Essential Nutrition Actions
Improving Maternal-Newborn-Infant and Young Child Health and Nutrition

Introduction

Malnutrition in all its forms either directly or indirectly is responsible for approximately half of all deaths worldwide. This applies to perinatal and infectious diseases as well as chronic diseases. Malnutrition accounts for 11% of the global burden of disease, leading to long-term poor health and disability and poor educational and developmental outcomes.

Worldwide, by 2010 it was found that about 104 million children under five years of age were underweight and 171 million stunted. At the same time, it was found that about 43 million children under five were overweight or obese[1]. About 90% of stunted children live in 36 countries and children under two years of age are most affected by undernutrition[2].

Nearly 20 million children under five suffer from severe acute malnutrition which is a life-threatening condition requiring urgent treatment. In fact, it is estimated that it contributes to 1 million child deaths every year. The order of magnitude of this estimate suggests that severe malnutrition in children is an important public health problem[3,4].

It has been estimated that in 2009, 8.1 million children under five died, mostly from preventable causes such as pneumonia, diarrhoea, malaria and neonatal conditions (Figure 1); about 90% of deaths of children under five happen in 42 countries, with half the worldwide deaths occurring in only six countries[5]. Undernutrition, associated with about one third of those deaths, was then associated with almost 3 million children deaths in 2009.

Improvement of exclusive breastfeeding practices, adequate and timely complementary feeding, along with continued breastfeeding for up to two years or beyond, could save annually the lives of 1.5 million children under five years of age[6]. Growth failure during intrauterine life and poor nutrition in the first two years of life, have critical consequences throughout the life-course. Appropriate breastfeeding and complementary feeding practices not only play a significant role in improving the health and nutrition of young children, they also confer significant long-term benefits during adolescence and adulthood. An estimated 13 million children are born with intra-uterine growth restriction every year[7].

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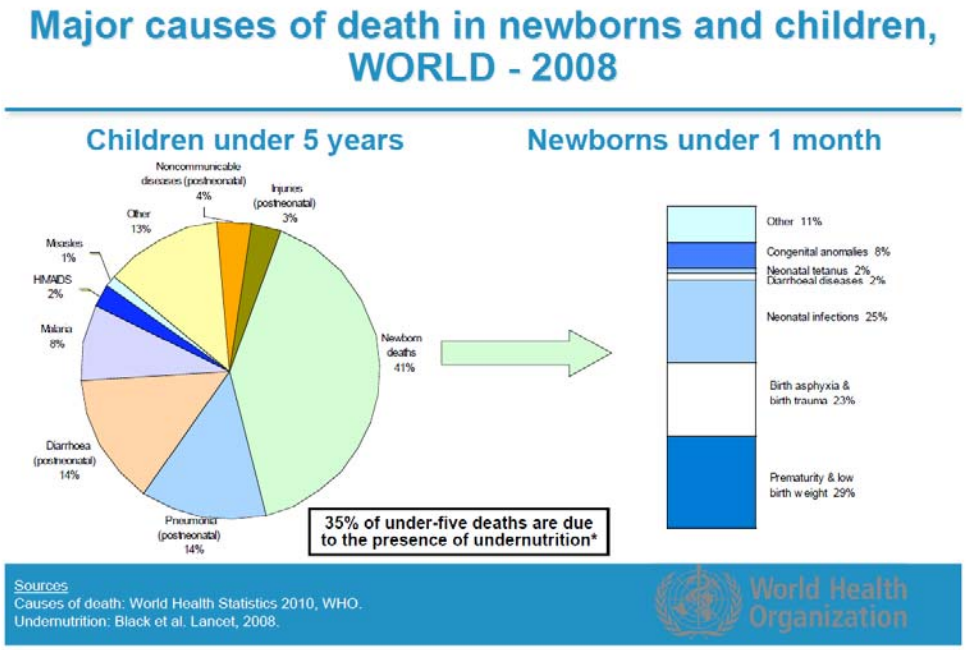
[1] WHO Global Database on Child Growth and Malnutrition. Data accessed on April 2011.
[2] Black RE et.al. Maternal and child undernutrition: global and regional exposures and health consequences. *The Lancet Series on Maternal and Child Undernutrition. 2008 5-22.*
[3] Community-based management of severe acute malnutrition: a joint Statement by the World Health Organization, the World Food Programme, the United Nations System Standing Committee on Nutrition, the United Nations Children's Fund. Geneva: World Health Organization, 2007.
[4] Prudhon C, Briend A, Weise Prinzo Z, Daelmans BM, Mason JB, guest editors. Food and Nutrition Bulletin: WHO, UNICEF, and SCN informal consultation on community-based management of severe malnutrition in children. Tokyo: International Nutrition Foundation; 2006.
[5] Data from the Inter-Agency Child Mortality Estimation Group, published in the CAH website, accessed on 19 April 2010.
[6] Jones G et.al. How many child deaths can we prevent this year? *Lancet 2004; 362:65-71.*
[7] Maternal and Child Undernutrition Study Group. *Lancet*. 2008, 371(9609).

Figure 1



Iron deficiency is the most common nutritional deficiency in the world, with over 2 billion people worldwide affected[8,9]. The World Health Organization global estimates indicate that anaemia affects 47.4% of the preschool-age population, with about 600 million pre-school and school-aged children being anaemic[10]. Infants and children under the age of 5 are at risk of developing iron deficiency anaemia because of their increased requirements for rapid growth and diets that are often lacking in sufficient absorbable iron[11,12]. Iron deficiency, with or without anaemia, is therefore an important health consequence for young children, and could include increased perinatal mortality, delayed mental and physical development, negative behavioural consequences, reduced auditory and visual function, and impaired physical performance[13]. Some of the negative effects of iron deficiency during early childhood are also irreversible and can

[8] Iron deficiency anemia: Assessment, prevention, and control: A guide for programme managers. World Health Organization, Geneva, 2001.
[9] Micronutrient Initiative. Investing in the future: A united call to action on vitamin and mineral deficiencies. Global Report 2009. Available at: http://www.unitedcalltoaction.org/documents/Investing_in_the_future.pdf
[10] WHO/CDC. Worldwide prevalence of anaemia 1993-2005: WHO Global Database of Anaemia. World Health Organization, Geneva, 2008.
[11] Institute of Medicine. Dietary reference intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium, and Zinc. 2001; National Academy Press. Washington, D.C.
[12] Dewey KG, Brown KH. Update on technical issues concerning complementary feeding of young children in developing countries and implications for intervention programs. Food and Nutrition Bulletin 2003; 24(1):5-28.
[13] Algarín C, Peirano P, Garrido M, Pizarro F, Lozoff B. Iron deficiency anemia in infancy: Long-lasting effects on auditory and visual system functioning. Pediatr Res 2003; 53:217–23.

lead to poor school performance, reduced physical work capacity and decreased productivity later in life[5,14,15,16,17].

The World Health Organization estimates that about 190 million children under five (33.3 % of the preschool age population) are vitamin A deficient with about 5.2 million are affected by night blindness[18]. Infants as well as young children have increased vitamin A requirements to support rapid growth and combat infections. Severe vitamin A deficiency at this age can cause visual impairments, anaemia, weakened immunity with an increased risk of morbidity and mortality from measles or diarrhoea[19].

Maternal short stature and iron deficiency anaemia, which can increase the risk of death of the mother at delivery, contribute to at least 20% of maternal deaths. Maternal undernutrition also increases the probability of low birth weight, which in turn increases the probability of neonatal deaths due to infections and asphyxia[20]. Globally, more than 30% of non-pregnant and almost 50% of pregnant women suffer from anaemia, much of which is caused by iron deficiency. 56 million pregnant women and 468 million non-pregnant women are anaemic[8]. Because adolescent girls and women of reproductive age lose iron through monthly menstruation, and because their diets are often lacking in iron, they are particularly vulnerable to iron deficiency[21 22,23]. WHO estimates indicate that 9.8 million women are affected by night blindness[16].

In 2008, 35% of adults aged 20 years and older were overweight (BMI ≥ 25 kg/m2) (34% men and 35% of women). The worldwide prevalence of obesity has nearly doubled between 1980 and 2008. In 2008, 14% of women in the world were obese (BMI ≥30 kg/m2), compared with 8% in 1980. An estimated 297 million women over the age of 20 were obese in 2008[24].

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[14] Lozoff B, Jimenez E, Hagen J, Mollen E, Wolf AW. Poorer behavioral and developmental outcome more than 10 years after treatment for iron deficiency in infancy. Pediatrics 2000; 105:E51.

[15] Lozoff B, Jimenez E, Wolf AW. Long-term developmental outcome of infants with iron deficiency. N Engl J Med 1991; 325:687–94.

[16] Haas JD, Brownlie T. Iron deficiency and reduced work capacity: A critical review of the research to determine a causal relationship. J Nutr 2001; 131(2S-2):676S–88S; discussion 688S–90S.

[17] Iannotti LL, Tielsch JM, Black MM, Black RE. Iron supplementation in early childhood: health benefits and risks. Am J Clin Nutr 2006; 84:1261-76.

[18] Global prevalence of vitamin A deficiency in population at risk 1995-2005: WHO Global Database of Vitamin A Deficiency. World Health Organization, Geneva, 2009.

[19] Sommer A, West KP Jr. Vitamin A deficiency: Health, survival, and vision. New York, Oxford University Press, 1996.

[20] Countdown to 2015 decade report (2000-2010): taking stock of maternal, newborn and child survival. World Health Organization and UNICEF, Washington DC, 2010.

[21] Ramakrishnan U, Yip R. Experiences and challenges in industrialized countries: control of iron deficiency in industrialized countries. J Nutr 2002; 132:820S-824S.

[22] Pala K, Dundar N. Prevalence and risk factors of anaemia among women of reproductive age in Bursa, Turkey. Indian Journal of Medical Research 2008; 128(3):282-6.

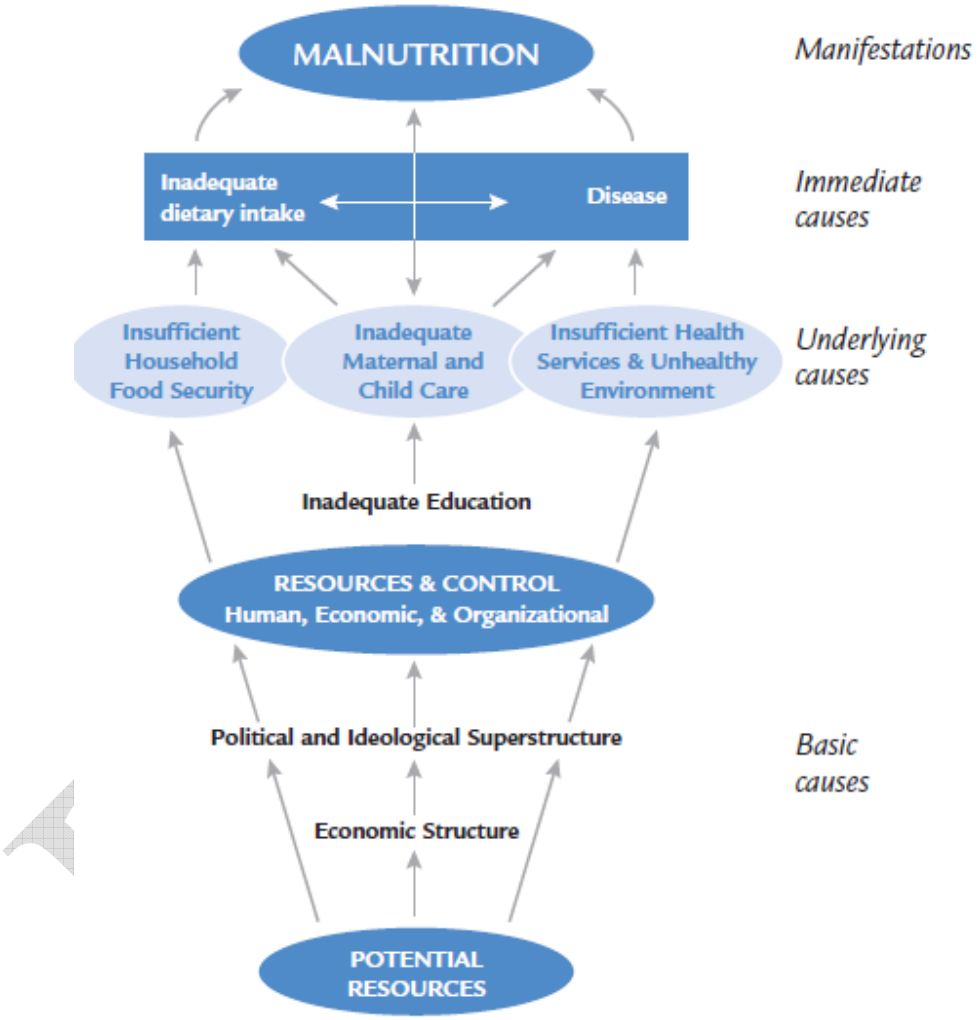
[23] Institute of Medicine. Dietary reference intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium, and Zinc. 2001; National Academy Press. Washington, D.C.

[24] Finucane MM et al. National, regional, and global trends in body-mass index since 1980: systematic analysis of health examination surveys and epidemiological studies with 960 country-years and 9.1 million participants. The Lancet, 2011; 337(9765):557–567.

Causes of malnutrition

The causes of malnutrition can be divided into immediate, underlying, and basic (Figure 2) Actions should then target the different causes to reach sustainable change. That requires a multisectoral approach.

Figure 2



Source: UNICEF 1990.

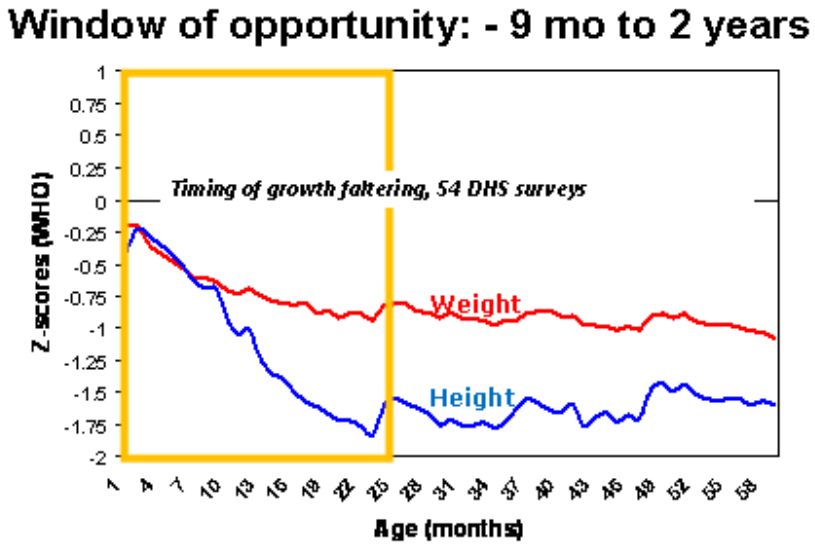
Window of opportunity

New analyses, using the WHO Growth Standards, confirm the importance of the first 2 years of life as a window of opportunity for growth promotion (Figure 3). An important feature of the WHO standards is that they reveal a much greater problem of undernutrition during the first 6 months of life than previously believed, bringing coherence between the rates of undernutrition observed in young infants and the prevalence of low birth weight and early abandonment of exclusive breastfeeding. These findings highlight the need for prenatal and early-life interventions to prevent the growth

failure that mainly happens during the first 2 years of life, including the promotion of appropriate infant feeding practices[25].

It is concluded then, that there is a critical window of opportunity for improving child nutrition; it goes from pregnancy through the first 24 months of life. The deficits acquired by this age are difficult to reverse later.

Figure 3



Source: Victora, de Onis, Hallal, Blössner, Shrimpton. Pediatrics 2010

Strategies to improve nutritional status and growth in children should include interventions to improve nutrition of pregnant and lactating women; early initiation of breastfeeding with exclusive breastfeeding for 6 months; promotion, protection, and support of continued breastfeeding along with appropriate complementary feeding from 6 months up to 2 years and beyond; and micronutrient supplementation, targeted fortification, and food supplementation, when needed.

Recommended nutrition practices targeting women, infants and young children

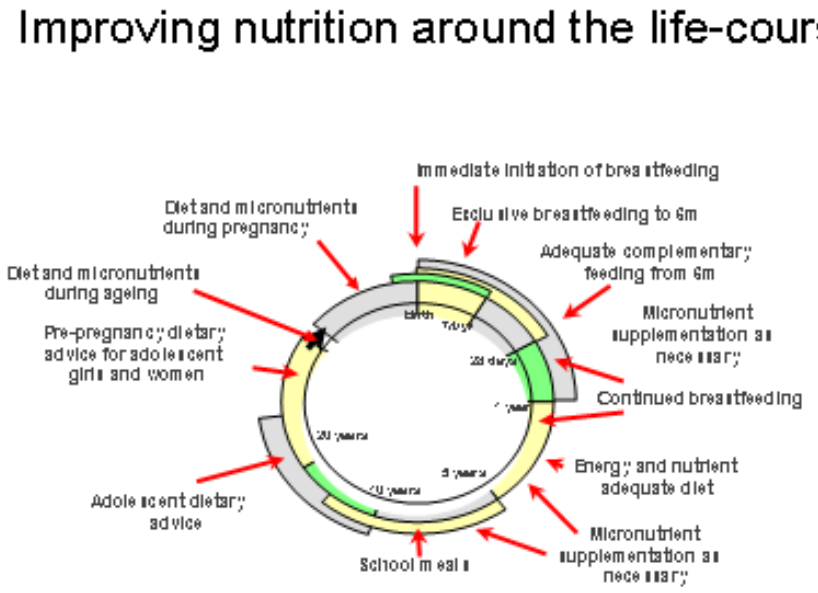
This paper provides evidence for essential actions aimed to protect, promote, and support the following priority nutrition practices (Figure 4):

- early initiation of breastfeeding
- exclusive breastfeeding for six months
- timely introduction of nutritionally adequate and safe complementary foods
- continued breastfeeding for up to two years or beyond

[25] Victora CG et.al. Worldwide timing of growth faltering: Revisiting implications for interventions. Pediatrics 2010; 125:e473-e480.

- micronutrient supplementation
- food fortification
- appropriate feeding of infants and young children living in exceptionally difficult circumstances
- appropriate nutritional care of sick children
- appropriate management of malnourished children

Figure 4



The World Health Organization work on evidence for essential nutrition actions

The WHO recognizes the need to improve the process by which health-related recommendations are developed using the best available evidence. The WHO established the Guidelines Review Committee in 2007 which has developed and implements procedures to ensure that WHO guidelines are produced in ways consistent with best practice, emphasizing the appropriate use of evidence (WHO, 2010). In strengthening its commitment in providing relevant guidance for programmes that support and develop capacity in evidence-informed policymaking to Member States, the WHO Department of Nutrition for Health and Development recently established the WHO Nutrition Guidance Expert Advisory Group with experts from WHO Advisory Panels and other experts in the fields of epidemiology, nutrition, public health, paediatric medicine, and program implementation. The members are from all over the world and represent a wide variety of backgrounds and expertise. Building on the recent focus on the increased need for evidence-informed guidelines to support Member States implement and expand nutrition actions, the Nutrition Guidance Expert Advisory Group has been working diligently to develop and update guidelines in the nutrition field. For

example, in the biennium 2010-2011, guidelines are being updated for the effects and safety of supplementation with vitamin A; supplementation with iron and folic acid for various population groups; home fortification with multiple micronutrient powders for children under two years of age, preschool age children and pregnant women; fortification of wheat and corn/maize flours, sugar and salt with micronutrients; and the nutritional management of moderate and severe malnutrition.

For these guidelines to be effective in supporting Member States, the information must be widely disseminated so that decision makers and donor agencies will have the knowledge to make appropriate choices for each country. eLENA intends to provide a platform to house and disseminate current and forthcoming evidence-informed recommendations, as well as other scientific information and tools for implementing and/or expanding nutrition actions in Member States. Policy options informed by scientific evidence and accompanied with best practices can help countries make appropriate choices for their context and improve the achievement of significant public health outcomes. Low and middle-income countries have scarce resources to address their health and nutrition challenges and need to make decisions informed by evidence to prioritize the use of those resources efficiently in actions proven to be effective in other contexts yet adapted to their specific needs. An understanding of the biological rationale for different actions and the behavioural and contextual factors which could affect, either positively or negatively, an action's success, combined with the use of relevant nutrition guidelines provides end users easy access to evidence-informed options that are clear and concise and can be used in nutrition programme development, implementation and scale-up.

The WHO electronic Library of Evidence for Nutrition Actions (eLENA), currently being developing, not only meets the rigorous requirements of evidence-informed recommendations, but also provides an overview of the biological rationale for various nutrition actions and the behavioural and contextual factors which could affect either positively or negatively the effectiveness of these actions or interventions. These Biological, Behavioural and Contextual Rationale statements included within eLENA will provide users with an easy to understand quick resources for determining if a nutrition action may have potential to work in their context. eLENA will also respond to the renewed organizational mandate to ensure that WHO guidelines are developed consistently with best practices in mind, making appropriate use of evidence.

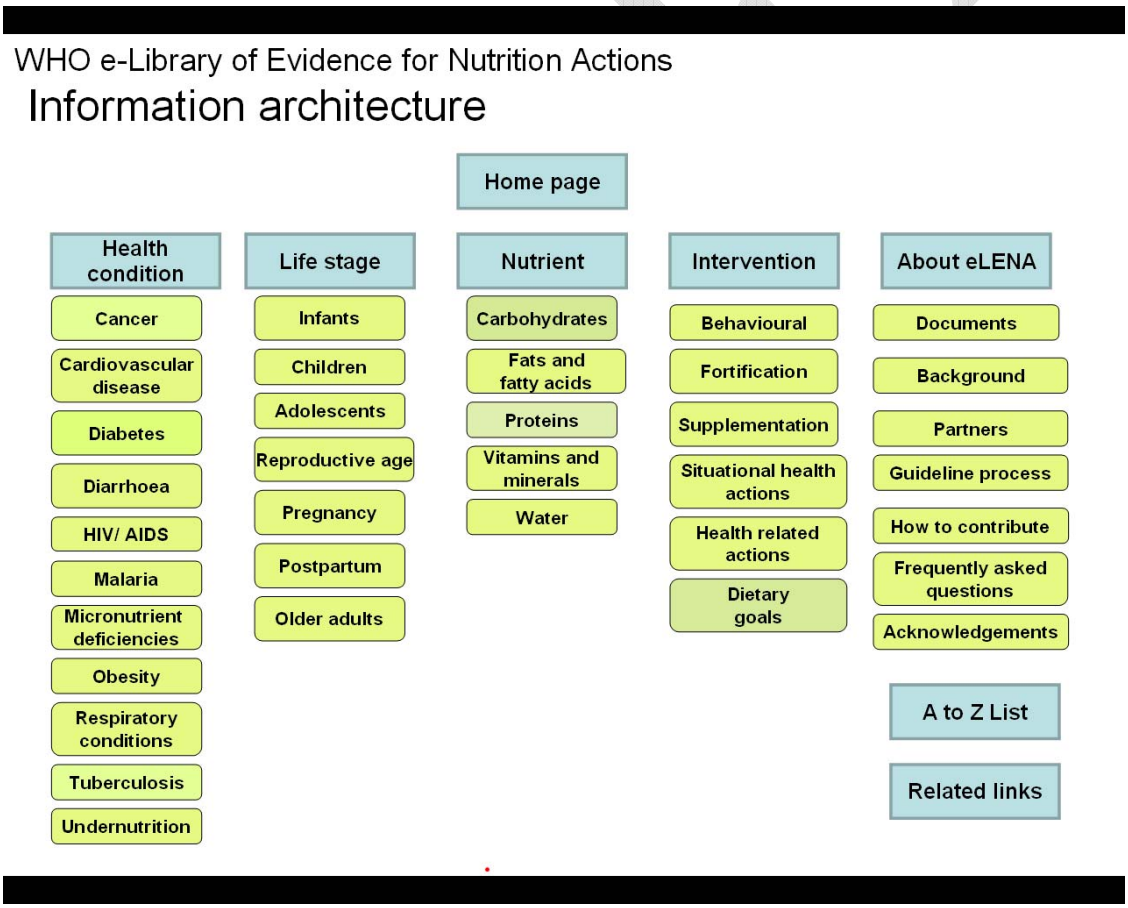
eLENA will be an on-line web portal containing the most current and relevant information related to nutrition actions across a broad spectrum of topics. The intent is to create a comprehensive tool that addresses a diverse range of subjects that influence (and are influenced by) national, regional and global policies and research on the broad topic of nutrition. Much of the information to be presented in eLENA, such as existing and developing WHO recommendations or guidelines are currently available in various formats and locations on the WHO website. The aim of eLENA is to compile and centralize this information to facilitate the adoption and adaptation of evidence-informed guidelines by Member States and their partners, so that effective and safe interventions can be scaled up easily. A single resource containing the biological, behavioural and contextual rationales for nutrition actions, along with current evidence, guidelines, and resources to support implementation that are available concurrently does not yet exist.

The design of eLENA facilitates easy-to-use and plain language documents accessible to a global audience. Content will also be available in the six WHO official languages:

Arabic, Chinese, English, French, Russian, and Spanish. Evidence is commonly only available in English making it difficult to adapt existing experiences and tools to local settings. Policy makers and researchers in a wide variety of settings will therefore have easy access to the best available research evidence for nutrition actions, which will help formulate sound policies and improved guidance for implementation. This process, requires sound methodologies to adapt and integrate scientific evidence into each unique country context, with the active co-participation of researchers, policy makers, private sector and representatives of citizen groups. The availability of these resources in one centralized location will facilitate this process.

eLENA envisions a logical and cyclic approach to assessing and disseminating evidence. The systematic review and critical assessment of existing guidance will facilitate the prioritization of areas in which the development of new or updated guidance is needed. eLENA will also be used as a forum for sharing commentaries, and will identify gaps for priority operational research. eLENA will also contain links to related resources from inside and outside WHO.

Figure 5



The information architecture for eLENA has been created and appears in Figure 5 (see above). The nutrition interventions to be included will address a wide range of identified

key actions that will be organized into the main topic areas of: health condition, life stage and nutrient. Indirect interventions or those that are not exclusively nutritional in nature but nonetheless have impact on nutritional outcomes will also be incorporated under a separate topic of health related actions. These titles will include deworming, delayed cord-clamping, agriculture-based food security and economic development interventions such as cash-transfers. For each of these nutrition action titles, the following elements will be available: 1) current WHO position; 2) biological, behavioral, and contextual rationale statement; 3) evidence links; 4) expert commentary, and 5) additional resources. New nutrition guidelines will be available as they are published and supporting evidence and supporting expert commentary and other links kept current through consistent site maintenance.

Early Initiation of Breastfeeding

Why skin-to-skin contact and early initiation of breastfeeding

The recommendation for early initiation of breastfeeding derives from the 1989 WHO/UNICEF Joint Statement "Protecting, promoting and supporting breast-feeding: the special role of maternity services" which includes the Ten Steps for successful breastfeeding, with Step 4 indicating "Help mothers initiate breastfeeding within a half-hour of birth"[i]. The World Health Organization reviewed the evidence for the ten steps for successful breastfeeding. The review concluded that evidence shows that early contact increases breastfeeding both soon after delivery and 2-3 months later; spontaneous suckling may not occur until from 45 minutes to 2 hours after birth, but skin-to-skin contact should start as soon as possible after delivery, It also indicated that provided the infant is in close contact with its mother and can suckle when it shows signs of readiness, there is no justification for forcing it to take the breast[26].

In 2009 a systematic review on skin-to-skin contact was published by Cochrane Group[27], the reviewers indicated that it has been suggested that in industrialized societies, hospital routines may significantly disrupt early mother-infant interactions and have harmful effects and they conducted a review to see if there was any impact of early skin-to-skin contact between the mother and her newborn baby on infant health, behaviour and breastfeeding. The review showed that babies interacted more with their mothers, stayed warmer, and cried less. Babies were more likely to be breastfed, and to breastfeed for longer, if they had early skin-to-skin contact. Additionally, a causal association between early breastfeeding and reduced infection-specific neonatal mortality has been reported, supporting the recommendation of early initiation[28].

Exclusive Breastfeeding (EBF)

Six months of exclusive breastfeeding: the recommendation revisited

The recommendation to exclusively breastfeed babies for their first six months of life was formulated after a meta-analysis and review of the evidence by a WHO Expert Committee[29]. The systematic review of the effects of exclusive breastfeeding for six months (versus four months) on child health, growth and development, and on maternal health showed that:

- infants who are exclusively breastfed for six months experience less illness due to gastrointestinal infections and good growth (no loss in weight or length gain);

[26] Evidence for the ten steps to successful breastfeeding (Revised) World Health Organization, Geneva, 1998.
[27] Moore ER, Anderson GC, Bergman N. Early skin-to-skin contact for mothers and their healthy newborn infants (Review) Cochrane Collaboration, 2009.
[28] Edmond ME et al. Effect of early infant feeding practices on infection-specific neonatal mortality: an investigation of the causal links with observational data from rural Ghana. Am J Clin Nutr 2007: 86:1126-31.
[29] Kramer MS, Kakuma R. The optimal duration of exclusive breastfeeding: A systematic review. World Health Organization, Geneva, 2001

- mothers who exclusively breastfeed for six months experience a longer period of post-partum amenorrhea (lack of menstrual bleeding which is a natural, though not fail-safe, method of birth control);
- preterm babies fed their mother's own milk have a lower incidence of infections and necrotizing enterocolitis, as well as improved neurodevelopmental outcomes. Term low-birth-weight babies experience similar benefits.

An expert consultation[30] analysed two background documents: the systematic review summarized above and a review on nutrient adequacy of exclusive breastfeeding for the first six months[31].

In 2009 the Cochrane Collaboration published the results of an updated systematic review on the optimal duration of exclusive breastfeeding[32], the authors concluded that "Although infants should still be managed individually so that insufficient growth or other adverse outcomes are not ignored and appropriate interventions are provided, the available evidence demonstrates no apparent risks in recommending, as a general policy, exclusive breastfeeding for the first six months of life in both developing and developed-country settings. Large randomized trials are recommended in both types of setting to rule out small effects on growth and to confirm the reported health benefits of exclusive breastfeeding for six months or beyond."

One of these effective and most rewarding preventable interventions is breastfeeding and appropriate complementary feeding which has the potential to reduce 19% of the under five mortality.

Continued Breastfeeding

Rationale

Breastfeeding continues to make an important nutritional contribution well beyond the first year of life. Breastfed children at 12-23 months of age receive on average 35-40% of total energy needs from breast milk[33] with 60-65% to be covered by complementary foods. Breast milk is a key source of energy and essential fatty acids and provides substantial amounts of certain micronutrients. The nutritional impact of breastfeeding is most evident during periods of illness, when the child's appetite for other foods decreases but breast milk intake is maintained[34]. Continued, frequent breastfeeding also protects child health by delaying maternal fertility post-partum and reducing the child's

[30] The optimal duration of exclusive breastfeeding: Report of an expert consultation, Geneva, Switzerland 28-30 March 2001. World Health Organization, Geneva, 2001.
[31] Butte NF et al. Nutrient adequacy of exclusive breastfeeding for the term infant during the first six months of life. World Health Organization, Geneva, 2002.
[32] Kramer MS, Kakuma R. Optimal duration of exclusive breastfeeding (review) The Cochrane Collaboration, 2009.
[33] Dewey KG, Brown KH. Update on technical issues concerning complementary feeding of young children in developing countries and implications for intervention programs. Food Nutr Bull 2003; 24: 5-28.
[34] Brown KH et.al. Effects of common illnesses on infants' energy intakes from breast milk and other foods during longitudinal community-based studies in Huascar (Lima), Peru. Am J Clin Nutr 1990; 52:1005-13.

risk of morbidity and mortality in disadvantaged populations.[35,36] Longitudinal studies demonstrate that in developing countries, a longer duration of breastfeeding is associated with greater linear growth[37,38], A longer duration of breastfeeding has been linked to reduced risk of childhood chronic illnesses[39] and obesity[40] and to improved cognitive outcomes[41] although the causal relationship underlying these associations remain controversial. Most studies have not specifically examined the effect of breastfeeding beyond 12 months on these outcomes.

Actions to protect promote and support breastfeeding

The Global Strategy on Infant and Young Child Feeding, adopted by the World Health Assembly and the UNICEF Executive Board in 2002, provides the framework for action to protect, promote and support breastfeeding. It builds on key global instruments that include:

- the International Code of Marketing of Breast-milk Substitutes and subsequent relevant World Health Assembly Resolutions (referred to as the Code);
- the Baby-Friendly Hospital Initiative (BFHI); and
- the International Labour Organization's (ILO) Maternity Protection Convention No183.

The Global Strategy reaffirms the four operational targets of the 1990 *Innocenti Declaration* on the Protection, Promotion and Support of Breastfeeding and includes additional targets for feeding infants and young children:

1) appointing a national breastfeeding coordinator;
2) ensuring that every facility providing maternity services fully practices all the “Ten Steps to successful breastfeeding”;
3) giving effect to the Code; and
4) enacting legislation to protect the breastfeeding rights of working women.
5) developing, implementing, monitoring and evaluating a comprehensive policy on infant and young child feeding
6) ensuring that health and other relevant sectors protect, promote and support exclusive breastfeeding for six months and continued breastfeeding up to 2 years of age or beyond
7) promoting timely, adequate, safe and appropriate complementary feeding with continued breastfeeding
8) providing guidance on feeding infants and young children in exceptionally difficult circumstances

[35] Molbak K et.al. Prolonged breastfeeding, diarrhoeal disease, and survival of children in Guinea-Bissau. Br Med J 1994; 308: 1403-06.
[36] WHO Collaborative Study Team on the Role of Breastfeeding on the Prevention of Infant Mortality. Effect of breastfeeding on infant and child mortality due to infectious diseases in less developed countries: a pooled analysis. Lancet 2000; 355: 451-55.
[37] Onyango AW et.al. Continued breastfeeding and child growth in the second year of life: a prospective cohort study in western Kenya. Lancet 1999; 354: 2041-45.
[38] Simondon KB et al. Breast-feeding is associated with improved growth in length, but not weight, in rural Senegalese toddlers. Am J Clin Nutr 2001; 73: 959-67.
[39] Davis MK. Breastfeeding and chronic disease in childhood and adolescence. Ped Clin N Amer 2001; 48: 125-42.
[40] Butte NF. The role of breastfeeding in obesity. Ped Clin N Amer 2001; 48: 189-98.
[41] Reynolds A. Breastfeeding and brain development. Ped Clin N Amer 2001; 48: 159-72.

9) considering new legislation or other measures as part of a comprehensive policy on infant and young child feeding to give effect to the Code and subsequent WHA resolutions

For a comprehensive approach to appropriate infant and young child feeding, it is recommended for countries to undertake actions in the following areas: policies, health systems, community

Implementation of the Code

To maximize the contribution that the Code can make to improved breastfeeding, given the many examples of non-compliance, in-country monitoring of its implementation must be carried out[42,43]. Companies found to be committing violations must be sanctioned by the government entity charged with Code enforcement. Ensuring that all companies that produce infant formula compete for market share in a manner consistent with the Code will benefit these companies by ensuring that no company is given an unfair advantage.

Improving maternity protection and health through the workplace

Maternity protection at work is essential for safe-guarding the health and economic security of women and their children. The consensus is reflected in the international labour standards of the ILO, which set out basic requirements of maternity protection at work. Few countries have ratified the Maternity Protection Convention No183, although many countries have adopted some of its provisions[44]. Health professionals have an important role to play in advocating for good legislation on maternity protection, and hospitals and other health facilities should offer maternity leave and breastfeeding support for their own personnel. All working women should be supported to sustain breastfeeding when they return to work, and in the work place, they should be granted a minimum of one daily break with pay, to breastfeed their infant or express and store breast milk[45,46,47].

[42] Nemsadze K. Report from the Country of Georgia: Protecting and promoting breastfeeding through regulation of artificial-feeding marketing practices. *The Journal of Perinatal Education 2004; 13:23-28.*
[43] Cattaneo A et.al. Protection, promotion and support of breast-feeding in Europe: progress from 2002 to 2007. *Public Health Nutrition 2009; 13:751-759.*
[44] Maternity Protection, In: Working conditions laws: Report 2010. ILO, Geneva, 2010.
[45] Galtry J. The impact of breastfeeding on breastfeeding of labour market policy and practice in Ireland, Sweden, and the USA. *Social Science & Medicine 2003; 57:167-177.*
[46] Guendelman S et.al. Juggling work and breastfeeding: Effects of maternity leave and occupational characteristics. *Pediatrics 2009: 123:e38-e46.*
[47] Safe maternity and the world of work. Geneva, International Labour Office, 2007.

The Baby-friendly Hospital Initiative[48,49,50]

WHO conducted a review of the evidence to support the implementation of the "Ten Steps for Successful Breastfeeding"[51] and an updated review is underway. A systematic review on intervention to promote breastfeeding found that BFHI is effective in increasing exclusive breastfeeding rates[52]. The BFHI needs to be revitalized with a systematic recertification process to ensure that its rigorous standards are upheld. Many hospitals that were certified in the past no longer meet the criteria and require recertification. Revitalization of the BFHI requires capacity building in breastfeeding counselling and the clinical aspects of lactation management. To enforce the monitoring of the BFHI criteria on a routine basis, consideration should be given to making fulfilment of the criteria a part of the overall system of quality certification of hospitals.

Training of health staff - Breastfeeding counselling and support by health care providers

There are several critical entry points when mothers and children have contact with health services - such as immunization or growth assessment/monitoring - that should not be missed to provide breastfeeding support. Besides breastfeeding counselling in health services, mothers also benefit greatly from the breastfeeding support that can be provided by women's support groups and by peer or lay counsellors. Several studies have shown that the strongest effects can be achieved when health care providers work in synergy with community members, providing consistent messages and practical support, and ensuring adequate referral for mothers with breastfeeding problems when needed [ix, 53]. Counselling and support depends on appropriate training of health care providers[54].

Breastfeeding counselling and support by peer/lay counsellors and community health workers

One-on-one breastfeeding counselling is particularly effective in promoting exclusive breastfeeding. Maternal counselling during pregnancy, immediately after child birth and at key moments in the post-natal period has large and significant effects on exclusive breastfeeding. Studies specifically looking at impact of education/counselling on child weight showed that children exposed to breastfeeding education were on average heavier at 4 months of age than control children[55]. A Cochrane review on community-

[48] WHO/UNICEF Baby-friendly Hospital Initiative Revised, Updated and Expanded for Integrated Care. World Health Organization, Geneva, 2009.

[49] Fairbank et.al. A systematic review to evaluate the effectiveness of interventions to promote the initiation of breastfeeding. *Health Technology Assessment, 2000: Vol 4. No. 25.*

[50] Breastfeeding promotion for infants in neonatal units: a systematic review and economic analysis. *Health Technology Assessment 2009, Vol 13: No. 40.*

[51] Evidence for the ten steps to successful breastfeeding (Revised) World Health Organization, Geneva, 1998.

[52] Chung M et.al. *Interventions in primary care to promote breastfeeding: A systematic review.* Agency for Healthcare Research and Quality (US); Oct. 2008.

[53] Britton C et.al. Support to breastfeeding mothers (Review) Cochrane Collaboration. 2009, Issue 4.

[54] Spiby H et.al. A systematic review of education and evidence-based practice interventions with health professionals and breastfeeding counsellors on duration of breast feeding. *Midwifery 2009; 25:50-61.*

[55] Giugliani ER, Victora CG. Breastfeeding promotion and infant growth. Web Appendix 2 to: Bhutta Z et.al. What works? Interventions for maternal and child undernutrition and survival. Lancet Series on Maternal and Child Undernutrition, 2008: 41-64..

based intervention packages for preventing maternal and newborn illness and death offers encouraging evidence of the value of integrating maternal and newborn care in community settings through a range of strategies, many of which can be packaged effectively for delivery through a range of community health workers [ix, 56]. The key public health challenge is how to integrate high quality breastfeeding counselling and support into primary health care in a way that will ensure universal coverage, including home visits, during the critical first week and month of life when mothers are most likely to abandon exclusive breastfeeding.

Appropriate Complementary Feeding

Complementary feeding The term complementary feeding, reserved to describe appropriate feeding in breastfed children 6 months of age or beyond, requires that the infant receive breast milk (including milk expressed or from a wet-nurse) and solid or semi-solid foods and allows the infant to receive anything else (any food or liquid including non-human milk and formula). A working definition refers to complementary feeding as the process starting when breast milk alone or infant formula alone is no longer sufficient to meet the nutritional requirements of infants, and therefore other foods and liquids are needed, along with breast milk or a breast-milk substitute. The target range for complementary feeding is generally taken to be 6 to 23 months[ii iii iv].

Complementary foods: any food, whether manufactured or locally prepared, suitable as a complement to breast milk or to a breast-milk substitute, when either becomes insufficient to satisfy the nutritional requirements of the infant.

Ii is recommended to follow key guiding principles to ensure children are appropriately fed between 6 and 23 months.

A. Guiding principles for complementary feeding of the breastfed child[v]

1. *Practice exclusive breastfeeding from birth to 6 months of age, and introduce complementary foods at 6 months of age (180 days) while continuing to breastfeed.*
2. *Continue frequent, on-demand breastfeeding until 2 years of age or beyond.*
3. *Practice responsive feeding, applying the principles of psycho-social care.*
4. *Practice good hygiene and proper food handling.*
5. *Start at six months of age with small amounts of food and increase the quantity as the child gets older, while maintaining frequent breastfeeding.*
6. *Gradually increase food consistency and variety as the infant gets older, adapting to the infant's requirements and abilities.*
7. *Increase the number of times that the child is fed complementary foods as he/she gets older.*
8. *Feed a variety of foods to ensure that nutrient needs are met.*
9. *Use fortified complementary foods or vitamin-mineral supplements for the infant, as needed.*

[56] Lassi ZC, Haider BA, Bhutta ZA. Community-based intervention packages for reducing maternal and neonatal morbidity and mortality and improving neonatal outcomes (Review). Cochrane Collaboration, 2010.

10. *Increase fluid intake during illness, including more frequent breastfeeding, and encourage the child to eat soft, varied, appetizing, favourite foods. After illness, give food more often than usual and encourage the child to eat more.*

B. Guiding principles for feeding non-breastfed children 6-24 months of age[vi]

1. *Ensure that energy needs are met.*
2. *Gradually increase food consistency and variety as the infant gets older, adapting to the infant's requirements and abilities.*
3. *For the average healthy infant, meals should be provided 4-5 times per day, with additional nutritious snacks offered 1-2 times per day, as desired.*
4. *Feed a variety of foods to ensure that nutrient needs are met.*
5. *As needed, use fortified foods or vitamin-mineral supplements (preferably mixed with or fed with food) that contain iron.*
6. *Non-breastfed infants and young children need at least 400-600 mL/d of extra fluids in a temperate climate, and 800-1200 mL/d in a hot climate.*
7. *Practise good hygiene and proper food handling.*
8. *Practise responsive feeding, applying the principles of psycho-social care.*
9. *Increase fluid intake during illness and encourage the child to eat soft, varied, appetizing, favourite foods. After illness, give food more often than usual and encourage the child to eat more.*

Importance and benefits of complementary feeding[57]:

As indicated in the introduction, a critical window of opportunity to ensure optimal growth and development has been identified and covers the period of pregnancy up to the second year of life[58]. The period of complementary feeding (6-24 months of age) is one of the most critical times for preventing malnutrition. Growth faltering is most evident during this time period, particularly between 6-12 months when foods of low nutrient density begin to replace breast milk and rates of diarrhoeal illness caused by food contamination at their highest. After about 2 years of age, it is very difficult to reverse stunting that occurred at earlier ages.

It appears that educational interventions are more likely to have an impact on growth when there is emphasis on feeding nutrient-rich animal-source foods. After review of studies it is concluded that for optimal growth, infants and young children need complementary foods with a high micronutrient density, especially at 6-12 months.

Actions to promote appropriate complementary feeding

Quality counselling of mothers and caregivers, and appropriate behavioural change communication [59] to other family and community decision-makers, are essential for improving feeding of children 6 to 24 months old; trained health care

[57] Dewey K, Adu-Afarwuah S. Systematic review of the efficacy and effectiveness of complementary feeding interventions in developing countries. Maternal and Child Nutrition 2008; 4: 24-85.
[58] Victora CG et.al.. Worldwide timing of growth faltering: revisiting implications for interventions. Pediatrics 2010; 125: e473-e480.
[59] Wuehler SW et.al. Accelerating improvement in nutritional and health status of young children in the Sahel region of Sub-Saharan Africa: review of international guidelines on infant and young child feeding and nutrition. *Maternal and Child Nutrition, 2011; 7 (Suppl1): 6-34.*

workers will be able to provide appropriate counselling[60]. Educational approaches can be effective. A greater impact was seen when food or food supplements were provided as well.

Maximize the utilization of locally produced foods in any given setting, and consider the promotion of additional products only if they can fill a critical gap in nutrients in an acceptable, feasible, affordable, sustainable and safe way, as a complement to continued breastfeeding and the local diet, not as a replacement. The use of nutrient-rich, animal source food has beneficial effects on growth and developmental outcomes. ***Where locally available foods alone will not satisfy nutritional requirements, consider alternative products*** such as:

- centrally produced fortified foods,
- micronutrient powders,
- lipid-based nutrient supplements.

Further research and carefully monitored applications at scale are needed to generate more evidence on which product is best for which circumstance, how best to promote their correct utilization, and their contribution to improving nutritional, developmental and health status in different circumstances.

Integrated Management of Severe Acute Malnutrition

Rationale

While the figures on SAM [4, 5] show worrying trends, the implementation of the developed WHO protocol for facility-based management of severe malnutrition is found to improve the quality of hospital care and potentially reduce case-fatality rate by 55%. These WHO guidelines are feasible and do not only cover the medical aspect of the treatment[61].

Additionally, the establishment of community-based management of severe malnutrition within routine health systems is strongly justified in the literature. Indeed, malnourished children, their families and the health systems could benefit from this type of management. When treated in the community, children could be less at risk of acquiring hospital infections and could be followed up more closely after discharge. Family members caring for the malnourished child could spend less time away from home and thus the opportunity cost could be reduced. Health systems could have a closer integration of curative and preventive services, a reduction in costs since hospitals would admit fewer cases and have them for shorter stay, and increased coverage rates[62,63,64].

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[60] Zaman S et.al. Training in complementary feeding counselling of healthcare workers and its influence on maternal behaviours and child growth: A cluster-randomized controlled trial in Lahore, Pakistan. *J Health Popul Nutr 2008; 26: 210-222.*

[61] Maternal and child undernutrition. London: The Lancet, 2008.

[62] Collins S, Dent N, Binns P, Bahwere P, Sadler K, Hallam A. Management of severe acute malnutrition in children. The Lancet, 2006; 368: 1992-2000.

[63] Ashworth A, Efficacy and effectiveness of community-based treatment of severe malnutrition. Food Nutrition Bulletin, 2006; 27(3): S24-48.

[64] Collins S. Changing the way we address severe malnutrition during famine. The Lancet, 2001; 358 (9280): 498-501.

Hopeful evidence suggests that with modern treatment regimens and improved access to treatment, case-fatality rates can be as low as 5 per cent, both in community and in health-care facilities.

In brief, the implementation of the WHO guidelines has the potential to save many of the lives currently being lost through severe malnutrition and to contribute substantially to achieving the Millennium Development Goal of reducing childhood mortality.

Actions to promote and support the management of SAM

Inpatient care

Guidelines for the management of SAM

"Management of severe malnutrition: a manual for physicians and other senior health workers" [65] is a manual that was developed by the WHO in 1999 to provide practical guidelines for the management of patients- mainly children below 5 years of age- with severe malnutrition in hospitals and health centres. It seeks to promote the best available therapy so as to reduce the risk of death, shorten the length of time spent in hospital, and facilitate rehabilitation and full recovery.

The management of the child with severe malnutrition is divided into four phases. These are:

- *Stabilization phase*: life-threatening problems are identified and treated in a hospital or a residential care facility, specific deficiencies are corrected, metabolic abnormalities are reversed and feeding is begun (F75). This include treatment of hypoglycaemia, hypothermia and dehydration, as well as the correction of electrolyte imbalance, treatment of infection and the correction of micronutrient deficiencies while excluding iron.
- *Transition phase*: with the return of the child's appetite and the reduced oedema, the feeding is moved from F75 to F100. Additionally, routine antibiotic therapy is continued during this phase.
- *Rehabilitation phase*: the correction of the electrolyte imbalance is continued, iron is included in the correction of micronutrient deficiencies, intensive feeding is given to recover most of the lost weight, emotional and physical stimulation are increased, the mother or caregiver is trained to continue care at home, and preparations are made for discharge of the child.
- *Follow-up*: after discharge, the child and the child's family are followed to prevent relapse and assure the sustained mental, emotional and physical development of the child. The latter consists of a continued intensive feeding regimen to allow for further catch-up growth. When this is done, the risk of death can be substantially reduced and the opportunity for full recovery greatly improved.

[65] Management of severe malnutrition: a manual for physicians and other health workers. Geneva: World Health Organization, 1999.

Training of health staff- Management of SAM in hospitals and counselling of mothers

A training course on hospital-based care of severely malnourished children has been developed based on the aforementioned WHO manual. It responds to the urgent need to reduce paediatric deaths related to severe malnutrition in many developing countries and it is intended for health personnel working at central and district level, including physicians, nurses and nutritionists[66].

An additional material to the training course is a WHO publication entitled "Guidelines for the inpatient treatment of severely malnourished children". It provides simple practical guidelines for treating these children successfully and takes into account the limited resources of many hospitals and health units in developing countries. The instructions are clear, concise, and easy to follow and can be used as a practical ten-step treatment tool.

The training course for health staff also incorporates instructions on group counselling sessions that are intended for mothers whose malnourished children have reached the rehabilitation phase. The counselling provides recommendations on the preparation of locally produced foods in order to meet the needs of the discharged child.

Outpatient care

WHO child growth standards and the identification of SAM in infants and children

A joint statement was developed in order to present updates on the community screening for the identification of 6-60 month old infants and children with SAM. The recommended diagnostic criteria for this population are severe wasting (weight-for-height below –3 SD of the WHO growth standards or MUAC below 115 mm) or the presence of bilateral oedema[67].

Community-based management of SAM

Until recently, treatment has been restricted to facility-based approaches, greatly limiting its coverage and impact. New evidence suggests, however, that large numbers of children with severe acute malnutrition can be treated in their communities without being admitted to a health facility or a therapeutic feeding centre[68].

Two publications dealing with the management of severe malnutrition at the community level are available: a report of an informal consultation which encompasses five background papers, and a joint statement. The former issue was developed by the WHO, UNICEF and SCN, while the second one had WFP as an additional contributor.

The community-based approach involves timely detection of severe acute malnutrition in the community and provision of treatment for those without medical complications with ready-to-use therapeutic foods (RUTF) or other nutrient-dense foods at home. If properly

[66] Training course on the management of severe malnutrition. World Health Organization, Geneva, 2002.
[67] WHO child growth standards and the identification of severe acute malnutrition in infants and children: a joint statement by the WHO and the United Nations Children's Fund. Geneva: WHO, 2009.
[68] 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, the United Nations Children's Fund. Geneva: World Health Organization, 2007.

combined with a facility-based approach for those malnourished children with medical complications or below 6 months and implemented on a large scale, community-based management of severe acute malnutrition could prevent the deaths of hundreds of thousands of children.

Severe acute malnutrition in children can be identified in the community before the onset of complications

- Community health workers or volunteers can easily identify the children affected by severe acute malnutrition using simple coloured plastic strips that are designed to measure MUAC. They can also be trained to recognize nutritional oedema of the feet, another sign of this condition. [5]

Uncomplicated forms of severe acute malnutrition should be treated in the community

- The treatment is to feed children a ready-to-use therapeutic food (RUTF) until they have gained adequate weight. In some settings it may be possible to construct an appropriate therapeutic diet using locally available nutrient-dense foods with added micronutrient supplements. In addition to the provision of RUTF, children need to receive a short course of basic oral medication to treat infections[69].

Recently developed home-based treatment: Ready-to-use therapeutic foods (RUTF)

Children with SAM need safe, palatable foods with high energy content and adequate amounts of vitamins and minerals.

RUTF are soft or crushable foods that can be consumed easily by children from the age of six months without adding water. RUTF have a similar nutrient composition to F100, which is the therapeutic diet used in hospital settings. But unlike F100, RUTF are not water-based, meaning that bacteria cannot grow in them. Therefore these foods can be used safely at home without refrigeration and even in areas where hygiene conditions are not optimal. As a result, more opportunities now exist for severely malnourished children to be discharged early from the hospital for continuing care in the community. [5]

Evidence shows that RUTF home therapy is successful[70,71,72], and that the production of RUTF spreads is easy and safe in most settings worldwide[73]. For this reason, the WHO developed international standards for the manufacturing of RUTF which can give guidance for local production; these include detailed nutrition composition and safety measures.

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[69] Collins S, Sadler K, Dent N, Khara T, Guerrero S, Myatt M, et al. Key issues in the success of community-based management of severe malnutrition. Food and Nutrition Bulletin, 2006; 27 (3): S49-82.

[70] Ciliberto HM, et al. Comparison of home-based therapy with ready-to-use therapeutic food with standard therapy in the treatment of malnourished Malawian children: a controlled, clinical effectiveness trial. American Journal of Clinical Nutrition, 2005; 81(4): 864-870.

[71] Manary M, Sandige H. Home-based therapy for severe malnutrition with ready-to-use food. Archives of Disease in Childhood, 2004; 89: 557-561.

[72] Sandige H, Ndekha MJ, Briend A, Ashorn P, Manary MJ. Home-based treatment of malnourished Malawian children with locally produced or imported ready-to-use food. Journal of Paediatric Gastroenterology and Nutrition, 2004; 39(2): 141-146.

[73] Manary M. Local production and provision of ready-to-use therapeutic food (RUTF) spread for the treatment of severe childhood malnutrition. Food and Nutrition Bulletin, 2006; 27 (3): S83-89.

Integrated management of SAM

The WHO is currently in the process of developing guidelines on the integrated management of SAM addressed to programme managers and policy makers which will include guidance for the development of national policies in order to address the overall treatment of severe acute malnutrition including outpatient care. This is seen as a preliminary step that will pave the way for development of a national policy aiming at incorporating community-based management into health systems in non-emergency contexts.

Vitamin A Supplementation for Children under Five

Rationale

Recent studies suggest that providing vitamin A supplements to children 6-59 months of age from developing countries is associated with a reduced risk of mortality and diarrhoea incidence[74]. The mechanisms by which vitamin A saves lives are not fully understood, and it is not clear whether its action is mediated through the correction of underlying deficiencies or through adjuvant therapeutic effects. Vitamin A supplements may improve gut integrity and therefore decrease the severity of some cases of diarrhoea in some cases[75]. The role of vitamin A in immunity may also affect the susceptibility and/or severity of other infections[76,77].

Many countries have integrated strategies to deliver vitamin A supplements to infants and children into national health policies. The delivery of vitamin A has been integrated into routine health services, for example through biannual 'special days" where supplementation is combined with other child survival interventions such as de-worming or nutrition education[78,79]. Vitamin A supplements are also commonly distributed as part of the Expanded Program on Immunization, particularly at nine months with the measles vaccinations. In 2009, approximately 77% of preschool children have been estimated to have received two annual doses of supplements in more than 103 priority countries[80].

[74] Imdad A, Herzer K, Mayo-Wilson E, Yakoob MY, Bhutta ZA. Vitamin A supplementation for preventing morbidity and mortality in children from 6 months to 5 years of age. Cochrane Database of Systematic Reviews 2010, Issue 12. Art. No.: CD008524. DOI: 10.1002/14651858.CD008524.pub2.
[75] Villamor E, Fawzi WW. Effects of Vitamin A Supplementation on Immune responses and correlation with clinical outcomes. Clinical Microbiology Reviews, 2005, 3: 446-464.
[76] Stephensen CB. Vitamin A, infection, and immune function. Annual Review of Nutrition, 2001, 21:167-192.
[77] Ross AC. Vitamin A supplementation and retinoic acid treatment in the regulation of antibody responses in vivo. Vitamins and Hormones, 2007, 75:197-222.
[78] WHO/UNICEF/IVACG. Vitamin A supplements: a guide to their use in the treatment and prevention of vitamin A deficiency and xerophthalmia - Second edition. Geneva, World Health Organization, 1997
[79] WHO, UNICEF. Integration of vitamin A supplementation with immunization: policy and programme implications. New York, UNICEF, 1998.
[80] UNICEF. The state of the world's children 2011. New York, The United Nations Children's Fund, 2011.

Provision of a high dose of vitamin A every six months until the age of five years has been based on the principle that single high dose of vitamin A is highly absorbed, and as a fat-soluble vitamin stored in the liver and mobilized over an extended period of time as needed. In infants 6-11 months of age doses of 100 000 IU and 200 000 IU for children 12-59 months of age have been considered to provide adequate protection for 4-6 months[81]. Most children in this age group tolerate these doses of vitamin A well, though temporary side-effects such as headache, nausea or vomiting and diarrhoea have been reported in a small percentage of these children[82]. On a per-child basis, the cost of vitamin A supplementation is considered inexpensive. Most of the vitamin A used during supplementation campaigns is supplied in gelatin capsules, which cost approximately US$ 0.02 each[83], with an estimated cost of US$ 1-2 for delivery per child per year. The total cost of supplementation per death averted is estimated at $200-250[84].

Two Cochrane reviews were recently updated to systematically evaluate the most recent evidence on the topic of vitamin A supplementation for children[78,85]. The first examined the effects and safety of vitamin A supplementation for the prevention of morbidity and mortality among children 6 to 59 months of age[78]. Results of the reviewed showed that supplementation with vitamin A can reduce mortality and the prevalence rates of communicable diseases such as diarrhoea. The meta-analysis included 17 clinical trials and indicated that vitamin A supplementation reduces the risk of all-cause mortality by 24 %. Another review assessed the effects and safety of a number of micronutrients, including vitamin A, in reducing morbidity and mortality for children and adults with HIV. This review included five trials on vitamin A supplementation in children and only three (all in Africa) contributed to data on all-cause mortality. The data suggests that periodic vitamin A supplementation of HIV-infected children over six months of age is beneficial in reducing overall mortality risk.

Promoting Vitamin A Supplementation for Children

- In 1997, WHO recommended universal vitamin A distribution, involving periodic administration of supplemental doses to all preschool-age children, with priority given to age group (usually 6 months - 3 years) or regions at greatest risk for the prevention of vitamin A deficiency, xerophthalmia, and nutritional blindness[82].

- Global, evidence-informed recommendations on the use of vitamin A supplementation for infants and children 6 to 59 months of age for the prevention of morbidity and mortality are currently being updated based on a systematic review of the current evidence. The guidelines will be disseminated through the WHO electronic Library of Evidence for Nutrition Actions (eLENA). This library aims to

[81] West KP Jr, Sommer A. Delivery of oral doses of vitamin A to prevent vitamin A deficiency and nutritional blindness. A state-of-the-art review. Nutrition Policy Discussion Paper No 2. Rome, United Nations Administrative Committee on Coordination, Subcommittee on Nutrition, 1987.
[82] Bauernfeind JC. The safe use of vitamin A. Washington DC, International Vitamin A Consultative Group, 1980.
[83] Micronutrient Initiative. Vitamin A: The scope of the problem. Ottawa, Micronutrient Initiative, 2011 (www.micronutrient.org/English/View.asp?x=577&id=440 , accessed 31 January 2011).
[84] Ching P et al. Childhood mortality impact and costs of integrating vitamin A supplementation into immunization campaigns. American Journal of Public Health, 2000, 90:1526-1529.
[85] Irlam JH et al. Micronutrient supplementation in children and adults with HIV infection. Cochrane Database of Systematic Reviews, 2010, (12):CD003650.

compile and display WHO guidelines related to nutrition along with complementary documents such as the systematic reviews and other evidence that informed the guidelines, biological and behavioural rationales, and additional resources produced by Member States and global partners.

Iron Supplementation for Children

Rationale

The World Health Organization (WHO) has previously recommended provision of iron to all infants and children 6 to 24 months of age in areas where the prevalence of anaemia exceeds 40%[86]. Iron, however, unlike other nutrients such as vitamin A, must be consumed at a low dose on a regular basis to be effective as there is a limit to the iron absorption capacity of the intestine. It has been proposed that intermittent doses once, twice, or three times per week [87] could be as effective as daily supplementation, because similar amounts of iron would reach the blood and tissues[88,89,90]. Because iron must be consumed regularly, supply and distribution systems can be costly and logistically complicated, contributing to the poor success of many supplementation programs[91]. Mild side may also occur with iron supplementation such as darken stools, gastrointestinal pain, diarrhoea, vomiting and teeth staining[92], which may limit adherence, especially for young children[93].

A recent Cochrane systematic review was conducted to assess the effects and safety of intermittent iron supplementation with iron, or iron combined with other micronutrients for children up to the age of 12[94]. A total of 23 randomized controlled trials were included in the review that compared providing iron supplements to either no intervention (placebo) or daily iron supplementation with the same nutrients among children living in various geographical settings, including malaria endemic regions. Intermittent iron supplementation provided to children in this age group was found to effectively increase

[86] World Health Organization. Iron deficiency anemia: Assessment, prevention, and control: A guide for programme managers. Geneva: WHO, 2001.
[87] Iannotti LL,TielschJM, BlackMM, BlackRE. Iron supplementation in early childhood: health benefits and risks. Am J Clin Nutr 2006; 84:1261-76.
[88] O'Niel-Cutting MA, Crosby WH. Blocking of iron absorption by a preliminary oral dose or iron. Arch Inter Med 1987; 147:489-91.
[89] Brown EG, Dubach R, Moore CV. Studies on iron transportation and metabolism. IX. Critical analysis of mucosal block by large doses of iron in human subjects. J Lab Clin Med 1958; 52:335-55.
[90] Ekstrom ECM. Supplementation for nutritional anemias. In: Nutritional Anemias. Ramakrishnan U. ed. 2000. CRC Press, Boca Raton. pp 129-151.
[91] Yip, R. Prevention and Control of Iron Deficiency: Policy and Strategy Issues. J Nutr 2002; 132.802S-805S.
[92] Geltman PL, Hironaka LK, Mehta S, Padilla P, Rodrigues P, Meyers AF, Bauchner H. Iron Supplementation of Low-Income Infants: A Randomized Clinical Trial of Adherence with Ferrous Fumarate Sprinkles versus Ferrous Sulfate Drops. J Pediatr 2009; 154:738-43.
[93] Stoltzfus RJ. Iron interventions for women and children in low-income countries. Journal of Nutrition, 2011, 2 March.
[94] De-Regil LM, Jefferds ME, Sylvetsky A, Dowswell T. Intermittent iron supplementation for improving nutrition and developmental outcomes in children. Cochrane Database of Systematic Reviews (in press).

haemoglobin compared to a placebo or no intervention, however, children receiving intermittent iron supplementation were more likely to be anaemic at the end of their supplementation regimen than those supplemented daily. Adherence rates were also higher among children receiving intermittent supplementation compared to daily.

Promoting Iron Supplementation for Children

- Children under the age of two who are diagnosed with anaemia should be targeted and treated with daily iron supplementation until haemoglobin concentrations return to normal[95].
- In areas where hookworm prevalence is 20% or greater, iron supplementation may be more effective when combined with antihelminthic treatment on an annual basis[96].
- Intermittent iron supplementation programmes targeting children need to take into account the overall nutritional status and intake of those attending school or pre-school to ensure that nutritional needs are met, but not exceeded.
- A behavioural communication change strategy promoting awareness and the correct use of intermittent supplements should be promoted in combination with other behavioural interventions such as: hand washing and diarrhoea management[97].
- Distribution through schools may be one opportunity to reach the most vulnerable members of the population, however, selection of the most appropriate and effective delivery setting is context specific.

Iron and Folic Acid Supplements for Menstruating Women

Rationale

Daily supplementation with iron and folic acid for three months has been the standard approach for preventing and treating iron deficiency anaemia (IDA) among women[98,99]. Despite its proven efficacy, iron must be consumed regularly; supply and distribution systems can be costly and logistically complicated. Lack of supply of affordable supplement is an important reason for poor success of many supplementation programs[100,101,102]. Another challenge is the occurrence of mild side effects, such as darken stools, gastrointestinal pain, diarrhoea, constipation, and vomiting[103].

[95] Global malaria report 2010. Global Malaria Programme. Geneva, World Health Organization 2010.
[96] INACG/WHO/UNICEF. Guidelines for the use of iron supplements to prevent and treat iron deficiency anaemia. Washington DC, ILSI Press 1998.
[97] WHO/UNICEF Joint Statement. Clinical management of acute diarrhoea. Geneva, World Health Organization, 2004.
[98] World Health Organization. Iron deficiency anemia: Assessment, prevention, and control: A guide for programme managers. Geneva: WHO, 2001.
[99] Beaton GH, McCabe GP. Efficacy of intermittent iron supplementation in the control of iron deficiency anemia in developing countries: an analysis of experience. Toronto, Canada: GHB Consulting, 1999.
[100] Yip, R. Prevention and Control of Iron Deficiency: Policy and Strategy Issues. J Nutr 2002; 132.802S-805S.
[101] Galloway R, McGuire J. Determinants of compliance with iron supplementation: supplies, side effects, or psychology? Soc Sci Med 1994; 39(3):381-90.

Intermittent supplementation, though not eliminating side effects, reduces the frequency and possibly the severity of side effects compared to daily supplementation[104,105,106,107,108]. Intermittent iron supplementation is the provision of iron once, twice or three times a week in supplement form[109]. The rationale behind the intervention is that there is a limit to the iron absorption capacity of the intestine and intermittent dosing could be as effective as daily supplementation because similar amounts of iron would reach the blood and tissues under both strategies[110,111,112]. Intermittent supplementation has been shown to improve iron nutrition more than no supplementation and, in many cases, it is as effective at improving iron status as daily supplementation[113,114].

To systematically assess the evidence behind the effects and safety of intermittent iron supplementation on anaemia, a Cochrane systematic review is in the process of being updated[115]. The review compared the intermittent use of iron supplements alone, or in combination with folic acid or other micronutrients, versus no intervention or placebo, and versus the same supplementation given daily to girls and women of reproductive age. The results showed that women who were taking intermittent iron supplements on their own or combined with other micronutrients, had higher haemoglobin and ferritin concentrations and less likely to develop anaemia than those not receiving the

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[102] Galloway R, Dusch E, Elder L, Achadi E, Grajeda R, Hurtado E, Favin M, Danani S, Marsaban J, Meda N, et.al. Women's perceptions of iron deficiency and anemia prevention and control in eight developing countries. Soc Sci Med 2002; 55(4):529-44.

[103] Hyder SM, Persson LA, Chowdhury AM, Ekstrom EC. Do side-effects reduce compliance to iron supplementation: A study of daily- and weekly-dose regimens in pregnancy. J Health Popul Nutr 2002; 20(2):175-9.

[104] Viteri FE, Berger J. Importance of pre-pregnancy and pregnancy iron status: Can long-term weekly preventive iron and folic acid supplementation achieve desirable and safe status? Nutrition Reviews 2005; 63:S65-S76.

[105] Viteri FE, Ali F, Tujague J. Long-term weekly iron supplementation improves and sustains nonpregnant women's iron status as well or better then currently recommended short-term daily supplementation. J Nutr 1999; 129:2013-20.

[106] Angeles-Agdeppa I, Schultink W, Sastroamidjojo S, Gross R, Karyadi D. Weekly micronutrient supplementation to build iron stores in female Indonesian adolescents. Am J Clin Nutr 1997; 66:177-83.

[107] Agarwal KN, Gomber S, Bisht H, Som M. Anemia prophylaxis in adolescent school girls by weekly or daily iron-folate supplementation. Indian Pediatr 2003; 40:296-301.

[108] Shobha S, Sharada D. Efficacy of twice weekly iron supplementation in anemic adolescent girls. Indian Pediatr 2003; 40:1186-90.

[109] Iannotti LL, Tielsch JM, Black MM, Black RE. Iron supplementation in early childhood: health benefits and risks. Am J Clin Nutr 2006; 84:1261-76.

[110] O'Niel-Cutting MA, Crosby WH. Blocking of iron absorption by a preliminary oral dose or iron. Arch Inter Med 1987; 147:489-91.

[111] Brown EG, Dubach R, Moore CV. Studies on iron transportation and metabolism. IX. Critical analysis of mucosal block by large doses of iron in human subjects. J Lab Clin Med 1958; 52:335-55.

[112] Ekstrom ECM. Supplementation for nutritional anemias. In: Nutritional Anemias. Ramakrishnan U. ed. 2000. CRC Press, Boca Raton. pp 129-51.

[113] Allen LH. Iron supplements: scientific issues concerning efficacy and implications for research and programs. J Nutr 2002; 132:813S-819S.

[114] Mozaffari-Khosravi H, Noori-Shadkam M, Fatehi F, Naghiaee Y. Once weekly low-dose iron supplementation effectively improved iron status in adolescent girls. Biological Trace Element Research 2010; 135:22-30.

[115] Fernandez-Gaxiola AC, De-Regil LM, Nasser M. Intermittent iron supplementation for reducing anaemia and its associated impairments in women of reproductive age. Cochrane Database of Systematic Reviews. (in progress).

supplement. Women receiving daily iron supplements tended to have lower haemoglobin and ferritin concentrations, even though they were equally likely to be anaemic as those receiving intermittent iron supplements.

Promoting Iron Supplementation for Menstruating Women

- Anaemic women and girls should be targeted and treated with 120 mg of elemental iron plus 400 µg of folic acid daily supplementation until haemoglobin concentration is normal.

- Providing iron intermittently can be integrated into national programmes for adolescent and reproductive health, ideally preceded by an assessment of nutritional status to ensure daily needs are being met[116,117].

- Once pregnancy is confirmed, women should be encouraged to attend standard antenatal care including either daily or intermittent iron supplementation, depending on anaemia status.

- Acceptability and adherence to supplementation regimens may be improved by implementing a behavioural change communication strategy to promote the benefits of the intervention and dietary diversity aimed at improved iron absorption.

- Working with both industry and government can improve availability and ensure accessibility to high-quality, low-cost supplement in resource-limited settings where the greatest number of at-risk women and girls are found[118].

- Adherence can be improved with well conducted social marketing and educational campaigns focusing on the harmful effects of anaemia, the benefits of supplement consumption and appropriate responses to eliminate or ameliorate side effects.

Home Fortification with Multiple Micronutrients of Foods for Young Children

Rationale

In lower-income settings, children's diets may also be primarily plant-based. A lack of animal-source foods in these settings result in insufficient amounts of key micronutrients such as vitamin A, zinc, iron and calcium, to meet the recommended intakes for children less than 24 months of age [vi]. The WHO estimates globally that 190 million preschool children are vitamin A deficient [119] and more than two-thirds of children are anaemic in regions of Africa and southeast Asia. Infants and young children are also most susceptible to the harmful consequences of these deficiencies. A compromised immune

[116] Adolescent friendly health services: An agenda for change. Geneva, World Health Organization 2002.
[117] UNICEF, UNFPA, WHO, World Bank. Packages of interventions: Family planning, safe abortion care, maternal, newborn and child health. Geneva, World Health Organization, 2010.
[118] Mora JO. Iron supplementation: Overcoming technical and practical barriers. Journal of Nutrition 2002; 132:853S-855S.
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status resulting from poor nutritional status can directly lead to an increased risk of infectious diseases and potentially elevated rates of infant morbidity and mortality[120].

Supplementation has been proposed as one of the best available nutrition interventions to address these vitamin and mineral deficiencies, as it can be targeted to some of the most vulnerable population groups such as those living in remote regions, as well as young children. [121] To address some of these concerns, multiple micronutrient powders (MNP) have been developed and have been shown to be successful in reducing micronutrient deficiencies among pregnant women and children in a variety of contexts as they can be added directly to food[122,123]. MNP come in small packages which are temperature and moisture resistant [124] giving them a longer shelf-life and easing transportation and storage problems[125]. These characteristics reduce the frequency of distribution necessary to maintain a supply of micronutrients[126].

Mild side effects can occur with supplementation such as darken stools, gastrointestinal pain, diarrhoea, constipation and vomiting[127]. Though MNP do not eliminate side effects, they do appear to reduce the frequency and severity of side effects and are highly acceptable[128]. The vitamins and minerals are covered in a fat-based protective coating so that the taste, colour and aroma of food, and thus dietary habits, are not changed. The fortification of foods using MNP can be done at home or any other locations where meals are prepared and consumed, such as schools or hospitals. This method of fortification is also referred to as point-of-use[129].

A Cochrane systematic review was recently conducted in order to assess the effects and safety of home fortification of foods with multiple micronutrient powders for children under two years to improve health outcomes. The review compared the provision of

[120] Preventing and controlling micronutrient deficiencies in populations affected by emergency. Geneva: WHO, 2007.
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MNP with at minimum iron, zinc and vitamin A, versus no intervention or placebo, versus regular supplementation practice such as iron supplementation. In total 8 trials including children living in a variety of settings were evaluated. When compared to no intervention, home fortification with MNP was found to reduce anaemia by 32% and iron deficiency by 50% in infants and young children. The intervention was found to be as effective as daily iron supplementation for anaemia and equally effective in populations with anaemia rates ranging from 25 to 100%. MNP was also found to be as effective in settings described by trialists as malaria endemic.

Promoting the Home Fortification of Foods with Multiple Micronutrient Powders for Children

- An evaluation of the nutritional status of children under five should take place prior to initiating a supplementation programme with MNP, along with any other existing measures in place to control anaemia and vitamin A deficiency, such as the provision of other fortified complementary foods.

- Home fortification with MNP should also include a behavioural change strategy to promote an awareness of the product along with its correct use and hygienic practices in the preparation of complementary foods and recommended breastfeeding practices, along with steps to manage diarrhoea[130].

- Home fortification with MNP provides a single delivery of multiple micronutrients as a cost-effective approach to achieve multiple goals; however, as MNP are a relatively new approach, programmes including home fortification with MNP may require high-level coordination and commitment, as well as, a communication component to raise awareness[131,132].

Zinc Supplements for Diarrhoea Management

Rationale

A continuing lack of safe water and sanitation in many parts of the world means that diarrhoea remains the leading cause of death among infants and young children in low- and middle-income countries[133]. Every year more than a million children under five years of age succumb to the fluid loss and dehydration associated with the majority of diarrhoea related deaths. It is estimated that 13% of all years lost due to ill-health, disability, or early death are caused by diarrhoea[134,135,136,137].

[130] WHO/UNICEF Joint Statement. Clinical management of acute diarrhoea. Geneva, World Health Organization, 2004.
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Oral rehydration is a well-known and relatively simple treatment approach[138,139,140,141,142,143,144]. Zinc supplementation has also been found to reduce the duration and severity of diarrhoeal episodes and likelihood of subsequent infections for 2–3 months[145,146,147,148]. Zinc supplements are generally accepted by both children and caregivers and are effective regardless of the type of common zinc salt used[149,150]. Supplementary zinc benefits children with diarrhoea because it is a vital micronutrient essential for protein synthesis, cell growth and differentiation, immune function, and intestinal transport of water and electrolytes[151,152,153,154]. Zinc is also important for normal growth and development of children both with and without diarrhoea[155,156,157]. Zinc

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deficiency is associated with an increased risk of gastrointestinal infections, adverse effects on the structure and function of the gastrointestinal tract, and impaired immune function[158,159,160,161]. Dietary deficiency of zinc is especially common in lower-income countries because of a low dietary intake of zinc-rich foods (mainly foods of animal origin) or inadequate absorption caused by its binding to dietary fibre and phytates often found in cereals, nuts and legumes[162,163].

Although the evidence to support the benefits of zinc supplementation in the management of diarrhoea have been established[164], there remain a number of barriers to the widespread implementation of this treatment strategy. Currently, zinc is not used to treat most cases of diarrhoea because the known benefits of zinc supplementation are still not widely appreciated by physicians and health-care workers in developing countries[165]. There is a need to establish the optimal dosage and to investigate whether the same benefits of zinc supplementation are also applicable to children in middle- or higher-income nations. There is a concern that high zinc intakes may compete for absorption with other micronutrients such as iron and calcium. This, in turn, can have unintended negative consequences for children's health and development[166, 167, 168]. Studies are needed to help identify subpopulations that would benefit most in resource-limited settings and to ensure access to zinc supplementation, especially for those families whose children are most at risk of diarrhoea but may not be able to afford treatments that include zinc supplements[169]. However, zinc deficiency remains difficult to diagnose because measuring serum zinc levels is not necessarily accurate for this purpose[170].

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Calcium Supplements for Women during Pregnancy

Rationale

Pre-eclampsia is a hypertensive disorder that develops in approximately 5% of all pregnancies, usually after about 20 week's gestation[171]. In pre-eclampsia there are often problems with the placenta, along with increased blood pressure that can reduce blood flow and therefore oxygen and nutrient supply to the baby. These conditions may result in intra-uterine growth restriction (IUGR) and possibly early delivery. Especially in lower-income settings, hypertensive disorders are the leading cause of infant mortality[172]. Pre-eclampsia may also cause serious outcomes for mother, such as kidney and liver problems, even progressing to stroke or seizures (eclampsia) if not treated. Hypertensive disorders such as pre-eclampsia are thought to account for up to 40,000 maternal deaths per year.

Most women are monitored for increasing blood pressure during antenatal visits. Preventive measures may assist in the prevention of prenatal complications and adverse outcomes for women at increased risk of hypertensive disorders, such as those with multiple pregnancies, older age or increased BMI (body mass index) [173]. It has been demonstrated that calcium supplements may reduce the chance of developing pre-eclampsia, especially in high risk women, as well as those who do not consume sufficient quantities of calcium in their diet[174,175,176, 177,178]. Recent studies have supported this hypothesis, although there have been some inconsistencies in the strength and public health applications of the associations[179,180]. In addition, the possible biological actions of prenatal calcium supplementation are not completely understood.

[171] Villar J et al. Methodological and technical issues related to the diagnosis, screening, prevention and treatment of pre-eclampsia and eclampsia. International Journal of Gynecology and Obstetrics, 2004, 85, S28-S41.
[172] Villar J et al. Preterm delivery syndrome: The unmet need. Research and Clinical Forums, 1994, 16: 9-39.
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[180] Levine RJ. Letter to the editor. JAMA, 1997, 278: 1147.

Calcium is an essential mineral that assists with many of the body's processes such as maintaining cell membranes in nerve as well as muscle contraction[181]. Low calcium intake is thought to cause high blood pressure by increasing the amount of calcium released in the cells of blood vessels, possibly leading to the constriction of these tissues. By supplementing with calcium during pregnancy, the amount of cellular calcium released is lessened, as is smooth muscle tissue contractility. These mechanisms could prevent preterm labour and delivery by reducing uterine muscle contractions, and perhaps improving utero-placental blood flow[182].

During pregnancy and lactation calcium supplementation is often recommended to meet the body's demands to benefit the overall health of mother and child. Dietary reference intakes (DRIs) for pregnant women range from 1000 to 1300 mg per day, according to age group, with an upper limit set at 2500 mg/d[183]. Although providing extra calcium supplements to prevent hypertensive disorders is a relatively inexpensive and accessible, large doses of >500 mg/d are less efficiently absorbed and may inhibit the absorption of other necessary micronutrients such as iron, zinc, magnesium and phosphorus[184,185].

According to a recent Cochrane systematic review, supplementation with at least one gram of calcium is associated with significantly diminishing the risk of pregnant women developing pre-eclampsia and preterm birth among women with low calcium intakes. The public health implications for this intervention are not however completely clear. Another recent study has determined that calcium supplementation in pregnant women with low calcium intakes may not necessarily benefit maternal bone health[186]. There is also conflicting evidence on the benefits of maternal calcium supplementation on the blood pressure of their offspring[187,188,189]. In addition, further research has also been suggested to confirm that large doses of calcium are safe for pregnant women and children exposed in utero before any attempt is at widespread introduction of this intervention is made.

[181] Buppasiri P et al. Calcium supplementation (other than for preventing or treating hypertension) for improving pregnancy and infant outcomes (Protocol). Cochrane Database of Systematic Reviews, 2008, Issue 2. Art. No.: CD007079.
[182] Carroli G et al. Effects of calcium supplementation on uteroplacental and fetoplacental blood flow in low-calcium-intake mothers: A randomized controlled trial. American Journal of Obstetrics and Gynecology, 2010, 202: 45e1-45e9.
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Infant feeding in the context of HIV

Rationale[190]

Guidelines on HIV and infant feeding were incorporated into the 2001 WHO publication "New data on the prevention of mother-to-child transmission of HIV and their policy implications: conclusions and recommendations". In 2006 WHO updated the guidelines on HIV and infant feeding. Significant programmatic experience and research evidence regarding HIV and infant feeding have accumulated since 2006; in particular it has been reported that antiretroviral interventions to either the HIV-infected mother of HIV-exposed infant can significantly reduce the risk of postnatal transmission of HIV through breastfeeding. This evidence has major implications for how women living with HIV might feed their infants and how health workers should counsel and support them.

In light of these issues, WHO held a Guideline Development Group meeting in Geneva on 22-23 October 2009, to update United Nations recommendations for infant and young child feeding in the context of HIV.

The group agreed on nine key principles that should be read together with the seven evidence-based recommendations. The principles reflect a set of values that contextualize the provision of care in programmatic settings. The key principles are directed towards policy-makers, academics and health workers.

Key Principles:

Key Principle 1: Balancing HIV prevention with protection from other causes of child mortality.
Key Principle 2: Integrating HIV interventions into maternal and child health services.
Key Principle 3: Setting national or sub-national recommendations for infant feeding in the context of HIV.
Key Principle 4: When antiretroviral drugs are not (immediately) available, breastfeeding may still provide infants born to HIV-infected mothers with a greater chance of HIV-free survival.
Key Principle 5: Informing mothers known to be HIV-infected about infant feeding alternatives.
Key Principle 6: Providing services to specifically support mothers to appropriately feed their infants.
Key Principle 7: Avoiding harm to infant feeding practices in the general population.
Key Principle 8: Advising mothers who are HIV uninfected or whose HIV status in unknown.
Key Principle 9: Investing in improvement in infant feeding practices in the context of HIV.

[190] World Health Organization, UNAIDS, UNFPA, UNICEF. Guidelines on HIV and infant feeding 2010: Principles and recommendations for infant feeding in the context of HIV and a summary of evidence. Geneva, WHO, 2010.

Recommendations:

1. Mothers known to be HIV-infected should be provided with lifelong antiretroviral therapy or antiretroviral prophylaxis interventions to reduce HICV transmission through breastfeeding

   In settings where national authorities have decided that the maternal and child health services will principally promote and support breastfeeding and antiretroviral interventions as the strategy that will most likely give infants born to mothers know to be HIV-infected the greatest change of HIV-free survival

2. Mothers known to be HIV-infected (and whose infants are HIV uninfected or of unknown HIV status) should exclusively breastfeed their infants for the firs 6 months of life, introducing appropriate complementary foods thereafter, and continue breastfeeding for the first 12 months of life. Breastfeeding should then only stop once a nutritionally adequate and safe diet without breast milk can be provided
3. Mothers known to be HIV-infected who decide to stop breastfeeding at any time should stop gradually within one month. Mothers or infants who have been receiving ARV prophylaxis should continue prophylaxis for one week after breastfeeding is fully stopped. Stopping breastfeeding abruptly is not advisable.
4. When mothers know to be HIV-infected decide to stop breastfeeding at any time, infants should be provided with safe and adequate replacement feeds to enable normal growth and development. Alternatives for breastfeeding include:
5. Mothers known to be HIV-infected should only give commercial infant formula milk as a replacement feed to their HIV-uninfected infants of infants who are of unknown HIV status, when specific conditions are met:
6. Mothers known to be HIV-infected may consider expressing and heat-treating breast milk as an interim feeding strategy:
7. If infants and young children are known to be HIV-infected, mothers are strongly encouraged to exclusively breastfeed for the first six months of life and continue breastfeeding as per the recommendations for the general population, that is up to two years or beyond

Evidence for recommendations[191]:

Recommendation 1 is based on the revised WHO recommendations for antiretroviral therapy or prophylaxis to reduce HIV transmission, including through breastfeeding[192].

Recommendation 2 is based on systematic review of the effect of different infant feeding practices, in the absence of ARVs, on HIV-free survival and other mortality, decreased HIV transmission in the first six months of infant life was associated with exclusive breastfeeding compared to mixed feeding; exclusive breastfeeding in the firs six months of life was also associated with reduced mortality over the first year of life in HIV-exposed infants. The risk of HIV transmission continues for as long as breastfeeding

[191] Annexes to the Guidelines on HIV and infant feeding 2010 http://www.who.int/child_adolescent_health/documents/9789241599535/en/index.html

[192] WHO. Antiretroviral drugs for treating pregnant women and preventing HIV infection in infants: Recommendations for a public health approach (2010 version). Geneva, WHO, 2010.

continues; despite this HIV-free survival of HIV exposed infants who breastfeed beyond six months of age was better than infants who were started on replacement feeds.

Recommendation 3 is based on research and programmatic experience reporting that rapid and abrupt cessation of breastfeeding was very difficult for mother to achieve and was associated with adverse consequences for the infant; breast-mil viral load is also known to spike with rapid cessation of breastfeeding.

For Recommendation 4 the group considered that the very considerable evidence from non HIV-exposed populations was relevant and justifiable to use to inform how HIV-infected mothers should feed their infants in the absence of breast milk. Alternatives to breastfeeding include:

- For infants less than six months of age:
    - commercial infant formula milk as long as home conditions outlined in Recommendation 5 are fulfilled
    - expressed, heat-treated breast milk
- For children over six months of age
    - Commercial infant formula milk as long as home conditions outlined in Recommendation 5 are fulfilled
    - Animal milk as part of a diet providing adequate micronutrient intake
    - Meals, including milk-only feeds

Home-modified animal milk is not recommended as a replacement food in the first six months of life

Recommendation 5 indicates that HIV-infected mothers should only give commercial infant formula when all following specific conditions are met: safe water and sanitation are assured; the mother or other caregiver can reliable provide sufficient infant formula milk; the mother or caregiver can prepare it cleanly and frequently enough; the mother or caregiver can exclusively give infant formula milk in the first six months; the family is supportive of this practice; the mother or caregiver can access health care that offers comprehensive child health services.

Recommendation 6 is based on laboratory evidence which demonstrated that heat treatment of expressed breast milk form HIV-infected mothers, if correctly done, inactivates HIV. This option is recommended in special circumstances (infant born with low-birth-weight or otherwise ill in the neonatal period and unable to breastfeed), when the mother is unwell and temporarily unable to breastfeed; to assist mothers to stop breastfeeding; if antiretroviral drugs are temporarily not available.

Actions to protect promote and support appropriate infant feeding in the context of HIV

Integrate HIV interventions into maternal and child health services

National authorities should aim to integrate HIV testing, care and treatment interventions for all women into maternal and child health services, including access to CD4 count testing and appropriate antiretroviral therapy or prophylaxis for the woman's health and to prevent mother-to-child transmission of HIV. While this does not directly refer to infant feeding, is considered important to emphasize the importance of other essential HIV-specific services.

Integrate HIV and infant feeding into a comprehensive infant and young child feeding policy

National authorities should decide whether health services will principally counsel and support mothers known to be HIV-infected to either breastfeed and receive ARV interventions or avoid all breastfeeding[193].

This decision should be based on considerations of the socio-economic and cultural contexts of the populations served by maternal, newborn and child health services, availability and quality of health services; local epidemiology including HIV prevalence among pregnant women; main causes of maternal and child undernutrition; main causes of infant and child mortality.

Adapt infant and young child feeding policies and programmes to the context of HIV

National authorities should review infant and young child feeding policies and programmes to adapt to the context of HIV. This adaptation should include measures to enforce the implementation and monitoring of the Code; integration of the section on HIV into the Baby-friendly Hospital Initiative[vii], establishing a procurement and distribution system that ensures availability of ARV. Policies and programmes should also be developed and implemented to prevent spill-over effect and avoid undermining optimal breastfeeding practices among the general population.

Counselling and support for mothers at health services and community level

Health care providers and community-level service providers should be trained to provide counselling and support to HIV-infected women during pregnancy, delivery, immediate postpartum, up to the moment their children are about two years of age[194,195].

Good counselling and support, as well as family, community and policy environments conducive to breastfeeding benefit women. In one study where trained peer counsellors were available and good follow-up provided, 45% of HIV-infected women exclusively breastfed for a full 6 months, while 66.7% did so for a full 5 months and 72.5% for 3 months.

Nutrition care and support during Emergencies

Elements to be considered for nutrition care and support during emergencies[196]

1. Infant and Young Child Feeding in Emergencies
2. Treatment of diarrhoea with ORT/Zinc
3. Prevention and Treatment of Vitamin A Deficiency

[193] WHO is developing guidance to assist countries in this decision-making progress

[194] Coovadia HM et.al. Mother-to-child transmission of HIV-1 infection during exclusive breastfeeding in the first 6 months of life: an intervention cohort study. *Lancet 2007; 369:1107-1116.*

[195] Bland RM et.al. Intervention to promote exclusive breast-feeding for the first 6 months of life in a high HIV prevalence area. *AIDS 2008; 22:883-891.*

[196]Global Nutrition Cluster. A toolkit for addressing nutrition in emergency situations. IASC Global Nutrition Cluster, UNICEF, New York, NY, 2008

4. Prevention and Treatment of Micronutrient Deficiencies
5. Management of Moderate Acute Malnutrition
6. Management of Severe Acute Malnutrition
7. Nutrition, HIV and AIDS
8. The Psychosocial Components of Nutrition
9. Nutritional care for Groups with Special Needs
10. The Use and Role of Food Assistance
11. Food Handling, Storage and Preparation
12. Household Food Security and Livelihoods

Unless indicated otherwise, WHO recommendations in stable situations, apply also to emergencies. In exceptionally difficult circumstances, the focus needs to be on creating conditions that will facilitate breastfeeding, such as establishing safe 'corners' for mothers and infants, one-to-one counselling, and mother-to-mother support. Traumatised and depressed women may have difficulty responding to their infants and require particular mental and emotional support. Every effort should be made to identify ways to breastfeed infants and young children who are separated from their mothers. Breast-milk substitutes, milk products, bottles ant teats should never be part of a general or blanket distribution. Dried milk products should be distributed only when pre-mixed with a milled staple food and should not be distributed as a single commodity. A general food basket should provide 2,100 kcal per person per day and include fortified products[197].

Rationale

Disruption and displacement of populations in emergency situations greatly impacts on the health and nutrition status of infants and young children. Adequate nutrition and care of children has been identified as one of the key factors to promote child health and stability Malnutrition is a major threat to child survival during an emergency and for those who survive; it can also have tremendous consequences on their cognitive, social, motor skill, physical and emotional development. The best way to prevent malnutrition is to ensure *optimal feeding and care for children*.

During emergencies, the risk of diarrhoea is exacerbated and transmission rates soar. Poor access to clean water, poor food hygiene practices, introduction to new or unusual foods, disrupted eating patterns and high rates of infectious illness due to overcrowded/insufficient living conditions and moving populations create a perfect environment for diarrhoeal disease. Providing *ORT/Zinc in emergencies* is a simple and cost-effective intervention which can greatly reduce the length and severity of the diarrhoea preventing severe dehydration, malnutrition and death.

Vitamin A intake is often limited in emergency situations where the food supply is either inadequate or inappropriate and access to vitamin A-rich foods is reduced. Without proper food support, body reserves of vitamin A become severely depleted. In the emergency context, there is an increase in communicable and infectious diseases due to over-crowded shelter conditions and disruption due to population displacement and the demise of health infrastructures. Transmission of illnesses such as diarrhoea, measles and pneumonia are exacerbated and lead to increased childhood mortality. Measles is

[197] UNHCR, UNICEF, WFP, WHO. Food and nutrition needs in emergencies. WFP, Rome, 2002.

especially common in emergencies and can trigger acute malnutrition and aggravate vitamin A deficiency to dangerous levels. Vitamin A provides an essential part of the treatment protocol for children already infected with measles and supplementation during mass measles vaccination campaigns provides protection against further vitamin A deficiency and the severity of potential measles infection.

Acute malnutrition needs to be addressed in the emergency context both to support a child's right to sufficient food, growth and well-being and to prevent more serious illness and death. From a cost perspective per child, moderate *malnutrition* is significantly cheaper to treat than severe malnutrition. Additionally, in emergencies there is generally disruption of access to basic food needs, health services and water and sanitation, the effects will be felt quicker and have a more deleterious effect among *families affected by HIV and AIDS.*

In emergency situations, the social destruction and physical violence suffered by the population have an impact on psychological well-being and family structure. Families may have experienced acts of violence and extreme distress, such as witnessing death, family separation, rape (which may have resulted in unwanted pregnancies), loss of possessions and shelter and disrupted food and survival systems. This *psychological trauma* together with the physical impact of hunger, and the dependence on humanitarian aid for survival, produces changes in behaviour and emotions, which impact on feeding practices. Emergencies can provoke and aggravate cases of chronic or acute malnutrition and micronutrient deficiencies through the impact they have on psychosocial well-being.

In emergency situations there is an increased risk of death among the affected population and in particular among *vulnerable groups*; needs of these groups, including: orphans and vulnerable children as well as pregnant and lactating women, must be taken into consideration to undertake effective nutrition programming,

In the emergency context, displaced or devastated communities are often dependent on the provision of *food aid* to meet their basic nutritional requirements. When food aid is provided, issues around *food handling, preparation and storage* are highlighted because the normal food systems, including cooking facilities and access to fuel and water are often disrupted and yet food must continue to be prepared and eaten.

Actions for appropriate infant and young child feeding in emergencies [198]

Early emergency response

The Infant Feeding in Emergencies (IFE) Operational Guidance gives full details on IFE implementation. In the first few days of an emergency, establish immediate links with other sectors, such as reproductive health to provide 'safe havens' for pregnant and lactating women in the early days of an emergency. These 'safe havens' should be easily accessible areas where privacy, security and shelter are provided with access to water and food for pregnant and lactating women. Basic supportive care of breastfeeding mothers and their infants can be offered and peer-to-peer support nurtured.

[198] Operational Guidance for Emergency Relief Saff and Programme Managers on Infant and Young Child Feeding in Emergencies. Version 2.1. February 2007 http://www.ennonline.net/ife/

Minimum level of response

A minimum response to support IFE is indicated in all emergencies. This should include nutritional adequacy and suitability of the general food ration for older infants and young children; consideration of supplementary feeding of pregnant and lactating women; ensuring and easing access to basic water and sanitation facilities, cooking, food and non-food items; ensuring rest areas for populations in transit including private areas for breastfeeding if culturally indicated; and establishing timely registration of newborns to support early initiation and exclusive breastfeeding.

Artificial feeding in emergencies

Any support of artificial feeding in an emergency should be based on a needs assessment by skilled technical staff including a risk analysis. This applies both in the context of HIV where replacement feeding may have been established pre-crisis or in any population where infants may be artificially fed. Interventions that support artificial feeding should meet key criteria on targeting, use, procurement, distribution and management of breast milk substitutes as detailed in the Operational Guidance on IFE.

Infant feeding and HIV in emergencies

In the interest of overall child survival, introducing replacement feeding or early cessation of breastfeeding is unlikely to be a safe option in most emergency situations Where HIV status of the mother is unknown or if she is known to be HIV negative, early initiation and exclusive breastfeeding for the first six months, continuation of breastfeeding into the second year of life or beyond, and nutritionally adequate and safe complementary feeding for children 6-24 months is recommended For further guidance, consult the latest WHO recommendations and UN guidance.

Annex

List of Essential Nutrition Actions targeting the window of opportunity (-9 to 24 months)

Health-related interventions with an impact on nutrition

1. Targeting women

1.1. For all women
- Iron and folic acid supplementation for menstruating women
- Iron and folic acid supplementation during pregnancy
- Calcium supplementation for women during pregnancy
- Nutrition counselling through food-based dietary guidelines
- Improving maternity protection and health through the workplace
- Breastfeeding counselling and support

1.2. In special circumstances
- Energy and protein supplementation in women with low body mass index
- Nutritional care and support for HIV-infected pregnant and lactating women
- Nutritional care and support in emergencies

2. Targeting children 0 to 24 months old

2.1. For all children
- Implementation of the International Code of Marketing of Breast-milk Substitutes and related resolutions of the World Health Assembly subsequent to resolution WHA34.22 adopting the Code
- Implementation of the Baby-friendly Hospital Initiative
- Counselling and support for optimal breastfeeding (early initiation, exclusive breastfeeding for the first six months and continued breastfeeding up to two years of age and beyond)
- Counselling of mothers and caregivers, and appropriate behavioural change communication on complementary feeding
- Provision of advice on safe and nutritionally-adequate home-made complementary foods
- Vitamin A supplementation for children under five years of age
- Iron supplementation for children under five years of age
- Zinc supplementation for diarrhoea management
- Home fortification with multiple micronutrients of foods for young children[199]

2.2. In special circumstances
- Nutrition counselling for the adequate care of sick children
- Nutrition counselling for the adequate care of malnourished children

[199] Also delivered outside health-system channels.

- Integrated management of severe acute malnutrition through facility- and community-based interventions
- Treatment of moderate acute malnutrition
- Orientation and counselling on infant feeding in the context of HIV (prevention of mother-to-child transmission of HIV)
- Integrated approach to the nutritional care of HIV-positive children
- Nutritional care and support in emergencies[200]

3. Other health interventions affecting women and children

- Prevention of adolescent pregnancy
- Pregnancy spacing
- Intermittent preventive treatment of malaria in pregnancy
- Prevention and cessation of tobacco, alcohol and drug consumption in pregnancy
- Reduction of indoor air pollution
- Prevention and control of occupational risk in pregnancy
- Prevention and control of genitourinary infections in pregnancy
- Provision of insecticide-treated bednets
- Properly-timed cord clamping
- Deworming of children and adolescents
- Deworming of pregnant women
- Hand washing and other hygienic interventions

Non-health related interventions with an impact on nutrition

1. Agriculture and food production

- Micronutrient fortification of staple foods
- Micronutrient fortification of complementary foods
- Salt iodization
- Water fluoridation
- Interventions to improve food security at household level
- Interventions to improve the nutritional quality of foods (reduction of the content of salt, fats and sugars, and elimination of *trans*-fatty acids)

2. *Social protection*

- Conditional and unconditional cash transfers
- Food aid

3. Trade

- Public policies can influence prices through taxation, subsidies or direct pricing ways that encourage healthy eating and lifelong physical activity[201].

[200] Provision of adequate support according to the Operational Guidance for Emergency Relief Staff and Programme Managers on infant and young child feeding in emergencies, [Interagency Working Group on Infant and Young Child Feeding in Emergencies, 2007; http://www.ennonline.net/pool/files/ife/ops-guidance-2-1-english-010307-with-addendum.pdf] which includes the protection, promotion and support for optimal breastfeeding, and the need to minimize the risks of artificial feeding

- Member States should consider different approaches, i.e. stepwise or comprehensive, to reduce the impact marketing of foods high in saturated fats, *trans*-fatty acids, free sugars, or salt, to children[202].
- Provision of food in public institutions
- Governments may require information to be provided on key nutritional aspects, as proposed in the Codex Guidelines on Nutritional Labelling[201].

4. Education
   - Women's primary and secondary education
   - Improvement of diet and physical activity in schools

5. Labour
   - Support to lactating working women (through adopting and enforcing the ILO Maternity Protection Convention, 2000 (No. 183) and Recommendation (No. 191))

6. Information
   - Conducting social marketing campaigns
   - Labelling of food products

[201] Global Strategy on Diet, Physical Activity and Health. World Health Organization, Geneva, 2004
[202] *Set of recommendations on the marketing of foods and non-alcoholic beverages to children*. World Health Organization, Geneva, 2010

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