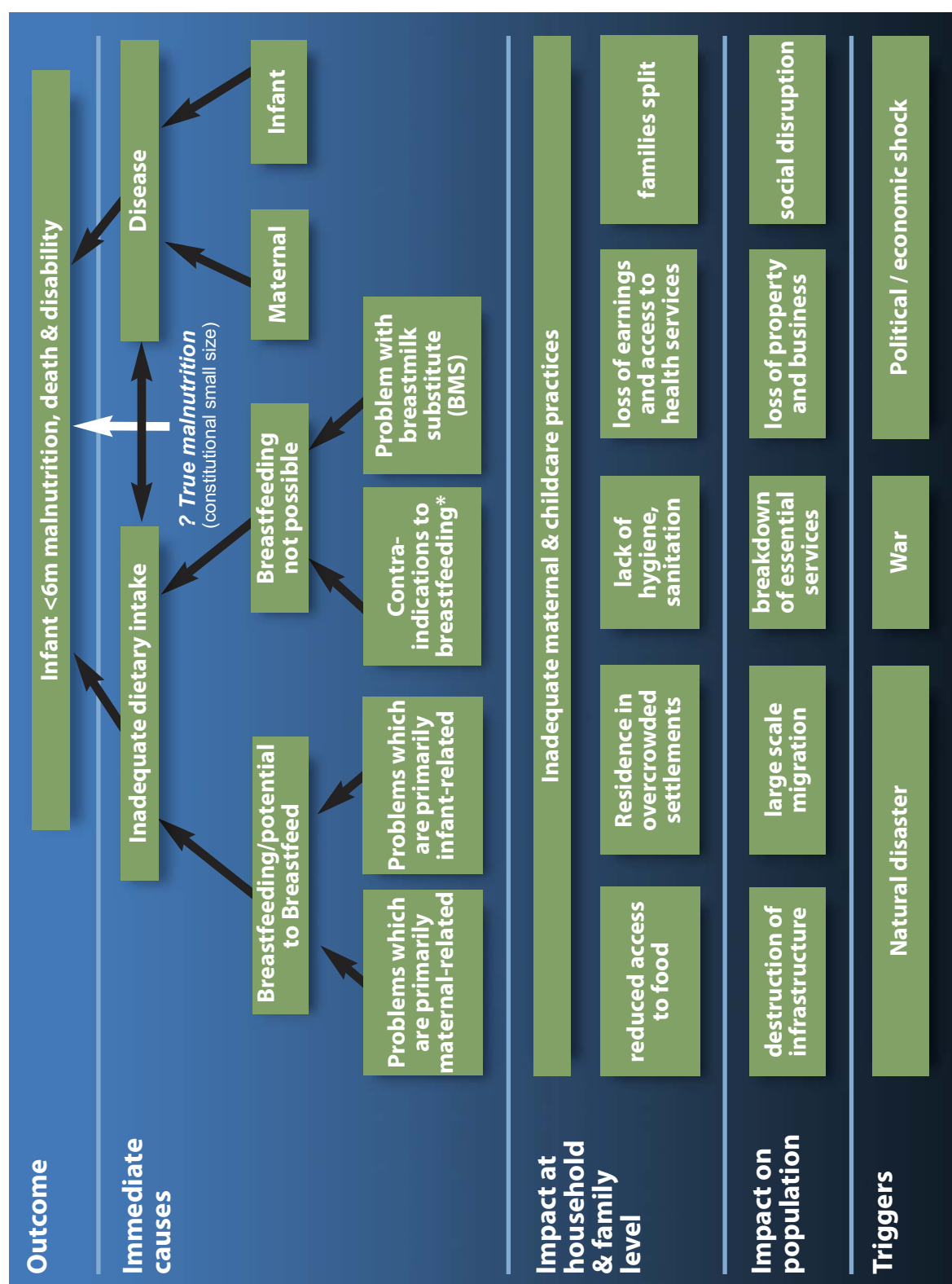


Appendix A Key Resources

Online links are provided to electronic versions where available. All resources listed are also located at www.ennonline.net/resources and select 'MAMI'.

- **ACF Assessment and Treatment of Malnutrition in Emergency Situations**, Claudine Prudhon, 2000 (*Book available for purchase via <http://www.aahuk.org/publications.htm>*)
- **IFE Core Group (2009) Infant Feeding in Emergencies Orientation Package (Module 1), updated 2009.** (*Download free from <http://www.ennonline.net/resources/view.aspx?resid=1>*)
- **IFE Core Group (2007) Infant feeding in emergencies. Module 2. Version 1.1** Developed through collaboration of ENN, IBFAN-GIFA, Fondation Terre des hommes, UNICEF, UNHCR, WHO, WFP. Core Manual (for training, practice and reference). English and French. (*Download free <http://www.ennonline.net/resources/view.aspx?resid=4> or in print from ENN, Oxford, UK or UNHCR, Nairobi*)
- **IFE Core Group (2007) Operational Guidance on IFE, version 2.1, May 2007. 11 languages.** (*Download free from <http://www.ennonline.net/resources/view.aspx?resid=6>*)
- **International Code of Marketing of Breastmilk Substitutes (1989)** (*Available at http://www.who.int/nutrition/publications/code_english.pdf*)
- **MSF Nutrition Guidelines (2006)** (*Download from <http://www.msf.org.uk/books.aspx>*)
- **Sphere Humanitarian Charter & Minimum Standards in Disaster Response (2004)** <http://www.sphereproject.org/>
- **Valid International (2006) International. Community-based Therapeutic Care (CTC). A Field Manual.** Oxford: Valid International. (*Available at <http://www.fantaproject.org/ctc/manual2006.shtml>*)
- **WHO/UNICEF (2003) Global Strategy on Infant and Young Child Feeding.** Geneva: World Health Organisation. (*Available at <http://www.who.int/nutrition/publications/infantfeeding/9241562218/en/index.html>*)
- **WHO (2003) Training course on the management of severe malnutrition.** Geneva: World Health Organisation. (*Available at http://www.who.int/nutrition/topics/severemalnutrition_training_courses/en/index.html*)
- **WHO (2004) Severe malnutrition: report of a consultation to review current literature.** Geneva, World Health Organization, 6-7 September 2004. (*Available at <http://www.who.int/nutrition/publications/malnutrition/en/index.html>*)
- **WHO (2004) Guiding Principles for feeding infants and young children during emergencies** (*Available at <http://www.who.int/nutrition/publications/emergencies/9241546069/en/index.html>*)
- **WHO (1999) Management of severe malnutrition: a manual for physicians and other senior health workers.** World Health Organisation. Geneva: World Health Organisation. (*Available at <http://www.who.int/nutrition/publications/malnutrition/en/index.html>*)
- **WHO (2003) Guidelines for the inpatient treatment of severely malnourished children.** Geneva: World Health Organisation. (*Available at <http://www.who.int/nutrition/publications/malnutrition/en/index.html>*)
- **WHO & UNICEF (2009) WHO child growth standards and the identification of severe acute malnutrition in infants and children.** A joint statement by the World Health Organization and the United Nations Children's Fund. (*Available at http://www.unicef.org/nutrition/files/stmt_child_growth_sam_final.pdf*)
- **World Health Organization. The WHO child growth standards.** (*Available at <http://www.who.int/childgrowth/standards/en/>*)
- **WHO, WFP & UNICEF (2007) Community-based management of severe acute malnutrition. A Joint Statement by the World Health Organization, the World Food Programme, the United Nations System Standing Committee on Nutrition and the United Nations Children's Fund.** (*Available at http://www.who.int/nutrition/topics/statement_commbased_malnutrition/en/index.html*)
- **UNICEF, UNAIDS, WHO, UNFPA (2003) HIV and infant feeding. A guide for health-care managers and supervisors.** (*Available at <http://www.who.int/child-adolescent-health/publications/NUTRITION>*)
- **WHO (2007) HIV and Infant Feeding: Update based on the Technical Consultation held on behalf of the Inter-agency Task Team (IATT) on Prevention of HIV Infection in Pregnant Women, Mothers and their Infants** Geneva, 25–27 October 2006
- **UNHCR (2009) Guidance on infant feeding and HIV in the context of refugees and displaced populations.** (*Available at <http://www.ennonline.net/resources>*)
- **WHO, UNICEF (2009) Acceptable medical reasons for using breastmilk substitutes.** (*Available at http://whqlibdoc.who.int/hq/2009/WHO_FCH_CAH_09.01_eng.pdf*)
- **WHO UNICEF (2006) Integrated IYCF Counselling Course. Trainers Guide.** (*Available at <http://www.ennonline.net/resources>*)
- **CARE, URC, CHS (2007) Infant and Young Child Feeding Counselling - Community Focused Approach. Trainers Guide.** (*Available at <http://www.ennonline.net/resources>*)
- **ENN/IFE Core Group (2009) Integration of IYCF support into CTC/CMAM. Facilitators Guide and handouts.** ENN, IFE Core Group & collaborators. October 2009. (*Available at <http://www.ennonline.net/resources>*)

Appendix B Conceptual framework for causes of malnutrition in infants <6m



Key references:

Breastfeeding and Human Lactation, Riordan & Wambach, 4th Edition, 2010
 Behavioural & Metabolic Aspects of Breastfeeding. International trends. Eds Simopoulos, Dutra de Oliveira, Desai, 1995
 Fast Facts - Infant Nutrition. Lucas & Zlotkin, 2003
 Forfar & Arneil's Textbook of Pediatrics. Sixth Edition
 Breastfeeding and Human Lactation, Riordan & Auerbach, 2nd Edition, 1998
 Breastfeeding. A guide for the medical profession. Lawrence & Lawrence. 6th ed, 2005
 IASC Nutrition cluster Harmonized training package

*acceptable, feasible, affordable, sustainable and safe conditions

Appendix C Additional Tables for Chapter 5 (Review of field treatment)

Table 43: Discharge codes by country and by frequency														
Discharge code*	Afghanistan	Burundi	DRC	Ethiopia	Kenya	Liberia	Myanmar	Niger	Somalia	Sudan	Tajikistan	Uganda	N	Countries using this code
Cured	+			+	+	+	+		+	+	+	+	50,483	9
Defaulter	+				+	+	+		+	+	+	+	8,531	8
Missing code data	+	+		+			+	+	+	+		+	1,611	8
Admission mistake					+	+	+		+	+	+	+	449	7
Death				+	+		+			+	+	+	691	6
Transfer				+	+	+				+	+	+	863	6
Other	+								+	+	+	+	545	5
Dead	+					+			+			+	294	4
Medical transfer					+		+	+				+	201	4
Non respondent				+	+						+	+	9,355	3
Abandon		+	+					+					2,061	3
Décès		+	+					+					710	3
End of TFC follow up					+						+	+	2,090	3
Erreur d'admission		+	+					+					283	3
Guéri		+	+					+					23,921	3
Non répondant			+					+					1,645	3
Transfert medical		+	+					+					33	3
Autres		+						+					72	2
CNR							+			+			613	2
Critères non-atteints		+						+					163	2
Default											+	+	76	2
Died	+											+	14	2
Inconnu		+						+					44	2
non responder							+		+				136	2
Non response										+		+	317	2
NR										+		+	51	2
Others						+				+			15	2

Appendix C

Table 43 cont'd

Discharge code*	Afghanistan	Burundi	DRC	Ethiopia	Kenya	Liberia	Myanmar	Niger	Somalia	Sudan	Tajikistan	Uganda	N	Countries using this code
Transfer to OTP					+							+	59	2
Transfer to TFC					+							+	786	2
Transfert			+					+					584	2
Unknown							+					+	8	2
Admission error										+			1	1
AM							+						5	1
C							+						902	1
C.N.R										+			276	1
CH							+						45	1
Cheating							+						36	1
Criteria not reached						+							23	1
D							+						104	1
D/Registration					+								9	1
Décédé								+					35	1
Def					+								1	1
DNG								+					45	1
End of CBC												+	3	1
End of CBC follow up												+	86	1
End of follow up												+	711	1
End of OTP follow up												+	7	1
End of TFC												+	90	1
End of transit												+	5	1
End OTP					+								1	1
Erreur admission								+					7	1
Error										+			4	1
Fin suivi CNT			+										2,660	1
M						+							13	1

Appendix C

Table 43 cont'd

Discharge code*	Afghanistan	Burundi	DRC	Ethiopia	Kenya	Liberia	Myanmar	Niger	Somalia	Sudan	Tajikistan	Uganda	N	Countries using this code
Medical referral												+	1	1
Mistake												+	6	1
Mistake admission												+	2	1
Mistake of admission												+	3	1
Non guéri								+					47	1
Non respond												+	5	1
Non respondant												+	326	1
OTP transfer													1	1
R,Creni								+					10	1
R, Transfert								+					68	1
Refus Creni								+					6	1
Refus de transfert								+					2	1
Refus transfert								+					5	1
Refused to go TFC					+								1	1
SFC transfer												+	2	1
T							+						43	1
T, Creni								+					21	1
TFC												+	20	1
To other OTP												+	1	1
Transfer CTC / TFC												+	12	1
Transfer HP										+			139	1
Transfer other										+			3	1
Transfer others										+			6	1
Transfer SFC					+								46	1
Transfer TFC												+	26	1
Transfer to CBC												+	101	1
Transfer to CTC												+	32	1

Appendix C

Table 43 cont'd

Discharge code*	Afghanistan	Burundi	DRC	Ethiopia	Kenya	Liberia	Myanmar	Niger	Somalia	Sudan	Tajikistan	Uganda	N	Countries using this code
Transfer to Health Ce												+	1	1
Transfer to OPT												+	3	1
Transfer to other CTC												+	5	1
Transfer to other OTP					+							+	5	1
Transfer to other SFC												+	965	1
Transfer to OTP / TFC												+	414	1
Transfer to SFC												+	249	1
Transféré								+					31	1
Transfert Centre de S			+										1	1
Transfert CNS			+										1,494	1
Transfert CNT			+										619	1
Transfert CS			+										4	1
Transfert H								+					1	1
Transfert hospital			+										161	1
Transfert vers crenam								+					9	1
Transfert vers creni								+					31	1
Transit												+	2	1
Wrong admission												+	7	1
Wrong child					+								14	1
Wrong discharge												+	13	1
N	1,096	5,481	24,155	59	8,466	2,797	2,011	5,721	3,730	8,355	9,329	45,591	116,79	
Number of outcome codes used in each country	6	9	13	5	18	7	16	25	8	16	9	48		

* As originally appear in the datasets

DRC: Democratic Republic of the Congo.

Appendix C

Table 44: Oedema by country and programme

	< 6 months						6 to 59 months					
Country	Oedema		No oedema		Missing values		Oedema		No oedema		Missing values	
	n	%	n	%	n	%	n	%	n	%	n	%
Afghanistan	12	1.2%	1,018	98.8%	0	0.0%	1	1.6%	62	98.4%	0	0.0%
Burundi	1	0.7%	145	99.3%	0	0.0%	1,209	60.1%	803	39.9%	0	0.0%
Ethiopia	0	0.0%	30	90.9%	3	9.1%	1	4.2%	22	91.7%	1	4.2%
Kenya	1	2.7%	32	86.5%	3	10.8%	57	11.5%	377	76.3%	60	12.1%
Liberia	1	0.6%	165	98.8%	1	0.6%	534	23.7%	1,715	76.3%	0	0.0%
Myanmar	5	2.8%	175	97.2%	0	0.0%	114	9.6%	1,075	90.4%	0	0.0%
Niger	1	0.7%	108	74.5%	36	24.8%	178	18.5%	534	55.5%	251	26.1%
DRC	116	8.3%	1,284	91.7%	0	0.0%	3,069	66.2%	1,564	33.8%	1	0.0%
Somalia	1	0.2%	398	99.0%	3	0.7%	524	20.4%	2,034	79.4%	5	0.2%
Sudan	2	0.6%	358	99.4%	0	0.0%	905	18.4%	4,020	81.6%	3	0.1%
Tajikistan	0	0.0%	83	96.5%	3	3.5%	5	1.7%	274	95.5%	8	2.8%
Uganda	0	0.0%	16	100.0%	0	0.0%	664	52.7%	597	47.3%	0	0.0%
Total	140	3.5%	3,812	95.3%	50	1.2%	7,261	35.1%	13,077	63.3%	329	1.6%
	< 6 months						6 to 59 months					
Programme	Oedema		No oedema		Missing values		Oedema		No oedema		Missing values	
	n	%	n	%	n	%	n	%	n	%	n	%
DC	2	0.3%	736	99.7%	0	0.0%	1,209	58.9%	844	41.1%	0	0.0%
HT	3	2.6%	111	97.4%	0	0.0%	73	7.2%	936	92.8%	0	0.0%
SC	2	2.0%	94	94.9%	3	3.0%	43	14.1%	262	85.6%	1	0.3%
TFC	133	4.4%	2,871	94.1%	47	1.5%	5,936	34.3%	11,035	63.8%	328	1.9%
Total	140	3.5%	3,812	95.3%	50	1.2%	7,261	35.1%	13,077	63.3%	329	1.6%
DRC: Democratic Republic of the Congo; DC: Day Centre; HT: Home treatment; SC: Stabilisation centre; TFC: Therapeutic Feeding Centre.												

* The percentages in this table are based on the total sample of 4002 infants <6m and 20,667 children aged 6 to 59 months.

Appendix D Interview schedules and additional tables for Chapter 6

Appendix D.1 Steering group meeting report, May 2008

Project MAMI

Management of Acute Malnutrition in Infants

A retrospective review of the current field management of acutely malnourished infants under six months of age

<http://www.ucl.ac.uk/cihd/research/nutrition/mami>

Implemented in a collaboration between Emergency Nutrition Network (ENN),
UCL Centre for International Health and Development (CIHD) and Action Contre la Faim
Funded by the UNICEF-led Inter-Agency Standing Committee (IASC) Nutrition Cluster
(<http://ocha.unog.ch/humanitarianreform/Default.aspx?tabid=74>)

Report of the 1st Research Advisory Group (RAG) and Interagency Steering Group (ISG) meeting
UCL Centre for International Health and Development, London,
Wednesday 28th May 2008

1 Presentations

(Copies of PowerPoint slides are available on request – marko.kerac@gmail.com)

1.1. Project background – Jeremy Shoham, ENN

The IFE (Infant and Young Child Feeding in Emergencies) Core Group, coordinated by ENN, has in its work since 1999 identified a lack of specific guidance for the management of acutely malnourished infants less than six months old. The MAMI project was conceived to address this need. Funding is from the UNICEF-led IASC Nutrition Cluster and is secured until December 2008.

1.2. Conceptual framework and project scope – Marko Kerac, CIHD

MAMI aims to document current practice in the management of acutely (moderate & severe) malnourished infants under six months, in emergency programmes, in order to learn from recent operational experience and identify further research needs. The immediate project outcome will be a detailed project report that will be produced at the end of 2008. Outputs planned for the longer term include interim 'Best Practice' guidelines based on currently available evidence and a research agenda suggesting studies that are needed to inform future practice. Project reports will be targeted at specific audiences:

- A technical document aimed at policy makers and researchers describing in detail the various issues related to the management of infant malnutrition (and explicit about underlying quality/grade of evidence).
- A short summary document targeted at fieldworkers.

A conceptual framework (see appendices) for defining and understanding the causes of infant malnutrition was presented. The purpose of this is to facilitate communication and common technical understanding of the classification and aetiology of malnutrition in this age group – which is often more complex than malnutrition in older ages. Challenges include the use of multiple indicators (anthropometric/clinical) and the difficulty of differentiating acute malnutrition from low birth weight (LBW) or premature infants in contexts where longitudinal growth data is often unavailable.

Main discussion points

a) Sub-categorisation of infants by age – there was discussion about:

- Usefulness of sub-categorization of 0 to 5.9m infants: rationale is to recognise that physiologically and patho-physiologically infants at different ends of this age spectrum are a very heterogeneous group. To what extent, and how any such differences impact on management was discussed.
- If adopted, what cut-offs should be used: There was discussion about the choice of cut-offs and about whether to have two or three age subcategories. One option was to follow IMCI with a two phase cutoff: 0- 1.9m to identify the youngest infants; and a second group 2 to 5.9m. This was to be further discussed in the MAMI report in light of published or field evidence.

Action

- Further feedback/evidence welcome. Will be explored in detail in the MAMI literature review
- Age data to be kept as a continuous variable wherever possible to allow flexibility and exploration of the pros/cons of different cut-off options

b) Defining cases – it was ascertained that agencies use many different indicators (anthropometry, clinical status and feeding adequacy) in the field, with no current consensus on best practice in infants below six months. The difficulty of distinguishing acute malnutrition from prematurity/LBW, given the frequent lack of longitudinal patient records in the field, was highlighted. Some agencies, as well as DHS surveys, ask mothers “Was your child small at birth?”, though the subjectivity of this method was acknowledged. The possibility of a pre-admission period of monitoring to ascertain risk and prioritise admission was suggested.

Action

- Pros/cons of various definitions to be explored during analysis of field data and related literature

c) Understanding aetiology – the general usefulness of a conceptual framework was acknowledged, but there was much discussion about terminology, format, and about the extent to which knowing cause changes patient management (e.g. breastfeeding support likely needed whatever other causes).

Action

- Individuals & agencies to feed back to Marko all suggestions for ‘evolving’ the initial draft framework

1.3. Review of progress & overview of proposed methodologies – Marko Kerac, CIHD

Progress to date includes initial literature searches, an online letter in the Lancet and workshops in Vietnam and Bali. One of the next steps will be to identify specific questions which MAMI can address using currently available evidence, including agency data. Interim ‘best practice’ guidelines will be written with explicit reference to the level of evidence used – graded according to the Oxford Centre for Evidence-Based Medicine (see www.cebm.net/levels_of_evidence.asp)

Action

- Marko to liaise with agencies re availability of data on 0 to 5.9m children – this will be central to determining what questions/issues MAMI can and cannot address in the initial project timeframe

1.4. Review of currently available field data – Caroline Wilkinson and Cecile Bizouerne, ACF

This presentation reviewed current field challenges in management of 0 to 5.9m malnourished infants. An example field database was also shown and discussed to help the group focus on what questions might be answerable through the review of field data. Key points included an observation that this age group is often not specifically targeted by feeding programmes and surveys (with infants <6m included in only an estimated 10% of surveys). There are therefore many unknowns both about the scale of the problem, and about how best to look after malnourished children who are identified. Adverse implications are likely

given known higher mortality rates of young infants and the specific resources/skills (e.g. staff training, time) needed to best care for mothers and infants in this group. It was postulated that the proportion of malnutrition caseload below six months might increase with the roll-out of CMAM, as more infants are identified. Lastly, psycho-social and preventative interventions were discussed, and examples reviewed.

Main discussion points

a) Availability of data –

- Asking those present at the meeting, it was established that many agencies do not routinely collate data on 0 to 5.9m infants – though it may be available by going to field records. Limitations of the data (e.g. grouping) that is available was acknowledged

Action

- Data analysis should be supported by some qualitative work to better understand the nature of that data and its' utility in informing future practice – e.g. by interviewing those who collected the data;
- Analysis of individual-level, raw data is important wherever possible

b) Determining programme impact & effectiveness: the importance of context

- There was much discussion about how context can affect programme outcomes. Which are 'universal' factors relevant everywhere; which are more 'localised' issues; is it possible / how to distinguish the two? These are important challenges when assessing programme effectiveness – especially of psychosocial and other more 'indirect' interventions.

Action

- Qualitative work & literature review will be important to try to identify 'key'/'universal' contextual factors

c) Database linking & coordination –

- Linking different databases was identified as a challenge. Some questions (e.g. the effect of supporting pregnant/lactating women so as to improve infant nutrition) are difficult to address without such linking.

Also discussed were the challenges of comparing outcomes from different management strategies – difficult if different admission criteria are used. There was some feeling that a useful outcome from MAMI would be to build agency consensus on admission criteria for malnourished infants as this would be a good basis for future work and harmonisation of practice.

The characteristics of a good admission criterion were discussed.

Action

- MAMI to be a forum for agencies to meet/ share experiences – initial steps towards database harmonization

1.5. Networking for progress: lessons from the Vermont Oxford Network

– Prof Alan Jackson, RAG

Key points included the fact that scientific literature on the feeding of infants below six months is sparse, and that standardised approaches to the 'gap' such as randomised controlled trials are unlikely to be the way forward. MAMI needs to ascertain the level of evidence needed to make judgements for better care standards, and to decide the best way of capturing such data for this purpose. The Vermont Oxford Network (VON) may be a useful model of how a related discipline has moved forward.

VON is a collaboration of health care professionals dedicated to improving the quality and safety of medical care for newborn infants and their families through a coordinated programme of research, education and quality improvement projects. It maintains a database of information about the care and outcomes of high-risk newborn infants. This can be used by participating units for quality management, process improvement, internal audit and publication in peer reviewed journals (see www.vtoxford.org).

2 Research questions/issues for MAMI to address: Summary of key areas identified:

Three working groups (+informal discussions during the day) helped identify and frame possible questions that MAMI might address.

Research question + why important	Data needed/available
Background	
<ul style="list-style-type: none"> What is the scale of the problem of 0 to 5.9m malnutrition? <ul style="list-style-type: none"> ? A 'paradigm shift' that malnutrition is a problem in this age group Helps determine where on the spectrum of (public health vs individual & (therapeutic vs preventative) efforts should be mainly (but not exclusively) focused 	<ul style="list-style-type: none"> National DHS databases; MICS databases
Current Guidelines	
<ul style="list-style-type: none"> What do current management protocols recommend for 0 to 5.9m malnutrition? <ul style="list-style-type: none"> To understand the range and variety of current practices so as to be able to: compare & contrast different approaches better understand 'baselines' before recommending future work/research What are constraints to some current programmes admitting/managing 0 to 5.9m olds 	<ul style="list-style-type: none"> Review of agency protocols Review of agency data Qualitative work & field visits
Admission Criteria	
<ul style="list-style-type: none"> Need a criterion that is optimally sensitive & specific against programme aims (as well as taking into account likely resource constraints) What is best way of identifying cases (e.g. rapid assessments; surveys; other) (How) can LBW/prematurity/post-natal malnutrition be differentiated? (and is there a 'weight' or other cut-off below which treatment needed regardless) What % of cases of malnutrition are 0 to 5.9m (in relation to 6 to 59.9m) What are the 'best' admission criteria: <ul style="list-style-type: none"> Which indicators (e.g. anthropometric/clinical status/feeding adequacy)? WHO growth standards or NHCS growth references? Do the criteria reflect risk of mortality? (ideally preventable mortality vs just mortality alone) What are technical / practical limitations of different admission criteria (e.g. age assessment; weight assessment if scales only weigh to nearest 100g) 	<ul style="list-style-type: none"> Literature review Review of agency data/ agency admission criteria Estimating expected caseload from DHS data would allow some prediction of the effects of changing admission criteria. Reference ENN's/University of Southampton work on field equipment (weighing scales) ROC curves constructed using field data to look at mortality predictors. (ideally supplemented by prospective work in future to look at clinical/other markers of risk)
Management Protocols	
<ul style="list-style-type: none"> What are the outcomes from 0 to 5.9m malnutrition using current protocols? What nutritional treatments are currently recommended/used (& how effective are they) e.g. breastfeeding support/ re-lactation/ breast-milk replacements/therapeutic milks What medical treatments are currently recommended/used (& how effective are they) Should (and does) regimes differ for LBW/prematurity/acute malnutrition? What is the role of psychosocial support? What is its effectiveness? 	<ul style="list-style-type: none"> Literature review Review of agency data Studies comparing treatment regimens (such as ACF's study comparing F100-diluted and infant formula).

Appendix D.1

Table cont'd

Research question + why important	Data needed/available
Discharge Criteria	
<ul style="list-style-type: none"> - Need a criterion that is optimally sensitive & specific against programme aims (as well as taking into account likely resource constraints) • What are the 'best' discharge criteria: <ul style="list-style-type: none"> - Which indicators (e.g. anthropometric/clinical status/feeding adequacy/% weight gain)? - WHO standards of NCHS norms - Do the criteria reflect risk of preventable mortality • What length of follow-up is ideal (and what is done in practice) • What are longer term outcomes following an episode of malnutrition • What are current default rates 	<ul style="list-style-type: none"> • Literature review • Review of agency data / agency discharge criteria • Estimating expected caseload from DHS data would allow some prediction of the effects of changing discharge criteria.
Rasource & Staff Issues/Requirements	
<ul style="list-style-type: none"> • What staff skills/training is needed? (esp. for breastfeeding related interventions) • Is there a minimum (and/or optimal) staff: patient ratio? 	<ul style="list-style-type: none"> • Qualitative work / interviews with agencies
Service Organization	
<ul style="list-style-type: none"> • What is coverage of present programmes • What is the right balance between facility-based and community based programmes/interventions • What is right balance btw preventative (e.g. nutritional support of pregnant & lactating women) vs treatment approaches • Is there a role for active community case-finding in the community? How would this be carried out? • Is there an 'essential minimum package' of resources/staff to be able to successfully carry out MAMI-related programmes ~ is it possible to decentralise this? • How can data collection be improved for future use? How can this data be shared between key players at country level? 	<ul style="list-style-type: none"> • compare expected numbers (e.g. from DHS surveys) vs actual numbers enrolled into feeding programmes to get very rough estimate of coverage • Literature reviews (+case examples from CTC/CMAM, BFHI etc) • ACF interviews with mothers
Cultural and Contexttual Issues	
<ul style="list-style-type: none"> • What are key factors affecting the management of infant malnutrition? • How does contact/culture affect prevalence/ treatment/ follow-up/mortality? • What is the impact of maternal factors (stress, illness, community support)? 	<ul style="list-style-type: none"> • Qualitative work (e.g. field visits/interviews with agencies)

Appendix D.2 Introductory letter for sharing of field data

MAMI Project**Management of Acute Malnutrition in Infants**<http://www.ucl.ac.uk/cihd/research/nutrition/mami>

(Funded by the UNICEF-led IASC Nutrition Cluster)

(sent to participants in advance of interview)

Dear Colleague,

To understand the issues and challenges relating to MAMI, “Management of Acute Malnutrition in Infants”, we are conducting telephone consultations with a number of key informants and field-based organizations. To make these focused and time-efficient, we hope it is helpful for you to see this rough agenda of points we would like to hear about.

A few things:

- i) Our interest is not only in how infants 0 to 6m are managed - but also in challenges faced and in understanding reasons *why they may not* be currently admitted or actively managed.
- ii) Copies of any project proposals/reports etc would be much appreciated – would save asking many ‘obvious’ questions!
- iii) Information you give will be used in MAMI related publications only. You/your organization will have the opportunity to see and comment on relevant reports before finalisation. You will also have the option of being named co-authors representing the “MAMI Steering group” (please see ‘data sharing’ document)
- vi) If part of our interviews includes describing a programme which has contributed past data to MAMI, it would be helpful to focus on conditions/issues *at the time data was collected* - as well as any important current/new issues.
- v) Our main aim is to **describe** details of and outcomes from the wide variety of current patient management practices. It is **not to ‘judge’** whether different programmes do or do not meet a ‘gold standard’ (which does not exist – hence the need for MAMI in the first place!)
Capturing actual experiences is critical to helping us understand how we can move forwards. Only in light of field realities can a sensible ‘field ideal’ be developed...

Many thanks in advance for your great help and support, I look forward to talking soon,

Best wishes,

Marko

MAMI Lead Researcher.

Appendix D.3 Interview Schedule for Chapter 6 (Key informant Interviews)

MAMI Project

Management of Acute Malnutrition in Infants

Field experiences: key informants interviews

Topics to discuss

<http://www.ucl.ac.uk/cihd/research/nutrition/mami>

(Funded by the UNICEF-led IASC Nutrition Cluster)

N.B a) "Infants" refers to infants < 6m (0 to 5.9m) unless otherwise stated
 b) Present tense is used ~ but if there are important past programmes, it is just as important for us to hear about those

A) Intro/General:

- i) What sort of nutrition programme(s) is your organization operating i.e. NRU, CTC/CMAM, SFP, other, etc?
- ii) Where (geographically) are the programmes operating?
- iii) How do the programmes link with other / local health service structures?
- iv) Which kind of staff are involved in your programmes (e.g. expat/local; clinicians/volunteers, etc)?

B) Infant SAM/MAM prevalence & causal factors

- i) Do you consider acute malnutrition in infants (0 to <6m) to be a public health problem in the location(s) where you work?
- ii) What are the main direct factors underlying infant malnutrition in your area(s) (if able to say)?
- iii) Which context (indirect) factors commonly affect infant malnutrition?

Either positively (reducing disease burden) or negatively (increasing disease burden)

Does your programme currently admit or directly manage infants?

If yes:

Continue with section C

If no:

Skip direct to section E

C) Identification of malnourished infants & admission to programme

- i) How are infants with possible malnutrition identified in your programme / area?
- ii) How is it decided/ confirmed which children are malnourished – and which are not? What is the 'case definition'?
- iii) What happens to those in whom the diagnosis is not confirmed?
- iv) What are major context factors affecting how infants with malnutrition present/arrive to the programme (either positive or negative influences).

D) Programme specifics

- i) What are carers'/community expectations from an infant SAM/MAM programme? (if able to say)
- ii) In brief, how do you currently 'manage' a malnourished infant, & what is the basis of this? For example, written guideline (e.g. international, national; organizational; local); informal local guideline; case-by-case clinical judgement.
- iii) At present, how well do you feel your current protocols / patient management practices meet the needs of infants with SAM / MAM?
 - What works well and why? (e.g. which patient groups respond well to treatment?)
 - Are there any specific situations / patient groups where difficulties occur?
- iv) What (if any) are specific challenges relating to medical treatments for infant SAM/MAM?
- v) What (if any) are specific challenges relating to nutritional treatments for infant SAM/MAM?

- vi) What (if any) are specific challenges relating to psycho-social and family support?
- vii) What are discharge criteria / how do you decide if an infant has been 'successfully' treated

E) Challenges & reasons for non-admission/infrequent admission

- i) How/to what extent do each of the following lead to non-admission or low admission of infants <6m:
 - no infants/low numbers of infants presenting for care
 - insufficient programme resources (e.g. physical space, equipment, supplies, staff, budget)
 - suboptimal programme processes (e.g. nothing to offer children in current guidelines)
- ii) If malnourished infants do present but are not admitted to TFP/SFP, where are they referred instead?
- iii) How often are infants almost 6m old treated as >6m olds, according to normal SAM/MAM protocols?
- iv) Are infants <6m reported in current M&E systems?

F) Training & support for infant malnutrition

- i) Have you ever had formal training on the management of infant malnutrition? What? Where? When?
- ii) Which literature / whose expert advice (either in, or external to your organization) would you seek for support /advice about infant malnutrition?

G) Context

- i) Which context factors would make the most difference to infant SAM/MAM if addressed?
- ii) Which context factors are most easy / realistic to change (even if public health impact not be great)?

NB context is often key to many questions. Possible factors to consider in this & other context questions include:

- geographical
 - is the programme area rural/urban?
 - what is access/transport like?
- characteristics of the 'emergency' - duration, causes
- socio-cultural context (e.g. religious issues, 'traditional beliefs/customs')
 - at country/national level
 - at local level
- political context (e.g. national leadership;/political will, presence or absence of other related programmes like baby-friendly hospital initiative)
 - international level (e.g. UNICEF, WHO, etc)
 - national level
 - local level
- programme
 - nature of the programme (e.g. stand alone integrated into govt system)?

H) Finally. . . .

- i) What do you see as the three biggest challenges in terms of managing malnourished infants in the field?
- ii) What three (realistic) outputs would you like to see from the MAMI Project in order to make the biggest difference to malnourished infants in the field?
- iii) Can you suggest any resources or literature or 'words of wisdom' from your own field experience which you think would help others in the MAMI network?

Thank you very much for your help & support!!!

Appendix D.4 Key informant interviewee

Table 45: Profile of 31 key informants interviewed

Several informants described more than one programme: hence >31 countries and projects represented

Country	Interviewee position (at the time of programme being described)	Type of organization/programme
Burundi	Nutritionist	International NGO
	Nutrition programme manager	International NGO
Ethiopia	Country programme manager (UK based)	NGO (mainly providing technical advice to government health system)
Kenya	Project officer	International NGO
	Community Health workers	Government Health Centre
	Nursing Officer in-charge	Government Health Centre
	Camp Nutritionist	UN refugee camp
	Stabilization centre supervisor	UN refugee camp
	Nutrition supervisor	UN refugee camp
	Nutritionist	UN refugee camp
	Nutrition specialist (regional advisor)	International NGO <i>All above programmes were CMAM-based, with combinations of inpatient & outpatient care</i>
Malawi	Country programme manager (UK based)	NGO (mainly providing technical advice to government health system)
	Nutritionist	International NGO
Somalia	Clinician in-charge of Nutrition project	NGO
Tanzania	Supervisor of paediatric ward (Regional referral hospital)	Paediatric ward, regional referral hospital
Uganda	Paediatrician in charge	Inpatient stabilization centre (part of CMAM Programme), set in section of general paed ward but staffed by large international NGO
Angola	Nutrition specialist (regional advisor)	International NGO
Guinea	Nutritionist (overseas-based, in charge of several countries)	International NGO
DRC	Nutritionist (USA-based)	NGO (mainly providing capacity building/ programme support)
	Nutrition specialist (regional advisor)	International NGO
Sudan	Clinician in-charge of Nutrition project	NGO
	Nutrition specialist (regional advisor)	International NGO
	Doctor (in charge of health/nutrition programme, involving front-line clinical work)	International NGO
	Nutrition advisor	International NGO
	Nutritionist	International NGO
Lesotho	Nutritionist (overseas-based, in charge of several countries)	International NGO
Swaziland	Paediatrician	Working in MoH hospital, part of international HIV support initiative
	Nutritionist (overseas-based, in charge of several countries)	International NGO
South Africa	Paediatrician	Government Hospital
Burkina Faso	Nutrition coordinator (in-charge several countries)	International NGO
Gambia	Paediatrician In-charge	(Central Government hospital)

Appendix D.4

Table 45 cont'd

Country	Interviewee position (at the time of programme being described)	Type of organization/programme
Liberia	Nutritionist	International NGO
Mali	Nutritionist (overseas-based, in charge of several countries)	International NGO
	Nutrition coordinator (in-charge several countries)	International NGO
Niger	Programmes manager	NGO (technical advisor)
	Nutritionist (overseas-based, in charge of several countries)	International NGO
	Nutrition coordinator (in-charge several countries)	International NGO
Senegal	Nutrition coordinator (in-charge several countries)	International NGO
Sierra Leone	Nutrition advisor	International NGO
	Nutritionist	International NGO
Afghanistan	Nutritionist (USA-based)	NGO (mainly providing capacity building/ programme support)
	Nutritionist	Nutritionist
Bangladesh	Professor and Doctor	NGO-led NRU
Myanmar	Nutrition programme manager	International NGO
Nepal	Nutritionist	International NGO
	Nutritionist	International NGO
Pakistan	Nutritionist (USA-based)	NGO (mainly providing capacity building/ programme support)
	Programme manager	International NGO
	Nutritionist	International NGO

Appendix D.5 Details of key informant interviews – Prevalence and Causes of Infant <6m malnutrition

Subtheme emerging	Interviewee position (at the time of programme being described) Quotations/examples
Lack of population focusing on infant <6m to get true estimate of the problem	<ul style="list-style-type: none"> No idea of prevalence of acute malnutrition in infants <6m in the community, some making assumptions based on admission numbers. We do see occasional cases, though cannot say what the true extent of the problem is in the community. No info on prevalence, though not uncommon on ward (approx four to five infants out of 30 on the ward at a time). Infant <6m malnutrition not a problem here – “rare” (on basis of cases seen in programme). There can be a bit of a mindset that infant <6m malnutrition is not a problem, so surveys don’t include this age group, and we never really know whether or not the assumptions are valid. Even if we wanted to include infants in surveys, there are important technical and practical barriers, like what sample size is needed for a valid result. Difficult to say whether infant SAM a problem – no surveys available. Admissions of infants <6m were uncommon, perhaps 1-2% of total (Sudan). Infant <6m admissions not common – maybe one per month or 2-3% of admissions – impossible to know how well this reflects community disease burden. Difficult to get good guidance on how to do surveys focused on <6m infants (e.g. sample size, measurement techniques)
Infant <6m factors underlying malnutrition	<ul style="list-style-type: none"> Low birth weight/preterm babies – especially those who are too weak or premature to suckle. Twins (often because LBW, premature). Twins, triplets seemed particularly common in some areas (impression from Democratic Republic of Congo). Diarrhoea, respiratory disease, other acute child illness. TB, HIV other chronic infant illness. Cerebral palsy (including post malaria or post meningitis) or other disability There were some cases of recurrent malnutrition – possibly due to underlying malabsorption
Maternal factors underlying malnutrition	<ul style="list-style-type: none"> Orphan (mother died) so no chance of child being breastfed (orphaning noted by the majority of respondents as a major challenge) Early weaning is very common and rates of EBF are very low. “Even mothers who have been taught about the benefits of exclusive breastfeeding in practice, often introduce other foods well before 6m”. Severe maternal illness (obstetric complications, HIV noted by several respondents) leading to a prolonged period when mother cannot breastfeed. Mother is ‘dysfunctional’. Young and inexperienced mothers were found to sometimes struggle with caring for their infant. Some mothers just never get breastfeeding well established, and they present for malnutrition treatment with infant aged one to two months – but presumably have had some inputs (from health centre or other) previously. Maternal depression (with range from clinical depression to poor coping strategies, to worries about other children), all contributing to likelihood of introducing complementary foods early and infant becoming malnourished. “Mothers value their business more than their infant, and even if the infant is with her, feeds and care get neglected.” “If women have the urge and desire, breastfeeding is generally not difficult. Other women however are lazy and do not look after infants well.” “Maternal milk insufficiency” – though difficult to tell how much of this is real and how much perceived by mother. Mother has poor knowledge about infant feeding practice Mother does not drink enough fluids and so breastmilk production suffers.

Appendix D.5

Table cont'd

Subtheme emerging	Interviewee position (at the time of programme being described) Quotations/examples
Health services	<ul style="list-style-type: none"> • Current health services do very little for those infants who genuinely have no access to breastmilk (e.g. orphans). No formula is available; advice on other alternatives is limited meaning infants that are already at high risk of malnutrition become even higher risk because of lack of support. • Other services related to early feeding support are unavailable in the area (e.g. Baby Friendly Hospital Initiative) • Access to healthcare is difficult (distance too far, transport too expensive so carers either wait for too long or don't go at all). • People often go to pharmacists or private clinicians first, these prefer to sell drugs which may not be appropriate rather than to refer.
Family factors underlying malnutrition	<ul style="list-style-type: none"> • Dysfunctional families, (e.g. father unsupportive or in some cases even abusive of mother). • Single mothers sometimes find it difficult to cope alone, feel that breastmilk alone is insufficient and start giving complementary foods too early. • Male and female infants valued differently that affects care seeking behaviour (e.g. not spending time/money on a girl); different problems (boys given complementary foods earlier). • Women often need male family member's permission to leave house/seek medical care.
HIV	<ul style="list-style-type: none"> • National protocols did not allow for testing of under 18 month olds – plus did not have treatment for this age anyway. • There has been a change of policy for infants of HIV infected mothers. Previously the option to replacement feed with formula was emphasised; currently EBF is the preferred option for 0 to 6m olds. This change has led to much confusion for both mothers and staff – still perceptions persist that it is best not to breastfeed to prevent HIV transmission. • One key informant reported observing a 2008 programme in Rwanda which was providing replacement feeds to all infants of HIV infected mothers. • HIV is a sensitive issue – both for patients and organizations. • Despite the fact that mothers may die of many different causes, orphaned infants are often assumed to be AIDS orphans – can be cause of stigma. • HIV is major factor that has led to numbers of malnourished infants <6m increasing, possibly associated with replacement feeding message.
Societal factors underlying malnutrition	<ul style="list-style-type: none"> • Poverty and employment – mother has to go out for work, and cannot take infant with her, so breastmilk substitutes given and/or complementary foods started much too early (NB sometimes infants left with other family, sometime in care centres). • Not sure of scale of problem, but is likely given food price rises, loss of livelihoods and high chance of mothers becoming malnourished. • Infant formula has strong image of being a 'modern' way of feeding, thus becomes popular and demanded by mothers. • Mothers work on land during the day, and even though infants are often carried with the mother, she is often too busy to take time to breastfeed. • Nutritional status has improved since peace agreement signed, roads opened and health services resumed (including significant NGO services (DRC)). • Mothers value their business more than their infant, and even if the infant is with her, feeds and care gets neglected. • Background conflict, insecurity and poor sanitation. • Grandmothers can provide useful support and care for infants <6m (other respondents noted that grandmothers sometimes encouraged and perpetuated practices which adversely influenced exclusive breastfeeding). • Infant feeding bottles/formula milks were available in the local market Æno mechanism for monitoring & ensuring compliance with International Code.

Appendix D.5

Table cont'd

Subtheme emerging	Interviewee position (at the time of programme being described)Quotations/examples
Cultural practices (negative)	<ul style="list-style-type: none"> • Strong, deeply engrained traditions, encouraged especially by grandmothers, to introduce complementary feeds (e.g. porridges) at a few weeks of age. • Adverse care practices, including not feeding infants during illness – there is a perception that it is normal for one twin to be less well nourished than the other, so a disparity is often not noticed or acted on. • Malnutrition is NOT linked to inadequate intake of food (milk in case of infants <6m) but to breaking of cultural taboos (e.g. sex outside of marriage; sex too soon after childbirth; being cursed by the 'evil eye'). Thus is difficult to suggest a nutrition-based solution to the problem. • A senior male relative needs to give consent for a woman to receive support or treatment – this can lead to delays in seeking care, and also can contribute to making it less effective when give due to late presentation. • An 'ideal' baby is seen as engaged and beginning to acquire adult-like characteristics – hence babies are often given tea, sugar and water, and exclusive breastfeeding is difficult to promote. • Child illness is not recognised unless there are specific symptoms such as diarrhoea or vomiting, thus malnutrition alone might not get picked up • Being subdued and quiet is seen as desirable characteristic of an infant and thus an infant who is subdued due to underlying malnutrition might not be easily identified as having a problem. • Often treated beforehand by traditional healers with herbs and other local medicines, e.g. removal of infant teeth; feeding stopped during illness; as soon as mother pregnant again, stops breastfeeding current infant; mothers encouraged to discard colostrum; mothers confined to home for 40 days after delivery (though possible to go out for medical advice if needed). • Mothers perceived that breastfeeding would make their breasts 'droop' and become unattractive and so breastfeeding is not popular.
Cultural practices (positive)	<ul style="list-style-type: none"> - Cows milk often given at home to infants as a supplement, malnutrition seems rarer in these families (NB unknown if modified or unmodified milk – likely unmodified). • Community support programmes by local healthcare workers have done much to increase breastfeeding, so infant malnutrition not a problem here (refugee camp with active infant feeding support programme). • Breastfeeding was common in the community, and most infants presenting for care were anyway breastfeeding • Traditional healer, whilst often first attempting to treat infants with malnutrition (and other problems) do often refer for further care if their treatments are unsuccessful. Depending on the individual healer, this may/may not result in delayed presentation.

Appendix D.6 Details of key informant interviews – Identification of malnourished infants <6m and admission to programme

Subtheme	Quotations / examples
Case finding in the community	<ul style="list-style-type: none"> Community health workers often don't look for the problem of infant <6m malnutrition, so won't see it even if there (NGO nutritionist). Infants <6m not a priority group for most nutrition programmes – often not the focus of community screening either. There was active case finding in the community by community health workers. They used hanging scales and clinical judgement to identify at-risk infants <6m. No strict guidelines available for identifying infants <6m – it's a matter of judgement. Cases normally identified if clinically obvious. Community health workers are aware of need to consider malnutrition in all under five year old children, but definitions and criteria for infants <6m are not clear. Therefore rely a lot on clinical judgement. Community health workers (CHW) in one place visited noted infant <6m malnutrition "not a problem" – however, no data, only clinical impressions to back up that statement. CHWs are already overburdened from other programmes – looking for malnourished infants would further increase existing pressures. Majority of cases referred in from active screening in community (NGO programme, DRC). Staff in health centres helped identify and refer vulnerable infants. Maternity services referred LBW and other vulnerable infants.
Growth charts	<ul style="list-style-type: none"> Experiences variable, considered valuable but often not acted on, inaccurate measures and birth weight often not measured or a later weight taken as a proxy for birth weight. Often filled, but not so often acted on, since infant appears to have been failing to thrive for some time before arriving at programme. Maybe not understood by community health workers. Despite many mothers having growth charts with previous weights, these are often unreliable (e.g. different, uncalibrated scales; previously weighed with clothes or nappy on). Growth monitoring is poor and cannot be relied on. Birth weight often unavailable, so cannot interpret trends. Birth weight is not always taken at birth, but as soon as possible, in 1st week of life. Second weight is taken at ~ one month of life, when traditional birth attendant hands over care to the community outreach team (or taken sooner if infant unwell). This system seems to work OK (Kenyan refugee camp). There is mismatch between growth monitoring, which generally looks at weight-for-age, and TFP/SFP admission which relies on weight-for-height indices. Growth monitoring does seem to work well and infants are referred to feeding programmes having been identified through growth monitoring programmes (DRC).
Assessment logistics and practicalities	<ul style="list-style-type: none"> There were no clear 'official' criteria, so staff had to make their own decisions (<i>response of staff member working for the NGO which did note infants <6m in some of its guidelines, though maybe not in the version used in this particular country/programme</i>). Admission is done by nurses in many programmes. Used to admit infants for assessment (to see if growing fine – these were given vit A, folic acid but only abs if lethargic/any risk signs – assessment infants had less strict discharge criteria). In absence of other guidelines, infants are assessed using same criteria as older children, using weight-for-height. Normally not a problem unless height is out of range of chart. Then go on clinical appearance and history. Maternal problems (e.g. mastitis) are often assessed at programme admission. To avoid prolonged admissions for all infants, most are admitted for one to two days 'observation' to assess directly how breastfeeding is going and avoid having to make a decision on supplementary feeds based on maternal reports of 'milk insufficiency' only. Maternal report of difficulty breastfeeding alone is taken as valid reason for admission to programme. It does not need to be backed up by objective evidence of this fact (assessment is difficult). Limited time is available for assessment.

Appendix D.6

Table cont'd

Subtheme	Quotations / examples
Anthropometry, measuring	<ul style="list-style-type: none"> • Despite clinical admission criteria, anthropometry is regarded as more of a 'gold standard' to decide about who to admit. • Weight-for-height is often used, but mainly to back up pre-existing clinical suspicions rather than routine for all infants <6m. • Scales accurate to 100g are insufficiently precise. • Scales are often not calibrated. • Scales are often not well maintained. • Length rarely measured. • Balance scales were more precise and worked well. • Many health workers weight infants clothed or with heavy nappies still on so cannot rely on previous weights. • Cannot carry scales into field so difficult to identify malnourished infants <6m (in contrast for children >6m, for whom MUAC can be used). • Length is very rarely done for infants <6m. • The use of 65cm as a proxy for <6m causes significant confusion for field staff. • Most carers of young infants WILL be able to give a relatively exact age, especially since birth is more recent. • There is a widespread 'fear of cold' – so mothers (and some healthcare staff) are reluctant to undress infants for weighing; clothes can contribute some 20% of body weight.
Reasons for presentation to feeding programme	<ul style="list-style-type: none"> • Most infants present sick / because of other clinical problems and the malnutrition identified during clinical assessment - Tanzania, MoH hospital, Kenya MoH, Malawi MoH hospital, Swaziland MoH hospital • Weight loss combined with adverse clinical picture. • Wanting food (from NGO). • Referred in by community health workers (including from growth monitoring programmes – DRC). • Carers had heard that feeds were available for young infants and came to see if their child might be eligible (so infants were often NOT sick at presentation) – NGO programme. Often presented at few days/weeks of age with feeding problems – had heard of service and wanted 'food' (NGO programme). • Present with breastfeeding difficulties. • Infant identified in the community on clinical grounds is referred to nutrition centre for more detailed assessment. • Infants often not admitted unless 'special cases', since programme focus is on 6 to 59.9m age group • Can be difficult to distinguish which mothers really have breastmilk insufficiency, and which are saying so in the hope of getting formula milk or other treatments.
Ward layout / assessment environment	<ul style="list-style-type: none"> • Malnutrition unit often next to paed's ward / a side bay of the main paediatric ward. • No set area for observation / assessment. • Assessment area was part of main ward. Infants admitted for 'assessment' were thus also at risk of nosocomial infection. Deciding whether to admit for assessment was hence very difficult.

Appendix D.7 Details of key informant interviews – Programme detail

Subtheme	Quotations / examples
Carer expectations	<ul style="list-style-type: none"> • Expect 'food' for the infant (but not specific about what food). • Expect infant formula (they heard it was available from the programme). • Expect some form of medication and often unhappy if given 'nothing' except advice. • Cannot say what carers expect, never asked. • Don't expect, and don't like the idea of, a long admission (beyond five to ten days is unpopular).
Guidelines	<ul style="list-style-type: none"> • Followed own agency guidelines. • Occasionally refer to internet for difficult cases and management challenges. • Use WHO 1999 SAM guidelines (MoH hospital, Gambia). • Was sometimes confusion about which guidelines to follow, as several different ones and several different versions were available. • Exactly which guidelines were followed was dependent on the supervising nutrition coordinator (emphasis changed with the arrival of a new coordinator).
Staff time	<ul style="list-style-type: none"> • Time to support BF is a 'luxury' for staff and often not possible (MoH, Tanzania). • Not an issue in our NGO programme, but was an issue with other NGOs who had less / less experienced staff. • About one member of staff per ten babies worked OK to support the needs and extra inputs required for infants admitted to programme (one per five to six infants would have been better). • one carer for five to six mothers worked well. • Field staff often complained of not enough time to look after infants properly / follow current protocols well.
Staff supervision	<ul style="list-style-type: none"> • Staff supervision is lacking – but "nobody trusts anybody to do a job", so work ineffective (MoH, Tanzania) • Having staff whose sole job it was to monitor feeds ('phase supervisors') worked well (NGO, DRC) • There was a problem of excess deaths at night, possibly due to staff sleeping/being less proactive at patient management and letting issues like rehydration after diarrhoea slip.
Medical	<ul style="list-style-type: none"> • Giving drugs to small infants is difficult, often no liquid medications (have to divide tablets or capsules). • Can be challenging to adapt drug doses to very small infants. • Drug doses seem to be very variable – some are consistently under-dosed (e.g. ceftriaxone), others frequently overdosed. • Choice of antibiotics uncertain for this age group. • No specific challenges – most treatment fairly straightforward. • Sometimes there was lack of specific pieces of equipment such as i.v. lines in the few cases where oral rehydration had failed or resuscitation needed. • Guidelines on which micronutrients to give were not clear.
Maternal issues	<ul style="list-style-type: none"> • Carers sometimes try to make the infant swallow by cupping milk into mouth and blocking nose. • Culturally difficult for mums to use Kangaroo care since were used to leaving infants by themselves for periods. • Mums often slept with infants to help keep them warm / encourage breastfeeding where possible. • Mothers were encouraged to drink at least 2l fluids per day whilst on ward to help with hydration and milk supply. • Providing supplementary rations to lactating mothers was popular and well received by patients. • Psychosocial support would have been ideal for women who were in shock (report from programme based in conflict situation). • Psychological support was provided through role play and group work (conflict situation, NGO programme). • Specialist staff led a programme of psychosocial support, but all staff were involved. • Same NGO ran a strong mental health programme which helped assess and care for mothers.

Appendix D.7

Table cont'd

Subtheme	Quotations / examples
Feeding methods	<ul style="list-style-type: none"> • If child too weak to suck, initially used syringe – later replaced with cup on advice of visiting 'expert'. • Successfully used supplementary sucking (SS) – no difficulties at all. Read about technique in book, never used before. WHY: success-culturally acceptable (though wet nursing was not the norm) nurses motivated, had time (healthcare assistants, two per 30 patients; one doctor; one nurse, one medical officer) • All tried breastfeed first, then top-up with supplementary sucking (SS)/breastmilk substitute (BMS). • Supplementary suckling was not successful – but only tried once and that mother was reluctant. • SS sounds good, but too time intensive, difficult and results in milk spillage, much mess. • SS supervision would be a problem, since staff numbers are so low that even existing tasks often are difficult to do. • SS worked very well, successful in most cases, (but needed time & support) (DRC, NGO programme; NGO programme, Niger; Tanzania Govnt Hospital) • There were difficulties with implementing the supplementary suckling technique. • Tables in the malnutrition manual were difficult to follow. • SS works reasonably well (~60% success rate in re-establishing full EBF). It is managed by a in-charge nutritionist. • Achieving weight gain criteria which are part of SS guidelines took long time to achieve. • SS is NOT practical or feasible ('often not done despite said that done'). • Tried SS and found it did not work; too complex, too much staff time. May be possible in different context. • Worked extremely well, though not always easy initially. Large part of success was down to a well motivate and highly skilled midwife who led and supervised the SS programme. • Still not sure about best feeding method – cup, spoon, syringe? • "One mother had stopped breastfeeding and started infant formula, initially saying the child was refusing breastfeeds. The baby then developed diarrhoea and had to be admitted to feeding centre for support. During this time, relactation was successfully started". • It is very difficult to get the balance between adequate, formal supply of infant formula for orphans and those who cannot breastfeed (with risk of increasing demand for the formula/'leakage' to those who could breastfeed) vs. minimizing the availability of formula, but thereby also risking inadequate supplies for those who do need it.
Type of milk used for therapy	<ul style="list-style-type: none"> • Sometimes confusing about which milk to use: infant formula, F75 F100 diluted? • Used diluted F100 – worked well. • When nurses busy, sometimes used to delegate making up F75 and F100 to mothers – this was not always supervised and maybe not always done well. • Good to have option to use local foodstuffs (MoH Tanzania – infant formula too expensive, supplies limited). • Occasionally F75 used, occasionally adapted cows milk. • Cost infant formula very high – not realistic to start in programme since difficult to maintain longer term. • 'Leakage of infant formula milk is a huge problem' – whenever give to targeted population, ends up in wider use among others in the community. • No problems with treatment whilst on ward (use dilute F100). Problem arises when infant who is unable to breastfeed (e.g. orphan) goes home. Family cannot afford to buy infant formula; programme provides only small quantities to small numbers of patients. • One challenge is to provide milk and safe water to those carers who are using infant formula. • Although officially discouraged, sometimes do give mothers a supply of F100 to take home. This is because breastfeeding is not possible, and infant formula or other milk is not available. • For those who could not breastfeed, a one month supply of infant formula was given on discharge (these were very small numbers). • Modified animal milks worked well, and were cheap and acceptable.
Physical space on ward	<ul style="list-style-type: none"> • Was a problem having the assessment unit as a bay on main paed ward – big danger of cross infection and dilemma about whether or not to admit. No space available for assessment of borderline cases. • Having a separate area of the ward for lactating mothers worked well • Separate building away from the main feeding centre worked well
Length of stay	<ul style="list-style-type: none"> • Average ten days - Mothers often want to, or do, leave if try to keep for much longer. • Infants are kept in until starting to gain weight. • Stayed as inpatients until breastfeeding well and two repeated measures were >70% median (for SAM) or >80% of median (for MAM).
Follow-up	<ul style="list-style-type: none"> • Community health workers follow up discharged infants in the community (stable emergency, Kenya). Reinforce health education messages • Long term care of orphans difficult – go home on infant formula, but have to buy themselves. No specific follow-up of how successful this is.

Appendix D.8 Details of key informant interviews – Challenges

Subtheme	Quotations / examples
Links to other clinical services	<ul style="list-style-type: none"> • Infants and children often assessed initially in admissions or paediatric ward. Only referred to nutrition ward if needed. This system worked well in most places described. • If still breastfeeding, referred to paediatric ward rather than managed in nutrition centre.
Community care	<ul style="list-style-type: none"> • Difficult to know what to do / recommend for patients not sick enough to be admitted, but who appear vulnerable – no extra foods (e.g. supplementary feeding) that is easily available as it is for older children. Mothers feel that no treatment is being given, do not see 'advice only' as treatment.
SFP	<ul style="list-style-type: none"> • SFP does exist 'on paper' and is recommended in national guidelines for pregnant and lactating women, but is not active in practice.
Non-admissions	<ul style="list-style-type: none"> • Referred to local child health (primary healthcare) clinics. • Referred to paediatric inpatient wards. • It's difficult to say what ultimately happens to infants referred elsewhere.
Unsolicited/ poorly coordinated donations	<ul style="list-style-type: none"> • A batch of RUTF arrived one day, which nobody seemed to know anything about.
Treating infants <6m as if they were >6m	<ul style="list-style-type: none"> • Some respondents were clear that programmes never gave RUTF to infants <6m. • Others occasionally started infants approaching 6m on RUTF if breastfeeding was not available as an option. • In our NGO programme, infant <6m always treated according to infant <6m guidelines, but this was not the case for many other NGOs in area. • Sometimes do give RUTF to infant aged > five months only if no other alternative, and no breastfeeding is possible. • RUTF is used for HIV positive infants from four months of age.
Reporting issues, databases & audit	<ul style="list-style-type: none"> • Recording on charts is poor, so would be very difficult to do good audit. • Infants <6m were reported by the NGO, but not by local UN/MoH systems. • Infants with underlying conditions such as cleft palate are often labelled as "not malnutrition" so as to avoid adversely influencing programme statistics. • Current databases do not always separate out infants <6m, so difficult to audit and learn from the data. • Outcome codes on current databases often complex, again leading to difficulty auditing and learning from databases. • Difficult to know what long term outcomes are since follow-up is poor. • Use local government reporting systems rather than own databases – does include infant <6m.

Appendix D.9 Details of key informant interviews – Training and Support

Subtheme	Quotations / examples
Formal training	<ul style="list-style-type: none"> • There is very little focus on infants during nutrition related diplomas, degrees (reported by many respondents). • “Infant feeding is a bit of a ‘Cinderella’ subject in university nutrition courses, not a major priority within nutrition.” • The majority of experience / expertise on infant <6m malnutrition is developed through field experience, and very little during training prior to going out. • In-hospital training course on WHO guidelines had significant impact on improving practice. • Refresher training during CMAM rollout was useful and mentioned infants <6m. • Most training is on-the-job rather than formal classroom training. Handovers help familiarize new staff with key protocols.
Induction	<ul style="list-style-type: none"> • Had brief handover from previous person who set up nutrition unit – themselves not very experienced, so not optimal handover. • NGO induction course focuses on management issues like financial systems, reporting etc – very little focus on patient management of conditions which were new to us (doctor trained in developing country, going out to emergency setting and treating SAM for the first time). • There are pre-deployment training courses run by the NGO, but it is not always possible for staff to attend since they may be required to go to emergency situations at very short notice.
Field visit by supervisor or other ‘expert’	<ul style="list-style-type: none"> • <i>Several instances were described where a on-site visiting ‘expert’ has big role in changing practice.</i> <ul style="list-style-type: none"> - e.g. syringe feed to spoon feed to promote more oro-motor skills - e.g. better phase transition - very limited experience, helped focus on the issue after visit of consultant who was assessing the programme. - visit from an international expert on malnutrition management made a big practical difference to daily patient care and also helped motivate.
On-job vs workshop training	<ul style="list-style-type: none"> • Having no specific infant training is a big constraint. • Too many staff spend time on workshops, which diverts valuable staff from the wards. • Leant a small amount during (professional) training, rest of IYCF training was delivered by international NGO with links to the centre.
Critical thinking skills, reflective learning	<ul style="list-style-type: none"> • Staff need to develop more critical thinking/reflexive learning skills, often just ignore rather than work around challenges.
Useful materials	<ul style="list-style-type: none"> • Most useful materials are those which have been locally adapted (e.g. wall posters in local language). • WHO 1999 manual. • WHO pocketbook of paediatric care (has useful pages on breastfeeding). • Agency protocols were useful (section dedicated to infants <6m). • National guideline followed (by international NGO). • <i>NB No interviewee who was not involved in IYCF policy making (i.e. all the field-based respondents) had seen or was aware of IFE Module 2 – probably the most detailed manual focused on management of infants <6m available to date.</i>
Not useful materials	<ul style="list-style-type: none"> • Leaflets – often just put up on wall – may not be used or appreciated if just gave out, plus would quickly run out. • Information on infant feeding is limited in current guidelines for managing acute malnutrition.

Appendix D.10 Details of key informant interviews – Ways forward

Subtheme	Quotations / examples
Identification	<ul style="list-style-type: none"> • More nutrition surveys need to include infants <6m: this would help both trigger and plan specific responses. • Need better tools for assessing nutritional status (ideally not needing WH, WA) e.g. MUAC. • “Obvious (and therefore advanced) cases of infant <6m SAM do mostly get picked up, but would be good to have tools to be more proactive and better identify earlier / less severe cases. • Need clearer anthropometric guidelines (e.g. what to do about the 65cm rule; how to measure length in infants <6m) and need to eliminate confusion over weight-for-age growth monitoring and WH feeding programme admission. • Criteria need to be clearer than at present – but also flexible enough to allow for clinical judgement and occasional case-by-case decisions for particular individuals. • Need better guidance on how to identify who is really ‘malnourished’ and who has some other underlying condition (e.g. cleft palate). • Need to link more with other community activities, notably growth monitoring, to ensure timely and appropriate referrals for malnutrition treatment. • Link with post-natal services (e.g. routine six week post-natal check) would allow infants with problems to be identified earlier than happens now.
Protocols	<ul style="list-style-type: none"> • Need community-based treatment options. • Protocols need to be simple and easy to follow (especially by field-level health workers who will be delivering the front-line care). • Management protocols, especially for infants who CANNOT be breastfed need to be better defined. • Needs to be more clarity about which milk product to use (e.g. F75, F100 or F100dilute). • Needs to be more clarity about feed options for those infants for whom breastfeeding is unavailable. • Need more guidance /evidence on how programmes to support infant feeding might work in populations who are widely dispersed / living over a large geographical area. • Need to better link with other guideline systems like IMCI – otherwise there is ‘guideline overload’, with several guidelines covering similar topics but all saying slightly different things and thus causing confusion at field level about which options are best for which patients. • Need a more evidence based approach. There are presently too many misconceptions e.g. one head of a nutrition department cited as stating that feeding the mother was all that was necessary to address infant <6m malnutrition. • Needs to be a broader focus with description of wider issues causing infant , 6m SAM – notably HIV • Many SFPs include ration for pregnant and lactating women – need to determine if this works/how well it works. • Should be more emphasis on general IYCF issues, including safe and effective complementary feeds. By the time they are cured, many infants will be coming up to six months of age and will need to start CF. It is a lost opportunity if this has not been discussed during programme admission.
Management of ward and staff	<ul style="list-style-type: none"> • Strong management and supervision would make big difference – often little space to take initiative, becomes undermining. • Staff would have regular mid-term evaluations – there was a risk of being fired if performance were seriously concerning (well performing NGO unit, where supplementary suckling went well). • Need to find better ways of motivating staff to perform well (NOT workshops, which distract and take staff away from busy wards, leaving staff levels even lower than before).
Well motivated staff	<ul style="list-style-type: none"> • “Everybody wanted to work for and was proud of being employed by NGO X” – things seemed to change after another agency took over (?less staff; less pay). • Also need enough staff to make the project a success.

Appendix D.10

Table cont'd

Subtheme	Quotations / examples
Staff (general)	<ul style="list-style-type: none"> Community health workers responsible for indentifying infants are overworked and involved in many different projects. CHW often prioritize work for which they get incentives and are rewarded for. Supplementary suckling is time intensive and requires staff with special experience. Greater staff numbers are needed on nutrition programmes if more infants are to be admitted; would not be able to cope given current resources. Need to be more staff whose role is dedicated to infants <6m; present numbers are inadequate to start adding extra roles. 'Task shifting' can be considered – use of support workers and other non-specialist staff to take on particular, closely defined roles and free up time for experienced clinical staff to concentrate on supervision and overall programme leadership.
Community support	<ul style="list-style-type: none"> Community treatments (e.g. support groups) need to be more widely available. Difficult to know what to offer after discharge from ward. Community support programmes often only focus on HIV infected patients – hard to find an equivalent for HIV negative. Would be good to develop 'ambulatory' approaches to care (similar to CMAM model). Need to optimise coverage of infant feeding programmes (likely through community rather than purely centre-based approaches to care). Community health workers need clearer guidelines how to promote and support breastfeeding.
HIV	<ul style="list-style-type: none"> Need better and earlier identification and treatment of HIV to prevent malnutrition developing in the first place. There is a need to clarify AFFAS criteria as lots of confusion at present. "There are few community support groups for HIV negative patients". Many mothers have misconceptions about HIV, and stop breastfeeding before six months despite counselling. Standard counselling tools are needed to help convey correct messages, especially about the risks/benefit balance of replacement feeding. Maybe this would also facilitate more mother to mother communication, reinforcing key messages.
Set of SIMPLE guidelines/ flow charts	<ul style="list-style-type: none"> Wall chart & simple flow charts helpful big manuals often not used so much for day-day work Need to ensure guidelines are locally 'owned' and account for local circumstances – often seem imposed from outside without much understanding of setting and knowledge of effect on other services.
Formulas	<ul style="list-style-type: none"> Would be important to have options for use when neither breastmilk or infant formula milks available. Consider formulas using local foodstuffs, however supply of minerals for fortification would be impossible. Infant formula itself is much too expensive for most families. If formula is used, is big challenge to avoid 'leakage.'
Links to other service	<ul style="list-style-type: none"> Need to link better with other services, such as maternity – despite having maternity services in same hospital, current relationship is limited There are too many new, vertical initiatives. Don't always link well and cause fragmented, extra work. Need to be more integration and coordination of new initiatives such as MAMI. Need more links to maternal health programmes tackling issues like low-birth-weight in order to minimize the number of infants becoming malnourished. Needs to be a continuum of care, joining up existing services. Rather than separate mother/baby health patient held health records, baby information should be recorded on the child health card; this would make birth weight and other early history more easily accessible. Need links with growth monitoring programmes (anthropometric indicators need to be harmonized, since growth monitoring uses weight-for-age whereas feeding programmes use weight-for-height). Need closer links with health centres and other local care structures.
Overall	<ul style="list-style-type: none"> Maybe need to distinguish complicated SAM who need hospital care with uncomplicated who do not. Overall management and coordination of infant feeding issues need 'ownership' by a lead individual or agency. Else everybody's good intentions too easily drift into nobody's responsibility and the job does not get done. More advocacy is needed for infants <6m. Having major agencies involved would strengthen calls for increased attention and increased resources. Need to ensure that programmes have high coverage.

Appendix E The Integrated Phase Classification (IPC)

Phase Classification		Key Reference Outcomes <i>Current or imminent outcomes on lives and livelihoods. Based on convergence of direct and indirect evidence rather than absolute thresholds. Not all indicators must be present for classification..</i>	Strategic Response Framework <i>Objectives: (1) mitigate immediate outcomes, (2) support livelihoods, and (3) address underlying causes</i>
1A	Generally Food Secure	Crude Mortality Rate < 0.5 / 10,000 / day Acute Malnutrition <3 % (w/h <-2 z-scores) Stunting <20% (h/age <-2 z-scores) Food Access/Availability usually adequate (> 2,100 kcal ppp day), stable	Strategic assistance to pockets of food insecure groups. Investment in food and economic production systems. Enable development of livelihood systems based on principles of sustainability, justice, and equity.
1B	Generally Food Secure	Dietary Diversity consistent quality and quantity of diversity Water Access/Avail. usually adequate (> 15 litres ppp day), stable Hazards moderate to low probability and vulnerability Civil Security prevailing and structural peace Livelihood Assets generally sustainable utilization (of 6 capitals)	Prevent emergence of structural hindrances to food security. Advocacy.
2	Moderately/Borderline Food Insecure	Crude Mortality Rate <0.5 / 10,000 / day; U5MR<1 / 10,000 / day Acute Malnutrition >3% but <10 % (w/h <-2 z-score), usual range, stable Stunting >20% (h/age <-2 z-scores) Food Access/Availability borderline adequate (2,100 kcal ppp day); unstable Dietary Diversity chronic dietary diversity deficit Water Access/Avail. borderline adequate (15 litres ppp day); unstable Hazards recurrent, with high livelihood vulnerability Civil Security Unstable; disruptive tension Coping "insurance strategies" Livelihood Assets stressed and unsustainable utilization (of 6 capitals) Structural Pronounced underlying hindrances to food security	Design & implement strategies to increase stability, resistance and resilience of livelihood systems, thus reducing risk. Provision of "safety nets" to high risk groups. Interventions for optimal and sustainable use of livelihood assets. Create contingency plan. Redress structural hindrances to food security. Close monitoring of relevant outcome and process indicators Advocacy
3	Acute Food and Livelihood Crisis	Crude Mortality Rate 0.5-1 / 10,000 / day, U5MR 1-2 / 10,000 / dy Acute Malnutrition 10-15 % (w/h <-2 z-score), > than usual, increasing Disease epidemic; increasing Food Access/Availability lack of entitlement; 2,100 kcal ppp day via asset stripping Dietary Diversity acute dietary diversity deficit Water Access/Avail. 7.5-15 litres ppp day, accessed via asset stripping Destitution/Displacement emerging; diffuse Civil Security limited spread, low intensity conflict Coping "crisis strategies"; CSI > than reference; increasing Livelihood Assets accelerated and critical depletion or loss of access	Support livelihoods and protect vulnerable groups. Strategic and complimentary interventions to immediately food access/availability AND support livelihoods. Selected provision of complimentary sectoral support (e.g., water, shelter, sanitation, health, etc.). Strategic interventions at community to national levels to create, stabilize, rehabilitate, or protect priority livelihood assets. Create or implement contingency plan. Close monitoring of relevant outcome and process indicators Use "crisis as opportunity" to redress underlying structural causes Advocacy

Appendix E

Table cont'd

4	Humanitarian Emergency	<p>Crude Mortality Rate 1-2 / 10,000 / day, >2x reference rate, increasing; U5MR > 2 / 10,000 / day</p> <p>Acute Malnutrition >15 % (w/h <-2 z-score), > than usual, increasing</p> <p>Disease Pandemic</p> <p>Food Access/Availability severe entitlement gap; unable to meet 2,100 kcal ppp day</p> <p>Dietary Diversity Regularly 3 or fewer main food groups consumed</p> <p>Water Access/Avail. < 7.5 litres ppp day (human usage only)</p> <p>Destitution/Displacement concentrated; increasing</p> <p>Civil Security widespread, high intensity conflict</p> <p>Coping "distress strategies"; CSI significantly > than reference</p> <p>Livelihood Assets near complete & irreversible depletion or loss of access</p> <p>Structural Pronounced underlying</p>	<p>Urgent protection of vulnerable groups</p> <p>Urgently food access through complimentary interventions</p> <p>Selected provision of complimentary sectoral support (e.g., water, shelter, sanitation, health, etc.)</p> <p>Protection against complete livelihood asset loss and / or advocacy for access</p> <p>Close monitoring of relevant outcome and process indicators</p> <p>Use "crisis as opportunity" to redress underlying structural causes</p> <p>Advocacy</p>
5	Famine / Humanitarian Catastrophe	<p>Crude Mortality Rate > 2 / 10,000 / day (example: 6,000 / 1,000,000 / 30 days)</p> <p>Acute Malnutrition > 30 % (w/h <-2 z-score)</p> <p>Disease Pandemic</p> <p>Food Access/Availability extreme entitlement gap; much below 2,100 kcal ppp day</p> <p>Water Access/Avail. < 4 litres ppp day (human usage only)</p> <p>Destitution/Displacement large scale, concentrated</p> <p>Civil Security widespread, high intensity conflict</p> <p>Livelihood Assets effectively complete loss; collapse</p>	<p>Support livelihoods and protect vulnerable groups.</p> <p>Strategic and complimentary interventions to immediately food access/availability AND support livelihoods.</p> <p>Selected provision of complimentary sectoral support (e.g., water, shelter, sanitation, health, etc.).</p> <p>Strategic interventions at community to national levels to create, stabilize, rehabilitate, or protect priority livelihood assets.</p> <p>Create or implement contingency plan.</p> <p>Close monitoring of relevant outcome and process indicators</p> <p>Use "crisis as opportunity" to redress underlying structural causes</p> <p>Advocacy</p>

(Source, FAO website)

Appendix F Additional tables for Chapter 8

Table 41: Research papers included in literature review on maternal depression												
Authors		Types of research		Nutrition measurement when child under 6 months	Types of malnutrition				Types of maternal psychological troubles			
		Cross-sectional	Cohort		Weight for height	Weight for age	Height for age	Weight and length	Prenatal depression	Postnatal depression	Major depression	General distress
Cross-sectional studies												
Anoop and al, 2004	x		No (in files but direct measures taken at first at 6 months)		x					x		
De Miranda and al, 1996	X		No		x						x (psychiatric morbidity)	
Harpham and al, 2007	x		No		x	x						
Rahman and al, 2003	x		No		x						x	
Baker-Henningham and al, 2003	x		No		x				x			
Surkan and al, 2007	x		No	x	x	x				x		
Stewart and al, 2008	x		No		x	x					x (common mental disorder)	
Cohort studies												
Adewuya and al, 2008		x	Yes				x			x		
Patel and al, 2003		x	Yes		x	x			x			
Rahman and al, 2004		x	Yes but no statistical analysis at 2 months, only at 6 months		x	x		x				
Tomlinson and al, 2005		x	2 and 18 months		x	x					x	

Appendix F

Table 46: Cross-sectional studies

Survey	Author(s) and Date	Study design	Country setting	Sample Size and participants	Infant age in months [mean (SD)]	Infant Growth outcome measures	% of sample who were cases	Maternal mental health measure	Prevalence of maternal mental health problems	Uncorrected association between infant outcome and maternal depression	Association corrected for confounders
ASIA											
Maternal depression and low maternal intelligence as risk factors for malnutrition in children: a community based case-control study from south India	Anoop and al, 2004	Case-control (matched)	India	144	Cases : 10,5 (1,6) Controls: 10,6 (1,5)	Underweight Cases: weight-for-age 50-80% of expected controls: weight-for-age >80% of expected	50% amongst the cases: 65,3% with grade I malnutrition, 25% with grade II malnutrition and 9,7% with grade III malnutrition	Structured Clinical Interview for DSM-III R (SCID, patient edition) for major depressive episode (current and recalled early postpartum) Revised Bathia's Short battery of performance test (for adult IQ)	Cases: current major depression: 14 (19,4%) postpartum depression: 9 (12,5%) Controls: current major depression: 5 (6,9%) postpartum depression: 2 (2,8%)	Current major depression: 3,2 (1,1 -9,5) Recalled postpartum major depression: 5 (1,0-24,0)	Current major depression: 3,1(0,9 -9,7) Recalled postpartum major depression: 7,4 (1,6-38,5)
Maternal mental health and child nutritional status in four developing countries	Harpham and al, 2005	Community based survey	India	1823	12 (range 6-18)	Underweight: cases: WAZ<-2 Stunting: cases: HAZ<-2 1977 NCHS references	Underweight : 45% Stunting: 27%	SRQ Cut-off: 7/8	Overall 30%	Underweight: 1,3 (1,1-1,7) Stunting: 1,6 (1,3-1,9)	Underweight: 1,1 (0,9-1,4) Stunting: 1,4 (1,2-1,6)
Maternal mental health and child nutritional status in four developing countries	Harpham and al, 2005	Community based survey	Vietnam	1570	12 (range 6-18)	Underweight: cases: WAZ<-2 Stunting: cases: HAZ<-2 1977 NCHS references	Underweight : 23% Stunting: 16%	SRQ Cut-off: 7/8	Overall 21%	Underweight: 1,5 (1,2-1,9) stunting: 1,4 (1,1-1,7)	Underweight 1,4 (1,1-1,8) Stunting: 1,3 (0,9-1,7)
Mother's mental health and infant growth: a case-control from Rawalpindi, Pakistan	Rahman and al, 2003	Case-control	Pakistan	172 (82 cases and 90 controls)	Cases : 9,7 (0,9) Controls: 9,7 (0,9)	Underweight: Weight for age <3rd centile Controls: weight for age>10th centile	48%	SRQ Cut-off: 11/12	Overall: 40% even with high cut-off Cases : 57% Controls: 25%	3,9 (1,9-7,8)	2,8 (1,2-6,8)
Mothers of undernourished Jamaican children have poorer psychosocial functioning and this is associated with stimulation provided in the home	Baker-Henningham and al, 2003	Case-control [matched]	Jamaica	210 : 139 undernourished children and 71 adequately nourished children	Cases : 18,5 (5,0) Controls : 19,4 (4,8)	Underweight : Cases: history of WAZ <-2 and current WAZ<-1,5 Controls: WAZ>-1, no history of malnutrition [NCHS references]	66%	CES-D (modified)	Cases: 26 (SD 0-91) Controls: 16,5 (SD 0-86)	t-test for difference between mean scores on modified CES-D P<0,01	Non-significant

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Table 46 cont'd

Survey	Author(s) and Date	Study design	Country setting	Sample Size and participants	Infant age in months [mean (SD)]	Infant Growth outcome measures	% of sample who were cases	Maternal mental health measure	Prevalence of maternal mental health problems	Uncorrected association between infant outcome and maternal depression	Association corrected for cofounders
AMERICAS											
Mental health of the mothers of malnourished children	De Miranda and al., 1996	Case-control	Brazil	139	Cases : 10,9 (6,9) Controls : 8,4 (4,8)	Underweight: cases: < 75% expected weight- for-age [according to the Gomez criteria]	57%	QMPA [Adult Psychiatric Morbidity Questionnaire, Brazilian screening instrument]	Cases: 63% Controls: 38%	2,8 (1,2-6,9)	2,6 (CI not given)
Maternal mental health and child nutritional status in four developing countries	Harpham and al., 2005	Community-based survey	Peru	1949	12 (range 6-18)	Underweight: cases: WAZ < -2 Stunting: cases: HAZ < -2 1977 NCHS references	Underweight: 10% Stunting: 25%	SRQ Cut-off: 7/8	Overall 30%	Underweight: 1,1 (0,8-1,4) Stunting: 1,2 (1,0-1,5)	Underweight: 0,8 (0,6-1,2) Stunting: 1,1 (0,9-1,4)
Maternal Depressive Symptoms, parenting Self-Efficacy and Child Growth	Surkan and al., 2008	Case-control	Brazil	595 mothers of children aged 6 to 24 months randomly selected from 9 low-income communities representing 4 geographic areas		Prevalence of weight for height too low (0.9% n = 5) short stature and underweight defined as less than -2 standard deviations of the WHO reference height -for-age and weight-for-age z scores respectively	Short stature: 25% of the sample and 4% underweight	CES-D (Center for Epidemiological Studies Depression Scale) score ≥ 16 corresponding to depressive symptomatology Parenting self-efficacy assessed using a 10-items scale with a 4-point scale	56% of mothers scored as high depressive symptoms range (≥ 16) 49% fell into low maternal self efficacy	Added to the multivariate model: high maternal depressive symptomatology related to a nearly 2-times greater odds of short stature OR= 1.8 95% CI 1.1, 2.9 No relationship between maternal depression symptoms and underweight.	Relationship between maternal depressive symptoms and child short stature persisted after controlling of socio-demographic indicators.
AFRICA											
Maternal mental health and child nutritional status in four developing countries	Harpham and al., 2005	Community-based survey	Ethiopia	1722	12 (range 6-18)	Underweight: cases: WAZ < -2 Stunting: cases: HAZ < -2 1977 NHCS references	Underweight: 42% Stunting: 38%	SRQ Cut-off: 7/8	Overall 33%	Underweight: 1,2 (1,0-1,4) Stunting: 0,9 (0,8-1,2)	Underweight: 1,1 (0,9-1,4) Stunting: 0,9 (0,7-1,2)
Maternal common mental disorder and infant growth - a cross sectional study from Malawi	Stewart and al., 2008	Case-control	Rural malawi	501 infants and mothers	9,9 months	Length-for-age Weight for age in Z-score		CMD measured by SRQ: score ≥ 8 indicates CMD	29.9%	Length-for-age Z-score when mothers with CMD : -1.5 SD 1.24 Mothers without CMD: -1.11 SD 1.12 Student's T-test: P=0.001 Mean weight-for-age when mothers with CMD: -1.77 SD 1.16 Mothers without CMD: -1.59 SD 1.09 (difference not significant)	Association confirmed for the length for age

Table 47: Cohort studies		
Survey	Impact of postnatal depression on infant growth in Nigeria	Postnatal depression and infant growth and development in low income countries: a cohort study from Goa, India
Author(s) and Date	Adewuya and al, 2008	Patel and al, 2003
Study design	Longitudinal case-control (matched)	Longitudinal case-control (matched)
Country	Nigeria	India
Country setting	Participants to a previous study on maternal postnatal depression attending the infant immunisation clinics in 5 health centres in Ilesha Township	Infant health clinic, urban/rural population Participants to a PND research and patients seen after birth of the child at 6-8 weeks postpartum
Sample Size and participants	242 women completed the study: 120 depressed and 122 matched non depressed postpartum women	171
Timing of recruitment	Participants to a postnatal depression survey at 6 weeks post-partum	6-8 weeks post-partum
Infant Growth outcome measures	Birth weight recorder ; Weight and Length	Underweight: weight-for-age < 5th centile Stunting: height for age < 5th centile
Infant age at follow up (in months)	6 weeks ; 3-6 and 9 months after delivery	6
Maternal mental health measure	The non patient version of Structured Interview for DSM III-R (SCID-NP) assessed by two psychiatrists	EPDS Cut-off 11/12
Prevalence of maternal mental health problems	14.6% from the total number of women tested	22% (n=37)
Uncorrected association between infant outcome and maternal depression	Poorer growth for infants of depressed mothers. Difference statistically significant at 3 and 6 months [OR (CI)]: 6 weeks: Weight 2.60 (0.87-7.62); length 1.55 (0.43-5.65) 3rd month: Weight 3.19 (1.21-8.40); length 3.28 (1.03-10.47) 6th month : Weight 4.21 (1.36-13.20); length 3.34, (1.18-9.55) 9th month: Weight 2.84 (0.98-8.24); length 2.68 (0.82 - 8.80)	Underweight [RR (CI)] : 2,3 (1,1-4,7) Stunting [RR(CI)]: 2,9 (1,3-6,8)
Association corrected for cofounders		Reported adjusted for individual cofounders. All associations remained significant

Appendix F

Table 47 cont'd

Survey	Impact of maternal depression on infant nutritional status and illness	Post-partum depression and infant growth in a south african peri-urban settlement
Author(s) and Date	Rahman and al, 2004	Tomlinson and al, 2005
Study design	Prospective cohort study (matched)	Longitudinal case-control (matched)
Country	Prospective cohort study (matched)	South Africa
Country setting	Rural community in Rawalpindi	Peri-urban community-based
Sample Size and participants	All the women in the area during the third trimester of their pregnancy during a 4-month period 320 women: 160 depressed prenatally matched with 160 non-depressed women. At 1 year post-partum, 129 depressed women and 136 non depressed women were still participating to the study.	147 women and complete measures for 122 infants - (At 18 months: 98 women and 96 infants)
Timing of recruitment	During the third trimester of pregnancy	2 months postpartum
Infant Growth outcome measures	Underweight: WAZ<-2 stunting: HAZ<-2 NCHS references	Weight: mean WAZ (SD) Height: mean HAZ (SD)
Infant age at follow(up (in months)	2,6, and 12 Due to the small number of children stunted and underweight at 2 months, this timing has not been considered in the multiple statistical analysis.	2 and 18
Maternal mental health measure	Schedules for clinical Assessment in Neuropsychiatry (SCAN) developed by WHO and based on ICD-10 done in the third semester of pregnancy + 2, 6 and 12 months postnatally	Structured Clinical Interview for DSM-IV
Prevalence of maternal mental health problems	25% in the total population at the third month of pregnancy 56% of mothers depressed in the postnatal period were depressed at all points of assesement in the postnatal period	34,7% at 2 months post-partum and 12% at 18 months post-partum
Uncorrected association between infant outcome and maternal depression	Underweight [RR (CI)] : 6 months: 4,0 (2,1-7,7) 12 months: 2,6 (1,7-4,1) Stunting [RR(CI): 6 months: 4,4 (1,7-11,4) 12 months: 2,5 (1,5-4,0)	Weight [mean WAZ (SD)]: Cases: -0,8 (1,74) Non-cases: -0,31 (1,13) P=0,051 Height [mean HAZ (SD)]: Cases: -0,89 (1,91) Non-cases: -0,34 (1,28) P=0,13
Association corrected for cofounders	Underweight [OR (CI)] : 6 months: 3,5 (1,5-8,6) 12 months: 3,0 (1,5-6,0) Stunting [OR(CI): 6 months: 3,2 (1,1-9,9) 12 months: 2,8 (1,3-6,1) When chronically depressed mothers (n=72) and mothers not depressed at any time (n=108): Underweight [RR (CI)] at 6 months: 5,9 (2,7-12,8) At 12 months: 3,5 (2,2-5,6) stunting [RR (CI)] - at 6 months: 5,5 (1,9-16,0) At 12 months: 3,2 (1,9-5,4)	Weight [mean WAZ (SD)]: Cases: -0,8 (1,29) Non-cases: -0,31 (1,13) P=0,26 Height : non significant