

Essential Nutrition
Actions: improving
maternal, newborn,
infant and young child
health and nutrition

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¹ Annex 3 is available only in the online version of this document.

Abbreviations

ACC	Administrative Committee on Coordination
ADB	Asian Development Bank
AGETIP	<i>Agence d'Exécution des Travaux d'Intérêt Public contre le Sous-emploi</i>
AIDS	Acquired immunodeficiency syndrome
AIN-C	<i>Atención Integral a la Niñez en la Comunidad</i>
ANW	<i>Anganwadi</i> worker
ARV	Antiretroviral
BA	<i>Bolsa Alimentação</i>
BFHI	Baby-friendly Hospital Initiative
BFP	<i>Bolsa Família</i> Programme
BIDANI	Barangay Integrated Development Approach for Nutrition Improvement
BINP	Bangladesh Integrated Nutrition Programme
BMI	Body-mass index
BRAC	Bangladesh Rural Advancement Committee
CBN	Community-based nutrition
CCT	Conditional cash transfer
CHD	Child health day
CHN	Community Health and Nutrition Project
CHNW	Community health and nutrition worker
CHW	Community health worker
CI	Confidence interval
cm	centimetre
CNC	Community nutrition centre
CNP	Community nutrition promoter (Bangladesh)
CNP	Community Nutrition Programme (Senegal)
Code	International Code of Marketing of Breast-milk Substitutes
CPP	Child Pastorate Programme
CSD	Child Survival and Development Programme
CSG	Child Support Grant
CT	Cash transfer
dL	decilitre
DRMFSS	Disaster Risk Management and Food Security Sector
EBF	Exclusive breastfeeding
ECD	Early childhood development
EEOS	Extended Enhanced Outreach Strategy
eLENA	electronic library of evidence for nutrition actions
ENA	Essential nutrition action
EOS	Enhanced Outreach Strategy
FA	<i>Familias en Acción</i>
FAO	Food and Agriculture Organization
FHP	Family Health Programme
FTE	Full-time equivalent
g	Gram
GDP	Gross domestic product
GNI	Gross national income
GoE	Government of Ethiopia

GoI	Government of India
HAZ	Height-for-age z score
HC	<i>Hogares comunitarios</i>
HEP	Health Extension Programme
HEW	Health extension worker
HH	Household
HIV	Human immunodeficiency virus
HNPSP	Health and Nutrition Population Sector Programme
HSDP	Health Sector Development Project
HSSP	Health Sector Strategic Plan
ICDS	Integrated Child Development Scheme Project
IDA	Iron deficiency anaemia
IDB	International Development Bank
IFE	Infant feeding in emergencies
ILO	International Labour Organization
IMCI	Integrated management of childhood illness
IU	International unit
IVACG	International vitamin A Consultative Group
JNSP	Joint Nutrition Support Programme
Kcal	Kilocalorie
Kg	Kilogram
l	Litre
LBW	Low birth weight
LHW	Lady health worker
m	Metre
mg	Milligram
MICS	<i>micro-enterprises</i>
mL	Millilitre
MNP	Micronutrient powder
MoH	Ministry of Health
MUAC	Mid upper-arm circumference
NCHS	National Center for Health Statistics
NEC	Necrotizing enterocolitis
NGO	Nongovernmental organization
NHD	Department of Nutrition for Health and Development
NNMB	National Nutrition Monitoring Bureau
NNP	National Nutrition Programme
OR	Odds ratio
ORS	Oral rehydration salts
OTP	Outpatient Therapeutic Programmes
PAHO	Pan American Health Organization
PEM	Protein-energy malnutrition
PLW	Pregnant and lactating women
ppm	Parts per million
ppt	Percentage points change
PSNP	Productive Safety Net Programme

RE	Retinol equivalent
RNI	Recommended nutrient intake
RPS	<i>Red de Protección Social</i> Programme
RR	Relative risk
RUTF	Ready to use therapeutic food
SAM	Severe acute malnutrition
SCN	Standing Committee on Nutrition
SD	Standard deviation
SECALINE	Surveillance and Education for Schools and Communities on Food and General Nutrition
SEECALINE	Second Surveillance and Education for Schools and Communities on Food and General Nutrition Project
TFP	Therapeutic Feeding Programme
TINP	Tamil Nadu Integrated Nutrition Programme
TSF	Targeted Supplementary Feeding
UK	United Kingdom
UNHCR	United Nations Refugee Agency
UNICEF	United Nations Children's Fund
UNU	United Nations University
UPGK	Family Nutrition Improvement Programme
USI	Universal salt iodization
VAD	Vitamin A deficiency
VHC	Village health communicator
VHV	Village health volunteer
VLBW	Very low birth weight
WAZ	Weight-for-age z score
WB	World Bank
WHA	World Health Assembly
WHO	World Health Organization

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Preface



This report has been developed to inform the discussion at the World Health Assembly on the Comprehensive Implementation Plan on Maternal, Infant and Young Child Nutrition¹ and is a compendium of the World Health Organization (WHO) guidance on effective nutrition programmes.

The document covers different aspects of infant feeding in normal or exceptional circumstances, such as emergencies, HIV infections and diarrhoea, as well as nutrition of women of reproductive age in different physiological status. It also discusses the value of implementing such programmes in an integrated fashion and with the adequate quality and intensity. It is the first time that WHO provides such a summary, organized by stage of the life course.

Most of the guidelines mentioned in the document (14 out of 24) have been recently developed or updated following the new WHO guideline process, i.e. in ways consistent with best practice, emphasizing the appropriate use of evidence. Systematic reviews of evidence are prepared to address critical outcomes for decision-making with consideration of the overall balance of risks and benefits, values and preferences, and costs. Grading of Recommendations Assessment, Development and Evaluation (GRADE) methodology is used for assessing the quality of the evidence and the strength of the recommendations. The whole process is implemented by WHO together with experts of a high professional standard and devoid of conflict of interest, with oversight by the WHO Guidelines Review Committee.

In order to provide real time updates, WHO launched in 2011 the electronic Library of Evidence on Nutrition Actions (eLENA²). eLENA is a simple web-based tool for academics, policy-makers, health workers, and development partners containing links to WHO evidence-informed nutrition recommendations and the underlying evidence. eLENA also includes topics on which evidence has started to accumulate but are still not the object of WHO guidance.

The guideline process does not end with the publication of a document, but continues with dissemination and assistance to policy-makers to adapt the guidance to the country context. Additional operational tools are often required, including analysis of cost and cost-effectiveness. Costing is addressed by the OneHealth software, developed jointly by various United Nations agencies and the World Bank.³

The importance of implementing at scale only interventions that have established evidence has been stressed by the first series on maternal and child undernutrition published by the *Lancet*.⁴ This document is published simultaneously with a second *Lancet* series, providing an update of the evidence base of programmes. WHO is pleased to note that there is now full alignment in the nutrition community on programme priorities.

Broad agreement on “what to do” has been one of the factors of the success of the Scaling-up Nutrition movement, that has generated unprecedented broader commitment of governments, donors and development actors to improve nutrition, towards the achievement, in 2025, of the global nutrition targets established by the World Health Assembly.

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Noncommunicable Diseases and Mental Health

¹ http://www.who.int/entity/nutrition/topics/WHA65.6_annex2_en.pdf

² <http://www.who.int/elena/en/index.html>

³ <http://www.futuresinstitute.org/onehealth.aspx>

⁴ Horton R. Maternal and child undernutrition: an urgent opportunity. *Lancet*, 2008, 371(9608):179.

Executive Summary

Malnutrition in all its forms is closely linked, either directly or indirectly, to major causes of death and disability worldwide. Globally, in 2011 about 101 million children under 5 years of age were underweight and 165 million stunted. At the same time, about 43 million children under 5 were overweight or obese.

The causes of malnutrition are directly related to inadequate dietary intake as well as disease, but indirectly to many factors, among others household food security, maternal and child care, health services and the environment. While most nutrition interventions are delivered through the health sector, non-health interventions can also be critical. Actions should target the different causes to reach sustainable change, which requires a multisectoral approach.

This document provides a compact summary of WHO guidance on nutrition interventions targeting the first 1000 days of life. Focusing on this package of essential nutrition actions, policy-makers could reduce infant and child mortality, improve physical and mental growth and development, and improve productivity.

Part I presents the interventions currently recommended by WHO (see table on pages 8 to 9), summarizes the rationale and the evidence for each, and describes the actions required to implement them. The document uses a life-course approach, from pre-conception throughout the first two years of life.

Some interventions require adequate behaviours, such as initiating breastfeeding soon after delivery, breastfeeding exclusively for six months and then continuing breastfeeding until two years and beyond. In order for those interventions to be successfully established action is needed to promote healthy behaviours; to create a supportive environment, such as a conducive hospital environment, skilled health workers, support in the community and the workplace; and protection from commercial and other negative influences.

Other interventions require the provision of supplies in adequate amounts for all those in need of them: iron and folic acid supplements, vitamin A supplements, multiple micronutrient powders and ready-to-use therapeutic foods.

The document highlights the circumstances in which the interventions have to be delivered, such as the prevalence of different nutrition conditions, or the occurrence of special situations, such as the presence of underlying disease (HIV infection, measles, diarrhoea) and emergency circumstances

The document deals with interventions delivered through the health sector, while recognizing that other interventions delivered through a variety of sectors (agriculture, water and sanitation, education, etc.) also have important impacts on nutrition. A special mention is made of food fortification, an intervention that requires the involvement of the health sector and actors in the food system.

Part II provides an analysis of community-based interventions aimed at improving nutrition and indicates how effective interventions can be delivered in an integrated fashion. It shows how the essential nutrition actions described in the first part have been implemented in large-scale programmes in various settings, what the outcomes have been, and to examine the evidence for attribution of changes in nutritional outcomes to programme activities. Some background on the evolution of programmatic evidence is given, and implications for the future are drawn.

Global nutrition challenges

Malnutrition in all its forms is closely linked, either directly or indirectly, to major causes of death and disability worldwide. This situation applies to perinatal and infectious diseases as well as chronic ones.

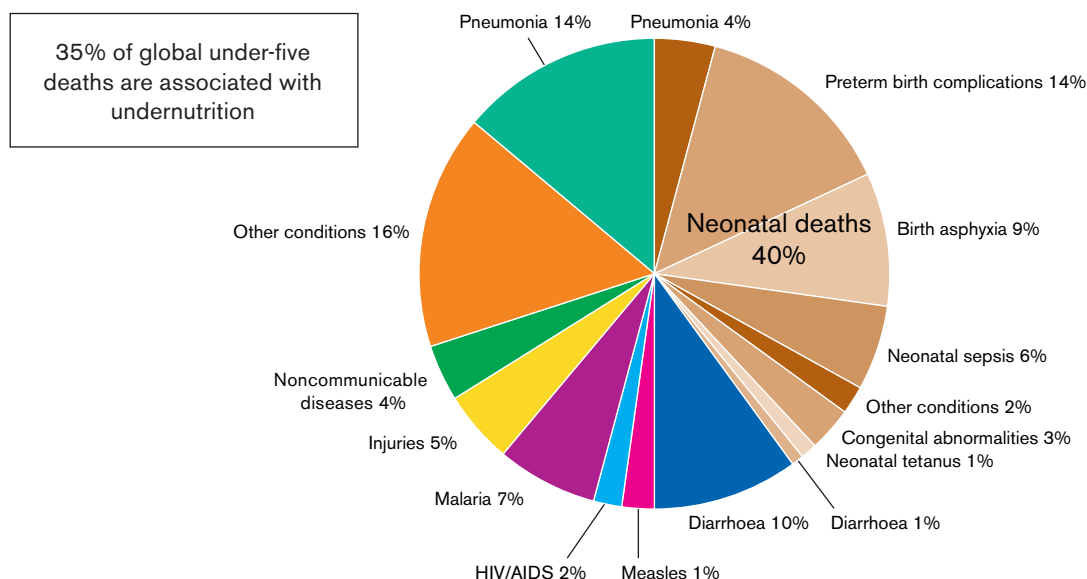
Globally, in 2011 about 101 million children under 5 years of age were underweight and 165 million stunted. At the same time, about 43 million children under 5 were overweight or obese (7). About 90% of stunted children live in only 36 countries, and children under 2 years of age are most affected by undernutrition (2).¹ Nearly 20 million children under 5 suffer from severe acute malnutrition, a life-threatening condition requiring urgent treatment.

In 2011, 6.9 million children under 5 died, mostly from preventable causes such as pneumonia, diarrhoea, malaria and neonatal conditions (3, 4) (**Figure 1**); about 90% of these deaths occurred in 42 countries, with half the worldwide deaths occurring in only 6 countries (5). Undernutrition is associated with more than one third of those deaths (2, 6).

Improvement of exclusive breastfeeding practices, adequate and timely complementary feeding, along with continued breastfeeding for up to 2 years or beyond, could save the lives of 1.5 million children under 5 years of age annually (7). 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 intrauterine growth restriction every year (2).¹

The World Health Organization (WHO) estimates that about 190 million children under five (33.3% of the preschool age population) are vitamin A deficient, with about 5.2 million affected by night blindness (9). Infants as well as young children have increased vitamin A requirements to

Figure 1. Global distribution of deaths among children under 5 by cause, 2010 (2, 4, 8)



¹ These figures will be updated as this report is published.

support rapid growth and combat infections. Severe vitamin A deficiency (VAD) at this age can cause visual impairments, anaemia and weakened immunity, with an increased risk of morbidity and mortality from measles or diarrhoea (10).

VAD is also an issue for women. WHO estimates that 9.8 million women are affected by night blindness, a problem related with insufficient vitamin A (11).

Iron is the most common nutritional deficiency, with approximately 2 billion people worldwide affected (12). WHO estimates that there are 469 million women of reproductive age and about 600 million preschool and school-age children worldwide anaemic, with at least half of these cases attributable to iron deficiency (iron deficiency anaemia) (13).

Infants and children under the age of five 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 (14, 15). Iron deficiency, with or without anaemia, may have important health consequences for young children, including increased perinatal mortality, delayed mental and physical development, negative behavioural consequences, reduced auditory and visual function, and impaired physical performance (16). Some of the negative effects of iron deficiency during early childhood are irreversible and can lead to poor school performance, reduced physical work capacity and decreased productivity later in life (3, 11, 17, 18, 19).

Maternal short stature and iron deficiency anaemia, which can increase the risk of death of the mother at delivery, contribute to at least 18% of maternal deaths in low- and middle-income countries (20). Anaemia rates have not improved appreciably over the past two decades (21). Maternal undernutrition also increases the probability of low birth weight, which in turn increases the probability of neonatal deaths due to infections and asphyxia (22). Anaemia is also associated with an increased risk of maternal mortality (23). Globally, almost 50% of pregnant women (56 million) are anaemic (4). 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 (10, 23, 24).

In 2008, 35% of adults aged 20 years and older were overweight (body-mass index [BMI] \geq 25 kg/m²) (34% of 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 \geq 30 kg/m²) (297 million over the age of 20), compared with 8% in 1980 (25, 26).

Causes of malnutrition

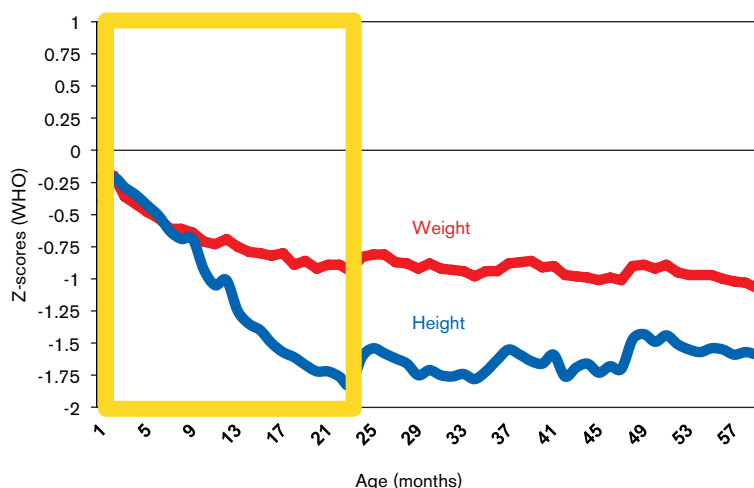
The causes of malnutrition are directly related to inadequate dietary intake as well as disease, but indirectly to many factors, among others household food security, maternal and child care, health services and the environment. While most nutrition interventions are delivered through the health sector, non-health interventions can also be critical. Actions should target the different causes to reach sustainable change, which requires a multisectoral approach.

Timing of interventions

New analyses, using the WHO Growth Standards (27), confirm the importance of the first two years of life as a window of opportunity for growth promotion (**Figure 2**). An important feature of the WHO standards is that they reveal a much greater problem of undernutrition during the first six 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 primarily happens during the first two years of life, including the promotion of appropriate infant feeding practices (28). The deficits acquired by this age are difficult to reverse later.

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 six months; promotion, protection, and support of continued breastfeeding

Figure 2. Timing of growth faltering, data from 54 surveys, 1994–2007 (27)



along with appropriate complementary feeding from six months up to two years and beyond; and micronutrient supplementation, targeted fortification and food supplementation, when needed.

Recommended nutrition practices targeting women, infants and young children

In 1999 WHO, in collaboration with UNICEF and BASICS, proposed effective, feasible, available and affordable interventions (29). These interventions worked best when combined with interventions to reduce infections, such as water, sanitation and hygiene.

Focusing on a package of essential nutrition actions (ENAs), health programmes could reduce infant and child mortality, improve physical and mental growth and development, and improve productivity. These essential actions protect, promote and support priority nutrition outcomes:

- exclusive breastfeeding for six months;
- adequate complementary feeding starting at six months with continued breastfeeding for two years;
- appropriate nutritional care of sick and malnourished children;
- adequate intake of vitamin A for women and children;
- adequate intake of iron for women and children; and
- adequate intake of iodine by all members of the household.

The actions proposed to obtain the priority nutrition outcomes included ones that health workers could implement, such as complementary feeding counselling and active feeding, growth monitoring and promotion, and supplementary feeding or food-based interventions. At the same time, health managers aiming for adequate intake of vitamin A for women and children could encourage daily intake of vitamin A-rich foods and adequate breastfeeding, give high-dose vitamin A supplements to children with infections, train staff to detect and treat clinical VAD, and design a plan for preventive supplementation of vitamin A for children and postpartum women in populations at risk of VAD.

Improving nutrition involves actions at health facility and population levels. At district level, these could include monitoring nutrition, identifying sub-populations at risk of nutrition problems, updating nutrition policies and protocols, and providing resources and tools to implement nutrition activities at health facilities and at community venues.

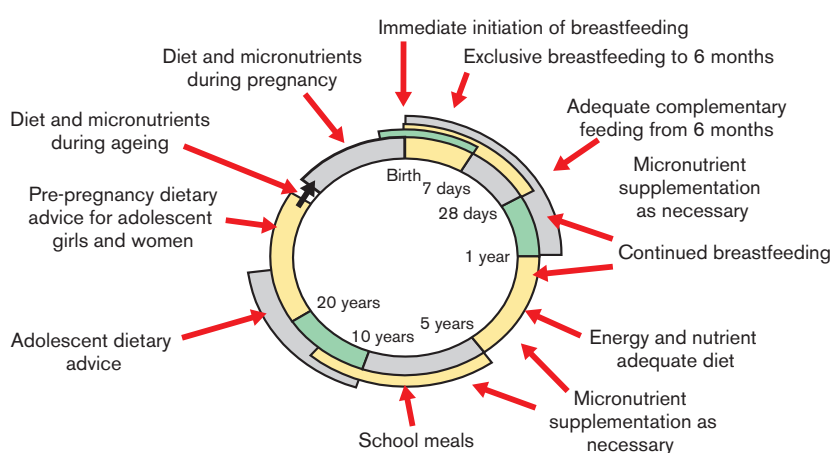
At health facilities, ENAs should be carried out at all contacts with pregnant and lactating women and their children. Outside facilities in the community, follow-up of mothers and children and support to community workers and groups are key.

Much experience has been gained since the ENAs were disseminated, thanks to the implementation of these and other actions for supporting priority nutrition outcomes. This has led to the acknowledgement that nutrition actions targeting women, infants and young children can help improve health and reduce mortality among these groups. The experience gained has benefited the preparation of this document. More recently, a series on nutrition in the *Lancet* in 2008/9 helped to provide a strong evidence base for programmes implementing priority actions.

WHO's electronic Library of Evidence for Nutrition Actions (eLENA) makes information accessible with the aim to plan programmes to protect, promote and support priority nutrition practices.

The content of this document is divided into two parts. **Part I** is organized around the life-course, and presents existing WHO recommendations for priority conditions and explains the rationale behind them. Evidence is provided on direct nutrition interventions and health-related and other interventions with an effect on nutrition, including those in **Figure 3** targeting women, infants and young children.

Figure 3. Improving nutrition around the life-course



Part II provides an analysis of community-based interventions aimed at improving nutrition and indicates how effective interventions can be delivered in an integrated fashion.

WHO work on evidence for nutrition actions

WHO recognizes the need to improve the process by which health-related recommendations are developed using the best available evidence. WHO established the Guidelines Review Committee in 2007 which has developed and implemented procedures to ensure that WHO guidelines are produced in ways consistent with best practice, emphasizing the appropriate use of evidence (30). In strengthening its commitment to providing relevant guidance for programmes that support and develop capacity in evidence-informed policy-making 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 programme 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 to implement and expand nutrition actions, the Nutrition Guidance Expert Advisory Group has developed and updated guidelines in the nutrition field.

For these guidelines to be effective in supporting Member States, they must be widely disseminated so that country decision-makers and donor agencies will have the information to make appropriate choices for each country. WHO's eLENA (31) has been developed to provide

an on-line platform to house and disseminate evidence-based 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. They 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.

References

1. UNICEF, WHO, World Bank. *UNICEF-WHO-World Bank Joint child malnutrition estimates*. New York, Geneva & Washington DC, UNICEF, WHO & World Bank, 2012 (<http://www.who.int/nutgrowthdb/estimates/en/index.html>, accessed 27 March 2013).
2. Black RE et al. Maternal and child undernutrition: global and regional exposures and health consequences. *Lancet*, 2008, 371(9608):5–22.
3. WHO. *Child epidemiology*, published on the website of the WHO Department of Maternal, Newborn, Child and Adolescent Health (http://www.who.int/maternal_child_adolescent/epidemiology/child/en/index.html, accessed 2 July 2012).
4. WHO. *World health statistics 2013: a wealth of information on global public health*. Geneva, WHO, 2013.
5. Inter-agency Child Mortality Estimation Group, published on the website of the WHO Department of Maternal, Newborn, Child and Adolescent Health (http://www.who.int/maternal_child_adolescent/en/, accessed 19 April 2012).
6. Liu et al. for the Child Health Epidemiology Reference Group of WHO and UNICEF. Global, regional, and national causes of child mortality: an updated systematic analysis for 2010 with time trends since 2000. *Lancet*, 2012, 379:2151–2161.
7. Jones G et al. How many child deaths can we prevent this year? *Lancet*, 2004, 362:65–71.
8. WHO, *Global Health Observatory* (http://www.who.int/gho/child_health/en/index.html, accessed 17 March 2013).
9. WHO. *Global prevalence of vitamin A deficiency in populations at risk 1995–2005: WHO Global database of vitamin A deficiency*. Geneva, WHO, 2009.
10. Sommer A, West KP Jr. *Vitamin A deficiency: health, survival, and vision*. New York, Oxford University Press, 1996.
11. Lozoff B, Jimenez E, Wolf AW. Long-term developmental outcome of infants with iron deficiency. *New England Journal of Medicine*, 1991, 325:687–694.
12. WHO. *Iron deficiency anaemia: assessment, prevention, and control. A guide for programme managers*. Geneva, WHO, 2001.
13. WHO, Centers for Disease Control. *Worldwide prevalence of anaemia 1993–2005: WHO global database of anaemia*. Geneva, WHO, 2008.
14. Institute of Medicine. *Dietary reference intakes for vitamin A, vitamin K, arsenic, boron, chromium, copper, iodine, iron, manganese, molybdenum, nickel, silicon, vanadium, and zinc*. Washington DC, National Academy Press, 2001.

15. 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.
16. Algarín C et al. Iron deficiency anemia in infancy: long-lasting effects on auditory and visual system functioning. *Pediatric Research*, 2003, 53:217–223.
17. Lozoff B et al. Poorer behavioral and developmental outcome more than 10 years after treatment for iron deficiency in infancy. *Pediatrics*, 2000, 105:E51.
18. Haas JD, Brownlie T. Iron deficiency and reduced work capacity: a critical review of the research to determine a causal relationship. *Journal of Nutrition*, 2001, 131(2S–2):676S–688S, discussion 688S–690S.
19. Iannotti LL et al. Iron supplementation in early childhood: health benefits and risks. *American Journal of Clinical Nutrition*, 2006, 84:1261–1276.
20. WHO. *Mortality and burden of disease attributable to selected major risks*. Geneva, WHO, 2009 (http://www.who.int/healthinfo/global_burden_disease/GlobalHealthRisks_report_full.pdf, accessed 17 May 2013).
21. United Nations System SCN. *Progress in nutrition: sixth report on the world nutrition situation*. Geneva, United Nations System SCN Secretariat, 2010.
22. WHO, UNICEF. *Countdown to 2015 decade report (2000–2010): taking stock of maternal, newborn and child survival*. Washington DC, WHO & UNICEF, 2010.
23. Ramakrishnan U, Yip R. Experiences and challenges in industrialized countries: control of iron deficiency in industrialized countries. *Journal of Nutrition*, 2002, 132:820S–824S.
24. 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):282–286.
25. 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. *Lancet*, 2011, 337(9765):557–567.
26. WHO. *Global status report of noncommunicable diseases 2010*. Geneva, WHO, 2011.
27. WHO. *The WHO child growth standards* (<http://www.who.int/childgrowth/en/>, accessed 27 March 2013).
28. Victora CG et al. Worldwide timing of growth faltering: revisiting implications for interventions. *Pediatrics*, 2010, 125:e473–e480.
29. WHO, BASICS, UNICEF. *Nutrition essentials: a guide for health managers*. Geneva, WHO, 1999.
30. WHO. *Handbook for guideline development*. Geneva, WHO, 2012.
31. WHO. *e-Library of evidence for nutrition actions* (<http://www.who.int/elena/en/>, accessed 27 March 2013).

Evidence-based nutrition actions over the life-course

Target group	Intervention areas	Evidence-based actions	Context/criteria
Infants (0–5 months)	Early initiation of breastfeeding	Counselling and support at facility and community level	All countries
	Exclusive breastfeeding	Implementation of the Baby-friendly Hospital Initiative Implementation of International Code of Marketing of Breast-milk Substitutes Maternity protection	All countries
	Feeding of low-birth-weight infants	Counselling and support	All countries, children born with weight <2500 g
	Infant feeding in the context of HIV	Counselling and support to HIV-positive mothers	All countries, children born to HIV-positive mothers
Infants and young children (6–23 months)	Continued breastfeeding	Counselling and support at facility and community level	All countries
		Implementation of International Code of Marketing of Breast-milk Substitutes	
	Appropriate complementary feeding	Counselling and support for appropriate complementary feeding	All countries
		Use of multiple micronutrient powders for home fortification of foods consumed by infants and young children 6–23 months of age	Populations where the prevalence of anaemia in children under 2 years is 20% or more
	Vitamin A status	Vitamin A supplementation in infants and children 6–59 months of age	Populations where the prevalence of night blindness is 1% or higher in children 24–59 months of age or where the prevalence of vitamin A deficiency (serum retinol 0.70 µmol/l or lower) is 20% or higher in infants and children 6–59 months of age
		Vitamin A supplementation to children with measles	All countries, all children with measles
	Iron deficiency	Daily iron supplementation for children 6–23 months of age	Countries where the diet does not include foods fortified with iron or where anaemia prevalence is above 40%
	Zinc status	Zinc supplementation to children with diarrhoea	All countries, children with diarrhoea
Iodine deficiency	Iodine supplementation to children	Countries where less than 20% of households have access to iodized salt, until the salt iodization programme is scaled-up	
Severe acute malnutrition	Out-patient and in-patient management of severe acute malnutrition	All countries, children with severe acute malnutrition	

Target group	Intervention areas	Evidence-based actions	Context/criteria
	Moderate acute malnutrition	Management of children with moderate acute malnutrition	All countries, children with moderate acute malnutrition
	Nutrition of children living with HIV	Nutritional care and support of children 6 months to 14 years old living with HIV	All countries, children living with HIV
	Nutrition in the context of emergencies	Nutritional care and support for children living in emergency situations	Countries in emergency situations
Women in reproductive age	Iron and folic acid deficiency	Intermittent iron and folic acid supplementation in menstruating women	Countries where the prevalence of anaemia among non-pregnant women of reproductive age is 20% or higher
Pregnant women	Iron and folic acid deficiency	Daily supplementation with iron and folic acid for women during pregnancy	Countries where anaemia in pregnant women is 40% or higher
		Intermittent iron and folic acid supplementation for non-anaemic pregnant women	Countries where prevalence of anaemia among pregnant women is lower than 20%
	Vitamin A deficiency	Vitamin A supplementation in pregnant women	Populations where the prevalence of night blindness is 5% or higher in pregnant women or 5% or higher in children 24–59 months of age
	Calcium status	Calcium supplementation in pregnant women	All countries. All pregnant women, particularly those at higher risk of hypertension
	Iodine deficiency	Iodine supplementation to pregnant and lactating women	Countries where less than 20% of households have access to iodized salt, until the salt iodization programme is scaled-up
	Nutrition in the context of emergencies	Nutritional care and support for pregnant and lactating women living in emergency situations	Countries in emergency situations
Global	Micronutrient status	Wheat and maize flour fortification	Countries where industrially produced flour is regularly consumed by large population groups

Part I

Recommendations, rationale and evidence for nutrition actions

This section aims to present current WHO recommendations relevant to nutrition of mothers and children through the life-course, as well as their underlying evidence. It deals with direct nutrition interventions delivered through the health sector, while recognizing that other interventions delivered through a variety of sectors (agriculture, water and sanitation, education, etc.) also have important impacts on nutrition.

1. Interventions targeted at young infants (0–5 months)¹

1.1 Early initiation of breastfeeding

WHO RECOMMENDATION

Place babies in skin-to-skin contact with their mothers immediately following birth for at least an hour and encourage mothers to recognize when their babies are ready to breastfeed, offering help if needed. (1)

Rationale and evidence

WHO and UNICEF provided recommendations on early initiation of breastfeeding in 1989, and the evidence was updated in 1998. Evidence for the importance of early initiation was systematically reviewed again in 2007, in the context of early skin-to-skin contact. The review found a positive effect on both the likelihood of exclusive breastfeeding (EBF) for one to four months of life, and the overall duration of breastfeeding, when mothers put the infant to the breast soon after birth. The review also showed that babies interacted more with their mothers, stayed warmer and cried less (2). A Cochrane review on community-based integrated packages to improve maternal and neonatal health found that community-based programming had a positive impact on the initiation of breastfeeding within one hour of birth (3).

Early initiation promotes exclusiveness and duration of breastfeeding, but the relationship between early initiation of breastfeeding and improved health has not been so well established. However, a recent study in Ghana (4) showed evidence of a causal association between early breastfeeding and reduced infection-specific neonatal mortality in young human infants.

The recommendation for early initiation of breastfeeding stems from the 1989 WHO/UNICEF Joint Statement *Protecting, promoting and supporting breast-feeding: the special role of maternity services* (5). An updated 1998 statement includes the ten steps for successful breastfeeding, with Step 4 indicating “Help mothers initiate breastfeeding within a half-hour of birth”. The updated review concluded that early contact increases breastfeeding both soon after delivery and two to three months later. Spontaneous suckling may not occur until between 45 minutes to 2 hours after birth, but skin-to-skin contact should start as soon as possible after delivery. Provided the infant is in close contact with his/her mother and can suckle when it shows signs of readiness, there is no justification for forcing him/her to take the breast (6).

A Cochrane systematic review (2) suggested that in industrialized societies, hospital routines may significantly disrupt early mother-infant interactions with harmful effects. It also showed that babies interacted more with their mothers, stayed warmer and cried less with early skin-to-skin contact. Babies were more likely to be breastfed, and to breastfeed for longer.

(For a summary of systematic reviews on early initiation of breastfeeding, see **Table I-1**.)

¹ 0–5 months refers to the period up to 180 days of life.

Table I-1 Systematic reviews on early initiation of breastfeeding

Cochrane Review: Early skin-to-skin contact for mothers and their healthy newborn infants concluded (2):

- Mothers were more likely to be breastfeeding 1 to 4 months post-birth than those in control groups (OR=1.82; 10 studies)
- Mothers using skin-to-skin contact breastfed for a longer duration (by an average of 42.55 days) than mothers in control groups (7 studies).

Cochrane Review: Community-based intervention packages for reducing maternal and neonatal morbidity and mortality and improving neonatal outcomes concluded (3):

- Community-based intervention packages had a “statistically significant impact on the initiation of breastfeeding within 1 hour of birth (average RR=1.94; 6 studies).

WHO: Evidence for the ten steps to successful breastfeeding concluded (6):

- Early contact increases breastfeeding both soon after delivery and 2–3 months later (11 studies).

1.2 Exclusive breastfeeding

WHO RECOMMENDATION

As a global public health recommendation, infants should be exclusively breastfed for the first six months of life to achieve optimal growth, development and health. (7)

Rationale and evidence

One of the most effective and rewarding preventable interventions is breastfeeding, which together with appropriate complementary feeding has the potential to reduce mortality among children under five by 19% (8). Six months of EBF is recommended for improved infant, child, and maternal health. EBF from birth is possible except for a few medical conditions, and unrestricted EBF results in ample milk production. The evidence stems from a systematic review in 2001 on the effects of EBF for six (versus three to four) months on infant and maternal health. The review found evidence of decreased gastrointestinal illnesses in infants who were exclusively breastfed for six months (compared to those who were mixed breastfed – receiving breast milk and other milk – at three to four months), and also that mothers who exclusively breastfed for six months experience prolonged lactational amenorrhea (9).

An expert consultation in 2001 served to analyse the systematic review as well as to review the nutrient adequacy of EBF (10) for six months (7). Based on the results, WHO recommended “exclusive breastfeeding for six months, with introduction of complementary foods and continued breastfeeding thereafter” (11).

The 2001 systematic review was updated to include six additional studies and was published in 2009 (12). The nearly identical results to those found previously reinforced WHO’s recommendation of six months of EBF for improved health.

(For a summary of systematic reviews on EBF, see **Table I-2**.)

Actions to protect, promote and support breastfeeding

The *Global strategy for infant and young child feeding*, adopted by the World Health Assembly (WHA) and the UNICEF Executive Board in 2002, provides the framework for action to protect, promote and support breastfeeding. It builds on key global instruments including:

- 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 No. 183.

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:

Table I-2 Systematic reviews on exclusive breastfeeding

Kramer & Kakuma. The optimal duration of exclusive breastfeeding: a systematic review concluded (9):

- “Infants exclusively breastfed for 6 months experience less morbidity from gastrointestinal infection than those who are mixed breastfed as of 3 or 4 months.” [16 studies]

WHO Report of the expert consultation on the optimal duration of exclusive breastfeeding recommended (7):

- “...[E]xclusive breastfeeding for 6 months, with introduction of complementary foods and continued breastfeeding thereafter.” (as shown below)

Global strategy for infant and young child feeding: the optimal duration of exclusive breastfeeding (based on Expert Consultation) noted (in paragraph 9) (11):

- “...[R]educed risks of gastrointestinal infection and of all-cause mortality for exclusively breastfed children compared with partially breastfed infants from 4 to 6 months, regardless of when the latter stopped breastfeeding.”

Cochrane Review: Optimal duration of exclusive breastfeeding (Review), concluded (12):

- “Infants exclusively breastfed for 6 months experience less morbidity from gastrointestinal infection than those who are mixed breastfed as of 3 or 4 months.” (6 additional studies added since review in 2001) (22 studies)

Lancet Breastfeeding promotion strategies and feeding practices (web appendix 1) concluded (13):

- Group counselling increased EBF during the neonatal period (OR=3.88; 6 studies) and at 6 months of age (OR=5.19; 5 studies).
- Individual counselling increased EBF during the neonatal period (OR=3.45; 15 studies) and at 6 months of age (OR=1.93; 9 studies).
- Mass media increased EBF at 1 month of age from 48–70%, at 4 months of age from 24–31%, and at 6 months of age from 7–12 % in exposed population (1 study).

Cochrane Review Support to breastfeeding mothers (Review) concluded (14):

- Any form of breastfeeding support to mothers (professional or lay) had a larger impact on EBF than all other forms of breastfeeding (e.g. mixed) (20 studies). [Studies with interventions occurring only during the antenatal period not included]
- Programmes using WHO/UNICEF breastfeeding training “showed significant benefit in prolonging exclusive breastfeeding” (6 studies).

Spiby et al. A systematic review of education and evidence-based practice interventions with health professionals and breast-feeding counsellors on duration of breast feeding concluded (15):

- “From studies reviewed, no single approach consistently positively affected breastfeeding duration” (9 studies).

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1. appointing a national breastfeeding coordinator;
 2. ensuring that every facility providing maternity services fully practises all the “Ten steps to successful breastfeeding”;
 3. giving effect to the Code;
 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 two 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;
 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, countries are recommended to undertake actions in the areas of policy, health systems and community.

International Code of Marketing of Breast-milk Substitutes (16)

The aim of the Code is to contribute to the provision of safe and adequate nutrition for infants, by the protection and promotion of breastfeeding, and by ensuring the proper use of breast-milk substitutes, when these are necessary, on the basis of adequate information and through appropriate marketing and distribution. The main elements of the Code deal with information and education; advertising and promotions to mothers and health workers; labelling; quality; and implementation and monitoring.

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 should be carried out (17, 18). Companies found to be committing violations should be sanctioned by the government entity charged with Code enforcement. Having 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 (19).

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. This consensus is reflected in the international labour standards of the ILO, which set out basic requirements for maternity protection at work. Many countries have ratified Maternity Protection Convention No. 183, and others have adopted some of its provisions (20). 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 workplace they should be granted a minimum of one daily break with pay, to breastfeed their infant or express and store breast milk (21, 22, 23, 24).

Baby-friendly Hospital Initiative (1, 25, 26)

WHO conducted a review of the evidence to support the implementation of the *Ten steps for successful breastfeeding* (27) and an update is underway. A review on interventions to promote breastfeeding found that BFHI is effective in increasing EBF rates (28). The BFHI has 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 also requires capacity building in breastfeeding counselling and 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 (29).

Counselling and support for appropriate breastfeeding at community and facility level

One-on-one breastfeeding counselling is particularly effective in promoting EBF. Maternal counselling during pregnancy, immediately after child birth and at key moments in the postnatal period has large and significant effects on EBF rates. The evidence of the effect of interventions on breastfeeding practices is less clear than the biological and behavioural effects of breastfeeding on health. Best practices to increase EBF, and thus improve health, were reviewed in a *Lancet* series on maternal and child undernutrition (30). The review showed counselling is particularly effective in promoting EBF. As compared to control groups, EBF increased among mothers during the neonatal period (OR 3.45, 95% CI 2.20–5.42) and at 6 months of age (OR 1.39, CI 1.18–3.15) when exposed to individual, one-on-one counselling. Group counselling was shown to increase EBF during the neonatal period (OR 3.88, CI 2.09–7.22) and at 6 months of age (OR 5.19, CI 1.90–14.15) compared to control groups. Maternal counselling during pregnancy, immediately after childbirth and at key moments in the postnatal period had large and significant effects on EBF. Promotion of breastfeeding through mass media was shown effective at increasing EBF during the 6-month postnatal period by between 7% and 70% in the exposed population, with the largest impact seen in mothers with infants 1 to 4 months of age (13). Studies specifically looking at the impact of education or counselling on child weight showed that children whose

mothers were exposed to breastfeeding education were on average heavier at four months of age than control children (31).

A Cochrane review on community-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 (CHWs) (3). 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 EBF.

A more recent Cochrane review on support given to breastfeeding mothers (32) found a positive effect on duration of EBF when mothers received any form of support (professional or lay) on breastfeeding and in programmes that used WHO/UNICEF breastfeeding training. The report emphasized that the strongest effects can be achieved when health care providers work in synergy with community members, providing consistent messages and practical support, as well as ensuring adequate referral for mothers with breastfeeding problems when needed. However, a systematic review of randomized controlled trials, non-randomized controlled trials with concurrent controls and before-after studies (cohort or cross-sectional) (total of nine studies) on the effect of training health professionals and lay educators on breastfeeding practices concluded that “[f]rom the studies reviewed, no single approach consistently positively affected breastfeeding duration” (15).

1.3 Counselling and support for appropriate feeding of low-birth-weight infants

WHO RECOMMENDATION

1. **Low-birth-weight (LBW) infants, including those with very low birth weight (VLBW), should be fed mother’s own milk.**
2. **LBW infants, including those with VLBW, who cannot be fed mother’s own milk should be fed donor human milk.¹**
3. **LBW infants, including those with VLBW, who cannot be fed mother’s own milk or donor human milk, should be fed standard infant formula. VLBW infants who cannot be fed mother’s own milk or donor human milk should be given preterm infant formula if they fail to gain weight despite adequate feeding with standard infant formula.**
4. **LBW infants, including those with VLBW, who cannot be fed mother’s own milk or donor human milk should be fed standard infant formula from the time of discharge until six months of age**
5. **VLBW infants who are fed mother’s own milk or donor human milk should not routinely be given bovine milk-based human-milk fortifier. VLBW infants who fail to gain weight despite adequate breast-milk feeding should be given human-milk fortifiers, preferably those that are human-milk based. (33)**

WHO recommendations refer also to supplements (vitamin D, calcium, iron, vitamin A, zinc); when and how to initiate feeding (soon after birth when infant is clinically stable); optimal duration of EBF (six months); how to feed (cup or tube if needed); and frequency of feeding (usually on demand) (33).

LBW infants who are able to breastfeed should be put to the breast as soon as possible after birth when they are clinically stable, and should be exclusively breastfed until six months of age. LBW infants who need to be fed by an alternative oral feeding method should be fed by cup or

¹ In settings where safe and affordable milk-banking facilities are available or can be set up.

spoon and should be fed based on the infants' hunger cues, except when the infant remains asleep beyond three hours of the last feed.

Implementation of these recommendations will help to reduce mortality and severe morbidity among these infants while helping in their growth and neurodevelopment.

Rationale and evidence

Important benefits were found for mortality (18% reduction), severe infections or necrotizing enterocolitis (NEC) (60% reduction), and mental development scores (5.2 points higher) associated with feeding mother's own milk compared with formula. The only apparent harm was lower length at nine months in one study.

Feeding donor human milk to LBW infants is associated with lower incidence of infections and NEC during the initial hospital stay after birth. There was no significant effect on mortality, mental development scores and anthropometric status at 18 months of age.

Actions to protect, promote and support appropriate feeding of low-birth-weight infants

The actions summarized in the section on exclusive breastfeeding (pages 12–15) also apply to feeding of LBW infants.

1.4 Infant feeding in the context of human immunodeficiency virus (HIV)

WHO RECOMMENDATION

1. Mothers known to be HIV-infected should be provided with lifelong antiretroviral (ARV) therapy or ARV prophylaxis interventions to reduce HIV transmission through breastfeeding.
In settings where national authorities have decided that the maternal and child health services will principally promote and support breastfeeding and ARV interventions as the strategy that will most likely give infants born to mothers known to be HIV-infected the greatest chance 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 first 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 known 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.
 5. Mothers known to be HIV infected should only give commercial infant formula milk as a replacement feed to their HIV-uninfected infants or 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. (34)
-

Rationale and evidence (34)

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 guidance on HIV and infant feeding. Significant programmatic experience and research evidence regarding HIV and infant feeding have accumulated since then, as reflected in the 2010 Guidelines; in particular, it is now known that ARV interventions to either the HIV-infected mother or the HIV-exposed infant significantly reduce the risk of postnatal transmission of HIV through breastfeeding. This evidence has had major implications for how women living with HIV should feed their infants and how health workers should counsel and support them.

Nine key principles underlie the seven evidence-based recommendations above. 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 ON HIV AND INFANT FEEDING

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

Recommendation 1 is based on the revised WHO recommendations for ARV therapy or prophylaxis to reduce HIV transmission, including through breastfeeding (35).

Recommendation 2 is based on a 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 EBF compared to mixed feeding. EBF in the first 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 continues; despite this, HIV-free survival of HIV-exposed infants who breastfed beyond six months of age was better than of 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 mothers to achieve and was associated with adverse consequences for the infant; breast-milk viral load is also known to spike with rapid cessation of breastfeeding.

For Recommendation 4, 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 six months of age and older:

- 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 the following specific conditions are met: clean water and sanitation are assured; the mother or other caregiver can reliably 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; and 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 from HIV-infected mothers, if correctly done, inactivates HIV. This option is recommended in special circumstances (i.e. 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; or if ARVs 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 ARV 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, it 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.¹

This decision should be based on considerations of the socioeconomic 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 them 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 BFHI (1); and establishing a procurement and distribution system that ensures availability of ARVs. Policies and programmes should also be developed and implemented to avoid undermining optimal breastfeeding practices among the general population.

¹ WHO is developing guidance to assist countries in this decision-making process.

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, and the postpartum period, up to the moment their children are about two years of age (36, 37).

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 (34).

2. Interventions targeted at infants and young children (6–23 months of age)

2.1 Continued breastfeeding

WHO RECOMMENDATION

Infants should be exclusively breastfed for the first six months of life to achieve optimal growth, development and health (7). Thereafter, to meet their evolving nutritional requirements, infants should receive nutritionally adequate and safe complementary foods while breastfeeding continues for up to two years of age or beyond (38).

Rationale and evidence

Guidelines for continued breastfeeding stem from the Pan American Health Organization (PAHO)/WHO *Guiding principles on complementary feeding of the breastfed child* which recommend “continued frequent, on-demand breastfeeding until two years of age or beyond” (38). 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% to 40% of total energy needs from breast milk (39) with the remaining 60% to 65% 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 (40). Continued, frequent breastfeeding also protects child health by delaying maternal fertility postpartum and reducing the child’s risk of morbidity and mortality in disadvantaged populations (41, 42). Longitudinal studies demonstrate that in developing countries, a longer duration of breastfeeding is associated with greater linear growth (43, 44). It is also linked to reduced risk of childhood chronic illnesses (45) and obesity (46) and to improved cognitive outcomes (47), although the causal relationship underlying these associations remains controversial. Breastfeeding in the first 6 months of life provides greater protection against diarrhoea than against acute respiratory illness (OR=6.1 vs. OR=2.4), but breastfeeding between 6–11 months shows “similar levels of protection” against both acute respiratory illness and diarrhoea (OR=1.9 vs. OR=2.5) (3 studies) (42). However, few studies have specifically examined the effect of breastfeeding beyond 12 months on these outcomes.

Actions to protect, promote and support continued breastfeeding

The actions summarized in the section on EBF (pages 12–15) also apply to continued breastfeeding, especially the implementation of the Code and counselling and support for appropriate breastfeeding at community and facility level.

2.2 Complementary feeding

WHO RECOMMENDATION

Infants should be exclusively breastfed for the first six months of life to achieve optimal growth, development and health.¹ Thereafter, to meet their evolving nutritional requirements, *infants should receive nutritionally adequate and safe complementary foods while breastfeeding continues for up to two years of age or beyond (38).*

¹ As formulated in the conclusions and recommendations of the expert consultation (Geneva, 28–30 March 2001) that completed the systematic review of the optimal duration of exclusive breastfeeding (see document A54/INF.DOC./4). See also resolution WHA454.2.

Guiding principles

Studies synthesized along these lines progressively led to the currently applicable guidelines, as described in Guiding principles for complementary feeding of the breastfed child (38) and for feeding non-breastfed children from 6 to 24 months (48).

GUIDING PRINCIPLES FOR COMPLEMENTARY FEEDING OF THE BREASTFED CHILD

1. Practise 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 two years of age or beyond.
3. Practise responsive feeding, applying the principles of psychosocial care.
4. Practise 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.
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.

GUIDING PRINCIPLES FOR FEEDING NON-BREASTFED CHILDREN 6–24 MONTHS OF AGE

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 four to five times per day, with additional nutritious snacks offered one or two 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/day of extra fluids in a temperate climate, and 800–1200 mL/day in a hot climate.
7. Practise good hygiene and proper food handling.
8. Practise responsive feeding, applying the principles of psychosocial 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.

Rationale and evidence

Following key guiding principles is recommended to ensure children are appropriately fed between 6 and 23 months. Complementary feeding, referring to appropriate feeding starting at six months of age, means that the infant receives breast milk (including milk expressed or from a wet-nurse) or a breast-milk substitute and solid or semi-solid food.

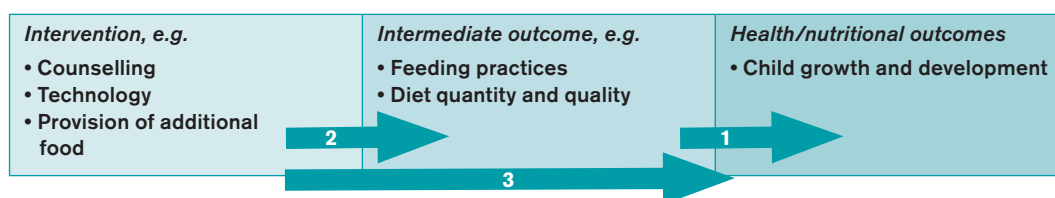
Complementary foods include those that are manufactured or locally prepared, suitable as a complement to breast milk or to a breast-milk substitute when either becomes insufficient to

satisfy the nutritional requirements of the infant. A working definition refers to complementary feeding as the process starting when breast milk 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 (16, 49, 50).

A critical window of opportunity to ensure optimal child growth and development covers the period of pregnancy up to the second year of life (51, 52). Successful complementary feeding is critical for preventing malnutrition. Growth faltering is most evident during this time period, particularly between 6 and 12 months when foods of low nutrient density begin to replace breast milk and rates of diarrhoeal illness caused by food contamination are at their highest. After about two years of age, it is very difficult to reverse stunting that occurred at earlier ages.

The evidence that feeding practices and diet affect growth and development of children (sequence 1 in **Figure I-1**) is summarized by WHO (53) and others, especially Dewey and Brown (39). The relationship of nutrient requirements, feeding frequency, energy density and feeding practices to adequate growth and development is considered well supported by the available evidence, which includes clearly understood mechanisms.

Figure I-1 How feeding practices and diet affect growth and development¹



The main issues have become how to optimize these practices (intermediate outcomes) with interventions (sequence 2 in **Figure I-1**). Since these intermediate outcomes are particularly difficult to quantify accurately, most studies have tried to link interventions directly with health or nutritional outcomes (sequence 3 in **Figure I-1**). Variable effects had previously been found (39). Literature reviews (54), especially by Dewey and Adu-Afarwuah (51), and a *Lancet* series (55) examined the effects of education or counselling and certain technologies (increasing energy density, nutrient bioavailability), with and without provision of additional food, on growth and other outcomes.

Education, with or without provision of complementary foods, had only small effects on growth and other outcomes (51). The *Lancet* series distinguished food secure and insecure situations in evaluating the effect of providing food, with the effect size increasing by 0.25 HAZ for populations with sufficient food and by 0.41 in populations with insufficient food (30). (Fortification is dealt with in the section on micronutrients.)

(For a summary of systematic reviews on complementary feeding, see **Table I-3**.)

Actions to promote appropriate complementary feeding

Counselling and support for appropriate complementary feeding at facility and community level

Quality counselling of mothers and caregivers, and appropriate behavioural change communication (56) to other family and community decision-makers, are essential for improving feeding of children 6 to 23 months old; trained health workers will be able to provide appropriate counselling (57). Educational approaches can be effective without food provision, improving height-

¹ Source: John Mason, personal communication, 2012.

for-age (as measured by z-scores, weighted mean difference 0.25) in exposed groups. A greater impact was seen when food or food supplements were provided as well, improving height-for-age (weighted mean difference 0.41) (55).

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 foods 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 for point-of-use fortification (see below)
- lipid-based nutrient supplements.

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

Table I-3 Systematic reviews on complementary feeding

Dewey & Adu-Afarwuah Systematic review of the efficacy and effectiveness of complementary feeding interventions in developing countries concluded (51):

- Education-only interventions on complementary feeding had a modest effect on child growth with a mean effect size of 0.28 on weight and 0.20 on linear growth (11 studies).
- Provision of complementary food-only interventions had an overall mean effect of 0.60 on weight and 0.47 on linear growth (8 studies). Removing one possible outlier study (in Nigeria), the effect shrinks to 0.26 for weight and 0.28 for linear growth (7 studies).
- Provision of complementary foods and education interventions, overall mean effect was 0.35 on weight and 0.17 on growth (8 studies).
- Interventions with complementary food fortified with micronutrients, the average effect was 0.11 on weight and 0.12 on length (6 studies).
- Interventions targeting increased energy density of food only had mixed results, only 2 of 5 studies showed impact on growth. Average effect size on weight was 0.35 and linear growth was 0.23 (5 studies).

Lancet Meta analysis of complementary feeding strategies and linear growth (web appendix 4) concluded (55):

- Educational interventions without provision of complementary foods (in food secure areas) improved HAZ by a weighted mean difference of 0.25 (3 studies).
 - Provision of food with or without education (in food insecure areas) improved HAZ by a weighted mean difference of 0.41 (7 studies).
-

2.3 Use of multiple micronutrient powders (MNPs) for home fortification of foods consumed by infants and young children 6–23 months of age

WHO RECOMMENDATION

Home fortification of foods with MNPs containing at least iron, vitamin A and zinc is recommended to improve iron status and reduce anaemia among infants and children 6–23 months of age.

A suggested scheme for home fortification with MNPs of foods consumed by infants and children aged 6–23 months is presented in Table I-4 (58).

Table I-4 Suggested scheme for home fortification with multiple micronutrient powders of foods consumed by infants and young children 6–23 months

Composition per sachet ^a	<ul style="list-style-type: none"> • Iron: 12.5 mg of elemental iron, preferably as encapsulated ferrous fumarate^b • Vitamin A: 300 µg of retinol • Zinc: 5 mg of elemental zinc, preferably as zinc gluconate
Frequency	One sachet per day
Duration and time interval between periods of intervention	At minimum, for a period of 2 months, followed by a period of 3–4 months off supplementation, so that use of micronutrient powders is started every 6 months
Target group	Infants and children 6–23 months of age, starting at the same time as weaning (complementary) foods are introduced into the diet
Settings	Populations where the prevalence of anaemia in children under 2 years or under 5 years of age is 20% or higher

^a The recommendation for the composition of the powder is based on the doses and nutrients included in the systematic review (59). In addition to iron, vitamin A and zinc, multiple micronutrient powders may contain other vitamins and minerals at currently recommended nutrient intake (RNI) doses for the target population (60).

^b 12.5 mg of elemental iron equals 37.5 mg of ferrous fumarate, 62.5 mg of ferrous sulfate heptahydrate or 105 mg of ferrous gluconate.

Rationale and evidence

In lower-income settings, children's diets may be primarily plant-based. A lack of animal-source foods in these settings results in insufficient amounts of key micronutrients such as vitamin A, zinc, and iron, to meet the recommended intakes for children less than 24 months of age. WHO estimates globally that 190 million preschool children are vitamin A deficient (61) and more than two thirds of children are anaemic in Africa and south-east Asia. Infants and young children are also most susceptible to the harmful consequences of these deficiencies. A compromised immune 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 (62).

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 (63). The MNPs were developed as an alternative to supplementation and have shown to be successful in reducing anaemia and iron deficiency in young children in a variety of contexts as they can be added directly to food (64, 65). MNPs are frequently packaged in small sachets which are temperature and moisture resistant (66), giving them a long shelf-life and easing transportation and storage problems (67). These characteristics reduce the frequency of distribution necessary to maintain a supply of micronutrients (68).

Mild side effects can occur with supplementation, such as darkened stools, gastrointestinal pain, diarrhoea, constipation and vomiting (69). Though MNPs do not eliminate these side effects, they do appear to reduce their frequency and severity and are highly acceptable (70). Iron is covered in a fat-based protective coating so that the taste, colour and aroma of food change minimally without greatly affecting children's dietary habits. The fortification of foods using MNPs 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 thus referred to as point-of-use (71).

A Cochrane systematic review assessed the effects and safety of home fortification of foods with MNPs for children under two years of age to improve health outcomes. The review compared the provision of MNPs with at minimum iron, zinc and vitamin A, versus no intervention or placebo and versus regular supplementation practice such as iron supplementation. In total eight trials including children living in a variety of settings were evaluated. When compared to no intervention, home fortification with MNPs was found to reduce anaemia by 32% and iron deficiency by 50% in infants and young children. The intervention seemed as effective as daily iron supplementation for anaemia and improving haemoglobin concentrations, although the evidence is limited. The effects of MNPs did not significantly vary among populations with anaemia rates ranging from 25% to 100% or in settings where malaria is endemic.

Actions to promote home fortification of foods with MNPs for children

- An evaluation of the nutritional status of children under five should take place prior to initiating a supplementation programme with MNPs, along with any other existing measures in place to control anaemia and VAD, such as the provision of other fortified complementary foods or deworming.
- In malaria-endemic areas, the provision of iron should be implemented in conjunction with adequate measures to prevent, diagnose and treat malaria.
- Home fortification with MNPs 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, as well as steps to manage diarrhoea (72). This intervention may also serve to promote breastfeeding practices after six months of age and age-appropriate preparation of complementary foods in terms of frequency, amounts, consistency and variety.
- Home fortification with MNPs provides a single delivery of multiple micronutrients as a cost-effective approach to achieve multiple goals; however, as MNPs are a relatively new approach, programmes including home fortification with MNPs may require high-level coordination and commitment, as well as a communication component to raise awareness (73, 74).

2.4 Vitamin A supplementation for children under five years of age

WHO RECOMMENDATION

In settings where vitamin A deficiency is a public health problem, vitamin A supplementation is recommended in infants and children 6–59 months of age as a public health intervention to reduce child morbidity and mortality. A suggested vitamin A supplementation scheme for infants and children 6–59 months of age is presented in Table I-5 (75).

Table I-5 Suggested vitamin A supplementation scheme for infants and children 6–59 months of age

Target group	Infants 6–11 months of age (including HIV+)	Children 12–59 months of age (including HIV+)
Dose	100 000 IU (30 mg RE) vitamin A	200 000 IU (60 mg RE) vitamin A
Frequency	Once	Every 4–6 months
Route of administration	Oral liquid, oil-based preparation of retinyl palmitate or retinyl acetate ^a	
Settings	Populations where the prevalence of night blindness is 1% or higher in children 24–59 months of age or where the prevalence of VAD (serum retinol 0.70 µmol/l or lower) is 20% or higher in infants and children 6–59 months of age	

IU, international units; RE, retinol equivalent.

^a An oil-based vitamin A solution can be delivered using soft gelatin capsules, as a single-dose dispenser or a graduated spoon (76). Consensus among manufacturers to use consistent colour coding for the different doses in soft gelatin capsules, namely red for the 200 000 IU capsules and blue for the 100 000 IU capsules, has led to much improved training and operational efficiencies in the field.

Rationale and evidence

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 (77). 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 (78). The role of vitamin A in immunity may also affect the susceptibility and/or severity of other infections (79, 80).

Many countries have integrated vitamin A supplementation for infants and children into national health policies and routine health services, for example through biannual "special days" where supplementation is combined with other child survival interventions such as deworming or nutrition education (81, 82). Vitamin A supplements are also commonly distributed as part of the Expanded Programme on Immunization, particularly at nine months with measles vaccinations. In 2009, approximately 77% of preschool children were estimated to have received two doses of supplements per year in more than 103 priority countries (83).

Provision of a high dose of vitamin A every six months until the age of five years has been based on the principle that a single high dose of vitamin A is highly absorbed, stored as a fat-soluble vitamin 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 in children 12–59 months of age 200 000 IU have been considered to provide adequate protection for 4 to 6 months (84). 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 cases (85). 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 (86), with an estimated cost of US\$ 1 to US\$ 2 for delivery per child per year. The total cost of supplementation per death averted is estimated at US\$ 200 to US\$ 250 (87).

Two Cochrane reviews were recently updated to systematically evaluate the most recent evidence on vitamin A supplementation in children (77, 88). The first examined the effects and safety of vitamin A supplementation for the prevention of morbidity and mortality among children 6–59 months of age (77). Results of the review 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 data on all-cause mortality. The data suggest that periodic vitamin A supplementation of HIV-infected children over six months of age is beneficial in reducing overall mortality risk.

Actions to promote 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 groups (usually six months to three years) or regions at greatest risk of VAD, xerophthalmia, and nutritional blindness (81).

Vitamin A supplements should be delivered to children 6–59 months of age twice yearly, during health system contacts. Where appropriate, supplements should be integrated into other public health programmes aimed at improving child survival, such as polio or measles national immunization days, or biannual child health days delivering a package of interventions such as deworming, distribution of insecticide-treated mosquito nets and immunizations (82). The dose should be marked on the child health card.

Prior to implementation, a vitamin A supplementation programme should include well-defined objectives that take into account available resources, existing policies, appropriate delivery and communication channels, and potential stakeholders and suppliers. Ideally, interventions should be implemented as part of an integrated strategy that includes control of nutritional deficiencies; the programme should begin as a pilot and be scaled up as the evidence grows and resources allow (81).

2.5 Vitamin A supplementation in children with measles

WHO RECOMMENDATION

All children diagnosed with measles should receive one dose of a vitamin A supplement.¹ Children from areas of known vitamin A deficiency or where measles case fatality is likely to be more than 1% should receive 2 doses of vitamin A supplements, given 24 hours apart, to help prevent eye damage and blindness. Vitamin A supplements have been shown to reduce the number of deaths from measles by 50%.

The recommended age-specific doses are:

- 50 000 IU for infants aged less than 6 months
- 100 000 IU for infants aged 6 to 11 months
- 200 000 IU for children \geq 12 months.

If the child has clinical signs of vitamin A deficiency (such as Bitot's spots), a third dose should be given 4–6 weeks later (81).

Rationale and evidence

VAD contributes to delayed recovery and to the high rate of post-measles complications. In addition, measles infection may precipitate acute VAD and xerophthalmia. As a result, measles accounts for a large proportion of preventable childhood blindness, particularly in Africa.

The beneficial impact of two doses of vitamin A during treatment of measles is well established. WHO's current policy advocates administering vitamin A to all acute cases. A high dose of vitamin A is given immediately on diagnosis and repeated the next day.

Even in countries where measles is not usually severe, vitamin A should be given to all cases of severe measles.

2.6 Daily iron supplementation for children 6 to 23 months old

WHO RECOMMENDATION

Infants have higher iron requirements in comparison with other age groups because they grow very rapidly. They are normally born with good iron stores. However, beyond six months of age the iron content of milk is not sufficient to meet many infants' requirements, and unfortified complementary foods are usually low in iron, making this age group susceptible to iron deficiency. LBW infants are born with fewer iron stores and thus are at higher risk of developing iron deficiency at a younger age. Where the diet does not include fortified foods, or prevalence of anaemia in children at approximately 1 year of age is severe (above 40%), supplements of iron at a dosage of 2 mg/kg of body weight per day should be given to all children between 6 and 23 months of age. (See Table I-6.) (89)

¹ See also newly released *Pocketbook of hospital care for children: guidelines for the management of common childhood illnesses*. 2nd edition, Geneva, WHO, 2013.

Table I-6 Guidelines for iron supplementation for children 6-23 months of age

Age group	Indication of supplementation	Dosage schedule	Duration
Children from 6 to 23 months of age	Where the diet does not include foods fortified with iron or where anaemia prevalence is above 40%	Iron 2 mg/kg of body weight/day	From 6 to 23 months of age, for 3 months duration

Rationale and evidence

Iron supplementation has traditionally been given on a daily basis. However, several studies suggest that it can 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. Intermittent doses once, twice or three times per week (90) on non-consecutive days may be an alternative to daily supplementation to improve iron stores and prevent anaemia (91).

A Cochrane systematic review assessed the benefits and safety of intermittent iron supplementation with iron, or iron combined with other micronutrients for children up to the age of 12 years (90). A total of 23 randomized controlled trials were included in the review that compared providing iron supplements to either no intervention, receiving a placebo or daily iron supplementation with the same nutrients among children living in various geographical settings, including malaria-endemic regions. Intermittent iron supplementation in this age group effectively increased haemoglobin concentrations and prevented anaemia when compared with 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 tended to be higher among children receiving intermittent compared to daily supplementation.

For guidelines on intermittent supplementation of children 24 to 59 months, see (92).

Actions to promote iron supplementation for children (93)

- Children under two years of age who are diagnosed with anaemia should be targeted and treated with 3 mg of iron per kg of body weight daily supplementation until haemoglobin concentrations return to normal (89).
- In malaria-endemic areas, the provision of iron supplements should be implemented in conjunction with adequate measures to prevent, diagnose and treat malaria (94).
- In areas where hookworm prevalence is 20% or greater, iron supplementation may be more effective when combined with anthelmintic treatment on an annual basis (95).
- 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 handwashing and diarrhoea case management (96).
- The current WHO recommendations for iron supplementation of young children are based on the known physiology of iron metabolism as well as clinical practices at the time the recommendations were formulated, and apply to otherwise healthy children.
- Numerous efficacy trials have demonstrated that it is possible to significantly reduce the prevalence of iron deficiency with iron supplementation or food fortification.
- In cases of severe undernutrition, iron supplementation should be delivered in accordance with WHO guidelines which state that supplementation be withheld until the acute problems related to infection have been effectively treated, and growth has resumed.
- While iron deficiency is frequently the primary factor contributing to anaemia, it is important to recognize that the control of anaemia requires a multisectoral approach.

2.7 Zinc supplementation for diarrhoea management

WHO RECOMMENDATION

Mothers and other caregivers should provide children with 20 mg per day of zinc supplementation for 10–14 days (10 mg per day for infants under 6 months of age) (97, 98, 99).

Rationale and evidence

A continuing lack of safe water and sanitation in many parts of the world means that diarrhoea remains a leading cause of death among infants and young children in low- and middle-income countries (100). Every year more than one 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 (101, 102, 103, 104).

Oral rehydration is a well-known and relatively simple treatment approach (105, 106, 107, 108, 109, 110, 111). Oral rehydration salts (ORS), and particularly the low osmolarity formula, are a proven life-saving commodity for the treatment of children with diarrhoea. Use of zinc supplements with ORS to treat children with diarrhoea reduces deaths in children less than five years of age (112). Zinc for the treatment of diarrhoea reduces diarrhoea mortality by 23% (113) and is associated with a 14–15% reduction in incidence of pneumonia or diarrhoea (114). Use of zinc supplements has been found to reduce the duration and severity of diarrhoeal episodes and the likelihood of subsequent infections for two to three months (115, 116, 117, 118). At the recommended dose zinc supplements are generally accepted by both children and caregivers and are effective regardless of the type of zinc salt used (119, 120). 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 (121, 122, 123, 124). Zinc is an essential micronutrient and protects cell membranes from oxidative damage (125). It is also important for normal growth and development of children both with and without diarrhoea (126, 127, 128). Zinc 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 (125, 129, 130, 131). 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 (132, 133).

Actions to promote use of zinc as part of diarrhoea treatment (134)

Policy issues will need to be resolved in order to remove barriers to scaling-up. These include:

- empowering community level workers to manage pneumonia with antibiotics as well as use of zinc in diarrhoea case management;
- improving outreach and service linkages with communities to raise immunization coverage; and
- considering use of new vaccine delivery devices or use of more heat-stable vaccines.

Although the benefits of zinc supplementation in the management of diarrhoea have been established (135), a number of barriers to the widespread implementation of this strategy remain (136) and have to be addressed, for example:

- dissemination of information and advocacy with physicians and health workers in developing countries;
- integration of the use of zinc for diarrhoea treatment in national policies;
- ensuring availability of zinc for diarrhoea in sufficient quantities or as an appropriate formulation for children;

- regulation for appropriate marketing and distribution of drugs by private sector retailers, to avoid distribution of drugs through the private market, where more expensive and ineffective treatments may be provided (e.g. antibiotics or anti-motility agents for diarrhoea rather than ORS and zinc);
- reaching private practitioners through their associations, for them to be strong allies for appropriate care when included in awareness-raising and educational activities.

At implementation level a comprehensive package of interventions should be promoted to prevent and treat diarrhoea and pneumonia, including preventive water, sanitation and hygiene practices, zinc, ORS, exclusive breastfeeding and vaccines.

2.8 Reaching optimal iodine nutrition in young children

WHO RECOMMENDATION

WHO and UNICEF recommend iodine supplementation for young children in countries where less than 20% of households have access to iodized salt, until the salt iodization programme is scaled up. Countries with household access to iodized salt between 20% and 90% should make efforts to accelerate salt iodization or assess the feasibility of increasing iodine intake in the form of a supplement or iodine-fortified foods by the most susceptible groups.

The doses recommended for children 6 to 23 months of age are 90 µg/d as a daily supplement or 200 mg/year in a single annual dose of iodized oil.

For children 0 to 6 months of age, iodine supplementation should be given through breast milk. This implies that the child is exclusively breastfed and that the lactating mother received iodine supplementation as recommended (137).

Rationale and evidence

Based on new evidence and lessons learned within the last decade, it appears that the groups most susceptible to iodine deficiency, including children less than two years of age, might not be adequately covered by iodized salt where Universal Salt Iodization (USI) is not fully implemented. This situation may jeopardize the optimal brain development of the fetus and young child.

Irrespective of where countries, or areas within countries, are categorized with regard to USI, there are specific situations, such as in emergencies, among displaced people and geographically remote areas, where iodized salt may not be accessible. In these specific situations, increasing iodine intake should be provided in the form of iodine supplements for pregnant and lactating women, and a supplement or complementary food fortified with iodine for children 6–23 months of age.

The figures for iodine supplements are for situations where complementary food fortified with iodine is not available.

Actions to promote optimal iodine nutrition in young children

Countries in this group will need to assess the feasibility of increasing iodine intake in the form of a supplement or iodine-fortified foods by the most susceptible groups, as described in the following programmatic steps.

- Assess population iodine nutrition status, household iodized salt coverage (preferably disaggregated) and salt iodization programmes in order to identify a national or sub-national problem.
- Develop new plans to strengthen salt iodization that include increasing political commitment, advocacy, capacity-building of the salt industry for production and quality assurance, adoption and enforcement of appropriate regulations/legislation, and an effective iodized salt monitoring system at production (or importation), retail and community levels.

- If a country does not succeed in scaling-up its salt iodization programme within two years, the feasibility of increasing the iodine intake of susceptible groups by means of supplements or iodine-fortified foods will need to be explored as a temporary measure while strengthening the salt iodization programme in areas of moderate and severe iodine deficiency.
- Assessing the feasibility of providing additional iodine should include: (i) costing of supplementation, (ii) existing channels for distribution to reach the target groups, (iii) likely duration of supplementation, and (iv) potential compliance.

2.9 Management of children with severe acute malnutrition (SAM)

WHO RECOMMENDATION FOR IDENTIFICATION OF SAM

WHO and UNICEF recommend the use of a cut-off for weight-for-height of below -3 standard deviations (SD) of the WHO standards to identify infants and children as having SAM. Children with bilateral pitting oedema are also considered as having SAM.

Mid-upper arm circumference (MUAC) can be used as an independent criterion for identification of children 6–60 months old with SAM, with the cut-off point of 115 mm (138).

Rationale and evidence

Children below -3 SD of the WHO standards for weight-for-height have a highly elevated risk of death compared to those who are above. These children have a higher weight gain when receiving a therapeutic diet compared to other diets, which results in faster recovery. There are no known risks or negative effects associated with therapeutic feeding of these children applying recommended protocols and appropriate therapeutic foods.

WHO standards for MUAC-for-age show that in a well-nourished population there are very few children aged 6–60 months with a MUAC less than 115 mm. Children with a MUAC less than 115 mm have a highly elevated risk of death compared to those who are above.

WHO RECOMMENDATION FOR OUTPATIENT MANAGEMENT OF CHILDREN WITH SAM

Children 6 months or older with SAM, appetite and no medical complications can be managed in the community with regular visits to a health centre. (138, 139)

Rationale and evidence

New evidence suggests that large numbers of children with SAM can be treated in their communities without being admitted to a health facility or a therapeutic feeding centre.

The community-based approach involves timely detection of SAM 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 and regular medical monitoring at a health facility. If properly combined with a facility-based approach for those malnourished children with medical complications or below six months of age and implemented on a large scale, community-based management of SAM could prevent the deaths of hundreds of thousands of children (139).

SAM in children can be identified in the community before the onset of complications by CHWs or volunteers using simple coloured plastic strips that are designed to measure MUAC. They can also be trained to recognize bilateral oedema of the feet, another sign of this condition.

Uncomplicated forms of SAM should be treated in the community using an RUTF until adequate weight has been gained. 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 and need to be regularly monitored for danger signs of deterioration (140).

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. RUTF have a similar nutrient composition to F100, which is the therapeutic diet used in hospital settings, except for its iron content. 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, 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 hospital for continuing care in the community.

Evidence shows that RUTF home/outpatient therapy is successful (141, 142, 143), and that the production of RUTF spreads is easy and safe in most settings worldwide (144). For this reason, WHO developed international standards for the manufacturing of RUTF which give guidance for local production; these include detailed nutrition composition and safety measures.

WHO RECOMMENDATION FOR INPATIENT MANAGEMENT OF CHILDREN WITH SAM

Children 6 months or older with SAM, no appetite or with medical complications should be hospitalized for inpatient management (138).

Rationale and evidence

While the figures on SAM show worrying trends, the implementation of the developed WHO protocol for facility-based management of SAM has improved the quality of hospital care.

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 health systems could benefit from this type of management. When treated in the community, children are less at risk of acquiring hospital infections. Family members caring for the malnourished child can spend less time away from home, and thus the opportunity cost of treatment is reduced. Health systems could reduce costs since hospitals would admit fewer cases and keep them for shorter stays, and potentially increase coverage rates (145, 146, 147). Evidence suggests that with capacity built for inpatient, outpatient care and follow-up after discharge, case fatality rates can be as low as 5%, both in the community and in health facilities.

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 child mortality.

Actions for appropriate inpatient management of children with SAM

Appropriate therapy

A manual was developed by WHO in 1999 (148) to provide practical guidelines for the management of patients – mainly children below five years of age – with severe malnutrition in hospitals and health centres.¹ 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:

- **Stabilization phase:** for children with SAM and medical complications, life-threatening problems are identified and treated in a hospital or a residential care facility, specific deficiencies are corrected, metabolic abnormalities are reversed and therapeutic feeding is begun (F75).² The protocol includes treatment of hypoglycaemia, hypothermia, dehydration with or without septic shock, and severe anaemia, as well as the correction of electrolyte imbalances, treatment of infection and the correction of micronutrient deficiencies (while excluding iron).³

¹ This manual is currently being updated.

² A special formula for treatment of malnourished children (as is F100).

³ Iron may be dangerous because transferrin levels are reduced and can become toxic because of reduced capacity of the liver to metabolize.

- *Transition phase:* with the return of the child's appetite and reduced oedema, therapeutic feeding is moved from F75 to F100 or RUTF. Additionally, routine antibiotic therapy is continued during this phase.
- *Rehabilitation phase:* when a child is ready for rehabilitation, he can be referred for outpatient care if available, otherwise rehabilitation should be done as inpatient. The correction of the electrolyte imbalance is continued, iron is included in the correction of micronutrient deficiencies, therapeutic feeding (F100 or RUTF) 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 and for prevention of relapse.
- *Follow-up:* after discharge, the child and the child's family should be seen regularly to prevent relapse and assure catch up growth, and sustained mental, emotional and physical development of the child. The latter consists of continued support to the mother for appropriate infant and young child feeding practices and for home-based play activities. When this is done, the risk of death can be substantially reduced and the opportunity for full recovery greatly improved. Follow-up should also be an opportunity to assure appropriate feeding practices and mental and physical stimulation for other children in the family.

Training of health staff

A training course on hospital-based care of severely malnourished children was developed based on the WHO manual cited above (148) and is currently being updated. It responds to the urgent need to reduce paediatric deaths related to severe acute malnutrition in many developing countries and is intended for health personnel working at central and district levels, including physicians, nurses and nutritionists (149).

The training course for health staff incorporates instructions on medical and nutritional care for children with SAM in a hospital setting, but also instructions for group counselling sessions and for emotional and physical stimulation activities 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.

2.10 Management of children with moderate acute malnutrition

WHO RECOMMENDATION

A technical note has been developed that summarizes existing knowledge and presents principles on the dietary management of children with moderate acute malnutrition (150).

- **Management of moderate acute malnutrition in children 6–59 months of age should include ENAs such as breastfeeding promotion and support, education and nutrition counselling for families, and other activities that identify and prevent the underlying causes of malnutrition, including nutrition insecurity. Interventions to improve food security include the provision of conditional or non-conditional cash transfers and support to agriculture, such as crop diversification.**
- **Children 6–59 months of age with moderate acute malnutrition need to receive nutrient-dense foods to meet their extra needs for weight and height gain and functional recovery.**

Rationale and evidence

Moderate acute malnutrition in children is defined as a weight-for-height between -3 and -2 z-scores of the median of the WHO child growth standards without oedema. Globally, about 40 million preschool-age children meet these criteria.

The dietary management of children with moderate acute malnutrition is based on the optimal use of locally available foods to improve nutritional status and prevent SAM. Nutrient-dense foods enable children to consume and maximize the absorption of nutrients in order to fulfill their

requirements for energy and all essential nutrients. Animal-source foods are more likely to meet the amino acid and other nutrient needs of recovering children. Plant-source foods, in particular legumes or a combination of cereals and legumes, also have high-quality proteins, although they also contain some anti-nutrients such as phytates, tannins or inhibitors of digestive enzymes, which may limit the absorption of some micronutrients, particularly minerals.

In situations of food shortage, or where some nutrients are not sufficiently available through local foods, supplementary foods have been used to treat children with moderate acute malnutrition.

Currently there are no evidence-informed recommendations on the composition of supplementary foods used to treat children with moderate acute malnutrition (150). Further research is required on the composition, acceptability and use of supplementary foods for the treatment of moderate acute malnutrition for the future development of WHO guidelines.

2.11 Nutritional care and support of HIV-infected children 6 months to 14 years old

WHO RECOMMENDATION

Children living with HIV should be assessed, classified and managed according to a nutrition care plan to cover their nutrient needs associated with the presence of HIV and nutritional status and to ensure appropriate growth and development (151).

Rationale and evidence (151)

Although the severe nutritional consequences of HIV infection in adults and children have been recognized for many years, gaps remain in the evidence base for defining effective interventions to prevent and treat HIV-associated malnutrition in resource-constrained settings. As a result, the development and implementation of guidelines on how best to offer nutritional care to HIV-infected children has lagged. The delivery of such care has also been compromised by service provider's heavy work burden and need for training, recurring staff losses and weakened health care systems in HIV-affected settings.

In 2004 WHO commissioned a technical review of the nutritional requirements of adults and children infected with HIV as an evidence-base for the development of nutritional care guidelines. These were presented at the WHO technical consultation on Nutrition and HIV/Acquired immunodeficiency syndrome (AIDS) held in Durban in April 2005, where participants called for urgent action to "*Develop practical nutrition assessment tools and guidelines for home, community, health facility-based and emergency programmes*".

HIV-infected children deserve special attention because of their additional needs to ensure growth and development and their dependency on adults for adequate care, including nutrition care and support for treatment. This is of particular importance in light of the recommendation to start treatment as soon as possible in infected children and the fact that nutrition plays an important role in support to ARV treatment.

Actions for an integrated approach to the nutritional care of HIV-infected children

The guidelines for an integrated approach to the nutritional care of HIV-infected children provide orientation on how to integrate nutritional care into the integrated care of the HIV-infected child; that orientation is summarized in three sections and ten steps:

Section 1. Assess, classify and decide a nutrition care plan.

Step 1. Assess and classify the child's growth, observing and measuring the child, using MUAC for classification of severe malnutrition and referral, weight-for-height z-score or weight-for-age z-score, according to the WHO growth standards (up to five years) and WHO growth references (from five years onward).

Step 2. Assess the child's nutritional needs to decide nutritional care plan (A when child is growing appropriately, B when there is poor weight gain or a condition with increased nutritional needs, and C in severe malnutrition).

Step 3. Decide a nutrition care plan.

Section 2. Implement the nutrition care plan.

Step 4. What does the child eat and drink? With the information the child is classified as serious poor food intake, poor food intake or food intake adequate.

Step 5. Discuss who gives the child his/her food and how the child eats, classifying the child as with caregiving not stable or caregiving stable.

Step 6. Assess if there is food and income at home, leading to the following classifications: financially supported, no financial support, serious food shortage, food shortage.

Step 7. Discuss exercise and avoiding risk factors for malnutrition.

Step 8. Decide if to refer and when to review.

Section 3. Children with special needs.

Step 9. The HIV-infected child with special needs (for example poor appetite, diarrhoea, anaemia).

Step 10. Children on ARV treatment.

2.12 Nutritional care and support during emergencies

SUMMARY OF WHO RECOMMENDATIONS FOR EMERGENCIES

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. Traumatized 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 and 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 2100 kcal per person per day and include products fortified with vitamins and minerals. Special focus should also be on early identification and management of infants and children with acute malnutrition to prevent serious illness and death (152, 153).

Rationale and evidence

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. 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.

During emergencies, the risk of diarrhoea is exacerbated (154) 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 ORS with zinc in emergencies is a simple and cost-effective intervention which can greatly reduce the length and severity of diarrhoea, preventing severe dehydration, malnutrition and death (see section on zinc).

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 infrastructure. Transmission of illnesses such as diarrhoea, measles and pneumonia are exacerbated and lead to increased childhood mortality. Measles is especially common in emergencies and can trigger acute malnutrition and aggravate VAD to dangerous levels.

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 (138, 139, 152). 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, and the effects will be felt more quickly and may have a more deleterious impact on families affected by HIV and AIDS (152). Emergencies can also provoke and aggravate cases of chronic or acute malnutrition and micronutrient deficiencies through the impact they have on psychosocial well-being (154).

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

Actions for appropriate infant and young child feeding in emergencies (155)

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, immediate links with other sectors should be established, such as with reproductive health to provide 'safe havens' for pregnant and lactating women. These 'safe havens' should be easily-accessible areas where privacy, security and shelter are provided with access to water and food. Basic supportive care of breastfeeding mothers and their infants can be offered and peer-to-peer support nurtured.

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.

Preventing and controlling micronutrient deficiencies: Multiple vitamin and mineral supplements

The groups most vulnerable to micronutrient deficiencies are pregnant women, lactating women and young children, mainly because they have a relatively greater need for vitamins and minerals and are more susceptible to the harmful consequences of deficiencies.

When fortified rations are not being given, children aged 6 to 59 months should be given one dose each day of the micronutrient supplement shown in **Table I-7**; when fortified rations are being given, children aged 6 to 59 months should be given two doses each week of the same micronutrient supplement.

Table I-7 The composition of multiple micronutrient supplements for children from 6 to 59 months of age, designed to provide the daily recommended intake of each nutrient (one RNI)

Micronutrient	Content ^a
Vitamin A µg	400
Vitamin D µg	5
Vitamin E mg	5
Vitamin C mg	30
Thiamine (vitamin B1) mg	0.5
Riboflavin (vitamin B2) mg	0.5
Niacin (vitamin B3) mg	6.0
Vitamin B6 mg	0.5
Vitamin B12 µg	0.9
Folic acid µg	150.0
Iron mg	10.0
Zinc mg	4.1
Copper mg	0.56 ^b
Selenium µg	17.0
Iodine µg	90.0

^a (156)

^b (157)

Furthermore, vitamin A supplements should continue to be given to young children and mothers post-partum according to existing recommendations. 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 VAD and the severity of potential measles infection (see section on vitamin A).

Breastfeeding and appropriate complementary feeding should also continue to be promoted actively. The multiple micronutrient supplements should be given until the emergency is over and access to nutrient-rich foods is restored.

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. In countries that recommend EBF with ARVs for HIV-infected mothers, the recommendation should remain unchanged, even if ARVs are temporarily not available. Where the HIV status of the mother is unknown or if she is known to be HIV negative, early initiation and EBF for the first 6 months, continuation of breastfeeding into the second year of life or beyond, and nutritionally adequate and safe complementary feeding for children 6–23 months is recommended, as for the general population.

In countries that recommend formula feeding for the infants of HIV-infected mothers, great care should be taken to ensure that Code-compliant infant formula is available only for those infants who need it. National authorities and/or the authority managing the emergency should establish whether the recommendation for formula feeding is still appropriate given the circumstances. For further guidance, consult the latest WHO recommendations and United Nations guidelines (158).

3. Intervention targeted at women of reproductive age

3.1 Intermittent iron and folic acid supplementation in menstruating women

WHO RECOMMENDATION

Intermittent iron and folic acid supplementation is recommended as a public health intervention in menstruating women living in settings where anaemia is highly prevalent, to improve their haemoglobin concentrations and iron status and reduce the risk of anaemia.

A suggested scheme for intermittent iron and folic acid supplementation in menstruating women is presented in Table I-8 (159).

Table I-8 Suggested scheme for intermittent iron and folic acid supplementation in menstruating women

Supplement composition	Iron: 60 mg of elemental iron; Folic acid: 2800 µg (2.8 mg)
Frequency	One supplement per week
Duration and time interval between periods of supplementation	3 months of supplementation followed by 3 months of no supplementation after which the provision of supplements should restart If feasible, intermittent supplements could be given throughout the school or calendar year
Target group	All menstruating adolescent girls and adult women
Settings	Populations where the prevalence of anaemia among non-pregnant women of reproductive age is 20% or higher

^a 60 mg of elemental iron equals 300 mg of ferrous sulfate heptahydrate, 180 mg of ferrous fumarate or 500 mg of ferrous gluconate.

Rationale and evidence

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 (89, 160). Despite its proven efficacy, supply and distribution of daily systems can be costly and logistically complicated. Lack of supply of affordable supplements may limit the success of many supplementation programmes (161, 162, 163). Another challenge is the occurrence of mild side effects, such as darkened stools, gastrointestinal pain, diarrhoea, constipation and vomiting (69).

Intermittent supplementation, though not eliminating side effects, reduces their frequency and possibly their severity compared to daily supplementation (68, 164, 165, 166, 167). Intermittent iron supplementation is the provision of iron supplements once, twice or three times a week on non-consecutive days (168). The rationale behind the intervention is that there is a limit to the iron absorption capacity of the intestine. Intermittent dosing may be as effective as daily supplementation because similar amounts of iron would reach the blood and tissues under both strategies (169, 170, 171). Intermittent supplementation has been shown to improve iron status more than no supplementation and, in many cases, it is as effective at improving iron status as daily supplementation (172, 173).

A Cochrane systematic review assessed the evidence behind the benefits and safety of intermittent iron supplementation on anaemia and other health outcomes (168). 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 supplements given daily to women after menarche. The results showed that women who were taking intermittent iron supplements, alone or combined with other micronutrients, had higher haemoglobin and ferritin concentrations and were less likely to develop anaemia than those not receiving the supplement.

However, in comparison with daily supplementation, women receiving supplements intermittently presented anaemia more frequently.

Actions to promote iron supplementation for menstruating women

- Intermittent iron and folic acid supplementation is a preventive strategy for implementation at population level. If a woman is diagnosed as having anaemia in a clinical setting, she should be treated with daily iron (120 mg of elemental iron) and folic acid (400 µg or 0.4 mg) supplementation until her haemoglobin concentration rises to normal. She can then switch to an intermittent regimen to prevent recurrence of anaemia (159).
- 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 (174, 175).
- Once pregnancy is confirmed, women should be encouraged to attend 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 supplements in resource-limited settings where the greatest number of at-risk women and girls are found (63).
- 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.

4. Interventions targeted at pregnant women

4.1 Daily supplementation with iron and folic acid for women during pregnancy

WHO RECOMMENDATION

Daily oral iron and folic acid supplementation is recommended as part of antenatal care to reduce the risk of low birth weight, maternal anaemia and iron deficiency (176).

A suggested scheme for daily iron and folic acid supplementation in pregnant women is presented in Table I-9.

Table I-9 Suggested scheme for daily iron and folic acid supplementation in pregnant women

Supplement composition	Iron: 30–60 mg of elemental iron ^a Folic acid: 400 µg (0.4 mg)
Frequency	One supplement daily
Duration	Throughout pregnancy. Iron and folic acid supplementation should begin as early as possible
Target group	All pregnant adolescents and adult women
Settings	All settings

^a 30 mg of elemental iron equals 150 mg of ferrous sulfate heptahydrate, 90 mg of ferrous fumarate or 250 mg of ferrous gluconate.

Rationale and evidence

It is estimated that 41.8% of pregnant women worldwide are anaemic (177). At least half of this anaemia burden is assumed to be due to iron deficiency (178), with the rest due to other conditions such as folate, vitamin B12 or vitamin A deficiencies, chronic inflammation, parasitic infections and inherited disorders. A pregnant woman is considered to be anaemic if her haemoglobin concentration during the first and third trimester of gestation is lower than 110 g/l, at sea level.

Low haemoglobin concentrations indicative of moderate or severe anaemia during pregnancy have been associated with an increased risk of premature delivery, maternal and child mortality, and infectious diseases. Growth and development may also be affected, both in utero and in the long term. Conversely, haemoglobin concentrations greater than 130 g/l at sea level may also be associated with negative pregnancy outcomes such as premature delivery and low birth weight.

Interventions aimed at preventing iron deficiency and IDA in pregnancy include iron supplementation, fortification of staple foods with iron, health and nutrition education, control of parasitic infections, and improvements in sanitation. During pregnancy, women need to consume additional iron to ensure they have sufficient iron stores to prevent iron deficiency. Therefore, in most low- and middle-income countries, iron supplements are used extensively by pregnant women to prevent and correct iron deficiency and anaemia during gestation.

An existing Cochrane systematic review assessing the benefits and harms of iron supplementation in healthy pregnant women was updated to arrive at this recommendation (179). Overall, women taking daily iron supplements were less likely to have LBW babies compared with controls and the mean birth weight was 30.81 g greater for those infants whose mothers received iron during pregnancy. There was no significant effect on preterm birth or neonatal death.

Daily iron supplementation reduced the risk of maternal anaemia at term by 70% and iron deficiency at term by 57%, but it had no significant effect on the risk of infections during pregnancy.

4.2 Intermittent iron and folic acid supplementation for non-anaemic pregnant women

WHO RECOMMENDATION¹

Intermittent use of iron and folic acid supplements by non-anaemic pregnant women is recommended to prevent anaemia and improve gestational outcomes (180).

A suggested scheme for intermittent iron and folic acid supplementation in non-anaemic pregnant women is presented in Table I-10.

Table I-10 Suggested scheme for intermittent iron and folic acid supplementation in non-anaemic pregnant women

Supplement composition	Iron: 120 mg of elemental iron ^a
	Folic acid: 2800 µg (2.8 mg)
Frequency	One supplement once per week
Duration	Throughout pregnancy. Iron and folic acid supplementation should begin as early as possible
Target group	Non-anaemic ^b pregnant adolescents and adult women
Settings	Countries where prevalence of anaemia among pregnant women is lower than 20%.

^a 120 mg of elemental iron equals 600 mg of ferrous sulfate heptahydrate, 360 mg of ferrous fumarate or 1000 mg of ferrous gluconate.

^b Haemoglobin concentrations should be measured prior to the start of supplementation to confirm non-anaemic status (181).

Rationale and evidence

As mentioned in the previous section, iron requirements are increased during pregnancy to support maternal need and fetal growth. The use of daily iron and folic acid supplements throughout pregnancy has been the standard approach to cover this gap and in turn prevent and treat IDA. Despite its proven efficacy, the use of daily iron supplementation has been limited in some settings, possibly due to a lack of compliance because of common side-effects (e.g. nausea, constipation, dark stools or metallic taste), concerns about the safety of this intervention among women with an adequate iron intake, and variable availability of the supplements at community level.

Intermittent iron supplementation, that is, the provision of iron supplements once, twice or three times a week on non-consecutive days, has thus been proposed as an alternative to daily supplementation.

A Cochrane systematic review (182) assessing the benefits and harms of intermittent supplements of iron alone or in combination with folic acid or other vitamins and minerals in pregnant women on neonatal and pregnancy outcomes found that there was no detectable difference between women taking iron supplements intermittently and those receiving daily supplements with regard to maternal anaemia at term, the risk of having a low-birth-weight or preterm baby or mortality.

Fewer side-effects were reported in women receiving intermittent rather than daily iron and folic acid supplements. High haemoglobin concentrations (more than 130 g/l) during the second and third trimester of pregnancy were also less frequent among women using supplements intermittently. The intervention seems to be equally effective among populations with different prevalences of anaemia, and in settings described as malaria endemic, and regardless of whether the supplementation was initiated earlier or later than 20 weeks of gestation or whether the dose of elemental iron per week was lower or higher than 120 mg.

If a woman is diagnosed with anaemia at any time during pregnancy, she should be given daily iron (120 mg of elemental iron) and folic acid (400 µg or 0.4 mg) until her haemoglobin concentration

¹ Note that this recommendation is for settings with lower prevalence of anaemia than the recommendation for daily supplementation.

rises to normal. She can then switch to the standard antenatal dose to prevent recurrence of anaemia.

Actions to promote the use of iron supplementation in pregnant women

In settings where anaemia in pregnant women is a severe public health problem (40% or higher), a daily dose of 60 mg of elemental iron is preferred over a lower dose.

If a woman is diagnosed with anaemia at any time during pregnancy, she should be given daily iron (120 mg of elemental iron) and folic acid (400 µg or 0.4 mg) until her haemoglobin concentration rises to normal. She can then switch to the standard antenatal dose to prevent recurrence of anaemia.

The implementation of intermittent supplementation among non-anaemic pregnant women may require a strong health system to facilitate confirmation of non-anaemic status prior to the start of supplementation and to monitor anaemia status throughout pregnancy.

In malaria-endemic areas, iron and folic acid supplementation programmes should be implemented in conjunction with measures to prevent, diagnose and treat malaria during pregnancy.

An iron supplementation programme may form part of an integrated programme of antenatal and neonatal care that promotes adequate gestational weight gain, screening of all women for anaemia at antenatal and postpartum visits, use of complementary measures to control and prevent anaemia (e.g. hookworm control), and a referral system to manage cases of severe anaemia.

4.3 Vitamin A supplementation in pregnant women

WHO RECOMMENDATION

In areas where there is a severe public health problem related to VAD,¹ vitamin A supplementation during pregnancy is recommended for the prevention of night blindness (183).

A suggested vitamin A supplementation scheme is presented in Table I-11.

Table I-11 Suggested vitamin A supplementation scheme in pregnant women for the prevention of night blindness in areas with a severe public health problem related to vitamin A

Target group	Pregnant women
Dose	Up to 10 000 IU vitamin A (daily dose) OR
	Up to 25 000 IU vitamin A (weekly dose)
Frequency	Daily or weekly
Route of administration	Oral liquid, oil-based preparation or retinyl palmitate or retinyl acetate
Duration	A minimum of 12 weeks during pregnancy until delivery
Settings	Populations where the prevalence of night blindness is 5% or higher in pregnant women or 5% or higher in children 24–59 months of age

IU, international unit

Rationale and evidence

Worldwide, approximately 1000 women die every day from complications related to pregnancy or childbirth (185). VAD also remains a public health problem among women, affecting an estimated 19 million pregnant women (184), with the highest burden found in the WHO regions of Africa and South-East Asia. During pregnancy, vitamin A is essential for the health of the mother as

¹ Determination of vitamin A deficiency as a public health problem involves estimating the prevalence of deficiency in a population by using specific biochemical and clinical indicators of vitamin A status. Classification of countries based on the most recent estimates is available in (184).

well as for the health and development of the fetus. This is because vitamin A is important for cell division, fetal organ and skeletal growth and maturation, maintenance of the immune system to strengthen defences against infections, and development of vision in the fetus as well as maintenance of maternal eye health and night vision. Thus, there is an increased need for vitamin A during pregnancy, although the additional amount required is small and the increased requirement is limited to the third trimester. The prevalence of night blindness (as a consequence of VAD) is more common in the third trimester of pregnancy, and populations with a prevalence $\geq 5\%$ are considered to have a significant public health problem. It is currently estimated that 9.8 million pregnant women are affected by night blindness worldwide.

According to two Cochrane systematic reviews, assessing the effects and safety of vitamin A supplementation in pregnant women (186, 187), it reduced the risk of maternal night blindness (one trial) and there was no difference in total fetal loss, rates of stillbirth and neonatal deaths between women given vitamin A compared with controls.

After an analysis of currently available evidence, WHO published a guideline indicating that vitamin A supplementation is not recommended during pregnancy as part of routine antenatal care for the prevention of maternal and infant morbidity and mortality. The use of a supplement is only recommended for the prevention of night blindness when there is a severe public health problem related to vitamin A, as indicated in the recommendation quoted above.

Other interventions such as dietary diversification and food fortification can be used along with vitamin A supplementation to improve vitamin A intakes. Pregnant women should be encouraged to receive adequate nutrition, which is best achieved through consumption of a healthy balanced diet.

4.4 Calcium supplements in pregnant women

WHO RECOMMENDATION

Supplementation of pregnant women with 1.5 to 2.0 grams of elemental calcium per day is recommended in areas where dietary calcium intake is low and for women at high risk of developing hypertensive disorders during pregnancy (188, 189).¹

The recommended dose is of three tablets three times per day, preferably with meals, for the duration of the pregnancy to achieve daily intake of 1.5 grams of elemental calcium.

Rationale and evidence

Pre-eclampsia is a hypertensive disorder that develops in approximately 5% of all pregnancies, usually after about 20 weeks gestation (190). 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 retardation and possibly early delivery. Especially in lower-income settings, hypertensive disorders are the leading cause of infant mortality (191). Pre-eclampsia may also cause serious outcomes for the 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 (192). Calcium supplements may reduce the chance of developing pre-eclampsia, especially in high-risk women, as well as those who do not consume sufficient

¹ Women are regarded as being at high risk of developing hypertension and pre-eclampsia if they have one or more of the following risk factors: obesity, previous pre-eclampsia, diabetes, chronic hypertension, renal disease, autoimmune disease, multiple pregnancy, and either adolescent or late pregnancy. This is not an exhaustive list, but can be adapted/complemented based on the local epidemiology of pre-eclampsia (see 189).

quantities of calcium in their diet (193, 194, 195, 196, 197). Recent studies have supported this hypothesis, although there have been some inconsistencies in the strength and public health applications of the associations (198, 199). In addition, the possible biological actions of prenatal calcium supplementation are not completely understood.

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 (200). 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 (201).

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 for pregnant women range from 1000 to 1300 mg per day, according to age group, with an upper limit set at 2500 mg/day (202). Although providing extra calcium supplements to prevent hypertensive disorders is relatively inexpensive and accessible, large doses of > 500 mg/day are less efficiently absorbed and may inhibit the absorption of other necessary micronutrients such as iron, zinc, magnesium and phosphorus (203, 204).

According to a recent Cochrane systematic review, supplementation with at least 1 g of calcium is associated with significantly lower risk of pregnant women developing pre-eclampsia and preterm birth among women with low calcium intakes. However, the public health implications for this intervention are not completely clear. Another recent study determined that calcium supplementation in pregnant women with low calcium intakes may not necessarily benefit maternal bone health (205). Conflicting evidence exists on the benefits of maternal calcium supplementation on the blood pressure of their offspring (206, 207, 208).

In summary, as indicated in the most recent WHO guidelines, there is clear evidence to show that daily supplementation with 1.5 to 2 g of elemental calcium is beneficial to reduce the risks of gestational hypertension, pre-eclampsia and preterm birth (189).

4.5 Reaching optimal iodine nutrition in pregnant and lactating women

WHO RECOMMENDATION

WHO and UNICEF recommend iodine supplementation for pregnant and lactating women in countries where less than 20% of households have access to iodized salt, until the salt iodization programme is scaled up. Countries with a household access to iodized salt between 20% and 90% should make efforts to accelerate salt iodization or assess the feasibility of increasing iodine intake in the form of a supplement or iodine fortified foods by the most susceptible groups (137).

Table I-12 shows the recommended daily or annual doses of iodine when supplementation is needed.

Table I-12 WHO-recommended dosages of daily and annual iodine supplementation

Population Group	Daily dose of iodine supplement (µg/day)	Single annual dose of iodized oil supplement (mg/year)
Pregnant women	250	400
Lactating women	250	400
Women of reproductive age (15–49 years)	150	400

Rationale and evidence

Based on new evidence and lessons learned within the last decade, it appears that pregnant and lactating women might not be adequately covered by iodized salt where USI is not fully implemented. This situation may jeopardize the optimal brain development of the fetus and young child.

Irrespective of where countries, or areas within countries, are categorized with regard to USI, there are specific situations, such as in emergencies, among displaced people and geographically remote areas, where iodized salt may not be accessible. In these specific situations, increasing iodine intake should be provided in the form of iodine supplements for pregnant and lactating women, and a supplement or complementary food fortified with iodine for children 6–23 months of age.

In cases where it is difficult to reach pregnant women, supplementation to all women of reproductive age is advised.

Actions to promote optimal iodine nutrition in pregnant and lactating women

The actions summarized in the section on iodine in young children, pages 30–31, apply to pregnant and lactating women.

4.6 Nutrition care and support for pregnant women during emergencies¹ (152)

WHO RECOMMENDATION

See page 36 for recommendation.

Rationale and evidence

During pregnancy and lactation, women's nutritional needs for energy, protein and micronutrients significantly increase. Pregnant women require an additional 285 kcals/day, and lactating women require an additional 500 kcals/day. Both pregnant and lactating women have increased needs for micronutrients. Adequate intake of iron, folate, vitamin A and iodine are particularly important for the health of both women and their infants.

Intra-household food distribution practices in many situations result in pregnant and lactating women consuming less than their minimum requirements. The consequences of poor nutritional status and inadequate nutritional intake for women during pregnancy and lactation not only directly affect the women's health status but may have a negative impact on infant birth weight and early development. Therefore, to meet the additional requirements of pregnancy and lactation, complementary interventions may be undertaken in addition to the provision of a basic food ration.

Appropriate complementary actions to meet the additional needs of pregnant and lactating women in emergencies (152)

Fortified food commodities²

Fortified blended food commodities are designed to provide 10%–12% (up to 15%) of energy from protein and 20%–25% energy from fat. The blended food must be fortified to meet two thirds of daily requirements for all micronutrients, particularly iron, folic acid and vitamin A. The food commodities can be provided through maternal and child health structures (in conjunction with other health services) or through blanket supplementary feeding programmes.

¹ The earlier section on infant and young child feeding in emergencies includes actions that also apply to pregnant and lactating women, including the recommendation.

² The food should be provided in addition to the basic general ration, either through the same mechanism as the general ration distribution or through maternal and child health facilities as a blanket supplementary feeding ration. The food should be targeted to women in their second and third trimesters of pregnancy and during the first six months of the lactating period (i.e. for a total period of 12 months).

Preventing and controlling micronutrient deficiencies: multiple vitamin and mineral supplements

The groups most vulnerable to micronutrient deficiencies are pregnant and lactating women and young children, mainly because they have a relatively greater need for vitamins and minerals and are more susceptible to the harmful consequences of deficiencies. For a pregnant woman these include a greater risk of dying during childbirth, or of giving birth to an underweight or mentally-impaired baby. For a lactating mother, her micronutrient status determines the health and development of her breastfed infant, especially during the first six months of life.

One way to meet the recommended daily intake of micronutrients is to provide foods fortified with micronutrients. Fortified foods, such as corn-soya blend, biscuits, vegetable oil enriched with vitamin A and iodized salt, are usually provided as part of food rations during emergencies. The aim is to avert micronutrient deficiencies or prevent them from getting worse among the affected population. Such foods must be appropriately fortified, taking into account the fact that other unfortified foods will meet a share of micronutrient needs. However, foods fortified with micronutrients may not meet fully the needs of certain nutritionally vulnerable subgroups such as pregnant and lactating women. For this reason UNICEF and the WHO have developed the daily multiple micronutrient formula shown in **Table I-13** to meet the RNI of these vulnerable groups during emergencies.

Table I-13 Composition of multiple micronutrient supplements for pregnant and lactating women, designed to provide the daily recommended intake of each nutrient (one RNI)

Micronutrient	Content ^a
Vitamin A µg	800.0
Vitamin D µg	5.0
Vitamin E mg	15.0
Vitamin C mg	55.0
Thiamine (vitamin B1) mg	1.4
Riboflavin (vitamin B2) mg	1.4
Niacin (vitamin B3) mg	18.0
Vitamin B6 mg	1.9
Vitamin B12 µg	2.6
Folic acid µg	600.0
Iron mg	27.0 ^b
Zinc mg	10.0
Copper mg	1.15 ^c
Selenium µg	30.0
Iodine µg	250.0 ^d

a (156)

b (209)

c (157)

d (137)

Pregnant and lactating women should be given this supplement providing one RNI of micronutrients daily, whether they receive fortified rations or not. Iron and folic acid supplements, when already provided, should be continued.

Drinking water

Women are ensured access to sufficient drinking water (extra 1 litre of clean water per day).

Malaria management in pregnancy

In areas where malaria is endemic, sulphadoxine-pyrimethamine can be administered through clinics at the beginning of the second and third trimesters. Encourage women to use an impregnated bed net during pregnancy. Advise women that they must seek immediate medical attention for episodes of fever.

Prophylaxis for management of intestinal parasites

Give each affected woman 500 g mebendazole in the second and the third trimester.

Nutrition education/counselling for women and communities

Nutrition education and counselling services should be established, such as with reproductive health to provide 'safe havens' for pregnant and lactating women. These 'safe havens' should be easily-accessible areas where privacy, security and shelter are provided with access to water and food. Basic supportive care of breastfeeding mothers and their infants can be offered and peer-to-peer support nurtured.

5. Global intervention

5.1 Wheat and maize flour fortification

WHO RECOMMENDATION

Wheat and maize flour fortification is a preventive food-based approach to improve micronutrient status of populations over time that can be integrated with other interventions in efforts to reduce vitamin and mineral deficiencies when identified as public health problems (210).

Table I-14 gives guidance on the amount of micronutrients to be added.

Table I-14 Average levels of nutrients to consider adding to fortified wheat flour based on extraction, fortificant compound and estimated per capita flour availability

Nutrient	Flour Extraction Rate	Compound	Level of nutrient to be added in parts per million (ppm) by estimated average per capita wheat flour availability (g/day) ^a			
			<75 ^b g/day	75–149 g/day	150–300 g/day	>300 g/day
Iron	Low	NaFeEDTA	40	40	20	15
		Ferrous Sulfate	60	60	30	20
		Ferrous Fumarate	60	60	30	20
		Electrolytic Iron	NR ^c	NR ^c	60	40
	High	NaFeEDTA	40	40	20	15
Folic Acid	Low or High	Folic Acid	5.0	2.6	1.3	1.0
Vitamin B ₁₂	Low or High	Cyanocobalamin	0.04	0.02	0.01	0.008
Vitamin A	Low or High	Vitamin A Palmitate	5.9	3	1.5	1
Zinc ^d	Low	Zinc Oxide	95	55	40	30
	High	Zinc Oxide	100	100	80	70

^a These estimated levels consider only wheat flour as main fortification vehicle in a public health programme. If other mass-fortification programmes with other food vehicles are implemented effectively, these suggested fortification levels may need to be adjusted downwards as needed.

^b Estimated per capita consumption of <75 g/day does not allow for addition of sufficient level of fortificant to cover micronutrient needs for women of childbearing age. Fortification of additional food vehicles and other interventions should be considered.

^c NR = Not Recommended because very high levels of electrolytic iron needed could negatively affect sensory properties of fortified flour.

^d These amounts of zinc fortification assume 5 mg zinc intake and no additional phytate intake from other dietary sources.

Rationale and evidence

Wheat and maize flour fortification should be considered when industrially-produced flour is regularly consumed by large population groups in a country. Wheat and maize flour fortification programmes are expected to be most effective in achieving a public health impact if mandated at the national level, and can help achieve international public health goals.

Decisions about which nutrients to add and the appropriate amounts to add to fortify flour should be based on a series of factors, including the nutritional needs and deficiencies of the population; the usual consumption profile of “fortifiable” flour (i.e. the total estimated amount of flour milled by industrial roller mills, produced domestically or imported, which could in principle be fortified); sensory and physical effects of the fortificant nutrients on flour and flour products; fortification of other food vehicles; population consumption of vitamin and mineral supplements; and costs.

Flour fortification programmes should include appropriate quality assurance and quality control programmes at mills, as well as regulatory and public health monitoring of the nutrient content of fortified foods and assessment of the nutritional and health impacts of the fortification strategies.

Though wheat and maize flours can be fortified with several micronutrients, iron, folic acid, vitamin B₁₂, vitamin A and zinc, are the five micronutrients recognized to be of public health significance in developing countries.

Other interventions with an impact on nutrition

This document has focused on health-related actions with an impact on nutrition, or what are also known as “direct nutrition interventions”. Many other health interventions and non-health related interventions outside the health sector also can have an important impact on nutrition. However, the evidence for those actions is variable and requires further elaboration, which is outside the scope of this publication. **Table I-15** provides a preliminary list of actions and **Part II** describes how some of these different types of interventions have been linked in implementation.

Table I-15 Health and non-health related interventions with an impact on nutrition

Intervention	Link
Other nutrition-related 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 (to prevent malaria and anaemia in pregnant women)	http://www.who.int/elena/titles/bednets_malaria_pregnancy/en/index.html
Properly-timed cord clamping	http://www.who.int/elena/titles/cord_clamping/en/index.html
Deworming of children and adolescents	http://www.who.int/elena/titles/deworming/en/index.html
Deworming of pregnant women	http://www.who.int/elena/titles/deworming/en/index.html
Handwashing with soap and other hygienic interventions	http://www.who.int/elena/titles/wsh_diarrhoea/en/index.html
Household water treatment and safe storage	
Community promotion of sanitation	
Non-health related interventions with an impact on nutrition	
<i>1. Agriculture and food production</i>	
Micronutrient fortification of staple foods	http://www.who.int/elena/titles/biofortification/en/index.html
Micronutrient fortification of complementary foods	
Salt iodization	http://www.who.int/elena/titles/salt_iodization/en/index.html
Water fluoridation	
Interventions to improve food security at household level	
Production of nutrient-rich foods and staple foods of the poor	
Home gardening and large-scale fruit and vegetable production	
Micronutrient-rich crop varieties (e.g. orange-flesh sweet potatoes)	
Diversified food production, and improved storage and processing of food	

Intervention	Link
Interventions to improve the nutritional quality of foods (reduction of the content of salt, fats and sugars, and elimination of trans-fatty acids)	
Agricultural activities that generate employment	
Small-scale agriculture	
Nutrition counselling integrated into agricultural extension programmes	
Women's role in agriculture supported	
<i>2. Social protection</i>	
Conditional and unconditional cash transfers	
Food aid	
<i>3. Trade</i>	
Taxation, subsidies or direct pricing to influence prices and encourage healthy eating and lifelong physical activity	
Approaches, i.e. stepwise or comprehensive, to reduce the impact of marketing of foods high in saturated fats, trans-fatty acids, free sugars or salt to children	
Provision of food in public institutions	
Implementation of the International Code of Marketing of Breast-milk Substitutes	
Information to be provided on key nutritional aspects, as proposed in the Codex Guidelines on Nutritional Labelling	
<i>4. Education</i>	
Women's primary and secondary education	
Improvement of diet and physical activity in schools	
<i>5. Labour</i>	
Support to lactating working women (through adopting and enforcing ILO Maternity Protection Convention, 2000 (No. 183) and Recommendation (No. 191)	
<i>6. Information</i>	
Conducting social marketing campaigns	
Labelling of food products	
<i>7. Water and sanitation</i>	
Improvement of water supply	
Improvement of sanitation	

References

1. WHO, UNICEF. *Baby-friendly Hospital Initiative revised, updated and expanded for integrated care*. Geneva, WHO, 2009.
2. Moore ER, Anderson GC, Bergman N. Early skin-to-skin contact for mothers and their healthy newborn infants. *Cochrane Database of Systematic Reviews*, 2009, (3):CD003519.
3. Lassi ZS, Haider BA, Bhutta ZA. Community-based intervention packages for reducing maternal and neonatal morbidity and mortality and improving neonatal outcomes. *Cochrane Database of Systematic Reviews*, 2010, (11):CD007754.
4. Edmond KM 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. *American Journal of Clinical Nutrition*, 2007, 86:1126–1131.
5. WHO, UNICEF. *Protecting, promoting and supporting breast-feeding: the special role of maternity services*. Geneva, WHO, 1989.
6. WHO. *Evidence for the ten steps to successful breastfeeding*. Geneva, WHO, 1998.
7. WHO. *Report of the expert consultation on the optimal duration of exclusive breastfeeding*. Geneva, WHO, 2001.
8. Jones G et al. How many child deaths can we prevent this year? *Lancet*, 2004, 362:65–71.
9. Kramer MS, Kakuma R. *The optimal duration of exclusive breastfeeding: a systematic review*. Geneva, WHO, 2001.
10. Butte, NF, Lopez-Alarcon MG, Garza C. *Nutrient adequacy of exclusive breastfeeding for the term infant during the first six months of life*. Geneva, WHO, 2002.
11. WHO. *Global Strategy for infant and young child feeding*. Geneva, WHO, 2001 (A54/INF.DOC/4).
12. Kramer MS, Kakuma R. Optimal duration of exclusive breastfeeding. *Cochrane Database of Systematic Reviews*, 2009, (1):CD003517.
13. Haider BA, Bhutta ZA. Breastfeeding promotion strategies and feeding practices. In: Bhutta ZA et al., *What works? Interventions for maternal and child undernutrition and survival*. *Lancet*, 2008, 371:417–440, Web appendix 1.
14. Britton C et al. Support to breastfeeding mothers (Review). *Cochrane Database of Systematic Reviews*, 2009, (4):CD001141.
15. 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.
16. WHO. *International Code of Marketing of Breast-milk Substitutes*. Geneva, WHO, 1981.
17. Nemsadze K. Report from the country of Georgia: protecting and promoting breastfeeding through regulation of artificial-feeding marketing practices. *Journal of Perinatal Education*, 2004, 13:23–28.
18. 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.
19. Sobel HL et al. Is unimpeded marketing of breast milk substitutes responsible for the decline in breastfeeding in the Philippines? An exploratory survey and focus group analysis. *Social Science & Medicine*, 2011, 73:1445–1448.
20. ILO. Chapter II: Maternity Protection. In: *Working conditions laws report 2010: a global review*. Geneva, ILO, 2010.

21. Galtry J. The impact on breastfeeding of labour market policy and practice in Ireland, Sweden, and the USA. *Social Science & Medicine*, 2003, 57:167–177.
22. Guendelman S et al. Juggling work and breastfeeding: effects of maternity leave and occupational characteristics. *Pediatrics*, 2009, 123:e38–e46.
23. ILO. *Safe maternity and the world of work*. Geneva, International Labour Office, 2007.
24. ILO et al. *Maternity protection resource package*. Geneva, ILO, 2012 (<http://mprp.ilo.org>, accessed 17 March 2013).
25. Fairbank L et al. A systematic review to evaluate the effectiveness of interventions to promote the initiation of breastfeeding. *Health Technology Assessment*, 2000, 4(25).
26. Renfrew MJ et al. Breastfeeding promotion for infants in neonatal units: a systematic review and economic analysis. *Health Technology Assessment*, 2009, 13(40):1–146, iii–iv.
27. WHO. *Evidence for the ten steps to successful breastfeeding (revised)*. Geneva, WHO, 1998.
28. Chung M et al. *Interventions in primary care to promote breastfeeding: a systematic review*. Rockville Maryland, Agency for Healthcare Research and Quality (United States), 2008.
29. DelliFraine J et al. Cost comparison of Baby Friendly and Non Baby Friendly Hospitals in the United States. *Pediatrics*, 2011, 127: e989–e994.
30. Bhutta ZA et al. What works? Interventions for maternal and child undernutrition and survival. *Lancet*, 2008, 371:417–440.
31. Giugliani ER and Victora CG. Breastfeeding promotion and infant growth. In: Bhutto Z et al., What works? Interventions for maternal and child undernutrition and survival. *Lancet*, 2008, 371:417–440 Web Appendix 2.
32. Britton C et al. Support to breastfeeding mothers (review.) *Cochrane Database of Systematic Reviews*, 2009, (4):CD001141.
33. WHO. *Guidelines on optimal feeding of low birth-weight infants in low- and middle-income countries*. Geneva, WHO, 2011.
34. WHO et al. *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 (http://www.who.int/child_adolescent_health/documents/9789241599535/en/index.html, accessed 15 May 2012).
35. WHO. *Antiretroviral drugs for treating pregnant women and preventing HIV infection in infants: recommendations for a public health approach (2010 version)*. Geneva, WHO, 2010.
36. 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.
37. 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.
38. PAHO, WHO. *Guiding principles for complementary feeding of the breastfed child*. Washington DC, PAHO and WHO, 2003.
39. 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, 24:5–28.
40. 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. *American Journal of Clinical Nutrition*, 1990, 52:1005–1013.

41. Molbak K et al. Prolonged breastfeeding, diarrhoeal disease, and survival of children in Guinea-Bissau. *BMJ*, 1994, 308:1403–1406.
42. 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, 355:451–455.
43. Onyango AW et al. Continued breastfeeding and child growth in the second year of life: a prospective cohort study in western Kenya. *Lancet*, 1999, 354:2041–2045.
44. Simondon KB et al. Breast-feeding is associated with improved growth in length, but not weight, in rural Senegalese toddlers. *American Journal of Clinical Nutrition*, 2001, 73:959–967.
45. Davis MK. Breastfeeding and chronic disease in childhood and adolescence. *Pediatric Clinics of North America*, 2001, 48:125–142.
46. Butte NF. The role of breastfeeding in obesity. *Pediatric Clinics of North America*, 2001, 48:189–198.
47. Reynolds A. Breastfeeding and brain development. *Pediatric Clinics of North America*, 2001, 48:159–172.
48. WHO. *Guiding principles for feeding non-breastfed children 6–24 months of age*. Geneva, WHO, 2005.
49. WHO et al. *Indicators for assessing infant and young child feeding practices. Part 1. Definitions*. Geneva, WHO, 2008.
50. WHO, UNICEF. *Strengthening action to improve feeding of infants and young children 6–23 months of age in nutrition and child health programmes. Geneva, 6–9 October 2008. Report of proceedings*. Geneva, WHO, 2008.
51. 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.
52. Victora CG et al. Worldwide timing of growth faltering: revisiting implications for interventions. *Pediatrics*, 2010, 125:e473–480.
53. WHO. *Complementary feeding, report of the Global Consultation, Geneva 10–13 December 2001*. Geneva, WHO, 2002.
54. Special issue based on a World Health Organization expert consultation on complementary feeding. *Food and Nutrition Bulletin*, 2003, 24(1).
55. Haider BA, Cousens S, Bhutta ZA. Meta analysis of complementary feeding strategies and linear growth. In: Bhutto Z et al., What works? Interventions for maternal and child undernutrition and survival. *Lancet*, 2008, 371:417–440 Web appendix 4.
56. 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(Suppl.1):6–34.
57. 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. *Journal of Health, Population and Nutrition*, 2008, 26:210–222.
58. WHO. *Guideline: use of multiple micronutrient powders for home fortification of foods consumed by infants and children 6–23 months of age*. Geneva, WHO, 2011.
59. De-Regil LM et al. Home fortification of foods with multiple micronutrient powders for health and nutrition in children under two years of age. *Cochrane Database of Systematic Reviews*, 2011, (9):CD008959.

60. WHO, FAO. *Vitamin and mineral requirements in human nutrition*, 2nd ed. Geneva, WHO, 2004 (<http://whqlibdoc.who.int/publications/2004/9241546123.pdf>, accessed 17 March 2013).
61. WHO. *Global health risks: mortality and burden of disease attributable to selected major risks*. Geneva, WHO, 2009.
62. WHO. *Preventing and controlling micronutrient deficiencies in populations affected by emergency*. Geneva, WHO, 2007.
63. Mora JO. Iron supplementation: overcoming technical and practical barriers. *Journal of Nutrition*, 2002, 132:853S–855S.
64. Hartman-Craven B. Relative bioavailability of iron and folic acid from a new powdered supplement compared to a traditional tablet in pregnant women. *BMC Pregnancy and Childbirth*, 2009, 9:33.
65. Zlotkin SH et al. Micronutrient sprinkles to control childhood anaemia. *Public Library of Science Medicine*, 2005, 2:e1.
66. de Pee S et al. World Food Programme; Sprinkles Global Health Initiative. Quality criteria for micronutrient powder products: report of a meeting organized by the World Food Programme and Sprinkles Global Health Initiative. *Food and Nutrition Bulletin*, 2008, 29(3):232–241.
67. Pettifor JM, Zlotkin S (eds.) Micronutrient deficiencies during the weaning period and the first years of life. *Nestle Nutrition Workshop Series Pediatric Program*. 54:233–248. Basel, Nestle Ltd., 2004.
68. 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.
69. Hyder SM et al. Do side-effects reduce compliance to iron supplementation: a study of daily- and weekly-dose regimens in pregnancy? *Journal of Health, Population and Nutrition*, 2002, 20(2):175–179.
70. Jefferds ME et al. Formative research exploring acceptability, utilization, and promotion in order to develop a micronutrient powder (Sprinkles) intervention among Luo families in western Kenya. *Food and Nutrition Bulletin*, 2010, 31(2 Suppl.):S179–S185.
71. De-Regil LM, Jefferds MED, Peña-Rosas JP. Point-of-use fortification of foods with micronutrient powders containing iron in children of preschool and school age (Protocol). *Cochrane Database of Systematic Reviews*, 2012, (2):CD009666. DOI: 10.1002/14651858.CD009666.
72. WHO, UNICEF. *Joint statement: clinical management of acute diarrhoea*. Geneva, WHO, 2004.
73. Sharieff W, Horton SE, Zlotkin S. Economic gains from a home fortification program: evaluation of “Sprinkles” from the provider’s perspective. *Canadian Journal of Public Health*, 2006, 97(1):20–23.
74. UNICEF. *Multiple micronutrient supplements to enhance foetal and infant survival, growth and development: workshop to review effectiveness trials, Bangkok 15–18 June, 2004*. New York, UNICEF, 2004.
75. WHO. *Guideline: vitamin A supplementation in infants and children 6–59 months of age*. Geneva, WHO, 2011.
76. WHO. *Model list of essential medicines – 16th list (updated)*. Geneva, WHO, 2010 (http://www.who.int/medicines/publications/essentialmedicines/Updated_sixteenth_adult_list_en.pdf, accessed 20 May 2011).

77. Imdad A et al. Vitamin A supplementation for preventing morbidity and mortality in children from 6 months to 5 years of age. *Cochrane Database of Systematic Reviews*, 2010, (12):CD008524.
78. Villamor E, Fawzi WW. Effects of vitamin A supplementation on immune responses and correlation with clinical outcomes. *Clinical Microbiology Reviews*, 2005, 3:446–464.
79. Stephensen CB. Vitamin A, infection, and immune function. *Annual Review of Nutrition*, 2001, 21:167–192.
80. Ross AC. Vitamin A supplementation and retinoic acid treatment in the regulation of antibody responses in vivo. *Vitamins and Hormones*, 2007, 75:197–222.
81. WHO, UNICEF, IVACG. *Vitamin A supplements: a guide to their use in the treatment and prevention of vitamin A deficiency and xerophthalmia*, 2nd ed. Geneva, WHO, 1997.
82. WHO, UNICEF. *Integration of vitamin A supplementation with immunization: policy and programme implications*. New York, UNICEF, 1998.
83. UNICEF. *The state of the world's children 2011*. New York, UNICEF, 2011.
84. 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*. Rome, United Nations ACC/SCN, 1987. Nutrition Policy Discussion Paper No 2.
85. Bauernfeind JC. *The safe use of vitamin A*. Washington DC, International Vitamin A Consultative Group, 1980.
86. Micronutrient Initiative. *Vitamin A: the scope of the problem*. Ottawa, Micronutrient Initiative, 2011.
87. 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.
88. Irlam JH et al. Micronutrient supplementation in children and adults with HIV infection. *Cochrane Database of Systematic Reviews*, 2010, (12):CD003650.
89. WHO. *Iron deficiency anemia: assessment, prevention, and control: a guide for programme managers*. Geneva, WHO, 2001 (http://who.int/nutrition/publications/micronutrients/anaemia_iron_deficiency/WHO_NHD_01.3/en/index.html, accessed 15 May 2013).
90. De-Regil LM et al. Intermittent iron supplementation for improving nutrition and development in children under 12 years of age. *Cochrane Database of Systematic Reviews*, 2011, (12):CD009085. DOI:10.1002/14651858.CD009085.pub2.
91. Iannotti LL et al. Iron supplementation in early childhood: health benefits and risks. *American Journal of Clinical Nutrition*, 2006, 84:1261–1276.
92. WHO. *Guideline: Intermittent iron supplementation in preschool and school-age children*. Geneva, WHO, 2011.
93. WHO, UNICEF. *Joint statement: iron supplementation of young children in regions where malaria transmission is intense and infectious disease highly prevalent*. Geneva, WHO, 2006.
94. WHO. *Global malaria report 2010*. Geneva, Global Malaria Programme, WHO, 2010.
95. IVACG, WHO, UNICEF. *Guidelines for the use of iron supplements to prevent and treat iron deficiency anaemia*. Washington DC, International Life Sciences Institute Press, 1998.
96. WHO, UNICEF. *Joint statement. Clinical management of acute diarrhoea*. Geneva, WHO, 2004.

97. WHO et al. *Implementing the new recommendation on the clinical management of diarrhoea*. Geneva, WHO, 2006.
98. WHO. *The treatment of diarrhoea: a manual for physicians and other senior health workers*. 4th rev. Geneva, WHO, 2005.
99. *WHO recommendations on the management of diarrhoea and pneumonia in HIV-infected infants and children: integrated management of childhood illness (IMCI)*. Geneva, WHO, 2010.
100. Podewils LJ et al., Acute, infectious diarrhea among children in developing countries. *Seminars in Pediatric Infectious Diseases*, 2004, 15(3):155–168.
101. Bryce J et al. WHO estimates of the causes of death in children. *Lancet*, 2005, 365(9465):1147–1152
102. Checkley W et al., Multi-country analysis of the effects of diarrhoea on childhood stunting. *International Journal of Epidemiology*, 2008, 37(4): 816–830.
103. Burton MJ, Mabey DC, The global burden of trachoma: a review. *Public Library of Science Neglected Tropical Diseases*, 2009, 3(10):e460.
104. Mathers CD, Ezzat M, Lopez AD. Measuring the burden of neglected tropical diseases: the global burden of disease framework. *Public Library of Science Neglected Tropical Diseases*, 2007, 1(2):e114.
105. Cash RA et al. A clinical trial of oral therapy in a rural cholera-treatment center. *American Journal of Tropical Medicine and Hygiene*, 1970, 19(4):653–656.
106. Mahalanabis D et al. Oral fluid therapy of cholera among Bangladesh refugees. *Johns Hopkins Medical Journal*, 1973, 132(4):197–205.
107. Mahalanabis D et al. Water and electrolyte losses due to cholera in infants and small children: a recovery balance study. *Pediatrics*, 1970, 45(3):374–385.
108. Nalin DR, Cash RA. Oral or nasogastric maintenance therapy in pediatric cholera patients. *Journal of Pediatrics*, 1971, 78(2):355–358.
109. Nalin DR et al. Oral maintenance therapy for cholera in adults. *Lancet*, 1968, 2(7564):370–373.
110. Pierce NF et al. Effect of intragastric glucose-electrolyte infusion upon water and electrolyte balance in Asiatic cholera. *Gastroenterology*, 1968, 55(3):333–343.
111. Pierce NF et al. Replacement of water and electrolyte losses in cholera by an oral glucose-electrolyte solution. *Annals of Internal Medicine*, 1969, 70(6):1173–1181.
112. WHO. *Recommendations for common childhood conditions: evidence for technical update of pocket book recommendations*. Geneva, WHO, 2012 (http://www.who.int/maternal_child_adolescent/documents/management_childhood_conditions/en/index.html, accessed 17 May 2013.)
113. Fischer Walker CL, Black RE. Zinc for the treatment of diarrhoea: effect on diarrhoea morbidity, mortality and incidence of future episodes. *International Journal of Epidemiology*, 2010, 39(Suppl 1):i63–i69.
114. Niessen L et al. Comparative impact assessment of child pneumonia interventions. *Bulletin of the World Health Organization*, 2009, 87:472–280.
115. Bhutta ZA et al. Therapeutic effects of oral zinc in acute and persistent diarrhea in children in developing countries: pooled analysis of randomized controlled trials. *American Journal of Clinical Nutrition*, 2000, 72(6):1516–1522.
116. WHO, UNICEF. *Reduced osmolarity oral rehydration salts (ORS) formulation*. New York, UNICEF, 2001.

117. Baqui AH et al. Effect of zinc supplementation started during diarrhoea on morbidity and mortality in Bangladeshi children: community randomised trial. *BMJ*, 2002, 325(7372):1059.
118. Water with sugar and salt (editorial). *Lancet*, 1978, 2(8084):300.
119. WHO et al. *Implementing the new recommendations of the clinical management of diarrhoea*. Geneva, WHO, 2006.
120. Awasthi S. Zinc supplementation in acute diarrhea is acceptable, does not interfere with oral rehydration, and reduces the use of other medications: a randomized trial in five countries. *Journal of Pediatric Gastroenterology and Nutrition*, 2006, 42(3):300–305.
121. Aggarwal R et al. Reactogenicity of a combined hepatitis A and hepatitis B vaccine in healthy Indian children and adults. *Indian Journal of Gastroenterology*, 2007, 26(5):248–249.
122. Shankar AH, Prasad AS. Zinc and immune function: the biological basis of altered resistance to infection. *American Journal of Clinical Nutrition*, 1998, 68(2 Suppl.):447S–463S.
123. Castillo-Duran C et al. Controlled trial of zinc supplementation during recovery from malnutrition: effects on growth and immune function. *American Journal of Clinical Nutrition*, 1987, 45(3):602–608.
124. Patel AB, Dhande LA, Rawat MS. Therapeutic evaluation of zinc and copper supplementation in acute diarrhea in children: double blind randomized trial. *Indian Pediatrics*, 2005, 42(5):433–442.
125. Lukacik M, Thomas RL, Aranda JV. A meta-analysis of the effects of oral zinc in the treatment of acute and persistent diarrhea. *Pediatrics*, 2008, 121:326–336.
126. Bhatnagar S, Natchu UC. Zinc in child health and disease. *Indian Journal of Pediatrics*, 2004, 71(11):991–995.
127. Fischer Walker CL, Ezzati M, Black RE. Global and regional child mortality and burden of disease attributable to zinc deficiency. *European Journal of Clinical Nutrition*, 2009, 63(5):591–597.
128. Black RE, Sazawal S. Zinc and childhood infectious disease morbidity and mortality. *British Journal of Nutrition*, 2001, 85(Suppl.2):S125–129.
129. Gebhard RL et al. The effect of severe zinc deficiency on activity of intestinal disaccharidases and 3-hydroxy-3-methylglutaryl coenzyme A reductase in the rat. *Journal of Nutrition*, 1983, 113(4):855–859.
130. Bhan MK, Bhandari N. The role of zinc and vitamin A in persistent diarrhea among infants and young children. *Journal of Pediatric Gastroenterology and Nutrition*, 1998, 26(4):446–453.
131. Prasad AS. Discovery of human zinc deficiency and studies in an experimental human model. *American Journal of Clinical Nutrition*, 1991, 53(2):403–412.
132. Aggarwal R, Sentz J, Miller MA. Role of zinc administration in prevention of childhood diarrhea and respiratory illnesses: a meta-analysis. *Pediatrics*, 2007, 119(6):1120–1130.
133. Haider BA, Bhutta ZA. The effect of therapeutic zinc supplementation among young children with selected infections: a review of the evidence. *Food and Nutrition Bulletin*, 2009, 30(1Suppl.):S41–S59.
134. WHO, UNICEF. *End preventable deaths: Global Action Plan for Prevention and Control of Pneumonia and Diarrhoea*. Geneva, WHO, 2013 (http://www.who.int/maternal_child_adolescent/documents/global_action_plan_pneumonia_diarrhoea/en/index.html, accessed 17 May 2013).

135. Lazzerini M, Ronfani L. Oral zinc for treating diarrhoea in children. *Cochrane Database of Systematic Reviews*, 2008, (3):CD005436.
136. Santosham M et al. Progress and barriers for the control of diarrhoeal disease. *Lancet*, 376(9734):63–67.
137. WHO, UNICEF. *Reaching optimal iodine nutrition in pregnant and lactating women and young children. Joint Statement by the World Health Organization and the United Nations Children's Fund*. Geneva, WHO, 2007.
138. WHO, UNICEF. *WHO child growth standards and the identification of severe acute malnutrition in infants and children: a joint statement by WHO and United Nations Children's Fund*. Geneva, WHO, 2009.
139. WHO et al. *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, WHO, 2007.
140. Collins S et al. Key issues in the success of community-based management of severe malnutrition. *Food and Nutrition Bulletin*, 2006, 27(3):S49–S82.
141. 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.
142. Manary M, Sandige H. Home-based therapy for severe malnutrition with ready-to-use food. *Archives of Disease in Childhood*, 2004, 89:557–561.
143. Sandige H et al. 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.
144. 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–S89.
145. Collins S et al. Management of severe acute malnutrition in children. *Lancet*, 2006, 368:1992–2000.
146. Ashworth A. Efficacy and effectiveness of community-based treatment of severe malnutrition. *Food and Nutrition Bulletin*, 2006, 27(3):S24–S48.
147. Collins S. Changing the way we address severe malnutrition during famine. *Lancet*, 2001, 358(9280):498–501.
148. WHO. *Management of severe malnutrition: a manual for physicians and other health workers*. Geneva, WHO, 1999.
149. WHO. *Training course on the management of severe malnutrition*. Geneva, WHO, 2002.
150. WHO. *Technical note: supplementary foods for the management of moderate acute malnutrition in infants and children 6–59 months of age*. Geneva, WHO, 2012.
151. WHO. *Guidelines for an integrated approach to the nutritional care of HIV-infected children (6 months–14 years): preliminary version for country introduction*. Geneva, WHO, 2009.
152. WHO et al. *Food and nutrition needs in emergencies*. Rome, World Food Programme, 2002.
153. WHO. *Communicable diseases and severe food shortage: technical note*. Geneva, WHO, 2010 (http://www.who.int/diseasecontrol_emergencies/publications/food_shortage/en/index.html, accessed 16 May 2013).

154. WHO. *Mental health and psychosocial wellbeing among children in severe food shortage situation*. Geneva, WHO, 2006 (http://www.who.int/nutrition/publications/emergencies/WHO_MSD_MER_06.1/en/, accessed 16 May 2013).
155. Infant Feeding in Emergencies Core Group. *Operational guidance for emergency relief staff and programme managers*. Geneva, Infant Feeding in Emergencies Core Group, 2007 (<http://www.enonline.net/pool/files/ife/ops-guidance-2-1-english-010307-with-addendum.pdf>, accessed 15 May 2013).
156. FAO, WHO. *Vitamin and mineral requirements in human nutrition*, 2nd ed. Geneva, WHO, 2005.
157. FAO, IAEA, WHO. *Trace elements in human nutrition and health*. WHO, Geneva, 1996.
158. WHO. *Humanitarian health action: technical guidelines in emergencies* (<http://www.who.int/hac/techguidance/en/>, accessed 27 March 2013).
159. WHO. *Guideline: intermittent iron and folic acid supplementation in menstruating women*. Geneva, WHO, 2011.
160. 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.
161. Yip R. Prevention and control of iron deficiency: policy and strategy issues. *Journal of Nutrition*, 2002, 132:802S–805S.
162. Galloway R, McGuire J. Determinants of compliance with iron supplementation: supplies, side effects, or psychology? *Social Science & Medicine*, 1994, 39(3):381–390.
163. Galloway R et al. Women's perceptions of iron deficiency and anemia prevention and control in eight developing countries. *Social Science & Medicine*, 2002, 55(4):529–544.
164. Viteri FE, Ali F, Tujague J. Long-term weekly iron supplementation improves and sustains nonpregnant women's iron status as well or better than currently recommended short-term daily supplementation. *Journal of Nutrition*, 1999, 129:2013–2020.
165. Angeles-Agdeppa I et al. Weekly micronutrient supplementation to build iron stores in female Indonesian adolescents. *American Journal of Clinical Nutrition*, 1997, 66:177–183.
166. Agarwal KN et al. Anemia prophylaxis in adolescent school girls by weekly or daily iron-folate supplementation. *Indian Pediatrics*, 2003, 40:296–301.
167. Shobha S, Sharada D. Efficacy of twice weekly iron supplementation in anemic adolescent girls. *Indian Pediatrics*, 2003, 40:1186–1190.
168. Fernández-Gaxiola AC, De-Regil LM. Intermittent iron supplementation for reducing anaemia and its associated impairments in menstruating women. *Cochrane Database of Systematic Reviews*, 2011, (12):CD009218. DOI:10.1002/14651858.CD009218.pub2.
169. O'Neil-Cutting MA, Crosby WH. Blocking of iron absorption by a preliminary oral dose of iron. *Archives of Internal Medicine*, 1987, 147:489–491.
170. 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. *Journal of Laboratory and Clinical Medicine*, 1958, 52:335–355.
171. Ekstrom ECM. Supplementation for nutritional anemias. In: Ramakrishnan U. ed. *Nutritional Anemias*. Boca Raton Florida, CRC Press, 2000, pp. 129–151.
172. Allen LH. Iron supplements: scientific issues concerning efficacy and implications for research and programs. *Journal of Nutrition*, 2002, 132:813S–819S.
173. Mozaffari-Khosravi H et al. Once weekly low-dose iron supplementation effectively improved iron status in adolescent girls. *Biological Trace Element Research*, 2010, 135:22–30.

174. WHO. *Adolescent friendly health services: an agenda for change*. Geneva, WHO, 2002.
175. UNICEF et al. *Packages of interventions: family planning, safe abortion care, maternal, newborn and child health*. Geneva, WHO, 2010.
176. WHO. *Guideline: daily iron and folic acid supplementation in pregnant women*. Geneva, WHO, 2012.
177. WHO, CDC. *Worldwide prevalence of anaemia 1993–2005*. WHO Global Database on Anaemia. Geneva, WHO, 2008 (http://whqlibdoc.who.int/publications/2008/9789241596657_eng.pdf, accessed 17 March 2013).
178. WHO, UNICEF, UNU. *Iron deficiency anaemia assessment, prevention, and control: a guide for programme managers*. Geneva, WHO, 2001 (http://www.who.int/nutrition/publications/en/ida_assessment_prevention_control.pdf, accessed 17 March 2013).
179. Peña-Rosas et al. Daily oral iron supplementation during pregnancy. *Cochrane Database of Systematic Reviews*, 2012, (12):CD004736. DOI:10.1002/14651858.CD004736.pub4.
180. WHO. *Guideline: intermittent iron and folic acid supplementation in non-anaemic pregnant women*. Geneva, WHO, 2012.
181. WHO. *Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity*. Vitamin and Mineral Nutrition Information System. Geneva, WHO, 2011 (WHO/NMH/NHD/MNM/11.1) (<http://www.who.int/vmnis/indicators/haemoglobin.pdf>, accessed 17 March 2013).
182. Peña-Rosas JP et al. Intermittent oral iron supplementation during pregnancy. *Cochrane Database of Systematic Reviews*, 2012, (7):CD009997 (<http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD009997/abstract;jsessionid=A5BF5B426BB3CC5F1A34A77EA7235009.d02t02>, accessed 18 March 2013).
183. WHO. *Guideline: vitamin A supplementation in pregnant women*. Geneva, WHO, 2011.
184. WHO. *Global prevalence of vitamin A deficiency in populations at risk 1995–2005*. WHO Global Database on vitamin A deficiency. Geneva, WHO, 2009 (http://whqlibdoc.who.int/publications/2009/9789241598019_eng.pdf, accessed 17 March, 2013).
185. WHO et al. *Trends in maternal mortality: 1990 to 2008*. Geneva, WHO, 2010 (http://whqlibdoc.who.int/publications/2010/9789241500265_eng.pdf, accessed 17 March 2013).
186. Van den Broek N et al. Vitamin A supplementation during pregnancy for maternal and newborn outcomes. *Cochrane Database of Systematic Reviews*, 2011, (1):CD004073.
187. Rumbold A et al. Vitamin supplementation for preventing miscarriage. *Cochrane Database of Systematic Reviews*, 2011, (1):CD004073
188. Calcium supplementation during pregnancy to prevent pre-eclampsia and its complications. In: *WHO recommendations for prevention and treatment of pre-eclampsia and eclampsia*. Geneva, WHO, 2011.
189. WHO. *Calcium supplementation in pregnant women*. Geneva, WHO, 2013.
190. 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.
191. Villar J et al. Preterm delivery syndrome: the unmet need. *Research and Clinical Forums*, 1994, 16:9–39.
192. Brinceno-Perez C et al. Prediction and prevention of preclampsia. *Hypertension in Pregnancy*, 2009, 28:138–155.

193. Hofmeyr GJ et al. Calcium supplementation during pregnancy for preventing hypertensive disorders and related problems. *Cochrane Database of Systematic Reviews*, 2010, (8):CD001059.
194. Kumar A et al. Calcium supplementation for the prevention of pre-eclampsia. *International Journal of Gynecology and Obstetrics*, 2009, 104:32–36.
195. Hofmeyr GJ et al. Dietary calcium supplementation for prevention of pre-eclampsia and related problems: a systematic review and commentary. *BJOG: An International Journal of Obstetrics and Gynaecology*, 2007, 14:933–943.
196. Villar J et al. World Health Organization randomized trial of calcium supplementation among low calcium intake pregnant women. *American Journal of Obstetrics and Gynecology*, 2006, 194:639–649.
197. Belizan JM, Villar J. The relationship between calcium intake and edema, proteinuria, and hypertension-gestosis: an hypothesis. *American Journal of Clinical Nutrition*, 1980, 33:2202–2210.
198. Villar J, Belizan JM. Same nutrient, different hypotheses: disparities in trials of calcium supplementation during pregnancy. *American Journal of Clinical Nutrition*, 2000, 71:1375S–1379S.
199. Levine RJ. Letter to the editor. *Journal of the American Medical Association*, 1997, 278:1147.
200. 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, (2):CD007079.
201. 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.
202. Standing Committee on the Scientific Evaluation of Dietary Reference Intakes, Food and Nutrition Board. *Dietary reference intakes for calcium, phosphorus, magnesium, vitamin D and fluoride*. Washington DC, Institute of Medicine, 1997.
203. Whiting SJ, Wood RJ. Adverse effects of high-calcium diets in humans. *Nutrition Reviews*, 1997, 55:1–9.
204. Hallberg L et al. Calcium and iron absorption: mechanism of action and nutritional importance. *European Journal of Clinical Nutrition*, 1992, 46:317–327.
205. Jarjou LMA et al. Effect of calcium supplementation in pregnancy on maternal bone outcomes in women with low calcium intake. *American Journal of Clinical Nutrition*, 2010, 92:450–457.
206. Hawkesworth S et al. Effect of maternal calcium supplementation on offspring blood pressure in 5- to 10-y-old rural Gambian children. *American Journal of Clinical Nutrition*, 2010, 92:741–747.
207. Hatton DC et al. Gestational calcium supplementation and blood pressure in the offspring. *American Journal of Hypertension*, 2003, 16:801–805.
208. Belizan JM et al. Long term effect of calcium supplementation during pregnancy on the blood pressure of offspring: follow-up of a randomised controlled trial. *BMJ*, 1997, 315:281–285.
209. Institute of Medicine. *Food and Nutrition Board Dietary reference intakes. Application in dietary assessment. A report of the Subcommittee on Interpretation and uses of dietary reference intakes and the Standing Committee on the Scientific Evaluation of Dietary Reference Intakes*. Washington DC, National Academic Press, 2001.
210. WHO et al. *Joint statement: wheat and maize flour fortification: practical recommendations for national application*. (no place, no date).

Part II

Effectiveness of large-scale nutrition programmes: evidence and implications

The purpose of Part II of this document is to show how some of the essential nutrition actions described in Part I have been implemented in large-scale programmes in various settings, briefly state what the outcomes have been, and examine the evidence for attribution of changes in nutritional outcomes to programme activities. Some background on the evolution of programmatic evidence is given, and implications for the future are drawn. Additionally, there is a section describing findings from cash transfer programmes.

1. The evolution of evidence for the effects of nutrition interventions, 1960–2010

Systematic scientific studies of the nature and causes of malnutrition in children and mothers in low-income societies were brought into early focus by Scrimshaw and colleagues (1), based largely on work in Central America. A number of prospective studies, of which one of the most influential was conducted in Narangwal, India (2), established that nutrition interventions were efficacious in contributing to child health, survival, growth and development. The authors of a synthesis of ten such studies (3) concluded that health and nutrition interventions do have a positive impact on children's nutrition.

Primary health care, as conceived at the Alma Ata conference (4), included nutrition interventions, as did Child Survival programmes (5) and similar initiatives, as brought together at the World Summit for Children (6). These interventions were bundled (e.g. UNICEF's GOBI-FFF – growth monitoring, oral rehydration, breastfeeding, immunization, female education, family spacing and food supplements) and applied on a large scale, but evaluations of impact were scarce. The evidence for designing effective programmes continued to be based primarily on the efficacy of individual interventions in experimental conditions.¹ A few large-scale programmes which started in the 1980s, such as the Tamil Nadu Integrated Nutrition Programme (TINP) supported by the World Bank, and the Iringa Joint Nutrition Support Programme (JNSP), supported by UNICEF and WHO, were carefully monitored, and the evidence continues to be relevant.

A considerable variety of interventions have been regarded as part of nutrition programmes (and many are also included in health-related programmes, such as the Integrated Management of Childhood Illness – IMCI (7)). The content ranged from feeding programmes and behavioural change, to immunization and medical interventions. The scope of this review was set by considerations of efficacy studies, and experience of programmes either defined as strictly nutrition, or with substantial nutrition components or objectives. For example, the *Lancet* nutrition series (8) evaluated 20 separately-defined interventions. As described in **Part I** of this document, an independent but similar set of ENAs may be grouped as addressing general nutrition, micronutrients and disease control. The main routes or platforms for interventions targeting mothers and young children are community based, usually linked to health facilities (or government outreach activities), and/or campaigns such as child health days/weeks. Cash transfer programmes, conditional or unconditional (CCTs or CTs) have recently increased in coverage and importance in addressing health and nutrition problems; usually they constitute programmes (or platforms) themselves, with conditionality linked to health, nutrition and education (see later section).

Evidence for the impact of nutrition actions from experimental studies (i.e. efficacy trials) has shown that child (and less often maternal) nutritional status can benefit from direct interventions (9, 10, 11). However, scaling-up based on efficacy results requires caution, as operational programmes have different conditions than efficacy trials, and priority should be given to evaluating effectiveness under operational conditions. This approach requires alternative, rigorous methods, beyond randomized trials (12), that have so far rarely been applied and carried through.

While a number of large-scale programmes were undertaken starting in the 1970s (see **Table II-1**), only a few included impact evaluation. Programme development continued without a solid evidence base, both as large-scale investments from the World Bank (e.g. in Bangladesh, Madagascar and Senegal), and as development of national programmes (e.g. in Thailand and Vietnam). The Thailand programme was developed after rejecting conventional externally-driven

¹ Effectiveness refers to estimated changes in outcome (e.g. child nutritional status) in large-scale operational programmes; and efficacy to changes in outcome estimated to be attributable to the intervention under controlled conditions.

Table II-1 Programmes included in reviews of effectiveness

Programme	Publi- cation	Gwatkin (3)	Berg (15)	ACC/ SCN (16)	ACC/SCN (17)	Mason (21)	UNICEF/ ADB (18 & 19)	WB/ UNICEF (21)	DCP2 (61)	WB (23)	Lancet (11)	WB (28)	Part II	Annex 3
	Year ^a	(80)	(81)	(91)	(96)	(00)	(01)	(03)	(06)	(06)	(06)	(10)	(12)	
Rural Guatemala 1, 2	(59-77)	Y	Y											
Imesi Nigeria	(69-77)	Y	Y											
North Peru	(62-67)	Y	Y											
Etimsgut, Turkey	(65)	Y	Y											
Narangwal, Punjab, India	(68-73)	Y	Y											
Jamblad, India	(71-)	Y	Y											
Hanover, Jamaica	(73-)	Y	Y											
Kavar, Iran	(73)	Y	Y											
Botswana Drought Relief	(82-88)			Y										
Costa Rica, NNHCP, HSDP	(74-)			Y		Y			Y		Y			
Gambia, Health/ Nutrition	(89)			Y							Y			
Ghana, Weaning Foods	(86-)			Y										
India, ICDS1	(90-97)			Y	Y	Y	Y	Y					Y	C
India, ICDS2	(93-01)					Y	Y	Y	Y		Y	Y	Y	C
India, TINP 1+II	(80-89)			Y	Y	Y	Y	Y	Y	Y	Y		Y*	C
Indonesia, UPGK	(79-)			Y	Y	Y			Y	Y	Y		Y*	C
Indonesia, CHN3	(93-01)												Y	
Peru, Copaca	(89)			Y										
Philippines, Price Subsidy	(83-86)			Y										
Philippines, BIDANI	(78-)			Y		Y	Y	Y			Y		Y	C
Philippines, ECD									Y		Y	Y	Y	C
Tanzania, JNSP Iringa	(84-88)			Y	Y	Y		Y	Y	Y	Y		Y*	C

Programme	Publi- cation	Gwatkin (3)	Berg (15)	ACC / SCN (16)	ACC/SCN (17)	Mason (21)	UNICEF/ ADB (18 & 19)	WB/ UNICEF (21)	DCP2 (61)	WB (23)	Lancet (11)	WB (28)	Part II		Annex 3
													(80)	(81)	
Tanzania, CSD	Year* (85-95)			Y	Y	Y		Y	Y	(06)	Y	(10)	Y		
Tanzania, IMCI												Y	Y		
Tanzania, HSDP2	(00-)														
Thailand, Health/ Nutrition	(82-)		Y	Y	Y	Y			Y	Y	Y			Y*	C
Brazil, Food supplement	(76)				Y										
Brazil, Child Pastoral Programme	(83)										Y		Y	Y	C
Brazil, IMCI												Y	Y		
Brazil, BA (CCT)													Y	Y	
Brazil, BFP (CCT)													Y	Y	
Zimbabwe, Supplementary Food Production	(81-)				Y				Y						
Bangladesh, BINP	(95-02)					Y	Y		Y	Y	Y	Y	Y*	Y*	C
Bangladesh, NNP	(04-07)										Y			Y	C
Bangladesh, BRAC									Y						
Bangladesh, HNPSP	(07-10)													Y	
Cambodia							Y								
Pakistan, LHWs	(94-)						Y						Y	Y	C
Vietnam, Health/ Nutrition							Y					Y	Y*	Y*	C
Sri Lanka, Thriposha and others							Y								
Madagascar, Secaline	(93-97)							Y				Y	Y	Y	C
Madagascar, Seecaline	(99-03)							Y		Y	Y	Y	Y*	Y*	C

Programme	Publi- cation	Gwatkin (3)	Berg (15)	ACC/ SCN (16)	ACC/SCN (17)	Mason (21)	UNICEF/ ADB (18 & 19)	WB/ UNICEF (21)	DCP2 (61)	WB (23)	Lancet (11)	WB (28)	Part II		Annex 3
													(80)	(81)	
Madagascar, Linkages	Year ^a										Y				
Mexico, Oportunidades	(97-)								Y	Y		Y		Y	C
Honduras, AIN-C									Y	Y	Y			Y	C
Jamaica, Community Health Aides									Y						
Ethiopia, Linkages											Y				
Ethiopia, PSNP (Food Aid)												Y		Y	
Ethiopia, CBN	(08-)													Y*	C
Senegal, CNP	(96-)										Y	Y		Y	C
Senegal, NEP	(02-)										Y	Y		Y*	C
Mauritania	(99-05)										Y				
Colombia, CCT												Y			
Nicaragua, community health									Y	Y		Y			
Nicaragua, CCT												Y		Y	
Ghana, CB programme	(99)										Y				
India, Woman & Child Development											Y				
Colombia, FA	(02-)													Y	C

^a - after year means programme is continuing at the time of writing. No data were available for some programmes.

Y* had enough data to estimate change in outcome (underweight, ppts/year) and intensity as CHWs/1000 or \$/child per year

C: case study done, provided in Annex 3.

plans (13). The drive to proceed in the relative absence of positive evaluation results was widely noted, for example by Save the Children-UK (14). (This programme is discussed later.)

Evaluations and assessments of operational programmes gradually built up from findings from large-scale programmes as they expanded from the 1980s on. Based on this development, some 61 projects, mostly large scale, have been reviewed (see **Table II-1**), representing most of the programmes considered relevant over about the last 30 years. Some of the early projects, such as the Narangwal study, tended towards efficacy trials, and they provide a basis for later work. Reviews by Gwatkin and colleagues (3) and Berg (15) drew on the same projects, and were significant in catalysing the expansion of large-scale programmes starting in the 1980s (16). Eleven commissioned country case studies provided additional information (17). A regional planning project sponsored by the Asian Development Bank and UNICEF assessed programmes in seven Asian countries (18, 19). An assessment of nutritional trends associated with nine programmes (20) was carried out as part of the *Combating malnutrition: time to act study* (21), which included four in-depth country investigations. The review was extended to include estimates of resources (intensity, as resources/head per year), coverage, outcomes and other key factors, for 15 programmes (22). A World Bank report (23), quoting many of the projects listed in **Table II-1**, referred to “short routes to improving nutrition”, meaning direct interventions as opposed to changing context (e.g. education, income).

The *Lancet* nutrition series (11) contains many of the efficacy results reported in **Part I**, as well as drawing on a number of the same set of established large-scale projects in **Table II-1** (24). Nonetheless, the paucity of rigorous effectiveness evaluations of large-scale programmes was highlighted by the comprehensive *Lancet* exercise. The World Bank sponsored re-evaluation in at least two cases – for Bangladesh (25) and Madagascar (26), as well as an evaluation of their Senegal programme (27). The Independent Evaluation Group published a synthesis of 28 evaluations (some large-scale, some experimental) (28). This review failed to elicit a clear pattern of activities linked to impact. However, it did not include estimates of intensity of resource use, which is likely to account for some differences. It acknowledged the likely impact of a number of the programmes reviewed, and where feasible estimated effect sizes. (This relation between input levels – ‘intensity’ – and size of effect has been rarely examined until recently.)

Several external agencies, such as the World Bank, the United States Agency for International Development, the Swedish International Development Agency and UNICEF supported these programmes. The reviews that synthesized these experiences (**Table II-1**) relied mainly on implementation and management aspects, since few evaluation data were available.

2. What do we need to know?

The actual impact in large-scale operational, multi-component programmes depends not just on the efficacy (hence, potential impact) of individual interventions, e.g. counselling on feeding practices. It also depends on the means by which these are provided (platforms or routes), the resource use, the context, and the interactions with other activities and factors. Without these it is difficult to interpret diverse results, as noted above (28). Not just interventions, but the routes by which people participate need consideration.

The evidence from large-scale programmes should be combined with efficacy to reach generalizable conclusions concerning the evidence and its interpretation, as well as its application to possible designs and resourcing of strengthened, scaled-up or new programmes intended to accelerate improvement of nutrition in children and women in low- and middle-income countries. Direct estimation of impact from some form of randomized assignment to treatment groups has virtually never proved feasible in national or large-scale programmes. Estimates of effectiveness at this scale depend on evaluation designs that attempt to extract likely net change attributable to an intervention by a variety of methods, often described as quasi-experimental (including natural experiments). Probably the only near-national programme that deliberately assigned the population to treatment or comparison groups was the *Progres/Oportunidades* programme in Mexico (29).

The development over time of large-scale maternal and child nutrition programmes (e.g. as measured by growth or BMI) was significantly interrupted by a move towards micronutrient programmes, which were largely run outside mainstream maternal and child activities. For instance, iodized salt was usually a separate programme, and VAD was mainly addressed through intermittent high dose capsule distribution in child health campaigns and/or immunization activities. Iron supplementation was linked to regular programmes, but generally has not achieved much outreach or impact. In the last decade, priorities have moved towards a more balanced and integrated approach. However, the data available on large-scale programmes cannot distinguish possible effects of different components on general nutrition (measured by anthropometry), although in principle micronutrient effects could be estimated when there are data (e.g. for anaemia).

Programmes should not be seen as simply an additive combination of single components (or separate interventions). Very often, multiple interventions can be expected to modify each other's effects.¹ Resources may not be additive: once a system is working, the mix of interventions can be flexible, and the marginal costs of adding activities lowered (within reason, without overwhelming the front-line worker). Key questions – of resource intensity and programme quality, coverage, context, and platforms or routes by which individuals are in contact with overall combined programme activities – are only recently being estimated as crucial determinants of outcome (22, 23, 24). This part of the document aims to stress the effectiveness of multi-component, large-scale, operational programmes, and to be useful for decisions on policies and programmes; in fact, the evaluation results appear adequate to contribute to such decisions (see Habicht and colleagues (30) on matching evaluation designs to decision needs).

¹ These interactions can be either direction: as examples, controlling diarrhoea would be expected to make feeding programmes more effective; measles immunization would lead to vitamin A supplements having less impact on measles mortality.

3. The impact on whom is being estimated?

The aim of this work is to provide evidence for attribution of changes in nutritional outcomes to programme activities. For this, it is necessary to define precisely whose nutritional outcome is being assessed, that is, whether the outcome refers to the participants or to the overall population (by age, sex, etc.). The initial rate of improvement appears to be much faster than the sustained rate, and this initial rate needs to be distinguished from the sustained rate to see consistent results. Typically the initial rate is about 5–10 percentage points change in underweight (ppt)/year, over a limited period (probably several months), and the sustained rate is then 1–2 ppt/year. A typical underlying (no programme) improving trend is around -0.5 ppt/year (e.g. starting at 40%, reducing to 35% in a decade).

Four rates may be measured:

- (1) Participants' initial rate (usually obtained from weighing data);
- (2) Participants' sustained rate;
- (3) Population initial rate;¹
- (4) Population sustained rate (e.g. from population-based evaluation surveys; related to participants' rate by coverage, although participants may change, coming in and out of the programme). This is the indicator used in **Figures II-1** and **II-2**, discussed later.

The effect size can be measured as *rates* of change – e.g. ppt/year – or as before-after (one time) changes. *Rate* is used for programmes which are not usually intended to have a one-time impact but to keep going until the intended outcome reaches a norm or goal.² Efficacy results usually refer to particular groups of participants (e.g. during pregnancy; 12–24 months old), and are not always translated into expected effects in terms of population prevalence reductions (i.e. rates of improvement in the population). Victora and colleagues (12) have discussed in detail the differences expected between efficacy rates and those from routine programmes. The *Lancet* series reported simulations for coverages, giving the outputs as mortality, stunting and disability-adjusted life years (11). Rates are used as the outcome for effectiveness, and effect sizes given as ppt/year.

¹ Usually not reported – population-based surveys are seldom carried out early in programmes.

² Objectives are often stated as, for example, reducing underweight in preschool children by 25% over five years. Note that this translates into ppt/year using the starting prevalence; if this is (say) 40%, then the objective is to reach 30% in 5 years, which is 10/5 ppt/year, = 2 ppt/year.

Figure II-1 Population sustained rate of underweight reduction (ppts/yr) compared to programme intensity estimated as CHNWs per 1000 children, as part-time equivalents (0.1 FTEs)

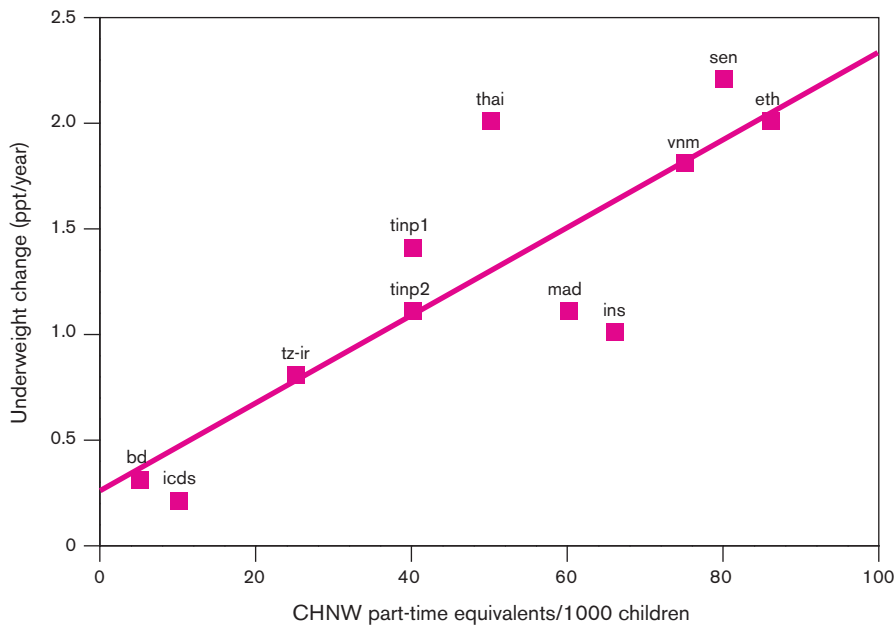
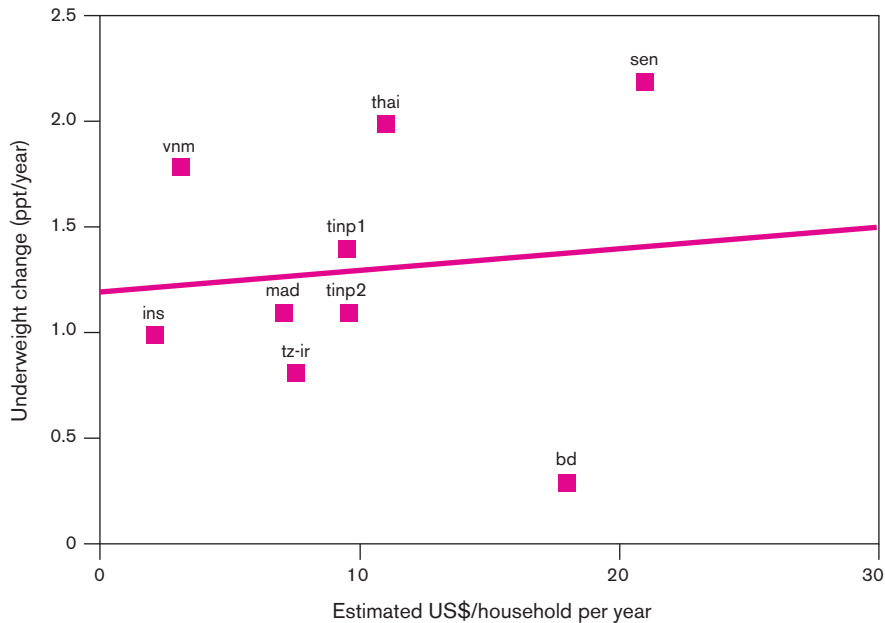


Figure II-2 Population sustained rate of underweight reduction (ppts/year) compared to programme intensity estimated as programme expenditures, running (not start-up) costs, US\$/household per year



Key

- bd Bangladesh Integrated Nutrition Project
- eth Ethiopia Community Based Nutrition Programme
- icds India Integrated Child Development Services Project I
- ins Indonesia Family Nutrition Improvement Programme
- mad Madagascar Second Community Nutrition Project
- sen Senegal Community Nutrition Programme
- thai Thailand National Nutrition Programme
- tinp1 Tamil Nadu Integrated Nutrition Programme I
- tinp2 Tamil Nadu Integrated Nutrition Programme II
- tz-ir Tanzania Iringa Joint Nutrition Support Programme
- vnm Vietnam Protein-Energy Malnutrition Control Programme

4. Shape of response curve

Two important non-linear effects should be distinguished. First, the observation noted above that the initial rate of reduction in malnutrition among participants, soon after the programme is launched, tends to be much more rapid than the sustained rate; thus, the prevalence curve is steep and then flattens. The reasons are not well established, but it seems likely that a vulnerable part of the population – for example, those currently ill – may respond quickly to care and medical attention, and improve rapidly. The causes of current underweight may be different for other segments of the population – for example, feeding practices or food insecurity – and they may improve less rapidly. It is the sustained rate that will eventually bring long-term nutrition improvement. What happens to the initial improvement if the programme is discontinued is not known, but it seems likely that it would deteriorate again. The estimated sustained rate at the population level is used as the main indicator.

Second, a non-linear dose-response type of relation between improvement rates (among participants) and resources applied is expected. This has long been postulated (31), and a rule suggested that US\$ 5–US\$ 10/head per year is needed to bring an additional 1–2 ppt/year improvement in underweight (17). Below this a less-than-proportional effect is seen – a threshold level must be reached before improvement starts. (A corollary is that spending too little per participant does not just solve the problem more slowly, but does not solve it at all, and wastes resources.) Until now not enough data have been available to examine this empirically. However, community health/nutrition worker (CHNW) numbers (e.g. CHNWs per 1000 households) give a useful measure of intensity and allow estimation of what resources are needed to achieve an effect.

In sum, one aim is to assess what types of operational programmes – multi-component, through different platforms – bring about a sustained reduction in child underweight among participants, and what level of resources is needed. Of the 60-plus country programmes identified (see **Table II-1**), 21 are reviewed here, and data were extracted from 11 that appeared to give reasonable estimates of both nutrition improvements and resource uses, as shown in **Figures II-1** and **II-2**.

5. Which components via what routes/platforms are included in effective programmes?

The programme components considered are summarized in **Table II-2**, which shows the groupings for the effectiveness of large-scale programmes reviewed, and their equivalent headings as ENAs whose efficacy has been reviewed in **Part I**; and in turn in the *Lancet* nutrition series.

For most programmes supplementary feeding refers to children, though occasionally may include women (e.g. in Ethiopia and Mexico). Counselling is considered to be community-based, rather than promotion via media. Growth monitoring is included as an operational programme component, but by itself has no efficacy. Micronutrient supplementation does not include fortification, since the latter is usually provided by routes other than those described here. Almost all the available programme outcome data are on general nutrition (of children), measured by anthropometry.

Programme components were delivered by one or more of four routes shown in **Table II-3**. Community nutrition centres were the main route, usually as a base for CHNWs who may carry out home visits. The distribution of routes was similar between the 32 programmes in total (**Table II-3a**), the 21 programmes which were described in detail (**Table II-3b**), and the 11 programmes for which quantitative data were available (**Table II-3c**). At least 70% of the programmes were community based, with CHNWs operating from a local nutrition centre. **Tables II-3a, II-3b, and II-3c** indicate that those analysed quantitatively (**Table II-3c**), selected because of data availability, were not substantially different from the larger groups from which they were drawn.

The 32 programmes in **Table II-1** were identified from a literature search for information on programme activities or components. Regardless of platform, all programmes reviewed were multi-component. Of the 32 programmes, 60% or more implemented supplementary feeding (usually targeted), growth monitoring and counselling (support for breastfeeding, complementary feeding or pregnancy, alone or in combination) (see **Table II-4a**); 80% or more of the 21 programmes described in detail implemented these components (**Table II-4b**). All programmes for which quantitative data were available included the three components (**Table II-4c**), with counselling as the intervention most frequently provided. More than one half of programmes reviewed implemented micronutrient supplementation and one third or more reported referral or treatment, which may have included community-based treatment of malnutrition.

Table II-2 Linkage in terminology between Part II, Part I, and the *Lancet* nutrition series

Programme components in Part II	Essential nutrition actions in Part I	<i>Lancet</i> nutrition series ^a
General nutrition^b		
Counselling and promotion of breastfeeding	Breastfeeding counselling and support by health care staff	Breastfeeding promotion and support
	Breastfeeding counselling and support by CHWs	
Counselling and promotion of complementary feeding practices, +/- supplementary feeding (children; targeted supplementary food provided in some projects)	Complementary feeding, quality counselling and behaviour change communication	Complementary feeding support with provision of supplementary food/cash transfers
	Counselling and support for appropriate feeding of low-birth-weight infants	Complementary feeding support without provision of supplementary food/cash transfers
Growth monitoring	No efficacy alone	No efficacy alone
Referral, treatment	Moderate acute malnutrition covered	SAM case management
	SAM not covered	
Conditional cash transfers	Not covered yet for efficacy	Conditional cash transfers (dietary diversification: no effect noted)
Micronutrient supplementation		
Iron/folic acid supplementation	Iron supplementation for children	Iron folate and iron supplementation
	Iron and folic acid supplements for menstruating women	
	Iron and folic acid supplements for pregnant women	
Vitamin A supplementation	Vitamin A supplementation for children under 5	Vitamin A supplementation
Zinc supplementation	Zinc supplements for diarrhoea management	Zinc supplementation (preventive and therapeutic)
Multiple micronutrient supplementation	Home fortification with multiple micronutrients of foods for young children	Multiple micronutrient supplements in pregnancy
Disease Control		
Hygiene	Handwashing and other hygienic practices	Hygiene interventions

^a Derived from Tables 3,4,5,6,7 & 8 in *Lancet* Series 3 (see 11).

^b The three main headings, "General nutrition, Micronutrient supplementation, Disease control" etc. are in line with the *Lancet* nutrition series (11), paper 3.

Table II-3 Frequency of platforms/routes used for components in programmes reviewed**Table II-3a Frequency of platform/route used for provision of programme components**

32 programmes overall, for which components were given

Platform/route	N	%
Health facility	3	9.4
Community-nutrition centre	23	71.9
Community-home based	4	12.5
Cash/conditional cash transfer	6	18.8

Table II-3b Frequency of platform/route used for provision of programme components

21 programmes for which detailed information was available, given in case studies (in Annex)

Platform/route	N	%
Health facility	1	4.8
Community-nutrition centre	19	90.5
Community-home based	4	19.0
Cash/conditional cash transfer	1	4.8

Table II-3c Frequency of platform/route used for provision of programme components

11 programmes for which outcome and resource data could be estimated

Platform/route	N	%
Health facility	0	0.0
Community-nutrition centre	10	100.0
Community-home based	1	10.0
Cash/conditional cash transfer	0	0.0

Table II-4 Frequency of types of components in programmes reviewed**Table II-4a Frequency of programme components**

32 programmes reviewed overall

Components	N	%
Counselling (breastfeeding, complementary feeding, pregnancy) ^a	28	87.5
Supplementary feeding ^b	19	59.4
Growth monitoring	25	78.1
Micronutrient supplementation ^c	17	53.1
Referral, treatment ^d	11	34.4

Table II-4b Frequency of programme components

21 programmes with details in case studies

Components	N	%
Counselling (breastfeeding, complementary feeding, pregnancy)	21	100.0
Supplementary feeding	17	81.0
Growth monitoring	19	90.5
Micronutrient supplementation	12	57.1
Referral, treatment	9	42.9

Table II-4c Frequency of programme components

11 programmes for which outcome/resources could be estimated quantitatively

Components	N	%
Counselling (breastfeeding, complementary feeding, pregnancy)	10	100.0
Supplementary feeding	10	100.0
Growth monitoring	10	100.0
Micronutrient supplementation	6	60.0
Referral, treatment	3	30.0

^a Counselling may include support for EBF, continued breastfeeding, and complementary feeding.

^b Supplementary feeding usually targeted based on growth monitoring.

^c Micronutrient supplementation includes vitamin A and/or iron.

^d Referral and treatment may include community-based treatment of severe malnutrition. Immunization and deworming not included due to lack of programme information; typically provided in Child Health Day activities.

6. Estimating nutrition improvement achieved and associated resources

6.1 Data sources and calculations

As indicated previously, about 60 programmes, mostly large-scale, were identified, almost all from previous reviews as listed in **Table II-1**. Of these, 21 were reviewed in detail, and for 11 programmes, sufficient data on both outcome (underweight,¹ ppt/year) and intensity of resources (CHNWs per 1000 households,² and US\$/household per year) were identified and further reviewed to explore associations. Initial identification of these programmes was by country; within countries, data on individual programmes were then investigated further. For each country and programme, the estimates for reduction in underweight and resource intensity were made from available materials.

The intensity estimates were determined from project documents, reports, etc. (for further details, see **Annex 3**). CHNWs were classified as full or part-time. Based on informal enquiries (e.g. in Thailand), it was estimated that part-time CHNWs worked about one half-day per week, so that one full-time CHNW would be equivalent to ten part-time ones, except where indicated. The finances assigned to the programmes were taken from budget or expenditure reports, and are very approximate. They were divided by the child population covered to give US\$/child per year. The figures are intended to estimate running costs, but in some cases part of start-up costs was included. The sources of the results used are described below.

Bangladesh. The Bangladesh Integrated Nutrition Project (BINP) operated from 1995 to 2002 with approximate coverage by area of 15% (59/464 *thanas*). Intensity of CHNWs was reported as 1:200 children (19), i.e. about 5:1000 households. Resource intensity was estimated at approximately US\$ 18/household per year, including supplementary feeding.

Various evaluations of BINP's nutritional impact were conducted by both internal and external reviewers. The estimate used of BINP impact on child underweight³ was derived from a theory-based impact evaluation of the project in which a combination of data from previous evaluations was used (33, 34). This latter evaluation reported an overall 2.0 ppt reduction in underweight due to BINP activities, i.e. 0.3 ppt/yr.

Subsequent activities led into the National Nutrition Programme (NNP), 2004–2007, whose intended coverage was 105/464 *thanas*. This programme had implementation problems; the baseline survey was delayed and the end survey never conducted (35). Thus, no estimate of effect is available.

Support for nutrition activities became absorbed into the Health and Nutrition Population Sector Programme (HNPSPP), 2007–2010 (25% nutrition and food security; about US\$ 4 300 m in funding, 37% external). HNPSPP has no available evaluation data, and disbursement (as of July 2010) was about 5%, so was clearly slow in starting (35).

Ethiopia. The Community Based Nutrition Programme (CBN), as part of the National Nutrition Programme, was initiated in 2008 and continues today (36). Population coverage in target areas (now approximately 250/640 *woredas* (districts)) is approximately 40% and intensity of CHWs is about 1:23 children, estimated as 0.2 FTEs, i.e. 86:1000 households (37). Estimates of reduction in underweight from the CBN programme are preliminary, derived from an initial analysis

¹ As far as possible, the age group for which these estimates were made was 0–5 years; no adjustment was made if only other age groups were reported (e.g. 0–3 years).

² While most CHNWs are part-time, in some projects full-time CHNWs are hired. Part-time CHNWs were calculated as 0.1 full-time equivalents (FTEs).

³ Early estimates of initial reduction in underweight among participants were rapid, for severe malnutrition 13.8% to 2.9% from April to November 1997 (32). UNICEF unpublished figures showed underweight in participants changed from 79% to 66% from April 1997 to March 1998 (20, Figure 2e.)

of weighing programme data from mid-2008 to mid-2010. The initial high rate of improvement among participants (estimated at approximately 8.0 ppt/year) is difficult to distinguish from the sustained rate. However, this latter rate appears to be approximately 5.0 ppt/year; with estimated 40% coverage this gives a sustained population rate of 2.0 ppt/year.

India. The Tamil Nadu Integrated Nutrition Programme I (TINP I) was implemented from 1980 to 1989 with approximately 46% coverage by area (173/373 rural blocks in 11 districts). CHW intensity for TINP I was reported as 1:150 households (38), or 40:1000 households. Resource intensity of TINP I was previously estimated at US\$ 9.50/household per year (38). Reduction in underweight in TINP areas was approximately 1.4 ppt/year (38) or 1.5 ppt/year (39).

The Tamil Integrated Nutrition Programme II (TINP II) ran from 1990–1997, and coverage was approximately 80% by area (316/385 rural blocks). TINP II intensity of CHWs and resources was the same as TINP I (22). The sustained rate of reduction in population underweight attributed to TINP II was 1.1 ppt/year (40).

The Integrated Child Development Services Project I (ICDS I) was supported by the World Bank and other donors from 1990-1997, with population coverage of approximately 2.5% (41). The intensity of CHNWs, known as *Anganwadi* workers (ANWs) (estimated at 20% FTE) was 1:1000 persons, i.e. approximately 1:200 children (19) or 10:1000 households. While there are no definitive evaluations, most reports on ICDS 1 estimate that the change in underweight attributable to the programme was slight (41, 42); the rate is plotted as 0.2 ppt/year.

Indonesia. The Family Nutrition Improvement programme (UPGK), also known as the *Posyandu* (weighing post) programme, started around 1979 and expanded to national coverage, continuing until constrained by an economic crisis in the late 1990s. From 1975–1990 coverage was approximately 90% by area (58 000/65 000 villages) (22, 43, 44). The number of children per *posyandu* was about 60.¹ Rohde (45) refers to five CHNWs per *posyandu*, nearly one million in total. However, they had limited training (3 days) and high turnover, and on evaluation only a small percentage was able to provide meaningful counselling. At 4 CHNWs per *posyandu*, this gives 66 CHNWs/1000.

Recurrent costs, which may be seen as those needed for sustained activities, were estimated at approximately US\$ 1/household per year (45), but this figure may not include all local costs. The reduction in underweight ascribed to UPGK activities based on previous research was approximately 1.0 ppt/year (22).

Madagascar. The Second Community Nutrition Project (SEECALINE) was supported by the World Bank and others from 1999–2003; coverage was approximately 50% by area (56/111 districts) (46). SEECALINE intensity of CHWs was estimated as 1:125 households to 1:225 households (21, 47), or 60:1000 households. Resource intensity for the project was estimated at US\$ 10/household per year based on project documents (21). The rate of underweight reduction was reported as 0.86-1.25 ppts/year (47), or approximately 1.1 ppt/year for the population sustained rate.

Senegal. The Community Nutrition Program (CNP) operated from 1995–2001, with coverage of approximately 20% of children under 3 years of age (48). Intensity of CHWs was about 1:124 households (48), i.e. 80:1000 households. Approximately 98% of beneficiaries were reached, and therefore the rate for participants is about equivalent to that of the population as a whole. Resource intensity of the CNP was approximately US\$ 40/household per year based on 6 months of participation for children (48).² Estimated reduction in population underweight was 2.2 ppt/year (48).

Tanzania. The Iringa JNSP was implemented from 1984–1991, and coverage was approximately 85% by area (6/7 districts). Estimated CHNW intensity of the programme was 1:40 households

¹ (43) reports 214 000 *posyandus* with 13 million participating children.

² Children were enrolled for 6 months, then discharged as rehabilitated; costs were estimated as US\$ 60/child, taken as US\$ 60/child per year for comparisons here (i.e. assumes they would not be readmitted during the year).

(49), i.e. 25:1000 households. Resource intensity of JNSP was US\$ 8–US\$ 17/household per year (22). The sustained rate of reduction in underweight was 0.8 ppt/year (50).

Thailand. The National Nutrition Program (NNP) began in 1975 and continues at the time of writing, with reportedly about 100% coverage by area reached in 1990 (51). Estimates of CHNW intensity are 1:20 households (13), i.e. 50:1000 households. Resource intensity is estimated as US\$ 11/household per year (22, 52).

Thai underweight estimates for 1982–1990 are found in a case study (52). Data for calculating the rate come from both the weighing programme (1982–90) and a number of surveys, which use both National Center for Health Statistics (NCHS) and local Thai standards. The sustained rate (1986–90) was 1.9 ppt/year (52) from the weighing programme, during which time coverage was around 90%; the rate in 1984–90 was 2.8 ppt/year. Using NCHS standards, the rate during 1987–95 was 1.5 ppt/year (53). Another report (54) gave underweight estimates of 40.6% for 1986 and 31.3% for 1995 using national standards, i.e. 1.0 ppt/year. The sustained population rate during the programme was 2.0 ppt/year.

Vietnam. The Protein-Energy Malnutrition (PEM) Control Programme was initiated in 1994/95 with coverage reported as approximately 100% (55). By 2005 an estimated 100 000 CHNWs (nutrition collaborators) were in place for an intensity of approximately 1 CHNW per 70 households, i.e. 75:1000 households. Resource intensity was about US\$ 0.70/household per year, excluding district and commune costs. Reduction in underweight, as the population sustained rate, was about 1.5–2.0 ppt/year from 1994–1998 plotted as 1.8 ppt/year from repeated surveys and from 1999–2005 data from the weighing programme (55, 56).

6.2 Do levels of resources relate to rates of improvement?

Estimates of changes in preschool children's underweight prevalences were calculated for 11 of the programmes examined (see last column of **Table II-1**) where both outcome results (underweight change) and resources (intensity as CHNWs/1000, and US\$/child per year) were available.

In **Figure II-1** the rate of underweight reduction (y-axis) is plotted with the CHNWs/1000 children, part-time equivalents. The rate (y-axis) is probably more dependable than the intensity, although both are somewhat uncertain. Above about 30 CHNWs/1000 children there are improvements of 1–2 ppt/year. It has not been possible to extract the underlying (without programme) rate in most cases; however, it would usually not be more than -0.5 ppt/year.

Most of the rate estimates are reasonably well known – Thailand and Vietnam are from national programmes, Tanzania/Iringa and TINP have been widely reported and Bangladesh, Madagascar and Senegal have been estimated by World Bank evaluators. The Ethiopia figure is from recent data and unpublished, but appears to be a fairly conservative estimate. The Indonesia rate appears low; however, the financial data (45) (see **Figure II-2**) have been a long-standing low outlier which may also explain the relatively low improvement rate.

Financial data (**Figure II-1**) seem to show little relation of effect with financial resources. At the lower end of resources the Vietnam figure does not include local costs, and (as above) the Indonesia figure may be an underestimate. While most programmes probably require a minimum of US\$ 10/child per year to show impact, how the funds are used may be more important than the amount per child.

7. Implications

7.1 Implications for programmes: limitations and caveats

The role of individual interventions in improving child nutrition was discussed in **Part I** of this document. Efficacy in terms of, for example, counselling changing breastfeeding practices, is well understood. The impact of these changes on child health and development outcomes, while covered in fewer studies, is reasonably well established. Bhutta and colleagues (11) provide an important synthesis as shown in **Table II-2**. The issue addressed concerns the evidence that interventions, known to be efficacious individually, have an impact when incorporated into operational large-scale programmes.

The extended list of programmes in **Table II-1** covers those that have been used for overviews in the past (up to 2010), with some newer ones identified and introduced for this review. Material was sought that described their content, with particular focus on quantitative measures of outcome and of programme coverage and resources. Some characteristics of 32 programmes were extracted, and detailed case studies developed for 21 of these based on availability of information (see Annex 3). Outcome evaluation data and resource estimates were considered adequate for 11 of these (see **Tables II-3** and **II-4**). The resource indicators chosen were (a) CHNWs per 1000 participants (or CHNWs/1000 households) and (b) running expenditures as US\$/household per year. The commonest outcome, underweight prevalence in children, was estimated as a rate of change, as ppt/year. Assessing outcomes should distinguish initial rates of improvement – now seen to be quite rapid – from the sustained rates (after a year or so); and between programme participants and the overall child population. (These distinctions are not always made in reports.) The population sustained rate of improvement was estimated in comparing outcomes.

The limited quality and number of the evaluation results for effectiveness of operational nutrition programmes is widely recognized to be a major constraint. The approach to evaluation of operational programmes is necessarily quite different to efficacy trials (12) and can rarely use randomization to treatment and comparison groups. Other designs can be employed, and especially when these are prospective, can give plausible inferences on impact, usually requiring some advanced analyses. As Bhutta and colleagues (11) noted from their extensive literature search for meta-analyses, "(of) evidence from effectiveness trials and programme assessments, fewer than 3% of all interventions qualified" for inclusion. Virtually all their data were from trials, and the results refer to efficacy. The quality of evidence on effectiveness is weaker, and permits including a number of the programmes excluded by Bhutta and colleagues. However, as described above, a number of programmes have been evaluated (some re-evaluated, e.g. by the World Bank, from Bangladesh, Madagascar and Senegal), and extracting the best estimates where data are available seems to give at least a plausible pattern, e.g. as shown in **Figure II-1**. Details of how the numbers were obtained are given in the text above and in the case studies in **Annex 3**.

Previous syntheses of evaluation results – including on efficacy – have not emphasized the key factors of coverage and resource intensity. Differences in resources (per capita) would be likely to influence impact, and would account for part of the differences between impact observed in large-scale programmes versus trials and pilot projects (where resources are normally less constrained). Thus particular attention has been paid to relating outcomes to resources. The indicators that could be obtained, e.g. CHNWs/1000, do not reflect quality, training, incentives, supervision and other crucial factors which should be included in future studies. CHNWs/1000 may also be an available proxy indicator of broader programme effort.

The programmes considered operate through CHNWs, based usually in community centres (with home visiting); the distribution of platforms is shown in **Table II-3**. Supervision is usually through the health system. The programmes have a reasonably common overall pattern of activities – counselling, micronutrients, etc. – but within these details vary, presumably with different conditions and contexts. Supplementary feeding – meaning provision of food, usually intended

to be complementary¹ foods for young children – is quite common in these programmes, nearly always targeted to children identified as at risk through growth monitoring or other assessments. Growth monitoring is not itself expected to improve nutrition, but has been found to be a regular activity in most programmes. The outcome used, underweight, may not be affected by the micronutrient components. The relation between programmes with common but not standardized features and a general nutrition outcome can be examined. The relative effects of individual components cannot be assessed in the present data.

7.2 Specific implications for designing future programmes and sustaining existing ones

When assessed in successful programmes, it appears that the initial improvement in underweight prevalence in participants is quite rapid, reducing by up to 10 ppt in the first year or so. At the same time, severe malnutrition also falls rapidly to low levels (e.g. 10% to 2%). This pattern was seen in, for example, Bangladesh (early BNIP), Ethiopia, Senegal, Tanzania (Iringa), Thailand and other places. The reasons for this initial response are not known, and are likely to be in part from treatment of diseases and immunization.

The sustained rate, over a number of years, is what presumably makes a long-term difference. An expected dose-response is seen roughly in the sustained rate (**Figure II-1**), measuring the resources as CHNWs/1000 households (or children). The results suggest that a level of around 30 CHNWs/1000 (1 CHNW:33 children, estimated as part time, 0.1 FTEs) is needed for an improvement rate of 1 ppt/year or higher in underweight.

The most important implication is that *community-based nutrition programmes can be effective, and that adequate resources – for example, enough CHNWs, trained and supported – must be put into these, and sustained over years, for them to provide a substantial impact on child nutrition*. For example, a with-programme improvement rate of 1.5 ppt/year is typical; current sub-regional child underweight prevalences are 13%–23% in Africa, with change rates of 0.1 to -0.2 ppt/year; in Asia these figures are 18%–33%, with change rates of -0.3 to -1.0 ppt/year. A rate of 1.5 ppt/year over 10 years reduces these prevalences by 15 ppt, i.e. to 0%–7% in Africa and 3%–18% in Asia (57). Thus, sustaining these activities at the required intensity for 10 years or so would substantially reduce child malnutrition, as has been seen in several countries with national programmes (e.g. Thailand, Vietnam).²

The resources needed show no such relation (**Figure II-2**), partly because of difficulties in estimating financial resources. This finding may also reflect that it is how funds are used that counts: investing in local organizations, and especially appropriate training, support, and incentives for community workers, are key.

The precise details of the interventions (counselling, referral, micronutrients, etc.) may not be the most essential factor, although of course they must be relevant and appropriate to the context. The extent of contact between trained, familiar community workers and mothers with children may be more crucial. It could be argued that the impact comes not primarily from delivering services, but from fostering the collective efficacy of communities: mothers obtain more control over their families' health and survival, and increase their own effective efforts.³ This is catalysed and supported by the community-based programme structure.

The question of interfacing with vertical programmes – child health days or weeks – was not explicitly studied here. Experience in six African countries (58, 59) indicates that there are opportunity costs to child health days/weeks for community-based programmes (e.g. personnel

¹ "Complementary foods" refers to those given from six months on to complement breastfeeding; it may in practice refer to children's foods in the period between 6 and 23 months of age. Supplementary foods refer here to foods provided from outside of the household.

² Countries that have experienced transitions at these rates are illustrated in (57), Figure 9 – some of which may be attributable to nutrition programmes (but the data are insufficient to estimate how much).

³ This argument is elaborated on p. 1067 in (22). The huge commitments of their own scarce resources that poor families make to children's education attest to the strong will to foster children's welfare, when people know better how to do so.

and resources are temporarily reassigned). While these can be mutually supportive, only a few interventions are effective on the six-monthly periodicity typical of child health days/weeks (notably immunization). Transition to continuing community-based activities as soon as outreach is adequate is implied.

In sum, community-based nutrition programmes would seem to be reasonably established as an effective route for bringing about significant reductions in child malnutrition. To do this they need to be supported and sustained for long enough to bring about lasting change. In principle, if they continue for sufficient time for intergenerational impact – fewer small girls growing up to be small mothers having small babies – to take effect, they can contribute to bringing about a permanent transition in populations' nutritional status. Indeed, these transitions are completed or underway in many countries (60), and the policy should be to accelerate these in many more.

8. Cash Transfer Programmes

Cash transfer programmes, conditional (on health/nutrition related actions: CCTs) or unconditional (CTs) have expanded rapidly in recent years, and are of increasing importance for improving nutrition. They are highly complementary to other nutrition actions, and involve establishing eligibility, usually based on low income. Hence, they are positively targeted towards the poor and most vulnerable. The level of resources/head is much higher than for typical nutrition programmes – but the objectives are broader – and the scale in terms of coverage equal or higher. Their effect on nutrition is both through increasing resources (income), and, for conditional programmes, enhancing use of services such as immunization and education. The impact on nutritional status of children is potentially both through maternal nutrition and hence intra-uterine growth and development, and through infant and young child feeding, care, and use of health services.

Examples of CCTs and CTs that have been described and evaluated to some extent were drawn from the literature, agency reports, and other documents for this section. These sixteen case studies are described in **Annex 3**, and some characteristics summarized in **Table II-5**. CCTs are the usual form for these programmes in Latin America, where they have been operating for some time, while CTs are the norm in Africa.

Cash transfer programmes provide assistance in the form of money in order to increase household income. Transfers may be given without requirements that household members meet specified conditions, or be contingent upon compliance with a specified set of conditions. CCTs have increased in popularity in recent years due to their perceived ability to create long-term benefits through encouraging behaviour adoption that improves well-being, and investing in human capital (62). Provision of transfer is generally targeted to poor households. Programmes may directly affect nutrition (e.g. providing supplements), or connect to nutrition outcomes less directly (e.g. through increasing use of health services, antenatal care or education). Conditionalities may include periodic health visits, growth monitoring, vaccination when applicable, antenatal care, and attendance at education sessions by mothers (63).

Both CTs and CCTs are forms of social assistance, or safety nets, assisting beneficiaries who are vulnerable to impoverishment without support (62, 64). Public works programmes (productive safety nets) and in-kind transfers (food for work) are two other components of social safety nets but will not be described in detail here. Ethiopia's PSNP is included as cash transfers are provided to mothers. In sub-Saharan Africa overall approximately 137 programmes were in operation in 37 countries in 2009 (64). Transfer programmes in Latin American countries are mostly CCTs, which have dramatically increased in popularity in comparison to CTs, as well as expanded to other regions, in the past 10 years (63).

Several programmes, such as *Oportunidades* in Mexico, *Bolsa Família* in Brazil, and *Red de Protección Social* in Nicaragua include requirements for receipt of transfers specific to addressing nutritional concerns. Conditions intended to improve nutritional outcomes may address behaviours through group nutrition education sessions and growth monitoring and promotion, which also may be accompanied by more personalized counselling. Conditionalities aimed at improving micronutrient status may be employed in CCT programmes through provision of essential micronutrients and food or supplements to supply both macro- and micronutrients, though the latter has been limited to Mexico's *Progresá* (65).

Conditionalities in programmes with nutrition objectives may be determined based on country context and nutrition actions for which there is evidence of efficacy. CCTs that are intended to improve nutritional outcomes should be "well coordinated with the existing priorities guiding a country's nutrition policy" (65). General agreement exists as to which interventions are the most efficacious, therefore guiding conditional requirements in CCT programmes. The efficacy of these ENAs are described in Part I of this document and include: exclusive breastfeeding for six months, appropriate complementary feeding, appropriate nutritional care of sick and severely malnourished children, adequate intake of vitamin A and iron for women and children and adequate intake of iodine by all household members (65 from 66).

8.1 Mechanisms, demand and supply-side

Preference for CCT programmes over in-kind and unconditional transfers has grown for several reasons. CCTs offer greater flexibility for determination of household needs and decreased logistical costs relative to in-kind transfers. In comparison to unconditional transfer programmes CCTs are promoted as a direct investment in human capital, as well as an incentive for households to adopt behaviours that improve well-being, both offering long-term benefits (62).

Various mechanisms by which CCT programmes work to improve maternal and child nutrition have been proposed:

- As women typically receive the cash transfer, programme beneficiaries may be empowered to prioritize care for both themselves and their children during the CCT programme and even after it ends (65).
- An increase in household purchasing power for food and health services may result from CCT programmes (65). Due to the multifactorial nature of undernutrition, complementary interventions need to be supplied and maintained in addition to income provision for real improvement (67).
- Direct provision of micronutrients and/or energy supplements may be provided to mothers and children, though this practice has not been widespread in CCT programmes thus far (65).
- Conditionality such as growth monitoring for children, antenatal care for mothers, and participation in nutrition education sessions for both may improve maternal and child nutrition by addressing behavioural determinants of undernutrition (65).

An important consideration of the ability of CCTs to improve nutritional status involves determining the effects of providing both demand- and supply-side incentives. Transfers offered to families can increase demand for health and nutrition services by overcoming barriers to access such as direct costs, indirect costs (transport, food during hospitalization) and opportunity costs (loss of income due to health-seeking activities). CCTs aimed at increasing demand for preventive services may also have positive spillover effects, thus furthering long-term benefits for beneficiaries (62).

Inadequate or poor quality supply of services limits the effectiveness of demand-side CCTs. Therefore some programmes are implementing supply-side transfers in addition to those typically provided directly to beneficiaries. For example, the *Programa de Asignación Familiar* (PRAF) provides health centres with approximately US\$ 6000 annually for meeting quality improvement and service standards at rural health posts, including nutrition training for mothers (68).

8.2 Coverage and resource intensities

In CCT programmes providing both demand and supply-side incentives the effects on health and nutritional outcomes of each as well as the combination should be distinguished. For example, an evaluation of Honduras's PRAF demonstrated that demand-side transfers resulted in the largest ppt increase in healthcare visits among children under three years of age, as well as attendance at growth monitoring within the same age group as compared to controls. The combination of demand- and supply-side benefits increased utilization of both health visits and growth monitoring to a lesser extent, but supply-side incentives alone failed to increase utilization of either. The demand- and supply-side benefits individually and in combination resulted in improvements in antenatal care attendance (five or more sessions), although supply-side incentives resulted in the lowest percentage point increase (65). This example may be flawed since health facilities received slightly more than one half of their expected incentives, but it is reasonable to assume that supply-side incentives may be beneficial only when demand-side transfers are offered concurrently.

Cash transfer programmes vary in implementation stage as pilots, early or small-scale programmes or national coverage (see **Table II-5** and details in **Annex 1**). Among pilot and early or small-scale programmes, mostly CTs in sub-Saharan Africa and CCTs in Latin America, coverage ranges from approximately 4000 beneficiaries, as in Zambia's Kalomo Pilot Social Cash Transfer Scheme (69) to 165 000 beneficiaries in Nicaragua's RPS (70). This coverage represents less than 1% and 3% of the populations respectively. Large-scale CCT programmes, mostly in operation in

Latin American countries, range in coverage from about 1 million participants, as in Honduras's PRAF (68), to 45 million participants in Brazil's BF Programme (65). About 15% and 25% of the population (100% of the targeted poor) are covered with these programmes respectively.

Estimates of programme intensity are based on the amount of transfer provided to beneficiaries. Among CT programmes, transfers range from US\$ 6/household per month in Mozambique's National Institute of Social Action (INAS) Food Subsidy Programme (PSA) (71) to US\$ 25/household per month in South Africa's Child Support Grant (CSG) (72). Among CCT programmes, the lowest estimate of expenditure was US \$4/household per month in Honduras's PRAF, or less than 10% of average household consumption (73). In contrast, the highest expenditure was US\$ 60/household per month in Brazil's BF programme (65) or approximately 15% of average household consumption (73). It should be noted that among BF beneficiaries not all households receive this amount as transfers are dependent upon the level of poverty and number of children.

8.3 Effect on nutrition outcomes

Effectiveness of CCTs is estimated mostly from programmes in Latin America. It is based on data for various age groups of children and a variety of outcomes, thus making comparisons with large-scale nutrition programmes themselves (as in this document) problematic. However, impacts on child growth, birth weight, as well as on food expenditure and consumption have been estimated (see **Annex 2**, last column).

Mexico's *Oportunidades* has multiple evaluations reporting an approximate 1.0 cm increase in height among children ages 0–6 months and 12–36 months, all as compared to controls (62). Improvement in HAZ scores as compared to controls of 0.13 (Brazil's BF, children less than 7 years of age), 0.25 (South Africa's CSG, children less than 36 months), 0.161 (Colombia's FA, children less than 24 months), and 0.17 (Nicaragua's RPS, children less than 5 years) were reported (62, 72).

Increase in birth weight of 0.13 kg was reported among beneficiaries as compared to controls in Mexico's *Oportunidades* (74). Additionally, an increase of 0.58 kg in "newborn" weight was reported for beneficiaries in Colombia's FA, although this should be interpreted with caution since the programme was targeted to children rather than mothers. Although mixed results have been found, there is evidence that CCT programmes can have a positive impact on child nutritional status. To date most CCT programmes designed to improve nutritional and health outcomes have targeted children rather than mothers, resulting in a lack of data available on changes in maternal nutritional status (65).

8.4 Linkage to direct nutrition programmes

Both types of cash transfer programmes offer a link to existing nutrition programmes within a country. Furthermore, they may work to bolster both demand- and supply-side improvements in nutrition services at the community level. When considering implementation of a cash transfer programme designed to improve undernutrition, several rules for determining appropriateness of using nutrition-related conditionalities have been proposed. An unconditional CT programme should be used when nutrition programmes of good quality are in place and utilized extensively. In contrast, a CCT programme is more useful when current nutrition programmes are not well-utilized, but quality is good. CCTs in addition to supply-side incentives should be considered when both quality and utilization of nutrition programmes is poor. Finally, when a country does not have an existing nutrition programme a CCT should be considered only when both services of appropriate quality can be introduced and when beneficiaries are able to utilize the services (65).

A number of important factors are likely to affect the positive impact of CCTs on maternal and child nutrition outcomes. Programmes should focus on the window of opportunity for nutrition impact, pregnancy through two years of age, and therefore target beneficiaries in this range. Conditionalities should be specific to nutrition, based on best practices, including ENAs, for which there is evidence of efficacy. Supply-side transfers should be provided when needed in order to maintain quality and quantity of health and nutrition services, thus increasing the ability of CCTs to improve the nutritional status of mothers and children.

Table II-5 Summary of CCT/CT programmes studied

Type	Region	No. programmes	Resources (\$/household/month): examples	Population coverage (in millions): examples
CCT	Africa	1	Republic of South Africa US\$ 25	South Africa 8
	Asia	3	Sri Lanka US\$ 2–9 India US\$ 130/pregnancy	Sri Lanka: 2 India: 0.6
	Latin America	5	Brazil US\$ 30-60 Mexico US\$ 15 Colombia US\$ 17 Nicaragua US\$ 19 Honduras US\$ 4	Brazil: 45 Mexico: 25 Honduras: 0.2
CT	Africa	8	Ethiopia US\$ 4 Mozambique US\$ 3–6 Senegal US\$ 14 Kenya US\$ 5 Zambia US\$ 8 Malawi US\$ 4–13	Ethiopia: 8 Mozambique: 0.2 Senegal: 0.3 Kenya: 0.3
	Asia	0		
	Latin America	0		

References

1. Scrimshaw NS, Taylor CE, Gordon JE. *Interactions of nutrition and infection*. Geneva, WHO, 1968.
2. Kielmann AA, Taylor CE, Parker RL. The Narangwal Nutrition Study: a summary review. *American Journal of Clinical Nutrition*, 1978, 31: 2040–2052.
3. Gwatkin D, Wilcox J, Wray J. *Can health and nutrition interventions make a difference?* Washington DC, Overseas Development Council, 1980 (Monograph 13).
4. WHO, UNICEF. *The declaration of Alma Ata. International conference on primary health care jointly sponsored by WHO and UNICEF*. Geneva, WHO, 1978.
5. UNICEF. *The state of the world's children*. New York, UNICEF, 1982–1983.
6. United Nations. *World declaration and plan of action. World Summit for Children*. New York, United Nations, 1990.
7. WHO, UNICEF. *Integrated Management of Childhood Illness, chart booklet*. Geneva, WHO, 2008.
8. Maternal and child undernutrition. *Lancet*, 2008, 371(9608):270–273 (<http://www.thelancet.com/series/maternal-and-child-undernutrition>, accessed 7 March 2013).
9. Pinstrip-Andersen P et al. Protein-energy malnutrition. In: Jamison DT et al., eds. *Disease control priorities in developing countries*. New York, Oxford Medical Publications, 1993:391–420.
10. Allen LH, Gillespie SR. *What works? A review of the efficacy and effectiveness of nutrition interventions*. Geneva and Manila, ADB and ACC/SCN, Manila, 2001 (ACC/SCN Nutrition Policy Paper No. 19; ADB Nutrition and Development Series No. 5).
11. Bhutta ZA et al. What works? Interventions for maternal and child undernutrition and survival. *Lancet*, 2008, 371:417–440.
12. Victora CG, Habicht JP, Bryce J. Evidence-based public health: moving beyond randomized trials. *American Journal of Public Health*, 2004, 94(3):400–405.
13. Tontisirin K, Winichagoon P. Community-based programmes: success factors for public nutrition derived from the experience in Thailand. *Food and Nutrition Bulletin*, 1999, 20(3):315–322.
14. Save the Children-UK. *Thin on the ground: questioning the evidence behind World Bank funded community nutrition projects in Bangladesh, Ethiopia, and Uganda*. (Mimeo). London UK, Save the Children, 2003 (http://www.savethechildren.org.uk/sites/default/files/docs/thin_on_the_ground_1.pdf, accessed 6 March 2013).
15. Berg A. *Malnourished people: a policy view*. Poverty and Basic Needs Series, Washington DC, World Bank, 1981.
16. Jennings J et al., eds. *Managing Successful Nutrition Programmes*. Geneva, ACC/SCN, 1991 (State-of-the-Art Series, Nutrition Policy Discussion Paper No. 8).
17. Gillespie S, Mason J, Martorell, R. *How nutrition improves*. Geneva, ACC/SCN, 1996 (Nutrition Policy Discussion Paper No. 15).
18. Mason JB et al. Investing in child nutrition in Asia. *Asian Development Review*, 1999, 17(1,2):1–32.
19. Mason JB et al. Improving child nutrition in Asia. *Food and Nutrition Bulletin*, 2001, 22(3):3–85.
20. Mason JB. How nutrition improves – and what that means for policy decisions, background paper for: Gillespie G, McLachlan M, Shrimpton R eds. *Combating malnutrition: time to act* (http://www.tulane.edu/~internut/publications/WB_Bckgrd_Pprs/Narrative/NarrativethreeMason.doc, accessed 6 March 2013).

21. World Bank, UNICEF. *Combating malnutrition: time to act*. Gillespie S, McLachlan M, Shrimpton R, eds. Washington DC, World Bank, 2003.
22. Mason JB et al. *Community health and nutrition programs*. In: Jamison DT et al., eds. *Disease control priorities in developing countries*, 2nd edition. Washington DC, World Bank, 2006: 1063–1074.
23. World Bank. *Repositioning nutrition as central to development. A strategy for large-scale action*. Washington DC, World Bank, 2006 (<http://siteresources.worldbank.org/NUTRITION/Resources/281846-1131636806329/NutritionStrategy.pdf>, accessed 6 March 2013).
24. ICDDR Global Nutrition Review Team. Large-scale nutrition programs. In: Bhutta ZA et al. *What works? Interventions for maternal and child undernutrition and survival*. *Lancet*, 2008, 371:417–440, web appendix 17.
25. White H, Masset E. Assessing interventions to improve child nutrition: a theory-based impact evaluation of the Bangladesh Integrated Nutrition Project. *Journal of International Development*, 2007, 19:627–652.
26. Galasso E, Yua J. *Learning through monitoring: lessons from a large scale nutrition program in Madagascar*. Washington DC, World Bank, 2006. (Policy Research Working Paper 4058) (http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2006/11/08/000016406_20061108091139/Rendered/PDF/wps4058.pdf, accessed 6 March 2013).
27. Alderman H et al. Effectiveness of a community-based intervention to improve nutrition in young children in Senegal: a difference in difference analysis. *Public Health Nutrition*, 2009, 12(5):667–673.
28. World Bank. *What can we learn from nutrition impact evaluations?* Washington DC, Independent Evaluation Group/World Bank, 2010 (http://siteresources.worldbank.org/EXTWBASSHEANUTPOP/Resources/Nutrition_eval.pdf, accessed 6 March 2013).
29. Rivera JA et al. Impact of the Mexican program for education, health, and nutrition (Progresá) on rates of growth and anemia in infants and young children: a randomized effectiveness study. *Journal of the American Medical Association*, 2004, 291(21):2563–2570.
30. Habicht J-P, Victora CG, Vaughan JP. Evaluation designs for adequacy, plausibility, and probability of public health programme performance and impact. *International Journal of Epidemiology*, 1999, 28:10–18.
31. Habicht J-P, Mason JB, Tabatabai H. Basic concepts for the design of evaluation during programme implementation. In: Sahn D, Lockwood R, Scrimshaw N, eds. *Methods for the evaluation of the impact of food and nutrition programmes*. Tokyo, The United Nations University Press, 1984.
32. Patwary Y et al. Assessing the impact of a community-based nutrition project in rural Bangladesh through active participation by women. Abstract presented at Annual Scientific Conference, Dhaka, ICDDR, 1998 (http://centre.icddr.org/images/7thascon_phn_II-assessing.pdf, accessed 6 May 2013).
33. White H. Comment on contributions regarding the impact of the Bangladesh Integrated Nutrition Project. *Health Policy and Planning*, 2005, 20(6):408–411.
34. White H, Masset E. Assessing interventions to improve child nutrition: a theory-based impact evaluation of the Bangladesh Integrated Nutrition Project. *Journal of International Development*, 2007, 19:627–652.
35. World Bank. *Implementation completion and results report*. Washington DC, World Bank, 2007 (Report No. ICR 0000242), p. 10.
36. Ethiopia Federal MoH. *Program implementation manual of National Nutrition Program (NNP)-I; July 2008–June 2013*. Addis Ababa, Federal Ministry of Health, 2008.

37. Mason JB, Hoblitt A. Analysis of process and underweight data from CBN-ENCU data (first tranche of CBN, 39 woredas, mid-2008–May 2010). Mimeo, draft. Addis Ababa, Tulane IHD & UNICEF, 2010.
38. Heaver R. *India's Tamil Nadu Nutrition Program: lessons and issues in capacity and management*. Washington DC, Health Nutrition and Population Unit, Human Development Network, World Bank, 2002.
39. Based on Measham AR, Chatterjee M. *Wasting away: the crisis of malnutrition in India*. Washington DC, World Bank, 1999; described in Mason JB. *How nutrition improves – and what that means for policy decisions*, 2000, pp. 90–98, 109–110; background paper for *Combating malnutrition: time to act*. Gillespie G, McLachlan M, Shrimpton R, eds., 2000, p.109 (http://www.tulane.edu/~internut/publications/WB_Bckgrd_Pprs/Narrative/NarrativethreeMason.doc accessed 20 May 2012).
40. World Bank. *Impact evaluation report: Tamil Nadu Integrated Nutrition Project*. Washington DC, World Bank 1994 (Report No. 13783-IN).
41. World Bank. *Implementation completion report: Integrated Child Development Services*. Washington DC, World Bank, 1998 (Report No. 17756).
42. Lokshin, M. Improving child nutrition? The Integrated Child Development Services in India. *Development and Change*, 2005, 36(4):613–640.
43. Kodyat B. Family nutrition improvement (UPGK), Indonesia. In: *Managing successful nutrition programmes – Nutrition Policy Discussion Paper No. 8*, Jennings J et al., eds. Geneva, United Nations ACC/SCN, 1991 (108–109).
44. Soekirman IT et al. *Economic growth, equity, and nutritional improvement in Indonesia*. Geneva, United Nations ACC/SCN, 1992.
45. Rohde J. *Indonesia's posyandus: accomplishments and future challenges*. In: Rohde J, Chatterjee M, Morley D, eds. *Reaching health for all*. Oxford UK, Oxford University Press, 1993 p. 145.
46. Galasso E, Yau J. *Learning through monitoring: lessons from a large scale nutrition program in Madagascar*. Washington DC, World Bank, 2006 (Policy Research Working Paper 4058).
47. Galasso E, Umapathi N. *Improving nutritional status through behavioral change: lessons from Madagascar*. Washington DC, World Bank, 2007 (Policy Research Working Paper 4424).
48. World Bank. *Implementation completion report: Community Nutrition Project, Senegal*. Washington DC, World Bank, 2001 (Report No. 21429), p. 11.
49. Mitalo et al. In: *Jennings J et al. Managing successful nutrition programmes*. New York, United Nations ACC/SCN, 1991 (Nutrition Policy Discussion Paper No. 8), pp. 117–119.
50. Mason JB. Within a decade no child will go to bed hungry? *Proceedings of the Nutrition Society*, 1996, 55:621–640; based on: *Improving child survival and nutrition: the joint WHO/UNICEF Nutrition Support Programme in Iringa, Tanzania*. New York, UNICEF, 1989.
51. ACC/SCN. *2nd Report on the world nutrition situation – Volume II: Country trends, methods and statistics*. Geneva, United Nations ACC/SCN, 1993.
52. Kachondham Y, Winichagoon P, Tontisirin K. *Nutrition and health in Thailand: trends and action*. Institute of Nutrition, Mahidol University, United Nations ACC/SCN, Bangkok and New York, 1992.
53. WHO. *Nutrition Landscape Information System (NLIS)*. Geneva, WHO, 2011 (<http://www.who.int/nutrition/nlis/en/>, accessed 6 March 2013).

54. Heaver R, Kachondam Y. *Thailand's National Nutrition Program: lessons in management and capacity development*. Washington DC, World Bank, 2002 (Health, Nutrition and Population Discussion Paper).
55. Vietnam MoH-National Institute of Nutrition. *Protein-energy malnutrition control program. Prevalence of malnutrition among children under 5 (1999–2005)*. Programme handout, no date.
56. Khan A A, Bano N, Salam A, Child malnutrition in South Asia: a comparative perspective. *South Asian Survey*, 2007, 14:129–145.
57. *Sixth report on the world nutrition situation: progress in nutrition*. Geneva, United Nations ACC/SCN, 2010 (Table 21).
58. Doherty T et al. Moving from vertical to integrated child health programmes: experiences from a multi-country assessment of Child Health Days approach in Africa. *Tropical Medicine and International Health*, 2010, 15 (3):296–305.
59. Oliphant N et al. The contribution of child health days to improving the coverage of periodic interventions in six African countries. *Food and Nutrition Bulletin*, 2010, 31(3):S248–263.
60. United Nations SCN. *Sixth report on the world nutrition situation: progress in nutrition*. Geneva, United Nations SCN, 2010, Figure 9.
61. Jamison DT et al., eds. *Disease control priorities in developing countries*, New York, Oxford Medical Publications, 1993 (391–420).
62. Lagarde M, Haines A, Palmer N. The impact of conditional cash transfers on health outcomes and use of health services in low and middle income countries (Review). *Cochrane Database of Systematic Reviews*, 2009, Issue 4.
63. Fiszbein A et al. *Conditional cash transfers: reducing present and future poverty*. Washington DC, World Bank, 2009.
64. Sherburne-Benz LD. *Social safety nets: moving forward for an African agenda: 2009–2012*. Powerpoint lecture, 2009 (draft).
65. Bassett L. *Can conditional cash transfer programs play a greater role in reducing child undernutrition?* Washington DC, World Bank, 2008 (SP Discussion Paper No. 0835).
66. Archaya K et al. *Using 'Essential nutrition actions' to accelerate coverage with nutrition interventions in high mortality settings*. Arlington, VA, Basic Support for Institutionalizing Child Survival Project (BASICS II), USAID, 2004.
67. Alderman H et al. *Reducing child malnutrition: how far does income growth take us?* Nottingham, UK, Centre for Research in Economic Development and International Trade, University of Nottingham, 2005.
68. Morris SS et al. Monetary incentives in primary health care and effects on use and coverage of preventive health care interventions in rural Honduras: Cluster randomized trial. *Lancet*, 2004, 364:2030–2037.
69. MCDSS/GTZ. *Final Evaluation Report: Kalomo Social Cash Transfer Scheme*. Lusaka, Ministry of Community Development and Social Services, German Technical Cooperation, 2007.
70. Maluccio JA, Flores R. *Impact evaluation of a conditional cash transfer program: the Nicaraguan Red de Protección Social*. Washington DC, International Food Policy Research Institute, 2005.
71. Save the Children UK. *Making Cash Count: Lessons from cash transfer schemes in east and southern Africa for supporting the most vulnerable children and households*. London, Save the Children UK, HelpAge International, Institute of Development Studies, 2005.

72. Agüero JR, Carter MR, Woolard I. *The impact of unconditional cash transfers on nutrition: the South African Child Support Grant*. New York, International Poverty Centre, United Nations Development Programme, 2007 (Working Paper number 39).
73. Yablonski J, O'Donnell M. *Lasting benefits: the role of cash transfers in tackling child mortality*. London, Save the Children UK, 2009.
74. Barber SL, Gertler PJ. The impact of Mexico's conditional cash transfer programme, *Oportunidades*, on birthweight. *Tropical Medicine and International Health*, 2008, 13(11):1405–1414.

Annexes

Annex 1. Components and platforms for 32 nutrition programmes with comparative data

COUNTRY	PROGRAMME NAME	Quanti- tative?	PLATFORMS				COMPONENTS									
			Facility	Community nutrition centre	Community worker based at home	CT/CCT	Coun- selling	SF	GM	MNs	Referral	Imm	FFW/CT			
Bangladesh	BINP (1995–2002)	Y	-	Y	-	-	Y	Y	-	-	-	-	-	-	-	-
	NNP (2004–07)	-	-	Y	-	-	-	Y	Y	-	-	-	-	-	-	-
	HNPSP (2007–10)	-	Y	-	-	-	-	Y	Y	-	-	Y	Y	-	-	-
Brazil	CPP (1983–present)	-	-	-	Y	-	-	Y	Y	-	-	Y	Y	-	-	-
	IMCI (1997–present)	-	Y	Y	-	-	-	Y	Y	-	-	Y	Y	-	-	-
	BA (2001–03)	-	-	-	-	Y	-	Y	Y	-	-	Y	Y	-	Y	Y
Colombia	BFP (2003–present)	-	-	-	-	-	Y	Y	Y	-	-	Y	Y	-	-	Y
	FA (2002–present)	-	-	-	-	-	Y	-	Y	-	-	Y	Y	-	-	Y
	PSNP (2005–present)	-	-	-	-	-	Y	-	Y	-	-	Y	Y	-	-	Y
Ethiopia	EOS/EEOS (2004–present)	Y	CHD	Y	-	-	-	-	-	Y	-	-	Y	-	-	-
	NNP/CBN (2008–present)	-	-	Y	-	-	-	Y	Y	-	-	Y	Y	-	-	-
Honduras	AIN-C (1995–present)	-	-	Y	Y	-	-	Y	Y	-	-	Y	Y	-	-	-
	TINP I (1980–89)	Y	-	Y	-	-	-	Y	Y	-	-	Y	Y	-	-	-
India	TINP II (1990–97)	Y	-	Y	-	-	-	Y	Y	-	-	Y	Y	-	-	-
	ICDS I (1990–97)	Y	-	Y	-	-	-	Y	Y	-	-	Y	Y	-	-	-
	ICDS II (1993–2001)	-	-	-	-	-	-	Y	Y	-	-	Y	Y	-	-	-
Indonesia	UPGK Posyandius (1975–90)	Y	-	Y	-	-	-	Y	Y	-	-	Y	Y	-	-	-
	CHN3 (1993–2001)	-	-	Y	-	-	-	Y	Y	-	-	Y	Y	-	-	-
Madagascar	SECALINE (1993–97)	Y	-	Y	-	-	-	Y	Y	-	-	Y	Y	-	-	-
	SEECALINE (1999–2003)	-	-	Y	Y	-	-	Y	Y	-	-	Y	Y	-	-	-
Mexico	<i>Oportunidades</i> (1997–present)	-	-	-	-	Y	-	Y	Y	-	-	Y	Y	-	-	Y
Nicaragua	RPS (2000–05)	-	-	-	-	-	Y	Y	Y	-	-	Y	Y	-	-	Y
Pakistan	LHW (1994–present)	-	-	Y	-	-	-	Y	Y	-	-	Y	Y	-	-	-
	BIDANI (1978–79)	-	-	Y	-	-	-	Y	Y	-	-	Y	Y	-	-	-
Philippines	ECD (1998–2005)	-	Y	-	Y	-	-	Y	Y	-	-	Y	Y	-	-	-

COUNTRY	PROGRAMME NAME	Quanti- tative?	PLATFORMS			COMPONENTS								
			Facility	Community nutrition centre	Community worker based at home	CT/CCT	Coun- selling	SF	GM	MNs	Referral	Imm	FFW/CT	
Senegal	CNP (1995–2001)	Y	-	Y	-	-	Y	Y	Y	-	-	-	-	-
	PRN (2002–06)	-	-	Y	-	-	Y	Y	-	Y	-	-	-	-
Tanzania	JNSP (1984–91)	Y	CHD	Y	-	-	Y	Y	Y	-	Y	-	-	-
	CSD (1985–95)	-	-	Y	-	-	Y	Y	-	Y	-	-	-	-
	HSDP2 (2003–present)	-	-	Y	-	-	Y	-	-	Y	-	-	-	-
Thailand	NNP (1975–present)	Y	-	Y	-	-	Y	Y	Y	Y	-	-	-	-
Vietnam	PEM Control Programme (1999–present)	Y	-	Y	-	-	Y	Y	Y	Y	-	-	-	-

Note: Programme name: see abbreviations at front of main document. **Platforms:** facility – health post or centre, CHD = Child Health Days (or weeks) linked to facility; community nutrition centre, or community worker based at home; CT/CCT – cash transfer or conditional cash transfer programme as base for intervention, may include food provision. **Components:** counselling; SF = provision of supplementary food (usually selective); GM = growth monitoring; MNs = micronutrients; referral; Imm = immunization; FFW/CT = food-for-work or cash transfer.

Annex 2. Summary of CT/CCT programmes

Programme	Country statistics	CCT or CT	Eligibility	Benefit	Coverage	Maternal/related child outcomes
Bangladesh Income Generation for Vulnerable Group Development (IGVGD) – BRAC/WFP 1985–present	Population (2005) 153 122 000 GNI/capita (2009 US\$) 590 Avg HH size 4.7 (2007) % below poverty line 49.6 (2005)	CCT	<ul style="list-style-type: none"> – Widowed or abandoned female-headed HH – HH own <1 acre of land – HH earn <300 taka (US\$ 6) per month – Selection of women for VGD by local elected officials for entry into programme; BRAC further selects for IGVGD 	<ul style="list-style-type: none"> – 30 kg of food grain for 18 months Conditions: <ul style="list-style-type: none"> – weekly meetings, skills training – save minimum 25 taka (US\$ 0.50) per month with BRAC – potential for graduation into microcredit programme 	<ul style="list-style-type: none"> – national programme covering ~1.4 million women – average provision is ~41 taka (US\$ 1/day); approximately 1/5 of average monthly expenditures 	
Brazil <i>Bolsa Alimentação</i> (BA): 2001–2003 – now part of <i>Bolsa Família Programme</i> (BF) 2003–present	Population (2005) 186 075 000 GNI/capita (2009 US\$) 8040 Avg HH size 4.1 (1996) % below poverty line 4.3 (2008)	CCT	<ul style="list-style-type: none"> – Geographic targeting: federal and municipal level – HH assessment: per capita monthly income ceilings of R\$120 (US\$ 66) for moderately poor HHs and R\$60 (US\$ 33) for extremely poor HHs 	BA: <ul style="list-style-type: none"> – R\$15–45 (US\$ 7–21) – maximum 3 children BF: <ul style="list-style-type: none"> – R\$18 (US\$ 10) pregnant woman or child – maximum 3 children – R\$54–112 (US\$ 30–61) poor–extremely poor Conditions: <ul style="list-style-type: none"> – children 0–7 years of age: scheduled vaccines; regular health visits and growth monitoring – pregnant/lactating women: regular pre- and postnatal visits; health and nutrition education seminars 	<ul style="list-style-type: none"> – BA (2003): 1.5 million beneficiaries – BF: 11.1 million families (45 million beneficiaries) – 2006 (25% of Brazilian population, 100% of poor) 	Nutritional <ul style="list-style-type: none"> – 0.13 decrease in HAZ scores among children less than 7 years of age compared to control (1) – lack of results reported: conditionalities not monitored due to lack of available health services (2)

Programme	Country statistics	CCT or CT	Eligibility	Benefit	Coverage	Maternal/related child outcomes
Colombia <i>Familias en Acción</i> 2002–present	Population (2005) 43 049 000 GNI/capita (2009 US\$) 4930 Avg HH size (2005) 4.1 % below poverty line (2006) 16	CCT	<ul style="list-style-type: none"> HH with children <7 years of age lowest of income categories (based on HH characteristics) as determined by system for identifying and selecting beneficiaries—roughly equal to poorest 1/5 of HH 	<ul style="list-style-type: none"> US\$ 17/month (per mother, not child) Conditions: children attend health visits established by Growth and Development Programme (MoH); weighed and measured 	<ul style="list-style-type: none"> 700 municipalities (2005) ~400 000 HH ~2.1 million persons 	<p>Intermediate</p> <ul style="list-style-type: none"> increase in intake of protein and vegetables in both urban and rural children 33.2% increase in children 24–48 months of age with up-to-date preventive health visits compared to controls (3) <p>Nutritional</p> <ul style="list-style-type: none"> 0.161 HAZ score increase in children <24 months of age compared to control group (non-enrollees) 0.58 kg increase in “newborn” weight (proxy for birth weight in study) in urban areas 0.069 decrease in probability of chronic malnourishment (as measured by increase in height) in children <24 months of age (1)
Ethiopia Mekki Livelihoods Development Project 2003–2008	Population (2005) 74 661 000 GNI/capita (2009 US\$) 330 Avg HH size (2005) 5 % below poverty line (2005) 39	CT	<ul style="list-style-type: none"> beneficiaries found through peasant associations and officials (livestock, land access, previous harvest) HH who cannot or should not work; includes pregnant and lactating mothers (other beneficiaries received cash for work) 	<ul style="list-style-type: none"> cash relief to meet “essential food expenditure” in bad years 30 <i>Birr</i> (US\$ 3.50) per person/month 	<ul style="list-style-type: none"> estimated 11% of all HH involved no formal number, percentage of HH receiving cash relief is set Data n/a for average income of beneficiaries due to variability with seasons/HH size 	<ul style="list-style-type: none"> frequency of feeding of children increased during programme care increased; young mothers able to spend more time with children
Ethiopia Productive Safety Net Programme 2005–present	Population (2005) 74 661 000 GNI/capita (2009 US\$) 330 Avg HH size (2005) 5 % below poverty line (2005) 39	CT	<ul style="list-style-type: none"> <i>woredas</i> (districts) that received most relief food assistance in past 10 years (2004) HH in districts with food gaps of at least 3 months in past 3 years and received food assistance pregnant/lactating women among those who receive CT (10%–20% of beneficiaries) 	<ul style="list-style-type: none"> either cash or food transfers: 6 months of year Cash: 10 <i>birr</i>/day or 50 <i>birr</i>/month Food: 3 kg cereal/day or 15 kg/month unconditional for pregnant/lactating mothers 	<ul style="list-style-type: none"> 7.5 million people (11% of population) 244 of more than 500 districts; 8 of 10 regions 	<ul style="list-style-type: none"> HH that received at least ½ of transfers had increased food security transfer levels were below programme targets (4)

Programme	Country statistics	CCT or CT	Eligibility	Benefit	Coverage	Maternal/related child outcomes
Honduras <i>Programa de Asignación Familiar II – Bono Salud</i> (Health Bonus) component 2000–present	Population (2005) 6 893 000 GNI/capita (2009 US\$) 1820 Avg HH size 4.8 (2005) % below poverty line 18.2 (2006)	CCT	<ul style="list-style-type: none"> municipal-level targeting; quantified poverty in municipalities with highest levels of malnutrition (lowest average HAZ scores) Poor HH with pregnant women or children <3 years of age 	<p>Demand: \$L660 (US\$ 46.3)/family per year</p> <p>Conditions:</p> <ul style="list-style-type: none"> women: 5 prenatal and 1 postnatal visits children: nutrition and health visits <p>Supply: \$L87,315 (US\$ 6020)/facility per year</p> <p>Conditions:</p> <ul style="list-style-type: none"> quality improvement at rural health posts services provided meet standards; includes nutrition training for mothers 	<ul style="list-style-type: none"> 133 municipalities 240 000 HH 1115 towns 15% of population (~1 million persons) 	<p>Intermediate</p> <ul style="list-style-type: none"> 20.2% increase in child health visits (at least 1 in past month) compared to control 18.7% increase in women completing more than 5 antenatal visits compared to controls (1) <p>Nutritional</p> <ul style="list-style-type: none"> No changes in health outcomes, including HAZ scores; may be due to lack of programme implementation and/or poor quality of evaluation (5)
India Dr. Muthulakshmi Maternity Benefit Scheme 2006–present	Population (2009) 1 155 347 678 GNI/capita (2009 USD) 1180 Avg HH size 4.8 (2006) % below poverty line 41.6 (2005)	CCT	<ul style="list-style-type: none"> loss of wages of pregnant women in families below poverty line: 12,000INR/annum (US\$ 266) pregnant women above age 19 	<ul style="list-style-type: none"> 6000INR (US\$ 133) intended in 2 installments: ½ at 5th month of pregnancy; ½ after birth – in reality given after birth since 2009 	<ul style="list-style-type: none"> 4.95 million (2008–09) (6) 	
India Janani Suraksha Yojana 2007/08 –present	Population (2009) 1 155 347 678 GNI/capita (2009 US\$) 1180 Avg HH size 4.8 (2006) % below poverty line 41.6 (2005)	CCT	<ul style="list-style-type: none"> pregnant women in families living below poverty line at least 18 years of age first/second births only 	<ul style="list-style-type: none"> 700INR (US\$ 155) 		
Kenya Hunger Safety Net Programme 2009–present	Population (2005) 35 817 000 GNI/capita (2009 US\$) 770 Avg HH size 4.2 (2008) % below poverty line 19.7 (2005)	CT	<ul style="list-style-type: none"> chronically food insecure (aged, orphans, widows, persons with disabilities) high dependency ratio 	<ul style="list-style-type: none"> bimonthly CT for 3 years monthly: Ksh 355 (US\$ 5) per HH head and Ksh 178 (US\$ 2.50) per each additional family member 	<p>Phase I: 4 poorest districts (Turkana, Marsabit, Wajir, Mandera)</p> <ul style="list-style-type: none"> 60 000 HH (300 000 persons) 	<p>Monitoring and evaluation plan in place</p>

Programme	Country statistics	CCT or CT	Eligibility	Benefit	Coverage	Maternal/related child outcomes
Malawi Mchiji Social Cash Transfer Pilot Scheme 2006–present	Population (2005) 13 654 000 GNI/capita (2009 US\$) 280 Avg HH size 4.4 (2004) % below poverty line 73.9 (2004)	CT	<ul style="list-style-type: none"> ultra poor: below lowest expenditure quintile and below national poverty line (1 meal/day, no valuable assets) labour constrained: HH without person age 19–64 fit for work (elderly, child-headed, chronically ill, disabled) OR HH with member able to work, but dependency ratio of more than 3 	<ul style="list-style-type: none"> 1 member HH: 600MK (US\$ 4) 2 member HH: 1000 MK (US\$ 7) 3 member HH: 1400MK (US\$ 10) 4 member HH: 1800MK (US\$ 13) 	<ul style="list-style-type: none"> targets lowest 10% of HH below ultra-poverty line (10 029MK (US\$ 72) per capita/year = 27MK(US\$ 0.20)/day) 23 561 HH reached (2009) 92 786 persons reached (2009) 	<p>Intermediate</p> <p>Based on head of HH report:</p> <ul style="list-style-type: none"> decreased illness in previous month among children in intervention compared to control (42% vs. 55%) improved food intake in intervention HH compared to control (93% vs. 11%) 3.1 ppts increase in average number of food groups consumed after 1 year by intervention HH compared to control (2.7 vs. 0.4) <p>Nutritional</p> <ul style="list-style-type: none"> 10.5 ppts reduction in underweight after 1 year among intervention children compared to control (19.6% vs. 9.1%) (7)
Mexico <i>Oportunidades</i> (formerly <i>Progresa</i>) 1997–present	Population (2005) 105 330 000 GNI/capita (2009 US\$) 8920 Avg HH size 4 (2005) % below poverty line 3.4 (2008)	CCT	<ul style="list-style-type: none"> poor community chosen based on literacy, HH infrastructure, employment poor HH within communities chosen based on socioeconomic status, occupation, income, disability, access to health services (78% of HH eligible) 	<ul style="list-style-type: none"> transfer for health: US\$ 15/HH per month <p>Conditions:</p> <ul style="list-style-type: none"> every member attends regular clinic visits and talks monthly meeting for principal beneficiary 5 prenatal visits for pregnant women nutritional supplements for pregnant/lactating women 	<ul style="list-style-type: none"> 5 million low-income families (2007) 97% of eligible HH with young children enrolled in programme CT equivalent to 17%–20% of pre-programme HH consumption/capita (rural) 	<p>Nutritional</p> <ul style="list-style-type: none"> 1.1 cm increase in height among children 0–6 months of age in poorest households compared to control (crossover group) mean haemoglobin 0.37 g/dL higher after 1 year of Progresa compared to control with no exposure (1) 1.0 cm increase in height among children 12–36 months of age compared to control (1) 1.0 cm increase in height among children 12–36 months of age compared to control (1) 0.1273 gm increase in birth weight compared to control (8) 4.6 ppts reduction in low birth weight for participating women compared to control (8)

Programme	Country statistics	CCT or CT	Eligibility	Benefit	Coverage	Maternal/related child outcomes
Mozambique /NAS Food Subsidy Programme (PSA) 1997–present	Population (2005) 20 834 000 GNI/capita (2009 US\$) 440 Avg HH size 5 (2005) % below poverty line 74.7 (2003)	CT	<ul style="list-style-type: none"> – HH in absolute poverty – head of HH unable to work, older woman, older man, handicapped, chronically sick, malnourished, pregnant – beneficiaries need ID cards or birth certificates – resident of area for more than 6 months – monthly income < Mzm 70 000 (US\$ 3) 	<ul style="list-style-type: none"> – Mzm 70 000–140 000 (US\$ 3–6) per month/HH dependent on HH size 	<ul style="list-style-type: none"> – operates in each province – targeting ~1% of population – 2005: 160 000 persons (HH and registered dependents) 	(9)
Nicaragua <i>Red de Protección Social</i> 2000–2005	Population (2005) 5 455 000 GNI/capita (2009 US\$) 1000 Avg HH size 5.3 (2001) % below poverty line 15.8 (2005)	CCT	<ul style="list-style-type: none"> – resident of municipalities chosen (consisted of 59 rural regions in 6 of 20 municipalities) – initial phase: high score on marginality index (family size, lack of piped water, lack of latrine, % of persons >5 years of age illiterate) – Second phase: most HH in intervention regions were beneficiaries 	<ul style="list-style-type: none"> – cash transfer every other month = US\$ 224/HH/year – antiparasitic meds, iron supplements, vitamins Conditions: – health education workshops every 2 months – growth monitoring: monthly age <24 months; every 2 months 2–5 years of age 	<ul style="list-style-type: none"> – 6 of 20 municipalities in which development programme (Participatory Micro-planning) was in operation – ~90% of HH in intervention regions were beneficiaries – ~3% of population covered (165 000 persons) 	<p>Intermediate</p> <ul style="list-style-type: none"> – 4.5% increase in food expenditure of HH budget in intervention group (decrease in control group seen despite level of poverty-explained by programme effect of increasing food security) – increase in diet diversity; increase in number and quality of food items purchased (10) – 17.5% increase in children 0–3 years of age taken for health control and weighed in previous 6 months compared to control (1) <p>Nutritional</p> <ul style="list-style-type: none"> – 0.17 HAZ score increase in children less than 5 years of age compared to control group – 5.3% decrease in children less than 5 who are stunted – 6.0% decrease in children less than 5 who are underweight (1)
Senegal Child Focused Social Cash Transfer and Nutrition Security Project 2009–present	Population (2005) 11 281 000 GNI/capita (2009 US\$) 1030 Avg HH size 8.7 (2005) % below poverty line 33.5 (2005)	CT	<ul style="list-style-type: none"> – mothers with children 0–5 years of age – inadequate HH food consumption per survey: local community leaders to verify eligibility 	<ul style="list-style-type: none"> – FCFA 7000 (US\$ 14)/ month per mother in HH with at least 1 child under age 5 (~14% of average food basket for HH of 4 adults) – bimonthly CT for 6–12 months 	<ul style="list-style-type: none"> – 10 districts with “critical” levels of malnutrition (>15%) in which Standardized Monitoring and Assessment for Relief and Transition surveys were conducted – 320 000 children under 5 years of age 	Monitoring and evaluation plan in place

Programme	Country statistics	CCT or CT	Eligibility	Benefit	Coverage	Maternal/related child outcomes
South Africa South African Child Support Grant 1998–present	Population (2009) 49 320 150 GNI/capita (2009 US\$) 5 770 Avg HH size (2003) 3.8 % below poverty line 26.2 (2000)	CT	Children <14 years of age residing in HH with monthly income of primary caregiver and his/her spouse (not entire HH) below R800 (US\$ 110) –rural and R1100 (US\$ 150) –urban	– R170 (US\$ 25) monthly to caregiver of eligible child	– 7.8 million beneficiaries (2006–07) (11)	Nutritional – 0.25 HAZ score increase among children when treatment (transfer) is provided for at least 24 months as compared to less than 1 month during the first 36 months of life (12)
Sri Lanka Samurdhi (consumption grant transfer component- food stamps) 1995–present	Population (2005) 19 531 000 GNI/capita (2009 US\$) 1990 Avg HH size (2004) 4.3 % below poverty line 14 (2002)	CCT	– combined HH income less than Rs 1000 (US\$ 9)/month – "Voluntary" labour in community development projects dependent upon size of grant (e.g. 4–5 man-days for grant of Rs 500) – unemployment in entire HH – all requirements must be met	– Rs 250–1000 (US\$ 2.25–US\$ 9)/month (dependent on # in HH and monthly income) – HH receipt of stamps every 6 months for monthly use – portion of grant withdrawn for forced savings	– designed as targeted programme – 60% of transfers go to lowest 2 expenditure quintiles – 36% of HH in lowest quintile missed – 21 of 25 districts; ~1.9 million families covered (~41% of population) Intensity: – Average transfer is Rs 381 (US\$ 3); covers 14%–21% of HH food expenditure	Intermediate – limited 7% average increase in HH food consumption among poorest 40% (13)
Zambia Kalomo Pilot Social Cash Transfer Scheme 2004–present	Population (2005) 11 738 000 GNI/capita (2009 US\$) 970 Avg HH size (2007) 4.9 % below poverty line 64.3 (2004)	CT	– critically poor (chronic hunger, undernourished, begging, danger of starvation) – incapacitated: HH without able-bodied person of working age (very old, young or sick); high dependency ratio	– HH without children: ZMK 30 000 (US\$ 6) per month – HH with children: ZMK 40 000 (US\$ 8) = 50 kg bag of maize	– 10% of HH in pilot region: ~1 000 HH = 3 856 persons – Public Welfare Assistance Scheme structures responsible for targeting and approval process	Intermediate – decrease in HH members living on 1 meal daily by 6.0 ppts (19.3% to 13.3%) after 1 year – increase in diet diversity (vegetables, fruits, fish, meat) after 1 year – decrease in illness by 7.8 ppts (42.8% to 35%) after 1 year (14) Nutritional – monitoring data based on growth monitoring cards: 8 ppts decrease in underweight among children 0–5 years of age (41% to 33%) (15) – not replicated in final evaluation (14)

References

1. Lagarde M, Haines A, Palmer N. The impact of conditional cash transfers on health outcomes and use of health services in low and middle income countries (Review). *Cochrane Database of Systematic Reviews*, 2009, (4):Art. No. CD008137.
2. Bassett L. *Can conditional cash transfer programs play a greater role in reducing child undernutrition?* Washington DC, World Bank, 2008 (SP Discussion Paper No. 0835).
3. Attanasio O et al. *The short-term impact of a conditional cash subsidy on child health and nutrition in Colombia*. London, Institute for Fiscal Studies, 2005 (http://www.ifs.org.uk/e depo/rs_fam03.pdf, accessed 18 May 2013).
4. Mason JB, Hoblitt A. *Analysis of process and underweight data from CBN-ENCU data (first tranche of CBN, 39 woredas, mid-2008–May 2010)*. Mimeo, draft. Addis Ababa, Tulane University Department of International Health and Development & UNICEF, 2010.
5. Morris SS et al. Monetary incentives in primary health care and effects on use and coverage of preventive health care interventions in rural Honduras: cluster randomized trial. *Lancet*, 2004, 364:2030–2037.
6. Government of Tamil Nadu. *Demand No. 19: Policy Note – 2009–2010*. Chennai, Health and Family Welfare Department, Government of Tamil Nadu, 2010 (http://www.tn.gov.in/policynotes/archives/policy2009_10/pdf/health_family_welfare.pdf, accessed 15 May 2013).
7. Miller C, Tsoka M, Reichert K. *Impact evaluation report: external evaluation of the Mchinji Social Cash Transfer Pilot*. Boston MA & Zomba Malawi, Center for International Health and Development, Boston University & Centre for Social Research, Malawi University, 2008.
8. Barber SL, Gertler PJ. The impact of Mexico's conditional cash transfer programme, Oportunidades, on birthweight. *Tropical Medicine and International Health*, 2008, 13(11):1405–1414.
9. Save the Children UK. *Making cash count: lessons from cash transfer schemes in east and southern Africa for supporting the most vulnerable children and households*. London, Save the Children UK, HelpAge International & Institute of Development Studies, 2005.
10. Maluccio JA, Flores R. *Impact evaluation of a conditional cash transfer program: the Nicaraguan Red de Protección Social*. Washington DC, International Food Policy Research Institute, 2005.
11. National Treasury, Republic of South Africa. *Budget Review 2007*. Pretoria, National Treasury, 2007.
12. Agüero JR, Carter MR, Woolard I. *The impact of unconditional cash transfers on nutrition: the South African Child Support Grant*. New York, International Poverty Centre, United Nations Development Programme, 2007 (Working Paper no. 39).
13. Glinskaya E. *An empirical evaluation of the Samurdhi program in Sri Lanka*. Washington DC, World Bank, 2003. Prepared as background paper for Sri Lanka Poverty Assessment, Report No 22-535-CE (<http://siteresources.worldbank.org/INTDECINEQ/Resources/SamurdhiJune042003.pdf>, accessed 18 May 2013).
14. Ministry of Community Development and Social Services, GTZ. *Final evaluation report: Kalomo Social Cash Transfer Scheme*. Lusaka, Ministry of Community Development and Social Services & German Technical Cooperation, 2007.
15. Sridhar D, Duffield A. *A review of the impact of cash transfer programmes on child nutritional status and some implications for Save the Children UK programmes*. London, Save the Children, 2006.

Annex 3

Nutrition Programme
Case Studies

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Bangladesh

The Bangladesh Integrated Nutrition Programme (BINP) ran from 1995 to 2002, with about 15% coverage by area (59/464 *thanas*). This led into the National Nutrition Program, 2004–2007, whose intended coverage was 105/464 *thanas*. Both of these programmes were supported by the World Bank. Various issues inhibited activities, which appear to have been absorbed into the Health and Nutrition Population Sector Programme (HNPSP), 2007–2010 (25% nutrition and food security; about \$4300 million, 37% external funding).

HNPSP has no available evaluation data, and disbursement up to July 2010 was about 5%, so the programme appears to have been slow in starting activities. Components are described in the project appraisal document. The World Bank implementation completion report (7) on National Nutrition Program was critical of the plan and the ineffective implementation. This followed considerable earlier debate on the effectiveness of the BINP, and most of the available data on process and outcome stem from this earlier programme. It is not clear whether support to community nutrition promoters continued under the HNPSP.

During BINP internal evaluations were commissioned (2), then challenged by Save the Children (3) based on a retrospective cross-sectional survey. White and Massett (4) concluded that the reduction in malnutrition (underweight or stunting) which could be ascribed to BINP activities was about 2 ppt (about 0.3 ppt/year). However, early data did show an initial substantial reduction in severe underweight, as in other projects, and about 20 g improvement in birth weight was attributed to BINP activities.

Programme design was similar to that for TINP, involving growth monitoring, with supplementary feeding for children with growth faltering and nutrition counselling. Reasons for low effectiveness may include:

- targeting for supplementary feeding was fairly ineffective, and food was shared;
- community nutrition promoters were of low intensity (approximately 1:150 households) and worked out of community nutrition centres rather than making home visits;
- while there was some effect on knowledge and to a lesser degree on practices, these did not translate into nutritional impact.

BINP itself was of low effectiveness and did not lead to a sustainable set of actions. In part this was due to the project design and inadequate intensity, and in part to complexities in implementation (institutional and otherwise). Under the HNPSP there appears to be less emphasis on community-based actions and services.

Brazil

The Child Pastorate Programme was implemented in 1983 by the Catholic Church of Brazil. It remains in operation to the time of writing and is funded by multiple sources, including the MoH (80%), Electric Company, Ministry of Education, the GLOBO television network and UNICEF. In 2001 Child Pastorate Programme coverage by area was about 63% (5140/8159 parishes), providing services to 32 265 communities. Coverage by population for the same year was about 1.6 million children less than 6 years of age (9.8% of total population for age group), in addition to more than 77 000 pregnant women. Resource intensity for the Child Pastorate Programme is US\$ 4/person per year and personnel intensity is 1 community worker:37 children less than 6 years of age. Total funding for the programme for 1999–2000 was US\$ 6.9 million.

Internal evaluations were conducted from 1988–2001 with reported decreases in malnourished children (from 18% to 4%) and pregnant women (from 20% to 4%), as well as low birth weight (from 14% to 6%). An increase in EBF during the first 4 months was also reported (from 60% to 80%). External evaluation data are unavailable.

The Integrated Management of Childhood Illness (IMCI) was implemented in Brazil in 1997 and by 2002 had begun in all states, within the context of the Family Health Programme, which is supported by the World Bank and the MoH. Coverage reported for the Family Health Programme is variable since municipalities must apply to the federal government and make a financial contribution to join the programme. Teams are trained in both Family Health Programme and IMCI principles though IMCI training is lagging behind that of FHP. Intensity of CHWs is reported as 1 per 100–200 families (5). The impact of IMCI on nutritional status in Brazil has not been reported.

Bolsa Alimentação was a CCT programme from 2001–2003, when it merged with several programmes to form the current *Bolsa Família* Programme (BFP). Coverage of *Bolsa Alimentação* in 2003 was 1.5 million persons (about 1% of the population) supported by the World Bank and managed by the MoH. Families with pregnant or lactating women and/or children less than 7 years of age with a monthly per capita income below US\$ 42 received US\$ 7 per child monthly, for up to 3 children. Conditions for receipt of the transfer included regular pre- and postnatal care, growth monitoring, immunization, and participation in nutrition education seminars (6).

Initial evaluation data from *Bolsa Alimentação* showed worsening height-for-age z-scores (HAZ) and weight-for-age z-scores (WAZ) for beneficiaries compared to non-beneficiaries, though results were not statistically significant (7). This result was despite a reported increase in food consumption, which may have been due to beneficiary mothers assuming they would be ineligible for benefits if children were healthy.

The *Bolsa Alimentação* programme was incorporated into the BFP in 2003. BFP coverage in 2006 was 11.1 million families (46 million persons), approximately 100% of the poor and 25% of the total Brazilian population. Public expenditure for the BFP in 2005 was US\$ 3.2 billion, equivalent to 0.36% of GDP (6). World Bank support for the programme was about US\$ 562 million from 2003–2009, or approximately US\$ 93.7 million/year (8). The entire BFP is overseen by the Ministry of Social Development, while the health component is managed by the MoH. Monthly cash transfers range from US\$ 7–US\$ 45 per family depending upon eligibility as determined by monthly per capita income ceilings of US\$ 57 (moderately poor) and US\$ 29 (extremely poor). Targeting of pregnant and lactating mothers and children less than 7 years of age and health conditions for receipt of the transfer remain as they did in *Bolsa Alimentação*.

Evaluation data from the BFP is limited, but a positive impact has been reported; stunting among beneficiary children aged 6–11 months was 3.3 ppt lower (2 versus 5.3) than non-beneficiary children. However, the results are questionable due to selection bias. Study results may also be limited (especially for children aged 12–36 months) by supply-side constraints restricting health services, irregular growth monitoring despite the conditionality, and lack of information on timing of enrollment (7).

Colombia

Hogares Comunitarios is a national community nursery programme that started in 1986 and at the time of writing is still in operation. It is funded principally by the Colombian government but also to a very small part by the parents of the children who participate through a monthly fee (US\$ 4) used to provide a small salary to the community mother who runs the nursery. Funding for the programme is US\$ 250 million annually. Children six years of age and younger in poor neighborhoods are targeted. In 2004, approximately 80 000 *Hogares Comunitarios* were in operation nationally, with an average of 12 children attending each (maximum 15); about 1 million children 6 years of age and younger attend. Supplementary feeding is a major programme component, as children are provided lunch and two snacks daily in addition to a supplemental beverage; in total 70% of daily caloric needs are provided (9).

Evaluation data for *Hogares Comunitarios* reported an increase in HAZ in children 0–72 months based on variables of programme attendance/participation (0.486), of number of months in the programme (0.013), and of the exposure (number of months adjusted by age of child) to *Hogares Comunitarios* (0.78). Changes in WAZ were not significant.

Familias en Acción is a large-scale CCT programme that began in 2002 and remains in operation at the time of writing. It is implemented by the Colombian government and supported by both the World Bank and the Inter-American Development Bank; total annual funding in 2004 was US\$ 95 million. Coverage of *Familias en Acción* in 2005 was 66% of municipalities (700/1060) and 5% of the population, roughly 400 000 households or 2.1 million persons (10). Children 7 years of age and younger in the lowest income category are targeted for the programme, which includes roughly the poorest 20% of households (11). The nutrition/health component transfer for *Familias en Acción* is US\$ 17/month per mother, independent of the number of children in the household, which is equivalent to approximately 24% of total household expenditure (12). Conditions for receipt of the transfer include regular health visits and growth monitoring.

Evaluation data of *Familias en Acción* has demonstrated an increase in HAZ score of 0.161 in children less than 24 months of age; though this increase is not significant, it translates to a 6.9% decrease in the risk of being chronically undernourished (11). In addition, *Familias en Acción* participants in urban areas experienced an increase in newborn weight of 57.8 g. This finding should be interpreted with caution since the programme was targeted to children, not mothers.

Ethiopia

Key strategies to address malnutrition in Ethiopia include the National Nutrition Programme (NNP), which has many relevant components, and the Productive Safety Net Programme. The Government of Ethiopia launched the programme (2008–present) to reduce the magnitude of malnutrition in Ethiopia by reorienting the focus away from emergency and food security interventions and mainstreaming nutrition into community-based health and development programmes. Key nutrition activities of the NNP include:

1. Health Extension Programme (HEP)
2. Promotion of Essential Nutrition Actions
3. Community-based Nutrition (CBN)
4. Therapeutic Feeding Programme (TFP)
5. Enhanced Outreach Strategy (EOS)/ Extended Enhanced Outreach Strategy (EEOS) and Targeted Supplementary Feeding (TSF).

The HEP (2005–time of writing) is the core strategy for universal primary health service coverage. The programme, operating with multi-donor support, aims to improve family health status through disease prevention and control at the community level. Under the HEP, the Government of Ethiopia aimed for a ratio of 1 health extension worker (HEW):2500 persons and 1 health post:5000 persons. After year-long training, HEWs deliver preventive, promotive and selected curative activities according to 16 modules. These incorporated IMCI (from 2002) and Essential Nutrition Actions (from 2004). As of 2009, 83% of target *kebeles* (sub-districts) had health post coverage, and 100% of the target HEWs (30 000) had been trained and deployed. However, resource intensity for the programme remains low: Government of Ethiopia spending on health is only 7.5% of the total government budget, and total per capita public health expenditure was US\$ 3.00 in 2008, below the target expenditure of US\$ 4.80 per capita estimated for full implementation of the HEP (13).

The CBN (2008 –present) was launched in 2008 and will expand to cover 35% of Ethiopia's total population (228 *woredas*¹) by the first half of 2011. CBN is focused on children under two and uses monthly growth monitoring and promotion to involve families and community members in assessing health and nutrition-related problems, analysing causes of these problems, taking action and monitoring progress. Other important processes in CBN include strengthened referral of severely underweight children to TFPs and/or TSFs as required; control of micronutrient deficiencies through biannual vitamin A supplementation and deworming; and quarterly screening for acute malnutrition through Community Health Days. CBN activities are facilitated by HEWs and voluntary CHWs (1:30–50 households). Per capita costs are not available. Initial analysis of routine programme data from 1.5 million under-2 children weighed in 4 regions showed a decline in underweight from 30% in January 2009 to 20% in March 2010 (8 ppt/year).²

In TFPs (2008–present), children with complicated SAM receive care through therapeutic feeding units, and children with uncomplicated SAM are managed in the community through Outpatient Therapeutic Programmes (OTP) at decentralized sites. There are more than 5000 OTP sites across 200 *woredas*.

¹ *woreda*: primary administrative unit (district)

² Mason J and Hoblitt A, personal communication, 2010.

EOS/TSF Programmes (2004–present) are jointly operated by the MoH with UNICEF support and the Disaster Risk Management and Food Security Sector with World Food Programme support. The EOS targets children 6–59 months for vitamin A supplementation, measles vaccination, insecticide-treated bednets in malarial areas, health messages and deworming. Children 6–59 months and pregnant and lactating women (PLW) are also screened using mid-upper arm circumference (MUAC). Those identified as moderately malnourished are referred to TSF for 3-month supplementary food rations, where available (14). The EOS/TSF programme began in 2004 as a pilot, and quickly scaled up to cover 6.8 million children in 365 drought-prone *woredas*. In 2005/6, the programme was expanded through the EEOS, which covers additional *woredas* with a reduced package of only vitamin A supplementation and deworming. National coverage by EOS and EEOS has expanded to reach around 95% of children under 5, at an estimated cost of US\$ 1.14 per child.¹ In 2008, the programme covered 163 food-insecure *woredas* (2.9 million children 6–59 months and 600 000 PLW), provided targeted supplementary food to 720 000 children and 420 000 PLW, and cost about US\$ 43 million. Under HEP, the EOS programme is currently phasing out and being replaced by Community Health Days. These events will offer the same inputs as EOS but will move away from the regionally-supported biannual mobilizations and instead be carried out quarterly, supported by the district health structures and HEWs (15).

The PSNP (2005–present) is a partnership between the GoE and a group of donors providing direct budgetary support through a multi-donor trust fund. Outside of South Africa, PSNP is the largest social protection programme in sub-Saharan Africa. In 2009, PSNP reached nearly 10% of the country (7.6 million people), covering more than 40% of the *woredas*. The annual budget is around US\$ 360 million. Per capita, cash and food transfers totaled US\$ 32.8 for male-headed households and US\$ 37.1 for female-headed households in 2007 (16). PSNP employs geographic, administrative and community-based targeting to identify chronically food-insecure populations. The objective of the programme is to improve food security and prevent vulnerable households from having to sell assets (nutrition is not explicitly addressed). Cash and/or in-kind support is provided to targeted households in exchange for labour-intensive public works to build community assets. Labour-poor households (i.e. female-headed households with young children, the elderly, PLWs) receive unconditional transfers. An impact evaluation in 2008 found no significant change in anthropometric status of children in PSNP households compared to non-PSNP households. However, participation had positive effects on use of education and health services and household food security, caloric acquisition, and asset protection (17).

¹ UNICEF Ethiopia, personal communication, 2010.

Honduras

The national *Atención Integral a la Niñez en la Comunidad* (AIN-C) began in the mid-1990s and remains in operation at the time of writing as a community-based expansion from the original AIN programme. AIN-C is supported by the Honduran MoH, and received major funding from United States Agency for International Development from 1998–2005 (initial planning and support began in 1991). Coverage of the programme by area was 24 of 42 health areas (>50%) in 2006 (18), and by population was 90% of children less than 24 months of age. Intensity as measured by CHNWs:children is 3:25, where CHNWs work part-time for 3.5 hours weekly. Financial resource intensity is US\$ 6.43/child per year (18).

The programme is targeted at children less than 24 months of age and sick children 24–60 months of age. Activities of the AIN-C are carried out at monthly growth monitoring and promotion sessions at the community centre, although home visits are provided for children who do not attend. Components of the programme include nutrition counselling for EBF less than 6 months of age, complementary feeding less than 24 months of age, and hygienic practices; micronutrient distribution for children (iron and vitamin A); medication distribution for illness; antenatal care (newborn visits); and referral to the health facility as needed (19).

Evaluation of the AIN-C was planned as a pre- and post-intervention, project and control comparison study, but the design was altered due to extensive contamination of control communities, non-equivalent groups, and reduced intensity of programme implementation due to changes in funding. A cross-sectional study using baseline data compared AIN-C participants to non-participants. Improved caring practices were reported among AIN-C mothers. A 15.8 ppt difference in EBF at 6 months was found (55.8% AIN-C, 40% non-AIN-C). With regard to receiving iron and vitamin A supplementation, differences of 36.1 ppt (65.6% AIN-C, 29.5% non-AIN-C) and 6.8 ppt (94.3% AIN-C, 87.5% non-AIN-C) respectively, were reported for children. Mean height-for-age was lower in the AIN-C group as compared to non-participants at less than six months of age. At 6–11 months and 12–23 months of age, there was no difference between AIN-C children and non-participants, suggesting a protective effect of AIN-C against growth faltering. Since a pre-/post- comparison was not possible, this conclusion cannot be certain (20). Intensity of participation in the programme was based on percentage of possible weighings attended by the child; after controlling for household assets and age of child, for every 1% increase in participation intensity, weight-for-age increased 0.005 z-score (20).

India

Two major health and nutrition programmes were evaluated: Integrated Child Development Scheme (ICDS) and Tamil Nadu Integrated Nutrition Programme (TINP). TINP 1, funded by the World Bank, operated from 1980 to 1989 and TINP II operated from 1990 to 1997. ICDS was initiated by the Government of India (GoI) in 1975 and continues today. From 1990 to 1997, the World Bank supported ICDS I in Orissa and Andhra Pradesh, and from 1993 to 2001, supported ICDS II in Madhya Pradesh and Bihar.

An important conclusion to draw from this analysis of large-scale nutrition programmes in India is that a lack of proper evaluation is a major constraint to the development of evidence-based nutrition policies.

TINP I (1980–1989)

Among TINP participants, there was an approximate 1.25 to 2.40 ppt/ year decline in underweight prevalence. In TINP areas, there was an approximate 0.83 to 1.12 ppt/year decline in underweight prevalence as compared with non-TINP areas where an approximate 0.26 to 1.12 ppt/year decrease in underweight prevalence was observed. The estimated underlying trend for the whole of India during this time was a 0.7 ppt/year decrease in underweight prevalence. Thus an estimated one quarter to one half of the decrease in underweight prevalence is attributable to the project.

There are important issues related to data sources. Data on residents in TINP and non-TINP areas (rather than on TINP participants) come from the National Nutrition Monitoring Bureau (NNMB) while data on TINP participants comes from programme monitoring records. NNMB estimates are from an 11-year period (1979–1990) while TINP estimates are from an 8-year period (1982–1990). Furthermore, NNMB surveys consistently produce higher estimated underweight prevalence than TINP surveys because NNMB surveys cover entire areas rather than only programme participants. This may reveal differences between participants and non-participants.

TINP II (1990–1997)

TINP II built off the lessons learned during TINP I. The components of TINP II remained the same as those in TINP I, although additional components were added.

Among TINP II participants, there was an approximate 6.0 ppt/year decrease in underweight prevalence. In TINP areas, there was an average 1.1 ppt/year decline in underweight prevalence. The underlying trend in Tamil Nadu at that time was estimated by the World Bank to be 5.0–7.0 ppt/year, which is most certainly an overestimate. In its 1998 Implementation Completion Report for TINP I, the World Bank suggests 2.0 ppt/year as a more realistic estimate of the underlying nutritional trend in Tamil Nadu.

Overall, TINP II was found to be successful in achieving its objective to decrease severe malnutrition but not successful in achieving its objective for moderate malnutrition. The latter objective may have been too ambitious, and underlying trends may have been overestimated.

ICDS (1975–present)

In 1998, ICDS was implemented in approximately 45% of the poorest villages and 60% of the richest villages in India. Universal coverage is a major goal of the programme, although it has proven difficult to reach certain remote areas and vulnerable groups. A major issue related to the effectiveness of the programme is the fact that coverage is much higher in

areas with lower underweight prevalence. The intensity also tends to be significantly higher in areas that are wealthier.

An evaluation by Lokshin and colleagues (21) found no statistically significant differences between the “treatment” group (children living in areas with ICDS) and the “control” group (children living in areas without ICDS). Using propensity score matching, the difference between HAZ scores among “cases” and “controls” was found to be only 0.056 in 1992 and 0.024 in 1998. Similarly, the difference between WAZ scores among “cases” and “controls” was found to be -0.044 (in the opposite direction expected) in 1992 and 0.001 in 1998. None of the differences was statistically significant. These figures (derived from National Family Health Surveys) can be used only to investigate differences at one point in time, rather than to examine trends year to year, and thus provide for only weak attribution of changes to programme activities.

ICDS I (1990–1997)

Between 1990 and 1997, the World Bank supported ICDS activities in Andhra Pradesh and Orissa.

According to programme monitoring data, the decrease in underweight prevalence was found to be approximately 3.2 ppt/year in Andhra Pradesh and 0.05 ppt/year in Orissa. This data represents changes among programme participants rather than among community members as a whole. The underlying trend in underweight prevalence was estimated to be 2.8 ppt/year in Orissa and 4.2 ppt/year in Andhra Pradesh. Overestimation of the underlying trend may have caused an underestimation of the effectiveness of ICDS I in Andhra Pradesh.

According to the World Bank, definitive judgments on the effectiveness of ICDS I cannot be made due to a lack of high-quality data. Measham & Chatterjee (22) attribute the ineffectiveness of the project, particularly in Orissa, to issues related to proper implementation of programme activities:

1. inadequate coverage of children < 3 years
2. irregular food supply
3. poor nutrition education
4. inadequate health worker training
5. *anganwadi* work “overload”
6. poor linkages between ICDS and the health system.

ICDS II (1993–2001)

Between 1993 and 2001, the World Bank supported ICDS activities in Madhya Pradesh and Bihar. Components of the programme were identical to those in ICDS I. ICDS II was found to be unsuccessful in improving the nutritional status of children in Madhya Pradesh and Bihar. In Madhya Pradesh, there was found to be a 0.62 ppt/year increase in severe underweight prevalence and a 0.18 ppt/year increase in moderate underweight prevalence (23, 24). In Bihar, a 0.93 ppt/year decrease in severe underweight prevalence and a 1.37 ppt/year decrease in moderate underweight prevalence were found. The World Bank did not provide information on the estimated underlying trend during this period.

Indonesia

The Family Nutrition Improvement Programme (UPGK) ran from 1975 to 1990, followed by the Third Community Health and Nutrition Project (CHN3) from 1993 to 2000. They were supported by the World Bank and combined participation and inputs from the MoH as well as from the community.

The UPGK (centred on *Posyandus*) projects were based on the strategy of consistent monthly weight gain in healthy children targeting children under five and their mothers. The activities included weighing, education, micronutrient supplementation and supplementary feeding in combination with other health interventions through weighing posts managed by community leaders and volunteers (25). The cost per beneficiary was US\$ 2 for weighing-screening and US\$ 11 per beneficiary for weighing-feeding. In all regions, 58 355 villages received access to weighing posts, and coverage reached 17 million children or 80% of the under-5 population. Of those 80%, 77% received services and 47% were weighed monthly. Of those weighed monthly, 54% showed consistent weight gain, but active long-term participation ranged from only 34%–69% (26). The level of severe protein-energy malnutrition declined from 3%–5% to 1%.

Both process and impact evaluations were performed on UPGK. A longitudinal study showed positive changes in health practices. However the degree to which these changes, or any change in nutritional status of the programme target population, can be attributed to the programme cannot be defined. Inclusion of too many other health issues may have diluted the nutrition interventions (27). Other evaluation results indicate high programme access and initial coverage above 80% but reduced active participation over time. A lack of baseline data makes impact difficult to assess.

CHN3 picked up where UPGK left off, running from 1993 to 2001 with a US\$ 3.6 million investment in improving nutritional status by the World Bank and US\$ 0.6 million by the Government of Indonesia. This project focused on capacity building, health information systems, education and service delivery in a province-based model in five provinces. From 1989 to 2003 underweight (<-2 SD WAZ) decreased from 37.5% to 27.5% (0.71 ppt/year) despite the financial crisis of the early 1990s. This decrease may be partially attributed to a reduction in birthrate in the lowest quintile of the population (28). A World Bank evaluation of the project determined that design made the project difficult to supervise and that poor monitoring and evaluation of performance made assessment of project effectiveness difficult to determine (29).

Improvements in childhood malnutrition have been seen from the early 1980s. National level programmes such as UPGK achieved strong access and initial coverage but met significant problems of sustained results, in part due to dilution of focus. Attempts to decentralize health interventions to the provincial level with CHN3 faced challenges of implementation and monitoring. Lack of baseline and surveillance data made effectiveness of these projects difficult to define.

Madagascar

SECALINE (1993–1997)

SECALINE (Surveillance and Education for Schools and Communities on Food and General Nutrition) was implemented in two provinces of Madagascar, Antananarivo and Toliary, starting in 1993. Nongovernmental organizations (NGOs) were contracted to provide services to beneficiaries and supervision for community nutrition workers (CNWs) in target areas. CNWs provided services at community nutrition centers and were paid in rice by SECALINE for working on the project five days each week. The ratio of beneficiaries to nutrition workers was approximately 400 to 1200 children and 200 women for each worker. The cost per child beneficiary was approximately US\$ 7.31 per year. The programme objective was to reduce food insecurity and malnutrition in Madagascar's two most food-insecure provinces through income generating projects and targeted nutrition programmes.

According to interim findings by the World Bank (30), there was a 14 ppt decrease in underweight prevalence among child participants in Antananarivo and a 10 ppt decrease in underweight prevalence among child participants in Toliary between January 1994 and June 1996. This amounted to a 5.6 ppt/year decrease in malnutrition in Antananarivo and a 4 ppt/year decrease in malnutrition in Toliary. The programme was deemed successful and was subsequently scaled up to cover all regions in the country through SEECALINE (see below).

SEECALINE (1999–2003)

The SEECALINE (Second Surveillance and Education for Schools and Communities on Food and General Nutrition) programme began in 1999 and was gradually scaled-up until 2002. Upon completion of scale-up activities, there were 3600 project sites in half the districts in Madagascar. SEECALINE targeted communities with poorer nutritional status as sites for implementation. Thus, communities with the programme had higher baseline levels of malnutrition than communities that did not have the programme. A key feature is that services are contracted out and provided by local NGOs in the target area. Activities were coordinated by a paid CNW in each programme site. Each site (and each CNW) serves between 200 and 500 women and children. There is a coverage rate of approximately 50% of children under the age of 3 years in each target area. The programme objective was to improve the nutritional status of children under three, PLW, and school-aged children

SEECALINE was evaluated by the World Bank in two different ways:

First, Galasso and Yau (31) utilized monitoring data to estimate improvements in the nutritional status of child participants. Over the course of 3 years, there was approximately a 7–9 ppt decrease in underweight prevalence among programme participants (2.33–3.0 ppt/year). Galasso and Yau (31) found that “the returns are decreasing as time and duration increase, though they do not dissipate to zero.” Results also showed higher differential returns in poorer areas and areas more vulnerable to disease.

Second, Galasso and Umaphathi (32) utilized two nationally representative surveys to calculate the improvements in child nutritional status in programme areas rather than among programme participants. Between the 1997/98 and 2004 surveys, they found a 5.2–7.5 ppt decrease in underweight prevalence in programme areas (0.86–1.25 ppt/year).

Mexico

Oportunidades (known as *Progresa* from 1997–2002) is a CCT programme in operation at the time of writing. The programme is funded by the government of Mexico with support from the World Bank (US\$ 1.5 billion in 2009). It was initiated in rural areas and expanded to include urban areas beginning in 2002, although approximately 70% of programme participants reside in rural areas. Total coverage in 2007 was 5 million families, or 20% of the population. Targeting for *Oportunidades* is based on both geography, through identification of localities with high marginality indices, and socioeconomic status, through proxy means testing. Approximately 60% of households in the bottom decile of per capita expenditures are participants, suggesting effective targeting of the poorest (33).

The health and nutrition transfer component of *Oportunidades* is US\$ 15/household per month, about 20% of average monthly household expenditures (7), and is intended for PLW, all children less than 2 years of age, and children less than 5 years of age with low WAZ scores. Receipt of transfer is conditional upon regular health visits for all children in which growth monitoring is included, pre- and postnatal care for women, and adult (greater than 15 years of age) participation in health and nutrition education sessions. Iron supplementation and nutrition supplements are provided as well. The nutrition supplement is intended to provide 20% of daily caloric and 100% of daily micronutrient requirements.

Multiple evaluations of *Oportunidades* have been conducted with data demonstrating significant improvements in nutritional outcomes. In 2004, Rivera and colleagues (34) reported an increase in height in children 0–6 months of 1.1 cm (26.4 cm versus 25.3 cm) in programme beneficiaries compared to a control group (35). In rural children ages 12–24 months, a significant increase in mean hemoglobin of 0.37 g/dl was found after 12 months in the programme; 11.12 g/dl in the treatment group compared to 10.75 g/dl in the controls. Corresponding anaemia prevalence among beneficiary children was 44.3% compared to 54.9% among control children, a significant 10.6 ppt decrease. Even with improvement, nearly half of beneficiary children were still anaemic (34).

Gertler (36) reported a significant increase in height of 0.96 cm in children 12–36 months in the treatment as compared to the control group, though there was no significant impact on the odds of being stunted. Treatment was defined as living in a locality covered by *Progresa*, therefore including children in households that were not receiving *Progresa* benefits. Thus, the estimates obtained from the study may be conservative (7). Anaemia prevalence was evaluated in rural children aged 12–48 months after 12 months in the programme; a significant difference of 48.3% in beneficiary children compared to 41.1% in comparison children was found (36).

A 2005 evaluation by Behrman and Hoddinott, as reviewed by Lagarde and colleagues (37), found a significant increase in height of 1.016 cm in children 12–36 months, although this occurred in children whose mothers had greater than 5 years of schooling.

Leroy and colleagues (12) found a significant impact on height in children 0–6 months; an increase of 1.53 cm was seen in treatment children compared to control children. The mean HAZ gain of 0.41 cm in this age group was also significant. When income/poverty tertiles were considered, a significant increase in height of 0.27 cm in the poorest tertile was found (35).

Barber and Gertler (38) also reported positive impact of *Oportunidades* on nutritional outcomes in 2008. They found a significantly higher birthweight of 127.3 g in programme beneficiaries and a 4.6 ppt reduction in LBW. When evaluated based on average beneficiary time, programme impact was 68.3 g, which was significant. Programme impact from cash received was not significant at 78.2 g (35).

Nicaragua

The *Red de Protección Social* Programme (RPS) ran from 2000–2005. It was a small-scale CCT programme funded mainly by the Inter-American Development Bank, with contributions from the Government of Nicaragua and the World Bank. Total funding was US\$ 38 million. The RPS provided transfers for both nutrition/health and education upon meeting of certain conditions by programme beneficiaries, although the education component will not be discussed here. Coverage of the RPS in 2005 was about 165 000 persons, or 3% of the population. Both geographical and household targeting was used for implementation in departments and municipalities with high rates of extreme poverty. Intended beneficiaries were children 5 years of age and younger (7).

RPS participants received a nutrition/food security transfer equivalent to US\$ 18/month upon confirmation that conditions were met, although it has been reported that this was not strictly monitored. The transfer was equivalent to approximately 18% average monthly household expenditure. Conditions for receipt of the transfer included: monthly growth monitoring for children less than 24 months (every other month for children ages 2–5 years), participation in nutrition and health education sessions on topics such as breastfeeding, hygiene and feeding practices, regular vaccinations for children, and routine care for pregnant women. Antiparasitic medications and iron supplements were also provided, though problems with delivery and noncompliance for iron have been reported (7). Supply-side enhancements to ensure access to health care and ability to meet conditions were implemented as well by providing funding to private providers (mostly NGOs).

Available evaluation data from the RPS report a 19% improvement in per capita consumption in beneficiary households versus control households. Beneficiary household consumption was unchanged despite an economic crisis and drought while control household consumption decreased; the cash transfer may be beneficial in protecting nutritional intake during times of crisis. An increase in HAZ of 0.17 was reported for beneficiary children and stunting decreased in RPS versus control groups by 5.5 ppt (39). A significant change in underweight was also reported; it decreased in RPS areas (13.7% to 9.8%) while it increased in control areas (14.3% to 16.6%). Compared to national averages for this time period, the prevalence of underweight was much higher in both RPS and control areas. The cash transfer may have a greater impact in these rural, poor areas in times of economic and environmental hardship.

Atención a Crisis ran from 2005–2006 as a pilot/experimental CCT programme designed to help poor households in drought-affected regions of Nicaragua. Total funding was US\$ 1.8 million, provided by the Ministry of Family. About 3000 households (approximately 16 500 persons) in 6 municipalities that were affected by drought during the previous year were targeted by the programme. The food transfer amount was US\$ 145/household per year (US\$ 24/every 2 months). Conditions for receipt of transfer included growth monitoring, nutrition education and pre- and postnatal care for women. Supply-side benefits were planned for the programme but not implemented.

Evaluation data for *Atención a Crisis* show no impact on HAZ, WAZ or LBW. Due to the short duration of the programme and evaluation just after its completion, the lack of results is understandable.

Pakistan

The Lady Health Worker (LHW) programme started in 1994, expanding to 100 000 LHWs by 2002/3 (40), at about 1:1000 people, or about 1:150 households; the aim was 1:200 households. An evaluation found that they worked approximately 30 hours/week, with about 25 household visits per week (41). LHW supervisors were at a ratio of about 1:20–25. Coverage rose to about 70% of households. The programme targets children under five and women of reproductive age. Components are village committees, water/sanitation, referral/links to the health system, health education, essential drugs provision, immunization, growth monitoring and antenatal care/safe motherhood including iron supplements. Cost data (40) estimate about US\$ 500 per LHW/year, of which US\$ 240 is stipend/salaries, about US\$ 2.50/household per year, which may be too low to expect measurable impact. Social exclusion is a key factor, not specifically addressed in the reports.

Evaluations showed good impact on some process indicators – e.g. immunization and growth monitoring – although none on EBF (42). Child nutritional status was not measured; the only outcome seems to have been infant/child mortality rates. No impact was found, but it could be due to lack of statistical power in the evaluation designs.

There seem to be no child underweight estimates since 2001 – the 2006/2007 Demographic and Health Survey did not include anthropometry. Most estimates up to 2001 indicate about 0.6 ppt/year improvement at national level. The programme may have been successfully implemented, but had too low intensity (e.g. resources/household) for a major impact on nutritional status.

Philippines

The Barangay Integrated Development Approach for Nutrition Improvement (BIDANI) programme ran in the Philippines from 1978 to 1989 with support from UNICEF and the World Bank. It achieved 70% coverage of children under 5 with inputs at US\$ 2/child per year in 136 villages primarily in the areas of supplementary feeding, nutrition education, growth monitoring and home food production (43). There was a reduction in underweight from 28.3% (1983) to 18.7% (1985) (3.2 ppt/year). However, during the height of the programme a 1997 broad evaluation by UNICEF found implementation to be a consistent restraint (44).

The Early Childhood Development (ECD) Project ran from 1998 to 2005 and achieved 86% national coverage with US\$19 million support from the World Bank (approximately 30% of total budget) and additional funding from the Asian Development Bank. The intervention used CHWs based in health centres and schools, as well as home visits. Programme components focused primarily on supplementary feeding, micronutrient supplementation and fortification, and nutrition education. Area coverage for feeding programmes reached 25/36 municipalities and nutrition education 36/36 municipalities. A World Bank evaluation of ECD in 2006 and an Asian Development Bank evaluation in 2007 found predominantly positive programme impacts on weight-for-height and wasting. From 2001 to 2003 in programme areas, underweight for age decreased 1.33 ppt/year and wasting decreased 1.56 ppt/year. No positive impact was found on stunting. An evaluation concluded that there were positive results on acute malnutrition due to the feeding programme but negative impact on chronic malnutrition as addressed by the nutrition education and behaviour change components (45). The programme might have been more successful with better coordination of the CHWs. During ECD, from 1993 to 2003, prevalence of underweight for age declined from 28.3% to 20.7% (1.52 ppt/year).

The BIDANI programme showed positive impact on weight for age, though there were some issues with implementation. The ECD programme has had some significant effectiveness and could have potentially had even better results with improved implementation. The ECD programme showed positive evidence for the influence of community-based programmes on improved nutrition status with solid results in reducing prevalence of weight-for-height and wasting through feeding programmes. Long-term behaviour change was less effective due to poor coordination of CHWs.

Senegal

Community Nutrition Programme (CNP) (1995–2001)

The Senegal CNP was implemented from 1995 to 2001 in poor urban and peri-urban areas. Activities were coordinated by the NGO *Agence d'Exécution des Travaux d'Intérêt Public contre le sous-emploi* (AGETIP), and other local NGOs were contracted out to provide services. Services were provided at community nutrition centres (CNC) in target areas. At the time of programme completion, there were 292 centres serving approximately 457 000 beneficiaries in 37 communes. According to interim data collected early in the programme cycle (June 1996), there were approximately 465 beneficiaries being served at each CNC. Services were provided by micro-enterprises composed of four young people from the target community. These groups were supervised by *maîtres d'oeuvre communautaires* employed by AGETIP. Each supervisor was responsible for five micro-enterprises. Members of micro-enterprises were paid salaries and worked on the project six days per week.

The programme objectives were to:

- halt further deterioration in the nutritional status of the most vulnerable groups (children under three and PLW) in targeted poor urban neighborhoods;
- provide potable water to under-serviced neighborhoods targeted under the nutrition programme; and
- enhance household food security among the poor urban population and in targeted poor rural areas during critical periods of vulnerability.

Nutrition Enhancement Programme

The Nutrition Enhancement Programme was designed to extend nutrition and growth promotion interventions into rural areas in Senegal through NGO service providers. The programme targeted 3 regions and contracted 12 NGOs to provide services through 34 district-level subprojects. By June 2005, 15% of the age cohort was receiving services.

Tanzania

The Tanzania Iringa Joint Nutrition Support Programme (JNSP) ran from 1984–1991, and was supported by WHO and UNICEF. The JNSP operated in 6/7 districts covering about 250 000 persons, 46 000 of whom were children (73% participation). Children less than 5 years of age and women were targeted, and selection was not based on socioeconomic status. Resource intensity of the JNSP ranged from US\$ 8–US\$ 17/child per year (US\$ 30/child per year total cost, equivalent to US\$ 6 million). Intensity as measured by personnel was 2 village health workers/village (1220 total) or 1:40 children.

JNSP evaluation data demonstrated a decrease in underweight from 50% to 35% (1984–1988), or 4.5 ppt/year for the first 4 years of the programme. The decrease occurring in the first 2 years of the programme was even greater at 8 ppt/year, although the sustained decline in underweight in the population was 0.8 ppt/year (for years 2–7). The JNSP had components such as systems development and support, health services and water facilities, but these were not in place when the initial improvements in nutritional outcomes were seen. The reduction in malnutrition was attributed to increased feeding frequency, especially of severely underweight children at established child feeding posts, improved health care in families and communities and provision of information.

Following the success of the JNSP, the Child Survival and Development (CSD) Programme was initiated in 1985 and ran until 1995 with support from the World Bank. The programme aimed for complete coverage, although ultimately it was about 45% (9/20 regions), with approximately 12 million beneficiaries, 2 million of whom were children. Resource intensity of the CSD programme was US\$ 2–US\$ 3/child per year (46).

Although coverage of the CSD programme was much greater than the JNSP and resource intensity was less, evaluation demonstrates comparable results to those of the JNSP; an initial reduction in malnutrition of about 8 ppt/year for 1–2 years, then a continued decrease of 1–2 ppt/year following the initial rapid decline. The difference in resource intensity may be due to the fact that supplementary feeding was not a component of the CSD programme.

IMCI was initiated in 1995 and is presently in operation with a goal of national coverage. It is both facility- and community-based and supported by WHO and UNICEF. Coverage at the time of writing is varied. All 114 districts have received orientation and the majority (83% in 2005) had carried out at least initial training. Resource intensity of IMCI is approximately US\$ 11/child/year (US\$ 1.70/child per year for routine care). IMCI has various components (47).

Evaluation data from IMCI show a decrease in stunting, as measured by improvement in concentration indices in children aged 24–59 months in IMCI districts (-0.102 to -0.032) in relation to comparison districts (-0.122 to -0.133) from 1999–2002 (48). Overall stunting decreased from 59% to 43% in IMCI districts versus 51% to 40% in comparison districts. Improvement in underweight was also seen in IMCI districts (-0.071 to -0.057) as compared to non-IMCI districts (-0.136 to -0.166). Corresponding percentage changes for underweight were 30%–23% in IMCI districts versus 27%–10% in comparison districts (49). Further studies demonstrating effectiveness of the programme have not yet been conducted. Several reported challenges in implementation have occurred, as the main activity remains training of health care workers without significant expansion to community-based practices.

Child Health Days (CHDs) were implemented in Tanzania beginning in 2000. Coverage for each component of CHDs has been reported as follows: measles immunization, 97% per population total (2005); vitamin A supplementation, 81% per population total (2005);

deworming, 80% -100% per target area population (2004–2006). Intensity and impact evaluation data are not available for CHDs; however, based on coverage and known efficacy of these interventions, positive effects are plausible (50).

From 1999 to 2004/05, during operation of both IMCI and CHDs, overall stunting in Tanzania decreased from 48.3% to 44.4%, which is equivalent to approximately 0.7 ppt/year. Underweight in this time period decreased from 25.3% to 16.7%, which corresponds to approximately 1.6 ppt/year.

The Health Sector Development Project II (HSDP II) was launched in 2003 with support from the World Bank and pooled funds from development partners. Total project funding was US\$ 1.83 billion, 14% of which was designated for nutrition and food security (US\$ 256 million). The project was extended through 2009 to support completion of the Second Health Sector Strategic Plan (HSSP II), which was also launched in 2003 with the same scope as HSDP II. As reported in a World Bank project paper, funding for the original project has been expanded for 2009–2011 under the Third Health Sector Strategic Plan (HSSP III), with the same scope and planned activities as the original project. Additional funding disbursed was US\$ 30.9 million in pooled funds and US\$ 9.1 million in non-pooled World Bank funds. Proposed use for the additional non-pooled funds is implementation of a comprehensive food fortification programme to decrease micronutrient deficiencies in Tanzania.

In the past, programmes in Tanzania that were multi-component, community-based, and adequate in intensity resulted in reductions in malnutrition among children less than 5 years of age. Improvements in both stunting and underweight have been seen during more recent years of implementation of both IMCI and CHDs, though effectiveness studies for CHDs are unavailable. Evaluation of effectiveness of IMCI may be limited by a continued focus on training of facility-based health care workers, rather than implementation of community-based practices.

Thailand

Thailand's nutrition interventions, which have provided an important model for community-based programmes in general, contributed to a reduction in child underweight from around 30% (converted to WHO standards) in 1987 to 7% in 2005, averaging 1.3 ppt/year. However, in the early stages this rate was probably 2–3 ppt/year for the population and above 4 ppt/year for participants in the various interventions. In fact the rates from 1982 – the first growth monitoring data – and the recent national survey (2005/06) are somewhat vague, but the overall major improvement is clear.

The attribution of improved child nutrition to programme activities has not been made through formal evaluations. Nutrition improvement started (1982–85) before rapid economic growth (51, 52), and while no-one doubts the success and contribution of the Thai nutrition programme (e.g. 53, 54) no attempt can be found in the literature to actually ascribe the improvement to the programme.

The programme gave high priority to training village health volunteers and village health communicators, at ratios of 1:100 and 1:10–20 to households (54). Coverage was reported to reach nearly 100% of villages and 90% of children by 1990 (51). Cost estimates of around US\$ 10/household per year come from average budget figures. The components were seen as a menu from which villages could select priorities. These included antenatal care, breastfeeding support, growth monitoring and counselling, micronutrient provision, limited supplementary foods (including use of vouchers) plus group feeding, hygiene, basic health services and others. Social mobilization, awareness and community participation were the key features, linked to evolving primary health care, while lessening reliance on direct top-down service delivery. A set of Basic Minimum Needs indicators, self-assessed by communities, helped prioritize and monitor activities through a structure of facilitators (local officers in health or other sectors), community leaders, and 'mobilizers' (village health communicators and village health volunteers).

Vietnam

Child underweight improved at 1.5 to 2 ppt/year from around 1994 to 2008 according to repeated surveys and from the weighing programme (1999–2005 data). The Protein-Energy Malnutrition (PEM) Control Programme operated in all 64 provinces of the country, covering 100% of communes with more than 10 000 health stations. About 100 000 nutritional collaborators were in place by 2005, a ratio of about 1:70 children at a cost of about US\$ 0.70/child per year.

The components were counselling for breastfeeding and complementary feeding; vitamin A campaigns; iron in pregnancy; hygiene, sanitation and deworming for kindergartens; growth monitoring; and nutrition products for malnourished children. During this period there were also rapid economic growth and poverty alleviation programmes, and iodized salt was adopted. Stunting reduction began at least by 1985. The portion of the recent nutrition improvement that can be ascribed to the PEM Control Programme has not been evaluated. A small-scale trial (55) indicated minor effects on child anthropometry.

Overall, this is an example of a widely-implemented community-based programme, with probable impact that has not been evaluated. An estimate of 1.5 ppt/year improvement from the programme seems reasonable from the data published by year and province by the MoH-National Institute of Nutrition (56).

References

1. World Bank. *Bangladesh – National Nutrition Project*. Washington DC, World Bank, 2007 (Report No. ICR242) http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2007/04/30/000020953_20070430112717/Rendered/PDF/ICR0000242.pdf, accessed 24 April 2013).
2. Karim R et al. *The Bangladesh Integrated Nutrition Project: endline evaluation of the community based nutrition component*. Dhaka and Boston MA, Institute of Nutrition and Food Sciences, University of Dhaka, and Friedman School of Public Nutrition Science and Policy, Tufts University, 2003.
3. Save the Children-UK. *Thin on the ground: questioning the evidence behind World Bank-funded community nutrition projects in Bangladesh, Ethiopia, and Uganda*. London, Save the Children UK, 2003 (http://www.savethechildren.org.uk/sites/default/files/docs/thin_on_the_ground_1.pdf, accessed 6 March 2013).
4. White H, Masset E. Assessing interventions to improve child nutrition: a theory-based impact evaluation of the Bangladesh Integrated Nutrition Project. *Journal of International Development*, 2007, 19:627–652.
5. WHO. *Multi-country evaluation, Integrated Management of Childhood Illness*. Geneva, WHO, 2006 (<http://www.who.int/imci-mce/Sites/brazil.htm>, accessed 6 March 2013).
6. Lindert K et al. *The nuts and bolts of Brazil's Bolsa Familia Program: implementing conditional cash transfers in a decentralized context*. Washington DC, World Bank, 2007 (Social Protection Discussion Paper No. 0709) (<http://siteresources.worldbank.org/SOCIALPROTECTION/Resources/SP-Discussion-papers/Safety-Nets-DP/0709.pdf>, accessed 6 March 2013).
7. Bassett L. *Can conditional cash transfer programs play a greater role in reducing child undernutrition?* Washington DC, World Bank, 2008 (Social Protection Discussion Paper No. 0835) (<http://siteresources.worldbank.org/SOCIALPROTECTION/Resources/SP-Discussion-papers/Safety-Nets-DP/0835.pdf>, accessed 6 March 2013).
8. World Bank. *Implementation completion and results report on a loan in the amount of US\$ 572.2 million to the Federative Republic of Brazil for a Bolsa Familia Project*. Washington DC, World Bank, 2010 (Report No. ICR 00001486) (http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2010/07/21/000333037_20100721025323/Rendered/PDF/ICR14860P087711fficial0Use0Only0191.pdf, accessed 6 March 2013).
9. Attanasio O, Vera-Hernandez M. *Medium and long run effects of nutrition and child care: evaluation of a community nursery programme in rural Colombia*. London, Institute for Fiscal Studies, 2004 (<http://www.ifs.org.uk/edepo/wps/ewp0406.pdf>, accessed 6 March 2013).
10. Ayala F. *Familias en acción [Families in action]*. London, Overseas Development Institute, 2006 (Policy Brief 2) (<http://www.odi.org.uk/resources/download/1068.pdf>, accessed 6 March 2013).
11. Attanasio O et al. *The short-term impact of a conditional cash subsidy on child health and nutrition in Colombia*. London, Institute for Fiscal Studies, 2005 (http://www.ifs.org.uk/edepo/rs_fam03.pdf, accessed 6 March 2013).

12. Leroy JL, Ruel M, Verhofstadt E. The impact of conditional cash transfer programmes on child nutrition: a review of evidence using a programme theory framework. *Journal of Development Effectiveness*, 2009, 1(2):103–129.
13. Independent Review Team. *Ethiopia Health Sector Development Program (HSDP-III) (2005/06–2010/11) mid-term review. Vol. I Component report*. Addis Ababa, Federal Ministry of Health, 2008.
14. Federal Ministry of Health. *Guideline for the Enhanced Outreach Strategy (EOS) for child survival interventions*. Addis Ababa, Federal Ministry of Health, 2004.
15. Federal Ministry of Health. *National guidelines for control and prevention of micronutrient deficiencies*. Addis Ababa, Federal Ministry of Health, 2008.
16. Devereux S et al. *Ethiopia's Productive Safety Net Programme (PSNP): 2008 assessment report*. London, Centre for Social Protection, Institute of Development Studies, Overseas Development Institute, Dadimos Development Consultants, the IDL Group and A–Z Consult, 2008.
17. Gilligan DO, Hoddinott J, Taffesse AS. *The impact of Ethiopia's Productive Safety Nets Program and its linkages*. Washington DC, International Food Policy Research Institute, 2009 (<http://www.ifpri.org/sites/default/files/publications/ifpridp00839.pdf>, accessed 6 March 2013).
18. Fiedler JL, Villalobos CA, De Mattos AC. An activity-based cost analysis of the Honduras Community-Based, Integrated Child Care (AIN-C) programme. *Health Policy and Planning*, 2008, 23:408–427 (<http://heapol.oxfordjournals.org/content/23/6/408.full.pdf+html>, accessed 6 March 2013).
19. Rifkin SB, Hewitt G, Draper AK. *Community participation in nutrition programs for child survival and anemia*. London, Centre for Public Health Nutrition, School of Integrated Health, University of Westminster, 2007 (http://www.a2zproject.org/pdf/Community_Participation_Review_October_1_09.pdf, accessed 6 March 2013).
20. BASICS. *Evaluation of the AIN-C Program in Honduras*. Arlington VA, Basic Support for Institutionalizing Child Survival for USAID, 2008 (<http://www.basics.org/documents/pdf/AIN-C%20Evaluation.pdf>, accessed 6 March 2013).
21. Lokshin M et al. Improving child nutrition? The Integrated Child Development Services in India. *Development and Change*, 2005, 36(4):613–640 (http://econ.worldbank.org/external/default/main?pagePK=64165259&theSitePK=469372&piPK=64165421&menuPK=64166093&entityID=000016406_20050616094643, accessed 6 March 2013).
22. Measham AR, Chatterjee M. *Wasting away: the crisis of malnutrition in India*. Washington DC, World Bank, 1999.
23. International Institute for Population Sciences. *National Family Health Survey (MCH and Family Planning), India 1992–93*. Bombay, International Institute for Population Sciences, 1995 (<http://www.measuredhs.com/pubs/pdf/FRIND1/FRIND1.pdf>, accessed 24 April 2013).
24. World Bank. *Implementation completion report: Integrated Child Development Services*. Washington DC, World Bank, 1998 (Report No. 17756) (http://www-wds.worldbank.org/external/default/main?pagePK=64193027&piPK=64187937&theSitePK=523679&menuPK=64187510&searchMenuPK=64187283&theSitePK=523679&entityID=000009265_3980624142952&searchMenuPK=64187283&theSitePK=523679, accessed 6 March 2013).

25. International Centre for Diarrhoeal Disease Research, Bangladesh. Global Nutrition Review Team: Large-scale nutrition programs. From: Bhutta ZA et al. What works? Interventions for maternal and child undernutrition and survival. *Lancet*, 2008, 371(9610):417–440 Web appendix 17 (<http://download.thelancet.com/pdfs/journals/lancet/PIIS0140673607616936.pdf?id=5bbe37e152166496:-237c741a:12e-2fe657a2:-3a7d1297885944602>, accessed 24 April 2013).
26. Mason JB et al. *Community health and nutrition programs*. In: Jamison DT et al., eds. Disease control priorities in developing countries, 2nd edition. Washington DC, World Bank, 2006 (1063–1074) (<http://files.dcp2.org/pdf/DCP/DCP56.pdf>, accessed 6 March 2013).
27. Jennings J et al. *Managing successful nutrition programmes*. New York, United Nations ACC/SCN, 1991 (Nutrition Policy Discussion Paper No. 8) (http://www.unscn.org/layout/modules/resources/files/Policy_paper_No_8.pdf, accessed 6 March 2013).
28. Tilden R et al. *The effect of decentralization on the health status and health care utilization patterns in Indonesia*. Jakarta, Asian Development Bank, 2006 (TA 3579 INO) (http://s3.amazonaws.com/zanran_storage/www.litbang.depkes.go.id/ContentPages/45253357.pdf, accessed 24 April 2013).
29. World Bank. *Implementation completion report – Third Community Health and Nutrition Project*. Washington DC, World Bank, 2001 (Report No. 22959) (<http://siteresources.worldbank.org/INTEAPREGTOPHEANUT/Resources/IndonesiaP003914-ICR.pdf>, accessed 6 March 2013).
30. World Bank. *Two community nutrition projects in Africa: interim findings*. Washington DC, World Bank, 1998 (Findings: Africa Region, No. 112) (http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2010/10/15/000333037_20101015014405/Rendered/PDF/571340BRI0Find10Box353751B01PUBLIC1.pdf, accessed 6 March 2013).
31. Galasso E, Yau J. *Learning through monitoring: lessons from a large scale nutrition program in Madagascar*. Washington DC, World Bank, 2006 (Policy Research Working Paper 4058) (http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2006/11/08/000016406_20061108091139/Rendered/PDF/wps4058.pdf, accessed 6 March 2013).
32. Galasso E, Umapathi N. *Improving nutritional status through behavioral change: lessons from Madagascar*. Washington DC, World Bank, 2007 (Policy Research Working Paper 4424) (http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2007/12/12/000158349_20071212132020/Rendered/PDF/wps4424.pdf, accessed 6 March 2013).
33. World Bank. *Project appraisal document on a proposed loan in the amount of US\$ 1,503.76 million to the United Mexican States for a support to Oportunidades project*. Washington DC, World Bank, 2009 (Report No. 46821-MX) (http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2009/03/24/000333038_20090324025531/Rendered/PDF/468210PAD0P1151e0only10R20091005811.pdf, accessed 6 March 2013).
34. Rivera JA et al. Impact of the Mexican program for education, health, and nutrition (Progresá) on rates of growth and anemia in infants and young children: a randomized effectiveness study. *Journal of the American Medical Association*, 2004, 291(21):2563–2570 (<http://jama.ama-assn.org/content/291/21/2563.full.pdf>, accessed 6 March 2013).
35. World Bank. *What can we learn from nutrition impact evaluations?* Washington DC, Independent Evaluation Group/World Bank, 2010 (http://siteresources.worldbank.org/EXTWBASSHEANUTPOP/Resources/Nutrition_eval.pdf, accessed 24 April 2013).

36. Gertler P. Do conditional cash transfers improve child health? Evidence from PROGRESA's control randomized experiment. *The American Economic Review*, 2004, 94(2):336–341 (<http://www.jstor.org/stable/3592906>, accessed 6 March 2013).
37. Lagarde M, Haines A, Palmer N. The impact of conditional cash transfers on health outcomes and use of health services in low and middle income countries (Review). *Cochrane Database of Systematic Reviews*, 2009, Issue 4.
38. Barber SL, Gertler PJ. The impact of Mexico's conditional cash transfer programme, Oportunidades, on birthweight. *Tropical Medicine & International Health*, 2008, 13(11):1405–1414.
39. Maluccio JA, Flores R. *Impact evaluation of a conditional cash transfer program: the Nicaraguan Red de Protección Social*. Washington DC, International Food Policy Research Institute, 2005 (Research Report 141) (<http://www.ifpri.org/sites/default/files/publications/rr141.pdf>, accessed 6 March 2013).
40. WHO. *Pakistan's experience in Lady Health Workers (LHWs) Programme*. Geneva, WHO Regional Committee for the Eastern Mediterranean, 2004 (EM/RC51/12).
41. Oxford Policy Management. *Lady Health Worker Programme: external evaluation of the National Programme for Family Planning and Primary Health Care*. Oxford, Oxford Policy Management, 2003.
42. Oxford Policy Management. *Lady Health Worker Programme: external evaluation of the National Programme for Family Planning and Primary Health Care*. Oxford, Oxford Policy Management, 2009.
43. World Bank. *Implementation completion report*. Washington DC, World Bank, 2006 (Report No. 36105) (<http://web.worldbank.org/external/projects/main?pagePK=104231&piPK=73230&theSitePK=40941&menuPK=228424&Projectid=P004566>, accessed 6 March 2013).
44. WHO. *Global database on child growth and malnutrition*. Geneva, WHO, 2011 (<http://www.who.int/nutgrowthdb/en/>, accessed 26 January 2011).
45. Armecina G et al. *Early childhood development through an integrated program: evidence from the Philippines*. Washington DC, World Bank, 2006 (Policy Research Working Paper 3922) (http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2006/05/11/000016406_20060511122104/Rendered/PDF/wps3922.pdf, accessed 6 March 2013).
46. Kavishe FP, Mushi SS. *Nutrition-relevant actions in Tanzania*. New York, United Nations ACC-SCN, 1993 (Monograph Series No. 1) (<http://www.unscn.org/layout/modules/resources/files/Tanzania1993.pdf>, accessed 6 March 2013).
47. Victora CG et al. Integrated management of the sick child. In: Jamison DT et al., eds. *Disease control priorities in developing countries, 2nd edition, Chapter 63*. Washington DC, World Bank, 2006 (1177–1191) (<http://www.ncbi.nlm.nih.gov/books/NBK11752/>, accessed 6 March 2013).
48. Masanja HJ et al. Impact of Integrated Management of Childhood Illness on inequalities in child health in rural Tanzania. *Health Policy and Planning*, 2005, 20(Supplement 1):77–84 (http://heapol.oxfordjournals.org/content/20/suppl_1/i77.full.pdf+html, accessed 6 March 2013).
49. Prosper H, Borghi J. *IMCI implementation in Tanzania: experiences, challenges, and lessons*. London, Consortium for Research on Equitable Health Systems/Department for International Development, 2009 (Policy Brief) (http://www.crehs.lshtm.ac.uk/downloads/publications/Tanzania_IMCI_policy_brief.pdf, accessed 6 March 2013).

50. Oliphant NP et al. The contribution of Child Health Days to improving coverage of periodic interventions in six African countries. *Food and Nutrition Bulletin Supplement: child nutrition in vulnerable populations in Eastern and Southern Africa 2000–2006*, 2010, 31(3):S248–S263.
51. Kachondam Y, Winichagoon P, Tontisirin K. *Nutrition and health in Thailand: trends and action*. Bangkok and Geneva, Institute of Nutrition at Mahidol University and United Nations ACC/SCN, 1992 (ACC/SCN case study) (<http://www.unscn.org/layout/modules/resources/files/Thailand1992.pdf>, accessed 7 March 2013).
52. ACC/SCN. *2nd Report on the world nutrition situation – Volume II: country trends methods and statistics*. Geneva, ACC/SCN, 1993 (http://www.unscn.org/layout/modules/resources/files/rwns2_2.pdf, accessed 7 March 2013).
53. Heaver R, Kachondam Y. *Thailand's National Nutrition Program: lessons in management and capacity development*. Washington DC, World Bank, 2002 (Health, Nutrition and Population Discussion Paper) (<http://siteresources.worldbank.org/HEALTHNUTRITIONANDPOPULATION/Resources/281627-1095698140167/Heaver-ThailandsNational-whole.pdf>, accessed 7 March 2013).
54. Tontisirin K, Winichagoon P. Community-based programmes: success factors for public nutrition derived from the experience in Thailand. *Food and Nutrition Bulletin*, 1999, 20(3):315–322 (<http://unu.edu/unupress/food/fnb20-3.pdf>, accessed 7 March 2013).
55. Schroeder DG et al. An integrated child nutrition intervention improved growth of younger, more malnourished children in northern Viet Nam. *Food and Nutrition Bulletin*, 2002, 23(4 Suppl):53–61 (PMID: 1250323).
56. MoH-National Institute of Nutrition. *Prevalence of malnutrition among children under 5 (1999–2005)*. Protein-Energy Malnutrition Control Program (programme handout), 2006.

Bibliography/ additional sources

Reviews

International Centre for Diarrhoeal Disease Research, Bangladesh. Global Nutrition Review Team: large-scale nutrition programs. From: Bhutta ZA et al. What works? Interventions for maternal and child undernutrition and survival. *Lancet*, 2008, 371(9610):417–440 Web appendix 17 (<http://download.thelancet.com/pdfs/journals/lancet/PIIS0140673607616936.pdf?id=5bbe37e152166496:-237c741a:12e2fe657a2:-3a7d1297885944602>, accessed 24 April 2013).

Mason JB et al. Improving child nutrition in Asia. *Food and Nutrition Bulletin*, 2001, 22(3):3–85 (http://www.adb.org/Documents/Books/Nutrition/Improving_Child/default.asp, accessed 24 April 2013).

Mason JB et al. Community health and nutrition programs. In: Jamison DT et al., eds. *Disease control priorities in developing countries, 2nd edition, Chapter 56*. Washington DC, World Bank, 2006 (1063–1074) (<http://files.dcp2.org/pdf/DCP/DCP56.pdf>, accessed 6 March 2013).

World Bank. Repositioning nutrition as central to development. A strategy for large-scale action. Washington DC, World Bank, 2006 (Annex 1) (<http://siteresources.worldbank.org/NUTRITION/Resources/281846-1131636806329/NutritionStrategy.pdf>, accessed 24 April 2013).

World Bank. *What can we learn from nutrition impact evaluations?* Washington DC, Independent Evaluation Group/World Bank, 2010 (http://siteresources.worldbank.org/EXTWBASSHEANUTPOP/Resources/Nutrition_eval.pdf, accessed 24 April 2013).

Other reports

_____. *Pakistan: Overview of childhood under-nutrition* (no place, no date) (<http://siteresources.worldbank.org/SOUTHASIAEXT/Resources/223546-1171488994713/3455847-1232124140958/5748939-1234285802791/PakistanNutrition.pdf>, accessed 6 March 2013).

Alderman H et al. Effectiveness of a community-based intervention to improve nutrition in young children in Senegal: a difference in difference analysis. *Public Health Nutrition*, 2009, 12(5):667–73, PMID: 18559130.

Asian Development Bank. *Republic of the Philippines: power sector development program*. (no place), Asian Development Bank, 2007 (ADB Completion Report) (<http://www.adb.org/Documents/PCRs/PHI/37752-01-phi-pcr.pdf>, accessed 6 March 2013).

Friedman J et al. *Health sector decentralization and Indonesia's nutrition programs: opportunities and challenges*. Washington DC, World Bank, 2006 (Report No. 39690) (http://siteresources.worldbank.org/EXTEAPREGTOPHEANUT/Resources/Health_Sector_Decentralization_and_Indonesia_Nutrition_Programs.pdf?resourceurlname=Health_Sector_Decentralization_and_Indonesia_Nutrition_Programs.pdf, accessed 6 March 2013).

Gragnolati M et al. *India's undernourished children: a call for reform and action*. Washington DC, World Bank, 2005 (Health, Nutrition and Population Discussion Paper) (<http://siteresources.worldbank.org/SOUTHASIAEXT/Resources/223546-1147272668285/IndiaUndernourishedChildrenFinal.pdf>, accessed 6 March 2013).

- Heaver R, Mason JB. *Making a national impact on malnutrition in the Philippines: you can't get there from here: a case study of government policies and programs, and the role of UNICEF and the World Bank*. New York, UNICEF, 2000 ([http://www.tulane.edu/~internut/heaver-mason\(wd\).doc](http://www.tulane.edu/~internut/heaver-mason(wd).doc), accessed 6 March 2013).
- Hossain SM, Duffield A, Taylor A. An evaluation of the impact of a US\$ 60 million nutrition programme in Bangladesh. *Health Policy and Planning*, 2005, 20(1):35–40 (<http://heapol.oxfordjournals.org/content/20/1/35.abstract>, accessed 6 March 2013).
- Ismail S et al. Annex 4(A) Brazil case study Child Pastorate Programme. In: *Community-based food and nutrition programmes: what makes them successful. A review and analysis of experience*. Rome, Food and Agriculture Organization, 2003:211–221 (<ftp://ftp.fao.org/docrep/fao/006/y5030e/y5030e03.pdf>, accessed 6 March 2013).
- Khan AM. *Country fact sheet (February 2008)*. London, Department for International Development, 2008 (http://www.iptu.co.uk/content/trade_cluster_info/bangladesh/factsheet_feb08.pdf, accessed 6 March 2013).
- Khan NC. *Country Report I: Current status of nutrition in Asia*. (no place, date, publisher) (http://www.kns.or.kr/users/kns2008/workshop2008/data/05.Seesion%203/9.Vietnam_N.Khan.pdf, accessed 7 March 2013).
- Khan NC et al. Reduction in childhood malnutrition in Vietnam from 1990 to 2004. *Asia Pacific Journal of Clinical Nutrition*, 2007, 16(2):274–278 (PMID: 17468083).
- Linnemayr S, Alderman H. *Almost random: evaluating a large-scale randomized nutrition program in the presence of crossover*. Washington DC, World Bank, 2008 (Policy Research Working Paper 4784) (http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2008/12/09/000158349_20081209104903/Rendered/PDF/WPS4784.pdf, accessed 6 March 2013).
- Marek T et al. Successful contracting of prevention services: fighting malnutrition in Senegal and Madagascar. *Health Policy and Planning*, 1999, 14(4):382–389 (<http://heapol.oxfordjournals.org/content/14/4/382.full.pdf+html>, accessed 6 March 2013).
- National Institute of Public Cooperation and Child Development. *Research on ICDS: an overview (1986–1995): Volume 2*. New Delhi, National Institute of Public Cooperation and Child Development, 2005 (<http://nipccd.nic.in/reports/icdsvol2.pdf>, accessed 6 March 2013).
- Pelletier D et al. *The Bangladesh Integrated Nutrition Project: effectiveness and lessons*. Dhaka, World Bank, 2005 (Bangladesh Development Series – paper no. 8) (<http://sitere-sources.worldbank.org/NUTRITION/Resources/BNGBINP8.pdf>, accessed 6 March 2013).
- Rhode J. Indonesia's Posyandus: accomplishments and future challenges. In: Rhode J, Chatterjee M, Morley D, eds. *Reaching health for all*. Oxford, Oxford University Press, 1993 (<http://www.tulane.edu/~internut/indonesiaposy.pdf>, accessed 6 March 2013).
- Soekirman et al. *Economic growth, equity and nutrition improvement in Indonesia*. New York, United Nations ACC/SCN, 1992 (Case Study) (<http://www.unscn.org/layout/modules/resources/files/Indonesia1992.pdf>, accessed 6 March 2013).
- White H. Comment on contributions regarding the impact of the Bangladesh Integrated Nutrition Project. *Health Policy and Planning*, 2005, 20(6):408–411 (<http://heapol.oxfordjournals.org/content/20/6/408.long>, accessed 6 March 2013).
- Winichagoon P et al. *Integrating food and nutrition into national development: Thailand's experience and future visions*. Bangkok and Geneva, Institute of Nutrition at Mahidol University and United Nations ACC/SCN, 1992.

World Bank. *Impact evaluation report: Tamil Nadu Integrated Nutrition Project*. Washington DC, World Bank, 1994 (Report No. 13783-IN) (http://www-wds.worldbank.org/external/default/main?pagePK=64193027&piPK=64187937&theSitePK=523679&menuPK=64187510&searchMenuPK=64187283&theSitePK=523679&entityID=000009265_3961007201701&searchMenuPK=64187283&theSitePK=523679, accessed 6 March 2013).

World Bank. *Implementation completion report: 2nd Tamil Nadu Integrated Nutrition Project*. Washington DC, World Bank, 1998 (Report No. 17755) (http://www-wds.worldbank.org/external/default/main?pagePK=64193027&piPK=64187937&theSitePK=523679&menuPK=64187510&searchMenuPK=64187283&theSitePK=523679&entityID=000009265_3980630180543&searchMenuPK=64187283&theSitePK=523679, accessed 6 March 2013).

World Bank. *Implementation completion report Republic of Madagascar, Food Security and Nutrition Project*. Washington DC, World Bank, 1999 (Report No. 19282) (http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/1999/07/22/000094946_99061705394561/Rendered/PDF/multi_page.pdf, accessed 6 March 2013).

World Bank. *Implementation completion report: Community Nutrition Project, Senegal*. Washington DC, World Bank, 2001 (Report No. 21429) (http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2001/09/18/000094946_01083004024820/Rendered/PDF/multi0page.pdf, accessed 6 March 2013).

World Bank. *Supplemental credit document: International Development Association proposed supplemental credit to the Republic of Madagascar for the Second Community Nutrition Project (SEECALINE)*. Washington DC, World Bank, 2003 (Report No. P7604-MAG) (http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2003/10/08/000012009_20031008124051/Rendered/PDF/P76040MG.pdf, accessed 6 March 2013).

World Bank. *Implementation and completion report on a credit in the amount of US\$16.2 million to the government of Tanzania for a Health Sector Development Program*. Washington DC, World Bank, 2004 (Report No. 29517) (http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2004/07/01/000012009_20040701141308/Rendered/PDF/29517.pdf, accessed 6 March 2013).

World Bank. *Project appraisal document on a proposed credit in the amount of sdr 196.1 million to the People's Republic of Bangladesh for a health nutrition and population sector program*. Washington DC, World Bank, 2005 (Report No. 31144-BD) (http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2005/04/12/000090341_20050412095154/Rendered/PDF/31144.pdf, accessed 6 March 2013).

World Bank. *Project performance assessment report: Bangladesh Integrated Nutrition Project*. Washington DC, World Bank, 2005 (Report No. 32563) ([http://inweb90.worldbank.org/OED/oeddoclib.nsf/DocUNIDViewForJavaSearch/1B9CDB38C3F674C985256FFE00663B07/\\$file/ppar_32563.pdf](http://inweb90.worldbank.org/OED/oeddoclib.nsf/DocUNIDViewForJavaSearch/1B9CDB38C3F674C985256FFE00663B07/$file/ppar_32563.pdf), accessed 6 March 2013).

WHO. *Nutrition landscape information system (NLIS)*. Geneva, WHO, 2011 (<http://www.who.int/nutrition/nlis/en/>, accessed 26 January 2011).

