European Commission

Strengthening Integration of Nutrition within Health Sector Programmes

An Evidence-based Planning Resource

May 2018

International Cooperation and Development

This study was commissioned by the European Commission.

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Strengthening integration of nutrition within health sector programmes: An evidence-based practice brief

Executive summary

Introduction

Diet has been identified as the top risk factor in the global burden of disease. Nutrition and health are inextricably linked through the vicious cycle of malnutrition and infection. Poor health results in poor nutrition outcomes, and poor nutrition results in poor health outcomes. Malnutrition is a broad term that encompasses both undernutrition, i.e. being too thin (wasted) and/or too short (stunted), or deficient in micronutrients, and an excessive intake of energy-dense food which, together with reduced physical activity, has led to an epidemic of obesity, overweight, and nutrition-related noncommunicable diseases (with or without micronutrient deficiencies).

Undernutrition in all its forms contributes to approximately 45% (3.1 million) of preventable deaths in children under 5 each year. Undernutrition negatively affects physical growth, cognitive development and educational attainment, causing potentially irreversible damage. It also reduces physical productivity and results in decreased income potential later in life. However, these effects can be prevented through improving nutrition of pregnant women and newborns, by acting during the so-called 'window of opportunity' of the first 1,000 days, corresponding to the entire period of intra-uterine development plus the first 2 years of life of the child. The causes of undernutrition may be immediate (disease and inadequate food intake), underlying (inadequate care, inadequate household food security, poor health environment and lack of access to health services and income poverty) and basic (social, economic and political context). These causes are complex and interdependent and pathways to addressing them are consequently multi-sectoral, multi-level and multi-stakeholder, as illustrated by the framework for corresponding actions in Figure 1.

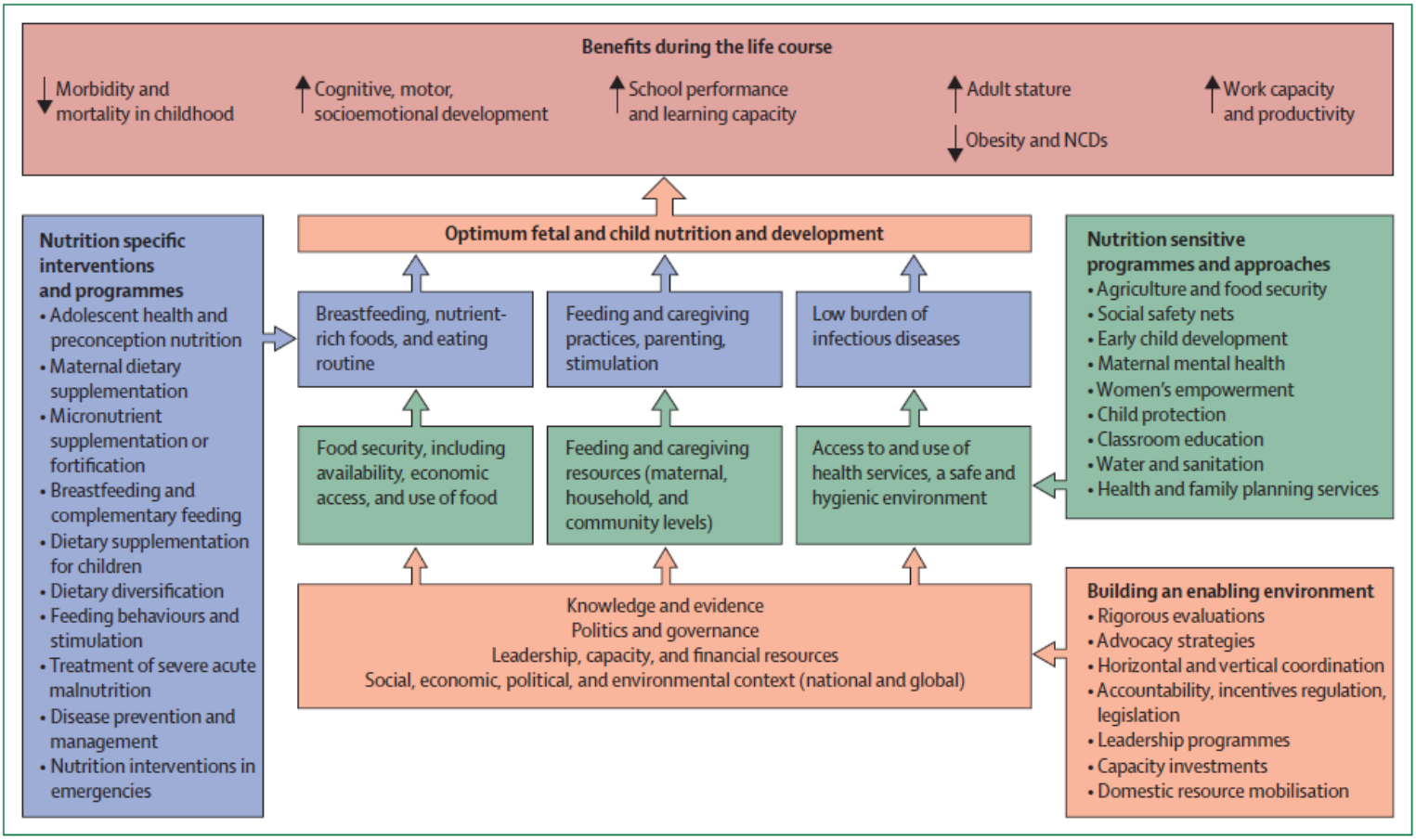


Figure 1: Framework for actions to achieve optimum foetal and child nutrition and development

A number of priority health interventions significantly impact on the nutritional status of the population, while many of the high impact, nutrition-specific interventions (as identified in *The Lancet Series on Maternal and Child Undernutrition*, 2013) are most feasibly delivered through health services. These health and nutrition interventions share common goals (reducing mortality and morbidity) and common target groups (women, adolescents and children). Investing in health and nutrition can therefore maximise synergies.

This evidence-based planning resource provides an overview of the evidence on nutrition interventions delivered through the health sector and highlights the importance of scaling-up priority high impact nutrition interventions and strengthening the delivery and effectiveness of selected cost-effective nutrition specific and nutrition sensitive interventions with the greatest impact on nutrition and health outcomes. The importance of strengthening national health systems at various levels to sustainably and effectively deliver equitable integrated services is emphasized throughout. A compelling evidence base, political commitment, leadership and good governance together with adequate capacity and resources, all create the enabling environment for action and scale up.

The resource is based on a review of available evidence on nutrition interventions delivered through health sector platforms that aim to improve the nutritional and health status of infants, children and women of reproductive age (WRA), including adolescent girls. It also reviews available evidence for key intervention areas required to enhance the overall nutrition sensitivity of the health sector to increase overall impact on nutrition and health including Water, Sanitation and Hygiene (WASH), Early Childhood Development (ECD) and cash transfers (CT). While the focus is mainly on undernutrition, the review also includes a brief addressing the challenges associated with the double burden of malnutrition and the alarming increase seen around the world in the prevalence of overweight and obesity. A short description of interventions for neonates as cited in the Lancet 2013 series is presented in Annex 1. Annex 2 provides summary tables of the key nutrition-specific interventions for infants, children and WRA, based on WHO recommendations. Annex 3 contains a nutrition and health glossary, Annex 4 gives details on the grading of evidence presented in the briefs, and Annex 5 provides further tools to facilitate the identification and prioritisation of interventions and evidence-based decisions, taking into account country context.

The review of evidence for this resource included quantitative, qualitative, and mixed-methods studies from published and grey literature. The grading of the quality of evidence (low, moderate or high) in each brief is based on the quality of findings presented in the cited study, and where a paper has stated the level of quality, that has been replicated in the brief. Where appropriate, the distinction between a lack of evidence, poor quality of evidence or poor evidence of impact is made. Further details on how the evidence presented in the briefs was graded are provided in Annex 4. One limitation of this resource is its focus on the available evidence base for interventions delivered through the health system. This gives an induced bias towards interventions that address the immediate causes of undernutrition, at the risk of overlooking the deeper underlying and basic causes which are at the same time accepted to be 80% of the problem.

Key Findings

Can micro-nutrient supplementation and other nutrition interventions for Women of Reproductive Age (WRA) and adolescent girls improve health and nutrition outcomes?

Introduction: Macronutrient and micronutrient deficiencies can negatively impact the health of the mother, her pregnancy as well as the health of the newborn baby. The adolescent period (age 10–19 years) is a critical time to target to ensure women's nutritional status prior to conception.

Findings

- Balanced energy and protein supplements for mothers (including adolescents) was associated with: fewer babies dying during labour and fewer low birth weight babies.
- Good evidence folic acid supplementation prevents neural tube defects.
- Moderate evidence high dose calcium supplements reduce pre-eclampsia, maternal death, but mixed evidence on reducing preterm births.
- No evidence that Vitamin A Supplementation during pregnancy or postpartum reduces maternal or infant mortality.
- Inconclusive evidence zinc supplementation reduces pre-term births.
- No evidence deworming during pregnancy reduces maternal anaemia or low birthweight.
- Iron and folic acid supplementation during pregnancy has a positive effect on infant birthweight, and maternal anaemia.
- Moderate evidence that iron and folic acid supplementation in pregnant and non-pregnant adolescent girls improve serum haemoglobin and reduce anaemia.
- Iron supplementation in WRA and postpartum mothers reduces anaemia and iron deficiency.
- Limited evidence that zinc supplementation increases haemoglobin concentration and serum zinc concentration in non-pregnant adolescents and reduces preterm births and LBW in pregnant adolescents.

Programmatic implications

WHO recommends routine interventions during pregnancy including:

Maternal balanced energy and protein supplements for undernourished pregnant women,

peri-conceptional folic acid supplements,

Iron or iron + folic acid supplements,

maternal high dose calcium supplements.

Vitamin A supplementation is recommended where vitamin A deficiency is a severe public health problem.

Micronutrient deficiencies in WRA, including adolescents, are best addressed through longer term solutions including consumption of a healthy, balanced diet, preventive measures to reduce infections, girls' education, birth spacing and reduction of adolescent pregnancies.

Challenges

- Poor integration with existing health services and community approaches.
- Quality of antenatal care (ANC), equity in access and a continuum of maternal care and weak maternal and foetal assessment (e.g. diagnosing anaemia in pregnancy).
- Barriers to sustainable availability and quality of nutrition supplements.
- Non-compliance with supplementation regimens.

Can breastfeeding promotion and appropriate complementary feeding improve health and nutrition outcomes?

Introduction: Poor Infant and young child feeding (IYCF) practices are significant contributing factors to undernutrition globally.

Findings

Optimal breastfeeding and appropriate complementary feeding have significant impacts on reducing mortality and morbidity in mother and child.

- No direct evidence exclusive breastfeeding reduces stunting but likely indirect effect through the reduction in diarrhoea.
- Good evidence breastfeeding reduces risk of overweight and obesity later in life.
- Limited evidence appropriate complementary feeding reduces stunting.

Programmatic implications

Best outcomes are achieved when interventions are delivered concurrently through a combination of delivery mechanisms and as an integrated package during antenatal, postnatal and child care services.

Complementary feeding messages should be clear, context specific and easy to understand, focusing on home prepared foods, diversified nutrient-rich food products and take into account women's time constraints.

Challenges

- Substantial gaps in knowledge and skills of health staff to support breastfeeding and complementary feeding in addition to an overall shortage of health workers in many settings.
- Aggressive commercial marketing of breastmilk substitutes and unhealthy food and drinks.
- Women's time constraints and workload together with, in many contexts, lack of legal, financial or workplace provisions, prevent them from implementing improved breastfeeding and complementary care practices.
- Social and cultural norms and misconceptions are a significant influence on mothers' ability to choose optimal breastfeeding and adopt appropriate food and hygiene practices. This is in turn influenced by maternal education.

Can Vitamin A supplementation (VAS) for children 6–59 months of age or pregnant/lactating women improve health and nutrition outcomes?

Introduction: Vitamin A deficiency (VAD) is the leading cause of preventable blindness in children and increases the risk of disease and death from severe infections. In pregnant women VAD causes night blindness and may increase the risk of maternal mortality.

Findings

- VAS has an impact on night blindness and precursors to blindness in children 6–59 months.
- VAS has a significant impact on morbidity and mortality in children 6–59 months but no effect in infants 1–5 months.
- Weak evidence VAS during pregnancy or post- partum has an effect on maternal or infant mortality.

Programmatic implications

WHO recommends VAS for children 6–59 months where VAD is a public health problem and for children with measles where VAD may be present. VAS is only recommended in pregnant women where VAD is a severe public health problem.

Challenges

- VAS focuses on a single micronutrient and those at risk of VAD are often deficient in multiple micronutrients.
- Parents should be well informed and reassured about possible side effects. One side effect is vomiting within 48 hours if taking large doses of vitamin A.

Can zinc supplementation for children under 5 years improve health and nutrition outcomes?

Introduction: Zinc is an essential micronutrient required for normal growth and development of children and immune functions. Zinc supplementation will reduce susceptibility to having diarrhoea and is expected to reduce susceptibility to respiratory infections and malaria as well as affecting growth and to have a positive effect in low-birth weight babies, although evidence currently available for the latter is inconclusive.

Findings

- Zinc supplementation has a positive effect on diarrhoea incidence, duration and severity in children older than 6 months, and those with malnutrition, but not in children younger than 6 months.
- Mixed evidence that zinc supplementation reduces mortality.
- Cannot draw conclusions from evidence relating to prevention of respiratory infection, effect on growth in children, effect in low birth-weight infants or pregnant women.

Programmatic implications

WHO recommends zinc supplementation for the management of diarrhoea: Mothers and other caregivers should provide children (6 months – 5 years) with 20 mg per day of zinc supplementation for 10–14 days (10 mg per day for infants under 6 months of age).

Health care workers are encouraged to also provide low osmolarity ORS solution for home use until the diarrhoea stops.

Challenges

- Adherence to taking zinc supplements for 10–14 days is a challenge – health workers should ensure mothers and caregivers clearly understand the purpose of the supplements.

Can micronutrient powders for point-of-use fortification improve health and nutrition outcomes in children 6–23 months and children 2–12 years?

Introduction: Multiple Micronutrient Powders (MNPs) for fortification of foods for children 6 months to 12 years to address deficiencies are used to overcome the constraints associated with use of supplementation and mass fortification. MNP typically contain 15 micronutrients including iron, zinc, iodine, vitamin A, C, D and range of B vitamins.

Findings	Programmatic implications
• Inconclusive evidence of the effect of MNP on mortality for children 6–23 months of age with lack of evidence on health impact for the 2–12 year age group and for pregnant women. • MNPs reduce anaemia amongst children 6 months – 12 years but no evidence they perform better than daily iron supplementation. • MNP has no effect on growth or serum zinc concentration in children 6–23 months, limited evidence of effect on vitamin A deficiency.	WHO recommends using MNPs for point-of-use fortification in children 6–23 months and 2–12 years where prevalence of anaemia is 20% or higher in these age groups. Daily iron supplementation is recommended for infants and young children aged 6–23 months, preschool-age children aged 24–59 months, school-age children aged 60 months and older, where the prevalence of anaemia is 40% or higher for the age group. MNPs are not a replacement for high dose VAS for children at risk of VAD. In malaria-endemic areas, iron in any form, including MNPs, should not be provided to children who do not have access to malaria-prevention strategies (e.g. provision of insecticide-treated bednets, prompt diagnosis of malaria and treatment with antimalarial drugs.

Challenges

- Countries should have a national strategy for prevention and control of micronutrient deficiencies grounded in a robust situation and causal analysis. The choice of intervention (e.g. MNPs, fortified foods, iron supplements, biofortification) should consider costs, cost effectiveness, feasibility and acceptability and the disaggregated prevalence of key micronutrient deficiencies based on up-to-date data.

Can deworming for preschool and school children, and WRA improve health and nutrition outcomes?

Introduction: Helminthic infections are associated with significant effects on nutrition, and impairment of mental and physical development.

Findings	Programmatic implications
• The latest Cochrane and Lancet review indicates no evidence of impact of mass deworming of children age 6 months to 16 years on mortality or cognitive development. • No evidence on impact of deworming during pregnancy on maternal anaemia or infant health. • Mixed evidence of mass deworming on reducing anaemia or other manifestations of malnutrition in children.	The WHO guidelines are based on infection prevalence which adopt a mass deworming approach rather than a screen-and-treat approach. The guidelines do not reflect the evidence from the latest Cochrane and Lancet review.

Challenges

- Plans to address helminth infections often do not adequately cover vector control or link to plans to address other social determinants of health.
- Out of school children, including adolescent girls may be difficult to reach if not accessing healthcare.

Management of moderate and severe acute malnutrition in children, and pregnant and lactating women to improve health and nutrition outcomes

Introduction: Acute malnutrition is associated with a high risk of mortality and can increase the case fatality rate in children suffering from common childhood illnesses.

Findings	Programmatic implications
• Weak evidence of impact of Lipid Nutrient Supplement (LNS) for MAM on mortality • Weak evidence regarding effectiveness of Targeted Supplementary Feeding Programme (TSFP) with respect to resulting in adequate recovery, limiting defaulting and reducing mortality. • Good evidence that community-based care using RUTF is effective approach in treating SAM, achieving low case fatality and high recovery rates.	Based on existing evidence, WHO/UNICEF have endorsed a community-based management approach to treating acute malnutrition (TSFP where appropriate, Out Patient Therapeutic programme (OTP), in-patient care and community mobilisation. National guidelines should be followed wherever possible. The key learning from the last ten years suggests that there is no one size fits all approach on how care for children with SAM is delivered. It is vital to consider capacities and constraints of health systems in countries.

Challenges

- Ensuring a sustainable adequate supply of RUTF particularly in inaccessible areas and insecure settings.
- Ensuring good follow-up of: children that move between the different programme components (TSFP, OTP, in-patient care), programme defaulters, long-term outcomes.

Can nutrition interventions for people with HIV and/or TB improve health and nutrition outcomes?

Introduction: Weight loss and undernutrition are common in people living with HIV/AIDS (PLWH) and tuberculosis (TB) and are risk factors for disease progression and mortality.

Findings	Programmatic implications
• Evidence that nutrition supplementation reduces morbidity, disease progression and mortality from HIV or TB is limited by the number and quality of existing studies. • Micronutrient supplementation may be beneficial in improving outcomes in HIV positive pregnant women and children. • Infant feeding counselling and support to HIV positive mothers is key for improving HIV free survival of infants.	Nutrition assessment, counselling and support to prevent and treat malnutrition can have a greater impact if started early in the course of the disease and should be integrated into routine care and treatment of PLWH and/or TB.

Challenges

- Integration of nutrition into routine care and treatment for people with HIV/TB may require broader health system strengthening inputs to be effective, in particular training of health workers.

Can WASH interventions delivered through health system platforms improve nutrition and health outcomes?

Introduction: WASH interventions aim to provide equitable and sustainable access to, and use of safe water and basic sanitation services and promote improved hygiene practices including at health service delivery points. WASH and nutrition are linked through three direct pathways: repeated bouts of diarrhoea, intestinal parasite infections and environmental enteropathy.

Findings	Programmatic implications
• Good evidence improved WASH reduces mortality and morbidity, especially diarrhoea related. • Evidence suggests WASH interventions by themselves have small benefits on nutrition outcomes which are greater in children under 24 months, although available evidence is limited and of low quality.	WASH interventions should address the 1,000 day window of opportunity and while improved WASH can significantly reduce women's workload and ability to care, at the same time interventions should be considerate of the same workload, care burden and time constraints. Behavioural factors are key; BCC programmes need to be tailored to local context and delivered through multiple complementary channels. Health sector policies, plans and programmes should include WASH and nutrition targets, and investment in corresponding resources is required.

Challenges

- Improved WASH delivered through health service platforms alone does not address inadequate WASH at household and community level, and therefore needs to be integrated with a package of complementary activities at these levels which are mutually reinforcing, including open defecation free communities / community led total sanitation.

Can integrated Early Childhood Development (ECD) programmes improve health and nutrition outcomes?

Introduction: Early Childhood Development refers to the physical, cognitive, linguistic and socio-emotional development of a child from the prenatal stage up to age eight years. The health sector has a significant role in the multi-sectoral delivery of an integrated package of ECD at policy and programme levels.

Findings	Programmatic implications
• Lack of evidence on the impact of integrated ECD interventions on health. • Good evidence integrated ECD and nutrition interventions have a synergistic effect on child developmental outcomes but not specifically nutrition outcomes.	The health sector has an important role in multi-sectoral delivery of ECD. Integration of ECD into health and nutrition services is feasible, affordable and cost effective.

Challenges

- Most disadvantaged families may be less able to benefit from ECD interventions for many reasons – including workload, travel and other opportunity costs, socio-cultural exclusion, likelihood of living in more remote areas and gender constraints.
- ECD is neither well understood or appreciated creating significant challenges for framing and governance, including in the development of required national ECD policy containing clear sectoral commitments and targets.

Can cash transfers improve health and nutrition outcomes?

Introduction: Cash transfers aim at increasing poor and vulnerable households' real income through cash provision and therefore enabling people to attain their basic human rights (food, water, access to essential services etc.). They can be unconditional (UCT) or conditional (CCT).

Findings	Programmatic implications
• Cash transfers can be effective in increasing the use of health services and improving health outcomes. • Overall evidence for impact of CT on nutrition is mixed but includes some robust evidence of positive impacts on stunting and wasting. • Evidence of conditionality (CCT) having an additional impact is weak. Size and duration of transfer are key determining factors.	Important considerations include: ensuring the inclusion of the most nutritionally vulnerable, addressing the 1000-day window, providing the transfer to mother/care giver, and provision of complementary inputs e.g. nutrition supplements, micronutrient supplement, deworming as required.

Challenges

- Impact on nutrition can be influenced by access to quality health services, markets and WASH.
- LICs may require investment in capacity development to effectively implement, monitor, and evaluate CTs to scale.
- CCTs can undermine a rights-based approach while entailing high administrative costs and increased capacity demands.

Addressing the Double Burden of Malnutrition (DBM)

Introduction: Many low- and middle-income countries (LMICS) face a "double burden" as a result of the negative impacts arising from both undernutrition and the coexistence of overweight, obesity and non-communicable diseases. Childhood stunting is an increased risk for obesity as an adult.

Childhood obesity is associated with a higher chance of obesity and premature death in adulthood while obese children experience breathing difficulties, hypertension, early markers of cardiovascular disease, insulin resistance and psychological effects.

Findings

- Good evidence breastfeeding reduces the risk of obesity in childhood.
- School-based physical activity interventions are effective in increasing physical fitness.
- Adolescents targeted with diet, physical activity, behaviour change, and combinations of those, showed a significant reduction in BMI post-intervention. Subgroups showed the largest effect for family-based interventions and the combination of the interventions.

Programmatic implications

WHO encourages double-duty actions that can simultaneously reduce the burden of both undernutrition and overweight/obesity.

Given the significance of the challenges presented by the double burden of disease, it is crucial for any national health policy to identify and address them in an integrated and coherent way. Competencies should be developed to address population's needs holistically – using innovative approaches to deliver quality integrated services.

Overweight and obesity data should be included in nutrition surveys

Challenges

- Lack of capacities to identify, prevent and address DBM which consequently need strengthening.
- Basic drivers of overweight and obesity epidemic include the unregulated and aggressive marketing of highly processed unhealthy food by large companies – including targeting children with snacks.
- Lack of evidence in low and middle income double-burden countries – existing evidence on overweight and obesity often relates to high income countries.
- To effectively embed preventative interventions within health, education and care systems to achieve long term sustainable impacts.

Conclusions

Supporting the scaling up and effective delivery through the health sector of both high-impact nutrition-specific interventions and essential nutrition-sensitive intervention areas can contribute to sustainable improvements in maternal, adolescent girls' and child health and nutrition as well as providing opportunities for achieving global targets on Universal Health Coverage.

The prioritisation of interventions in any context should be based on a robust situational analysis supported by strong evidence. Despite strong associations and plausible impact pathways, the existing evidence base for some nutrition interventions, especially nutrition sensitive approaches, remains limited by number, quality and variability in design of studies.

Prioritisation of interventions is also strongly dependent on the following criteria: relevance, political support, effectiveness, feasibility, expected contribution to health system strengthening, local capacities, ease of integration and targeting for sustainability, cost effectiveness, and dependent on available financing and presence of a funding gap.

Health system platforms are important for the effective delivery and coverage of nutrition interventions, particularly to mothers and children under five years of age but do not necessarily reach all affected groups e.g. school aged children, adolescent girls, the poorest, conflict affected populations, communities in remote areas etc. Additional delivery mechanisms are needed to reach these especially vulnerable populations.

Ensuring adequate investment across the health system building blocks, based on an assessment of existing capacities (at all levels) to deliver and the identification of bottle necks and potential weaknesses is a priority. In particular, investment in technical and functional capacities of the health workforce, starting with the training curriculum (pre-service and in-service training), is important to reinforce the quality, effectiveness and sustainability of interventions.

Facilitating better access to a healthy diet (for example through cash transfers as part of a comprehensive social protection policy), safe drinking water and sanitation and quality health services, all present significant challenges to achieving universal coverage and require investment in rights based, locally appropriate, gender sensitive and context specific interventions. Within this, effective social behaviour change communication and improving adherence to any form of supplements identified as necessary are also important.

Investments in the generation of robust and relevant evidence to inform implementation, strengthen accountability and guide the evolution of policies to ensure optimal nutrition impact should be considered an essential design component.

Ensuring the incorporation of both high impact nutrition specific interventions and essential nutrition sensitive intervention areas in the health sector must be understood as a key component of any broader national commitment and multi-sectoral strategic framework for eradicating malnutrition through a rights-based approach.

List of acronyms and abbreviations

AAH	Action Against Hunger
AIDS	Acquired Immune Deficiency Syndrome
AM	Acute Malnutrition
ANC	Antenatal Care
ART	Antiretroviral Therapy
BCC	Behaviour Change Communication
BF	Breastfeeding
BMI	Body Mass Index
CCT	Conditional Cash Transfer
CF	Complementary Feeding
CI	Confidence Interval
CMAM	Community-Based Management of Acute Malnutrition
CT	Cash Transfer
DALY	Disability Adjusted Life Year
DBM	Double Burden of Malnutrition
EBF	Exclusive Breastfeeding
EC	European Commission
ECD	Early Childhood Development
EU	European Union
GAM	Global Acute Malnutrition
GDP	Gross Domestic Product
GRADE	Grading of Recommendations, Assessment, Development and Evaluations
HAZ	Height-for-Age Z-Score
HCF	Health Care Facility
HICs	High Income Countries
HIV	Human Immunodeficiency Virus
HR	Human Resources
iCCM	Integrated Community Case Management
IDA	Iron Deficiency Anaemia
IFA	Iron and Folic Acid
IMAM	Integrated Management of Acute Malnutrition
INGOs	International Non-Governmental Organisations
IYCF	Infant and Young Child Feeding
LBW	Low Birth Weight
LMICs	Low and Middle Income Countries
LNS	Lipid-Based Nutrient Supplement
MAM	Moderate Acute Malnutrition
MDD – W	Minimum Dietary Diversity - women
MMN	Multiple Micronutrients
MNP	Multiple Micronutrient Powder
MMS	Multiple Micronutrient Supplementation
MUAC	Mid-Upper Arm Circumference
M&E	Monitoring and Evaluation
NCA	Nutrition Causal Analysis
NCDs	Non Communicable Diseases
NGOs	Non-Governmental Organisations
ORS	Oral Rehydration Solution
OTP	Out-Patient Therapeutic Programme
PLWH	People Living With HIV/AIDS
RCT	Randomised Controlled Trial
RR	Relative risk
RUSF	Ready to use Supplementary Food
RUTF	Ready to Use Therapeutic Food
SAM	Severe Acute Malnutrition
SBCC	Social and Behaviour Change Communication
SDG	Sustainable Development Goal
SFP	Supplementary Feeding Programme
SMART	Standardised Monitoring and Assessment of Relief and Transitions
STH	Soil-transmitted Helminths
SUN	Scaling up Nutrition
TB	Tuberculosis
TOR	Terms of Reference
TSFP	Targeted Supplementary Feeding Programme
UCT	Unconditional Cash Transfer
UHC	Universal Health Coverage
UN	United Nations
UNICEF	United Nations Children's Fund
VAD	Vitamin A Deficiency
VAS	Vitamin A Supplementation
WASH	Water, Sanitation and Hygiene
WAZ	Weight-for-age Z-Score
WFP	World Food Programme
WHA	World Health Assembly
WHO	World Health Organisation
WHZ	Weight-for-Height Z-Score
WRA	Women of Reproductive Age

Strengthening Integration of Nutrition within Health Sector Programmes: An Evidence-based Planning Resource

Introduction

Overview and scope

This evidence-based planning resource provides an overview of evidence on nutrition interventions delivered through the health sector, highlighting the importance of strengthening the delivery and effectiveness of selected cost-effective interventions with the greatest impact on nutrition and health outcomes. It emphasizes the importance of strengthening national health systems at various levels, so as to sustainably and effectively deliver integrated services. A compelling evidence base, political commitment, leadership, and good governance, together with adequate capacity and resources, create the enabling environment for action and scale-up.

This resource aims to:

- Inform and facilitate the work of EU Delegations involved in the development and management of health and nutrition programmes.
- Contribute to optimizing the integration and expansion of evidence-based nutrition interventions within health sector programmes, and efficient use of the resources available for health and nutrition.
- Contribute to strengthening national health systems and thereby the achievement of key country and global health and nutrition targets, including Sustainable Development Goals (SDGs) 2, 3, 6 and 17.

The resource is based on a review of evidence on nutrition interventions delivered through health sector platforms that aim to improve the nutritional and health status of infants, children, adolescent girls, and women of reproductive age (WRA). It focuses on undernutrition, but in recognition of the increasing double burden of malnutrition, also considers overweight and obesity. The review of evidence included quantitative, qualitative, and mixed-methods studies from published and grey literature. The categorisation of the quality of evidence (low, moderate, or high) in each brief is based on the quality of findings presented in the cited study, and where a paper has stated the level of quality this is also given. Where appropriate, the distinction between lack of evidence, poor quality of evidence, and poor evidence of impact has been made. Further details on how the evidence presented in the briefs was graded is described in Annex 4. A limitation of this resource is its focus on the evidence base: this induces a bias in favour of interventions that address the immediate causes of undernutrition, at the risk of overlooking the deeper underlying causes which are thought to be 80% of the problem.[1]

The evidence is presented as:

- Executive summary.
- A series of evidence-based briefs covering impact on nutrition; impact on health; cost considerations; application of evidence to design and implementation of policies and programmes; challenges; and monitoring and evaluation, including project-based indicators.
- A conclusion chapter summarising the analysis and providing further reflections on the importance of building effective and equitable health systems, the significance of lessons learnt and best practices, and challenges related to capacity development.
- An annex with nutrition-specific interventions for neonates (based on Lancet 2013), further tools to facilitate identification and evidence-based decisions taking into account country context, and a glossary.

Investing in health and nutrition – maximizing synergies

Diet has been identified as the top risk factor in the global burden of disease.[2] Nutrition and health are inextricably linked through the vicious cycle of malnutrition and infection (see Figure 1). Poor health results in poor nutrition outcomes, and poor nutrition results in poor health outcomes.

A number of priority health interventions significantly impact the nutritional status of the population, while most of the high-impact, nutrition-specific interventions are most feasibly delivered through the health service. These health and nutrition interventions share common goals (reducing mortality and morbidity) and common target groups (women and children). Some of the benefits of integrated models of service delivery include: improved quality of care and clinical outcomes, improved patient satisfaction, and better targeting of resources. Integration is also a promising basis on which to scale up coverage of nutrition interventions, with the potential to reach poor populations through demand creation and household service delivery. Yet there are also possible downsides to integration: without adequate investment in system strengthening at all levels, including community, health professionals can become overloaded and may lack specialist skills, leading to poor quality services and poor outcomes. Furthermore, integration may not always be appropriate or feasible in certain humanitarian contexts or where capacities are especially weak. Where accessibility to public health services is poor, by implication, this will limit accessibility to integrated nutrition services.

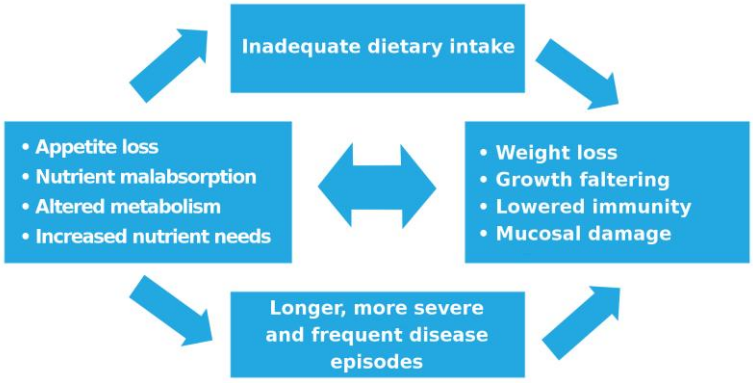


Figure 1: The vicious infection–malnutrition cycle

What are the consequences of malnutrition?

What is malnutrition?

Malnutrition is a broad term that encompasses both undernutrition, i.e. being too thin (wasted) and/or too short (stunted), or deficient in micronutrients, and an excessive intake of energy-dense food which, together with reduced physical activity, has led to an epidemic of obesity, overweight, and nutrition-related noncommunicable diseases (with or without micronutrient deficiencies). People become malnourished if their diet does not provide adequate energy or nutrients, or they are unable to fully utilize the food they eat due to illness (undernutrition) or due to excess intake of energy-dense nutrients).

Causes and consequences of undernutrition

There is strong evidence that undernutrition in all its forms contributes to approximately 45% (3.1 million) of preventable deaths in children under 5 each year.[3] Undernutrition negatively affects physical growth, cognitive development, and educational attainment; and it reduces physical productivity and results in decreased income potential. For young children, poor nutrition in the early years often means irreversible damage to bodies and minds during the time when both are developing rapidly. However it can be prevented by improving nutrition for children as early as in the uterus through to their second birthday (the so-called 1000 days window of opportunity).

- An undernourished child is at risk of losing 10% of lifetime earning potential.[4]
- The education gap and consequent lower skill level of a workforce substantially delays the development of countries affected by malnutrition. The economic cost of malnutrition is estimated to range from 2% to 3% of Gross Domestic Product, to as much as 16% in the most-affected countries.[5]
- Specific micronutrient deficiencies are associated with increased incidence of diarrhoeal diseases, pneumonia, and other acute respiratory infections, while there are reciprocal relationships between e.g. vitamin A deficiency and measles, whereby one exacerbates the other.
- At the same time, severe infectious disease in early childhood – such as measles, diarrhoea, pneumonia, meningitis, and malaria – can cause acute wasting and have long-term effects on growth.
- The effects of malnutrition trap generations of individuals and communities in the vicious circle of poverty (see Figure 2, right).[6]

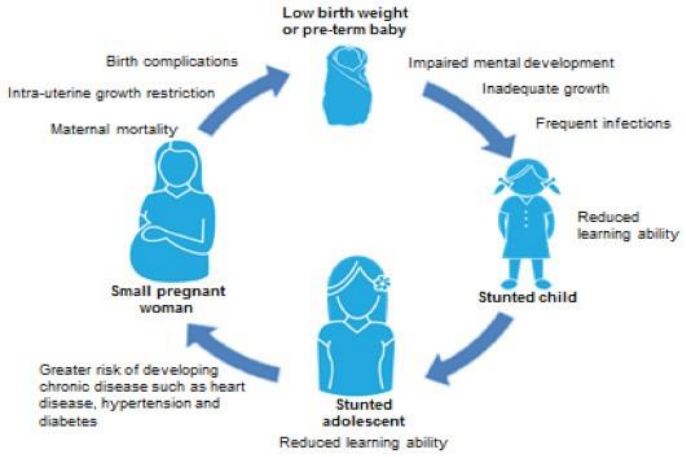


Figure 3: The intergenerational cycle of nutrition

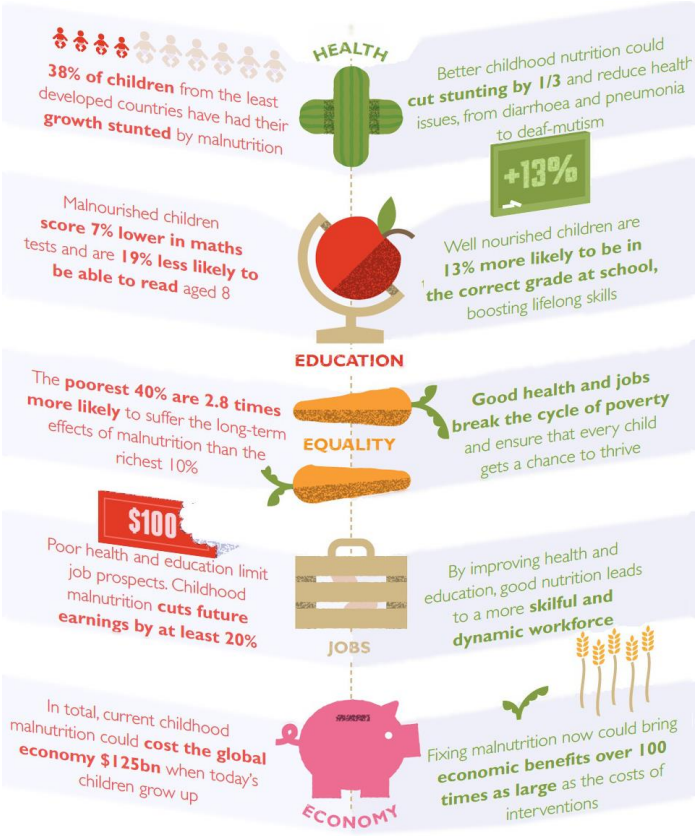


Figure 2: Consequences of malnutrition on child growth, health, education and the wider economy

Consequences of overweight and obesity

The relationship between nutrition and non-communicable diseases (NCDs) is well documented.[7 8] More than 10% of school-age children are currently categorized as overweight or obese and the situation is worsening in every region of the world.[9] There is also greater understanding of how undernutrition during pregnancy, which affects foetal growth, and the first 2 years of life, is a major determinant of both stunting of linear growth and subsequent obesity and NCDs in adulthood.[10] Maternal overweight results in increased maternal morbidity and infant mortality.

The 1,000-day window of opportunity and the intergenerational cycle of undernutrition

The 1,000 days from conception until a child's second birthday has been identified as a critical time, during which optimal nutrition can have a lasting impact on a child's growth, learning, and future productivity.[11] Good nutrition for pregnant women promotes healthy birth outcomes and can reduce the risk of maternal illness and death, as well as illness, death, and stunting in the child.

The intergenerational cycle of undernutrition (Figure 3, left) illustrates how undernutrition at one stage of life affects future stages, such that generations can be caught up in a cycle of poor nutrition and health outcomes. This supports the integration of nutrition and health through a mutually beneficial lifecycle approach.

Furthermore, improvements in women's education, particularly beyond the primary school level, are linked to better nutritional outcomes for their children, by improving care practices, strengthening economic prospects, and delaying the first pregnancy.[12]

Nutrition-specific and nutrition-sensitive interventions

The nutrition-specific activities reviewed draw on the recommendations of the *Lancet* series on maternal and child undernutrition (2013), as well as covering additional interventions (zinc supplementation as a treatment, deworming, micronutrient powders, and iron supplementation for WRA); overweight and obesity is also considered.

Nutrition-specific interventions aim to address the more immediate causes of undernutrition, such as inadequate dietary intake and poor health. These could have a dramatic impact on reducing malnutrition if taken to scale in 34 high-burden countries. There are 10 interventions which, if scaled to 90% coverage, it is estimated could reduce stunting by 20% and severe wasting by 60%.[13] The interventions are: (1) Maternal multiple micronutrient supplements; (2) Calcium supplementation to mothers at risk of low intake; (3) Maternal balanced energy protein supplements as needed; (4) Universal salt iodisation; (5) Promotion of early and exclusive breastfeeding for 6 months and continued breastfeeding for up to 24 months; (6) Appropriate complementary feeding education in food secure populations and additional complementary food supplements in food insecure populations; (7) Vitamin A supplementation between 6 and 59 months of age; (8) Preventive zinc supplements between 12 and 59 months of age; (9) Management of moderate acute malnutrition; (10) Management of severe acute malnutrition.

Effective prevention and management of infectious diseases can also decrease the harmful effects of illness on nutritional status.[14] Nutrition-specific interventions alone will not eliminate undernutrition; however, in combination with nutrition-sensitive interventions, there is enormous potential to enhance the effectiveness of nutrition investments worldwide.

Nutrition-sensitive interventions address the underlying and basic causes of undernutrition (e.g. poverty, food insecurity, education, women's empowerment, and social status) through indirect but plausible pathways. Interventions such as agriculture, livelihoods, social safety nets, women's empowerment, education, and early child development, all contribute indirectly to improving nutrition outcomes. Nutrition-sensitive interventions can also serve as delivery platforms for nutrition-specific interventions. Harmonisation of interventions and messages across community platforms of different sectors is crucial for coherence.

Interventions covered in this resource:

Nutrition-specific interventions

- Micro- and macro nutrient supplementation for Women of Reproductive Age and adolescent girls (covering balanced energy and protein supplements, and multiple micronutrients, folic acid, iron, calcium, vitamin A and zinc supplementation)
- Promotion of optimum breastfeeding and complementary feeding practices
- Micronutrient supplementation for children (covering vitamin A, zinc and multi-nutrient powders)
- Deworming
- Management of acute malnutrition

The importance of disease prevention and management is also considered (e.g. malaria prophylaxis, zinc therapy for diarrhoea, nutrition intervention as an integral part of management/treatment of tuberculosis (TB) and human immunodeficiency virus (HIV) infection) as well as the double burden of malnutrition and diseases.

Nutrition-sensitive interventions

- WASH (Water, Sanitation, Hygiene) programmes
- Early Childhood Development programmes
- Use of cash transfers (conditional and unconditional)

Interventions relating to agriculture and education programmes are dealt with more comprehensively in other EU evidence briefs,[15] guidelines,[16] and reference documents.[17]

International agenda for health and nutrition

World Health Assembly targets

In 2012 the World Health Assembly endorsed a Comprehensive Implementation Plan on maternal, infant, and young child nutrition. This specified a set of 6 global nutrition targets that aim by 2025 to:

- Achieve a 40% reduction in the number of children under 5 who are stunted
- Achieve a 50% reduction of anaemia in women of reproductive age
- Achieve a 30% reduction in low birth weight
- Ensure that there is no increase in childhood overweight
- Increase the rate of exclusive breastfeeding in the first 6 months to at least 50%
- Reduce and maintain childhood wasting to less than 5%

The Sustainable Development Goals

Sustainable Development Goal 2 (SDG 2) is directly related to nutrition, and SDG 3 is directly related to health. In addition, improving nutrition and health integration can promote progress towards other SDGs relating to poverty, equity, gender, education, and economic development. However, a multi-sectoral approach is poorly reflected in the SDGs, and the range of nutrition indicators presented is limited.

SDG 2: Zero Hunger. End hunger, achieve food security and improved nutrition and promote sustainable agriculture	
Target 2.1	By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round
Target 2.2	By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons
SDG 3: Good Health and Well-being. Ensure healthy lives and promote well being for all at all ages	
Target 3.1	By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births
Target 3.2	By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births
Target 3.4	By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being
Target 3.7	By 2030, ensure universal access to sexual and reproductive health-care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes
Target 3.8	Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all
Target 3.D	Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks

EU Commitments for health and nutrition

The EU is committed to improved development outcomes. The Agenda for Change (2011) informs EU programming between 2014 and 2020 aiming to increase the impact and effectiveness of EU development policy by changing the way assistance is delivered. With regard to health, the Agenda commits the EU 'to take action to develop and strengthen health systems, reduce inequalities in access to health services, promote policy coherence and increase protection against global health threats so as to improve health outcomes for all.' The EU's commitment to strengthening health systems in support of the delivery of universal coverage of basic quality care through a holistic and rights-based approach also features in the Communication on the EU Role in Global Health (2010). The EU's policy framework on nutrition is set out in the Communication on Maternal and Child Nutrition (2013) and the Action Plan on Nutrition (2014). The focus on women, children, and adolescent girls and the 1,000-day window of opportunity will be realised under each of the **three strategic priorities**:

1. **Enhance mobilisation and political commitment for nutrition**
2. **Scale up actions at country level**
3. **Strengthen the expertise and knowledge base for nutrition**

The Action Plan aims to realise the official pledge to spend €3.5 billion on nutrition (including nutrition-specific and nutrition-sensitive investments) by 2020 to meet the EU's commitment to reduce the number of stunted children by 7 million across 40 countries by 2025. The EU country profiles on nutrition provide a regular overview of how EU delegations are contributing to achieving national nutrition priorities and targets, and help structure dialogue internally as well as with government counterparts and other partners. The second Progress Report on the Action Plan shows how progress towards the goal has accelerated during 2016–17. Many countries supported by the EU also participate in Scaling Up Nutrition (SUN), G8 Nutrition for Growth, and Zero Hunger initiatives. The EU has also developed a Staff Working Document on Addressing Undernutrition in Emergencies (2013).

Mutual benefits – Brief rationale for strengthening integration of nutrition within health sector programmes

The boxes below outline why it is important for both health and nutrition managers to understand and support strengthening the linkages and integration of nutrition and health interventions within a health system.

Rationale for health programme managers

Not addressing undernutrition and overnutrition will impede progress towards achieving health targets.

Optimising the effective integration of nutrition interventions into the health system will:

- Offer good returns on investment in terms of preventing mortality in children under 5
- Contribute to Health System Strengthening
- Improve coverage of nutrition interventions by achieving scale
- Reduce the burden on the health system as malnourished children are more likely to get sick
- Increase coverage, reduce direct and indirect costs and opportunity costs to women and children; and improve demand for services
- Increasing availability of nutritious food and nutrition related behavioural change (addressing cultural barriers, preparation and storage, water/sanitation practices) is essential for breaking the cycle of malnutrition and ill health.

Rationale for nutrition programme managers

Nutrition targets will not be achieved if coverage/quality of nutrition-specific interventions is not improved.

Nutrition interventions have proven benefits to health and survival of populations.

- Healthier, better-nourished people will be more productive, thereby increasing agricultural productivity and food production
- Using health system platforms to deliver nutrition interventions maximises synergies as both health and nutrition interventions share common target groups (women, children and adolescent girls), common goals (reduced morbidity and mortality), reducing costs to the health system and opportunity costs to the people
- Strengthening nutrition–health system linkages can be a potential win–win for the policy, programme, and research communities that are engaged in strengthening health systems, scaling up nutrition, or both[18]

Nutrition interventions delivered through the health system should be part of a package of interventions that incorporate relevant sectors (e.g. health, social protection, agriculture, education, water) implemented as part of a coordinated multisectoral strategy.

Can micronutrient supplementation and other nutrition interventions for Women of Reproductive Age and adolescent girls improve health and nutrition outcomes?

An evidence-based practice brief

SYNOPSIS

- Macronutrient deficiencies in energy and protein, as well as micronutrient deficiencies such as vitamin A, iodine, folic acid, iron, calcium, and zinc, can negatively impact the health of the mother (pre-eclampsia, anaemia, serious maternal morbidity or maternal death) and her pregnancy (still births and pre-term birth), as well as the health of the newborn baby.
- WHO recommended interventions include: Maternal balanced energy and protein supplements for undernourished pregnant women), peri-conceptional folic acid supplements, iron or iron + folic acid supplements, maternal calcium supplements, and zinc supplementation. Vitamin A supplementation is recommended where vitamin A deficiency is a severe public health problem.
- Tackling micronutrient deficiencies in Women of Reproductive Age (WRA) and adolescent girls is best achieved through longer-term integrated (multifactorial and multi-sectorial) solutions, including consumption of a healthy, balanced diet, preventive measures to reduce infections, girls' education, birth spacing, and reduction of adolescent pregnancies.

Definition

Macronutrient deficiencies in energy and protein as well as micronutrient deficiencies, particularly vitamin A, iodine, folic acid, iron, calcium and zinc, can negatively impact the health of the mother (pre-eclampsia, anaemia, serious maternal morbidity or maternal death), her pregnancy (still births and pre-term birth) as well as the health of the newborn baby (neural tube defect and small for gestational age).

The following nutritional interventions aim to address the nutritional needs of Women of Reproductive Age (WRA) and their babies, as well as that of adolescent girls:

- Maternal balanced energy and protein supplements (during pregnancy (context specific: considered only for populations or settings with a high prevalence of undernourished pregnant women)
- Peri-conceptional folic acid supplements (prior to pregnancy and in the first 12 weeks)
- Iron or iron + folic acid supplements (daily during pregnancy)
- Maternal calcium supplements (high dose during pregnancy)
- Vitamin A
- Zinc supplementation (only in the context of rigorous research)
- Deworming

To overcome maternal micronutrient deficiencies, a multiple micronutrient supplement (MMS) was developed specifically for pregnant women which provides one recommended daily allowance of vitamin A, vitamin B1, vitamin B2, niacin, vitamin B6, vitamin B12, folic acid, vitamin C, vitamin D, vitamin E, copper, selenium, and iodine with 30 mg of iron and 15 mg of zinc for pregnant women. A lower dose of iron was recommended as the absorption of iron was expected to be enhanced due to vitamin C, vitamin A, and riboflavin, and given that the majority of pregnant women suffer from mild anaemia and the potential side-effects associated with higher doses of iron.[19]

Increasing investments are being channelled into Social and Behaviour Change Communication (SBCC) to improve health outcomes through healthier individual and group behaviours as well as strengthening the social context.

The adolescent period (age 10–19 years) is a critical time to target to ensure women's nutritional status prior to conception. Girls at this age are still growing and need a variety of types of food to fully develop. They are at high risk of iron deficiency and anaemia due to accelerated increase in requirements for iron, poor dietary

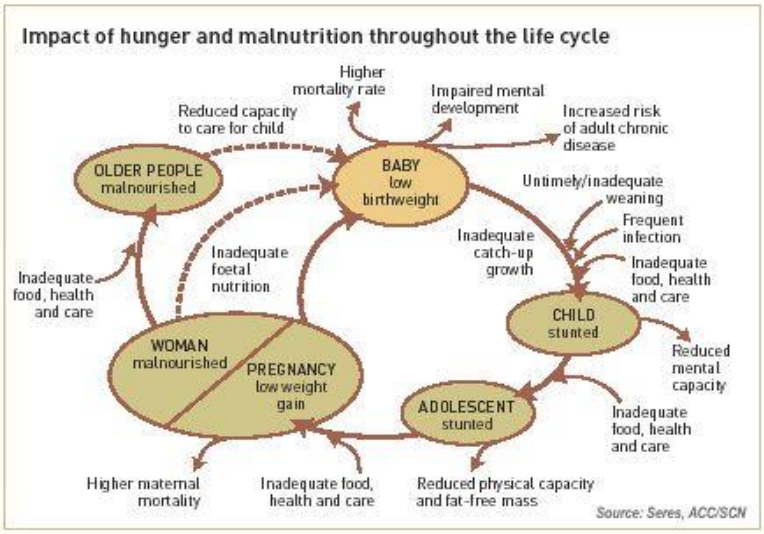


Figure 1: Source http://www.fao.org/3/a-y5650e.pdf

intake of iron, high rate of infection and worm infestation, as well as exposure to early marriage and adolescent pregnancy.

The 1000 days from conception until a child's second birthday is a critical time during which optimal nutrition can have a lasting impact on a child's growth, learning, and future productivity. Good nutrition for pregnant women promotes healthy birth outcomes and can reduce the risk of maternal illness and death, as well as illness, death and stunting in the child.

Pregnancy requires a healthy diet that includes an adequate intake of energy, protein, vitamins and minerals to meet maternal and foetal needs. However, for many pregnant women, dietary intake of vegetables, meat, dairy products and fruit is often insufficient to meet these needs, particularly in low and middle-income countries (LMICs) where multiple nutritional deficiencies often co-exist. Similar challenges in addressing nutrient gaps are found in adolescent girls and non-pregnant WRA.

Rationale

Maternal undernutrition is recognized as a key determinant of poor perinatal outcomes and is a major determinant of both stunting and obesity and non-communicable diseases in adulthood.[20]

Anaemia is associated with iron, folate and vitamin A deficiencies. In 2014, approximately 264 million women of reproductive age were affected by iron-deficiency-related anaemia.[21] Major aggravating factors contributing to iron deficiency anaemia include parasitic infections such as malaria, hookworm and

schistosomiasis, and other infectious diseases such as tuberculosis (TB) and HIV, as well as haemoglobinopathies such as sickle-cell disease.

In pregnancy, severe anaemia is associated with an increased risk of maternal and infant mortality.

In addition to causing anaemia, iron deficiency adversely affects the use of energy sources by muscles and, thus, physical capacity and work performance, and also adversely affects immune status and morbidity from infections. Folate (vitamin B9) deficiency, in addition to anaemia is also linked to foetal neural tube defects.

In pregnant women Vitamin A Deficiency causes night blindness and may increase the risk of maternal mortality.

Calcium deficiency is associated with an increased risk of pre-eclampsia, and deficiencies of other vitamins and minerals, such as vitamin E, C, B6 and zinc, have also been postulated to play a role in pre-eclampsia. Zinc deficiency is associated with impaired immunity. Vitamin C intake enhances iron absorption from the gut; however, zinc, iron and other mineral supplements may compete for absorption, and it is unclear whether such interactions have health consequences.[22]

Evidence of impact

Maternal balanced energy and protein supplements (undernourished populations)

Source	Finding	Evidence
Cochrane review of 17 trials (7 from high-income countries and 10 trials from low- and middle-income countries).[23]	• Balanced energy and protein supplements for mothers was associated with: - fewer babies dying during labour. - clear increases in birthweight and fewer babies that have low birth weight or are small for gestational age. - the impact on the long-term health of the baby was uncertain, including among undernourished women.	Moderate quality

Periconceptional folic acid supplements

Source	Finding	Evidence
Cochrane review of 5 trials.[24]	• Folic acid supplementation prevents the first and second time occurrence of neural tube defects, but not enough evidence to determine if folic acid prevents other birth defects.	Moderate quality

Maternal calcium supplements

Source	Finding	Evidence
Cochrane review of 23 studies.[25]	• Regular intake of extra calcium tablets during pregnancy did not improve the number of preterm births or other infant outcomes, except for a slight increase in infant birthweight.	Moderate quality
Cochrane review of 24 trials.[26]	• Women receiving low and high dose calcium supplements were less likely to die or have serious problems related to pre-eclampsia. Babies were less likely to be born preterm.	Moderate quality
Review of 4 studies in Israel, the United States, and China: 2 each on non-pregnant and pregnant adolescents.[27]	• Calcium supplementation (600 to 1200mg.day) showed a nonsignificant improvement in hip bone mineral density after 1 year of supplementation for non-pregnant adolescents and serum calcium concentration. • Calcium supplementation (600 to 1200mg) among pregnant adolescents showed no effect on mean birth weight.	High quality

Vitamin A Supplementation

Source	Finding	Evidence
Cochrane review of 14 trials in India, Bangladesh, Indonesia, Tanzania, Gambia, Zimbabwe, Kenya, Ghana, Peru, and Brazil.[28]	• no evidence that VAS during pregnancy or postpartum reduces maternal mortality.	Low quality
	• no evidence that VAS reduces infant mortality at 2–12 months. While effects on morbidity (gastroenteritis at 3 months) was uncertain.	Low quality
Cochrane review of 19 trials mortality.[29]	• weak correlation that VAS in vitamin A deficient populations during pregnancy reduces maternal anaemia but has little or no effect on maternal mortality.	Low quality
Review of study from Bangladesh.[30]	• a significant reduction in anaemia reported in 138 non-pregnant adolescents who were provided with 2.42 mg retinol as vitamin A supplementation.	Moderate quality

Iron or iron + folic acid supplements

Source	Finding	Evidence
Pregnant women: *Daily oral iron and folic acid supplements*		
Cochrane review of 60 trials in low, middle and high income countries.[31]	• women were less likely to have low birthweight newborns (below 2500 g) and mean birthweight was 30.81 g greater for those infants whose mothers received iron during pregnancy. • reduced risk of maternal anaemia at term by 70% and iron deficiency at term by 57%. Reduced risk of IDA including in settings where malaria is endemic. • side effects reported, particularly at doses 60 mg of elemental iron or higher (not statistically significant).	High quality
Pregnant women: *Intermittent iron supplementation*		
Cochrane review of 27 trials.[32]	• No clear difference between daily or intermittent iron supplementation for most of outcomes: infant birthweight, premature birth, and perinatal death, or anaemia, haemoglobin concentration and iron deficiency in women at the end of pregnancy. • fewer women with high haemoglobin concentrations during mid and late pregnancy. • Women receiving intermittent supplements were less likely to report side effects (such as constipation and nausea) than those receiving daily supplementation.	Moderate quality
Pregnant women: MMS supplements with iron and folic acid versus iron with or without folic acid		
Cochrane review of 17 trials mainly in low and middle income countries[33]	• Pregnant women who received MMS supplementation with iron and folic acid had fewer low birthweight babies and small-for-gestational-age babies.	Moderate quality
Postpartum women		
Cochrane review of 3 trials from Mexico, China and Turkey.[34]	• Women receiving 65 mg elemental iron as ferrous sulphate three times daily for 6 weeks were less likely to have anaemia. • Postpartum supplementation with iron alone (80 mg elemental iron once daily or 65 mg elemental iron three times daily was also associated with a reduction in iron deficiency compared to women receiving placebo.	Low quality
Adolescents		
Systematic review of 31 studies, 23 in low and middle income countries, evaluating iron, folic acid, vitamins A, D, C, calcium, zinc, and multiple micronutrients	• Micronutrient supplementation among adolescents (predominantly females) can significantly decrease anaemia prevalence while interventions to improve nutritional status among "pregnant adolescents" showed statistically significant improved birth weight, decreased low birth weight, and preterm birth.	Moderate quality

Source	Finding	Evidence
supplementation to adolescent population.[35]	Interventions to promote nutrition and prevent obesity had a marginal impact on reducing body mass index.	
Review of 11 studies, from India, Iran, Pakistan, Sri Lanka, Tanzania, the United States, and Vietnam.[36]	• Significant impact of iron supplementation on improving serum haemoglobin levels when provided with iron as ferrous sulphate preparations in dosages ranging from 50 to 260 mg.	Moderate quality
Review of 23 studies from Bangladesh, Kenya, India, Indonesia, Iran, Mali, Malaysia, Mozambique, Nepal, Sri Lanka, and Tanzania.[37]	• daily IFA supplementation reduced the prevalence of anaemia and weekly IFA supplementation also led to a reduction in anaemia and improved the serum haemoglobin concentration.	Moderate quality
Women of reproductive age		
Cochrane review of 67 trials.[38]	• Iron supplements reduce the prevalence of anaemia and iron deficiency, and raise levels of haemoglobin in the blood and in iron stores. • Iron supplementation clearly increases the risk of side effects, for example, constipation and abdominal pain.	Moderate quality

Zinc supplementation

Source	Finding	Evidence
Cochrane* review of 21 trials on pregnant women in low and middle-income countries.[39]	• small effect (14%) on reducing preterm births. [The 14% relative reduction in preterm birth for zinc compared with placebo was primarily represented by trials of women with low incomes.] • no indication prevents low birthweight babies. • No clear differences on development of pregnancy hypertension or pre-eclampsia	Moderate quality
Review of seven studies on adolescents from Brazil, Chile, India, Sri Lanka, the United Kingdom, and the United States. Adolescents were supplemented with zinc ranging from 14 to 20 mg/day. Of these, four studies examined pregnant adolescents.[40]	• Two studies on 494 nonpregnant adolescents reported significant increases in haemoglobin concentration and serum zinc concentration. • Studies on pregnant adolescent reported a significant reduction in preterm births and LBW.	Moderate quality

* The authors of the Cochrane review suggest that finding ways to improve women's overall nutritional status, particularly in low income areas, will do more to improve the health of mothers and babies than supplementing pregnant women with zinc alone.

Deworming

Source	Finding	Evidence
Cochrane review of four trials.[41]	• no effect of antihelminthic administered in second trimester of pregnancy on maternal anaemia, low birthweight, preterm births or perinatal deaths. • No data on the impact on infant survival at six months of age. • No impact on maternal anaemia in studies in which iron or iron-folate was given to pregnant women along with antihelminthic.	Low quality

Cost considerations

For a package of pregnancy-related interventions *The Lancet* series (2013) estimates that cost per life-year saved ranges from $398 to $1191. Note that this package comprises multiple micronutrients to all, calcium supplements for mothers at risk of low intake, maternal balanced energy protein supplements 'as needed' (not defined), and universal salt iodisation; it does not include periconceptional folic acid supplementation.[42]

Applying the evidence to design & implementation

See the table at the end of this brief for interventions and recommendations broken down by target group.

- ➔ Countries should have a national strategy for prevention and control of micronutrient malnutrition. The choice of intervention (e.g. MMS, fortified foods, iron supplements, biofortification) should consider costs, cost-effectiveness, feasibility and acceptability and prevalence of key micronutrient deficiencies as well as aetiology based on up-to-date data.
- ➔ Tackling micronutrient deficiencies in WRA and adolescent girls is best achieved through integrated (multi-factoral and multi-sectoral) longer-term solutions including consumption of a healthy, balanced diet, preventive measures to reduce infections, girls' education, birth spacing and reduction of adolescent pregnancies.
- ➔ Longer-term strategies to tackle micronutrient deficiencies to be considered should also include social protection, enabling the poor to access nutritious food and shielding them from price spikes; empowering women by increasing access to education; and access to clean water and good sanitation.
- ➔ The interventions listed are part of a core package of public health measures for ANC that all WRA should receive, with the flexibility to employ a variety of options based on the context of different countries.
- ➔ The importance of timely and high-quality antenatal care throughout pregnancy and post-partum care, with nutrition education and counselling during routine visits, cannot be overstated to prevent and/or identify any issues of concern and provide adequate treatment and follow-up actions.
- ➔ In malaria-endemic areas, provision of iron and folic acid supplements should be made in conjunction with public health measures to prevent, diagnose and treat malaria.
- ➔ WHO does not currently recommend the use of MMS in lieu of iron and folic acid supplementation during pregnancy.

Challenges

Non-compliance is one important challenge in combating anaemia.[43] Reasons include:

- nausea associated with the iron tablets
- misunderstanding or forgetting that tablets need to be taken throughout pregnancy
- inadequate counselling and distribution of iron tablets
- difficult access and poor utilization of prenatal health care service
- beliefs against consuming medications during pregnancy
- fears that taking too much iron may cause too much blood or a big baby, making delivery more difficult

There are additional challenges to implementation:

- poor integration with existing health services and community approaches
- barriers to sustainable product availability and quality
- quality of ANC, equity in access and a continuum of maternal care
- weak maternal and foetal assessment (e.g. diagnosing anaemia in pregnancy)
- for many micronutrient deficits, prevalence data are scarce or outdated, making the revision of national strategies in this area a challenge

Monitoring & evaluation and measuring impact

The table below provides guidance on potential evaluation indicators

Activities	✓ # of health workers trained
Outputs	✓ Number of WRA and number of adolescent girls reached with specific interventions
Outcomes & Impact	✓ Coverage of interventions (IFA, vit A, zinc, calcium, deworming, energy-protein supplements) ✓ Prevalence of anaemia and other micronutrient deficiencies ✓ Prevalence of Neural Tube Defects ✓ Birth outcomes ✓ Prevalence of Stunting ✓ Prevalence of Low birth weight ✓ Prevalence of pre-term births ✓ Minimum dietary diversity for women

Further information & key programming resources

The following documents may prove useful as reference documents for planning, designing, implementing, and monitoring and evaluation.

- LINKAGES, CORE GROUP. Maternal Nutrition Guide. http://www.coregroup.org/storage/documents/Workingpapers/MaternalNutritionDietaryGuide_AED.pdf
- Other evidence briefs in this resource relating to Vitamin A supplementation, Micronutrient powders and Zinc supplementation.

Applying the evidence to design & implementation: Interventions and related recommendations broken down by target group

Target group	Intervention	Recommendation
Non-pregnant adult women and adolescent girls	Iron with or without folic acid supplementation[44]	• Daily iron supplementation is recommended in menstruating adult women and adolescent girls living where the prevalence of anaemia is 40% or higher in this age group, for the prevention of anaemia and iron deficiency. • In populations where the prevalence of anaemia among non-pregnant WRA is 20% or higher, intermittent iron and folic acid supplementation is recommended in menstruating women, to improve their haemoglobin concentrations and iron status and reduce the risk of anaemia.
	Deworming[45 46]	• Periodic medicinal treatment (deworming) without previous individual diagnosis to all at-risk people living in endemic areas. Treatment should be given once a year when the baseline prevalence of soil-transmitted helminth infections in the community is over 20%, and twice a year when the prevalence is over 50%. • The WHO strategy for schistosomiasis control focuses on reducing disease through periodic, targeted treatment with praziquantel (preventive chemotherapy) of affected populations. In countries with low transmission, the elimination of the disease should be aimed at through treating targeted groups including school-age children.
Periconceptional women	Folic acid[47]	• From the moment they begin trying to conceive until 12 weeks of gestation, women should take a folic acid supplement (400 µg folic acid daily). • Women who have had a foetus diagnosed as affected by a neural tube defect or have given birth to a baby with a neural tube defect should: - receive information on the risk of recurrence - be advised on the protective effect of periconceptional folic acid supplementation - be offered high-dose supplementation (5 mg folic acid daily) - be advised to increase their food intake of folate.
Pregnant women[48]	Dietary interventions	• Counselling about healthy eating and keeping physically active. • During pregnancy it is recommended for pregnant women to stay healthy and to prevent excessive weight gain. • In undernourished populations, nutrition education on increasing daily energy and protein intake is recommended for pregnant women to reduce the risk of low-birth-weight neonates. • In undernourished populations, balanced energy and protein dietary supplementation is recommended for pregnant women to reduce the risk of stillbirths and small-for-gestational-age neonates. [i]
	Iron and folic acid supplements	• Daily oral iron and folic acid supplementation with 30 mg to 60 mg of elemental iron and 400 g (0.4 mg) of folic acid recommended to prevent maternal anaemia, low birth weight, and preterm birth. [ii] [iii] • Intermittent oral iron and folic acid supplementation with 120 mg of elemental iron and 2800 g (2.8 mg) of folic acid once weekly is recommended to improve maternal and neonatal outcomes if daily iron is not acceptable due to side-effects, and in populations with an anaemia prevalence among pregnant women of less than 20%. [iv]
	Calcium supplements	• In populations with low dietary calcium intake, daily calcium • Supplementation (1.5–2.0 g oral elemental calcium) is recommended to reduce the risk of pre-eclampsia.
	Vitamin A supplements	• Vitamin A supplementation is only recommended for pregnant women in areas where vitamin A deficiency is a severe public health problem, to prevent night blindness.[v]
	Zinc supplements	• Zinc supplementation for pregnant women is only recommended in the context of rigorous research.
	Restricting caffeine intake	• For pregnant women with high daily caffeine intake (more than 300 mg per day), lowering daily caffeine intake during pregnancy is recommended to reduce the risk of pregnancy loss and low-birth-weight neonates.[vi]
	Deworming	• Periodic medicinal treatment (deworming) without previous individual diagnosis to all at-risk people living in endemic areas. Treatment should be given once a year when the baseline prevalence of soil-transmitted helminth infections in the community is over 20%, and twice a year when the prevalence is over 50%. • The WHO strategy for schistosomiasis control focuses on reducing disease through periodic, targeted treatment with praziquantel (preventive chemotherapy) of affected populations. In countries with low transmission, the elimination of the disease should be aimed at through treating targeted groups including school-age children
Postpartum women	Iron with or without folic acid supplementation[49]	• Oral iron supplementation, either alone or in combination with folic acid, may be provided to postpartum women for 6–12 weeks following delivery for reducing the risk of anaemia in settings where gestational anaemia is of public health concern.[vii]
	Deworming[50]	• Periodic medicinal treatment (deworming) without previous individual diagnosis to all at-risk people living in endemic areas. Treatment should be given once a year when the baseline prevalence of soil-transmitted helminth infections in the community is over 20%, and twice a year when the prevalence is over 50%. • The WHO strategy for schistosomiasis control focuses on reducing disease through periodic, targeted treatment with praziquantel (preventive chemotherapy) of affected populations. In countries with low transmission, the elimination of the disease should be aimed at through treating targeted groups including school-age children

[i] In undernourished populations, high-protein supplementation is not recommended for pregnant women to improve maternal and perinatal outcomes.

[i] The equivalent of 60 mg of elemental iron is 300 mg of ferrous sulphate heptahydrate, 180 mg of ferrous fumarate or 500 mg of ferrous gluconate.

[iii] Folic acid should be commenced as early as possible (ideally before conception) to prevent neural tube defects.

[iv] The equivalent of 120 mg of elemental iron equals 600 mg of ferrous sulphate heptahydrate, 360 mg of ferrous fumarate or 1000 mg of ferrous gluconate.

[v] Vitamin A deficiency is defined as a severe public health problem if > 5% of women in a population have a history of night blindness in their most recent pregnancy in the previous 3–5 years that ended in a live birth, or if > 20% of pregnant women have a serum retinol level < 0.70 mol/L. Determination of vitamin A deficiency as a public health problem involves estimating the prevalence of deficiency in a population by using specific indicators of vitamin A status.

[vi] Includes any product, beverage or food containing caffeine (i.e. brewed coffee, tea, cola-type soft drinks, caffeinated energy drinks, chocolate, caffeine tablets).

[vii] WHO considers a 20% or higher population prevalence of gestational anaemia to be a moderate public health problem.

Can breastfeeding promotion and appropriate complementary feeding improve health and nutrition outcomes?

An evidence-based practice brief

SYNOPSIS

- Near-universal breastfeeding could prevent an estimated 823,000 child deaths and 20,000 breast cancer deaths annually.
- Scaling up complementary feeding practices has potential to prevent an estimated 99,952 child deaths annually.
- Breastfeeding reduces child mortality, protects against diarrhoea, pneumonia and other childhood illness, increases IQ and lowers the risk of overweight, obesity and diabetes; and, for the mother, delays the return of periods after giving birth, reduces the risk of overweight and obesity, and protects against breast and ovarian cancer.
- Breastfeeding promotion interventions are effective in improving optimal breastfeeding rates.
- No direct evidence for a link between exclusive breastfeeding and stunting is currently available at the systematic review level but there is evidence of an indirect link through the reduction of diarrhoea.
- Best outcomes are achieved when interventions are delivered concurrently through a combination of mechanisms and as an integrated package during antenatal, postnatal and routine child care services.

Definitions

Early initiation of breastfeeding is defined as provision of mother's breast milk (i.e. colostrum) to infants within one hour of birth. *Exclusive breastfeeding* for the first 6 months of life means no other food or drink, not even water, except breast milk (including milk expressed or from a wet nurse), but allows the infant to receive ORS, drops and syrups (vitamins, minerals and medicines).

Complementary feeding (CF) is the introduction of safe (clean) and nutritionally adequate foods - appropriate to the age of the child - in addition to breast feeding around the age of six months and up to 2 years. CF should be timely, adequate, safe, appropriate and given in sufficient quantity.[51] It is a very vulnerable period as infants gradually transition to solid foods eaten by the rest of the family.

Rationale

Breastmilk contains all the energy and key nutrients and protective factors for infants during the first months of life and continues to be a significant energy source well beyond the first year of life. Breastmilk provides readily available clean perfectly balanced food for the infant at the correct temperature. Breastfeeding provides significant benefits for both mother (prevention of breast cancer, improving birth spacing, reduction in risks of diabetes and ovarian cancer, postpartum depression) and child (lower morbidity and mortality, higher IQ, protection against obesity and diabetes later on in life). It is estimated that scaling up of breastfeeding to near universal coverage could prevent an estimated 823 000 child deaths (13% of all deaths in children under five) and 20 000 breast cancer deaths every year.[52]

Poor infant and young child feeding (IYCF) practices have demonstrated to be significant contributing factors to undernutrition globally.[53 54] Appropriate complementary feeding is crucial in the prevention of malnutrition and promotion of adequate growth and development. Indicators of appropriate CF (increased dietary diversity and minimum acceptable diet) in children 6 to 24 months in low income countries have been found to be positively associated with height for-age HAZ[55] and reduced risk of both stunting and underweight[56] and iron deficiency anaemia.[57] Scaling up appropriate complementary feeding practices has the potential to prevent an estimated 99,952 under-five deaths annually.[58]

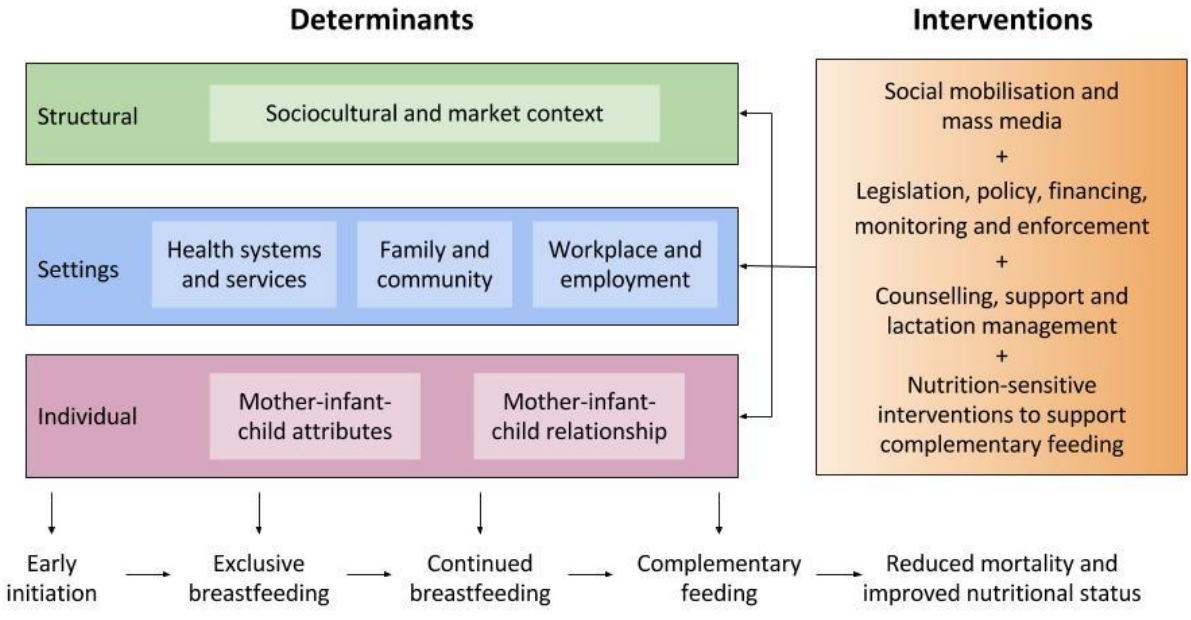


Figure 1: Impact pathway. Source: Adapted from Rollins NC, et al. Lancet Breastfeeding Series: Lancet 2016; 387: 491–504

Evidence of impact

Impact on health

Optimal breastfeeding reduces infant and young child mortality significantly

Source	Finding	Evidence
Meta-analysis of 13 studies.[59]	• Risk of all-cause mortality was higher in predominantly (RR 1.5), partially (RR 4.8) and non-breastfed (RR14.4) infants compared to exclusively breastfed infants 0–5 months of age.	Moderate to high quality
	• Children 6–11 and 12–23 months of age who were not breastfed had 1.8- and 2.0-fold higher risk of mortality, respectively, when compared to those who were breastfed.	
	• Risk of infection-related mortality in 0–5 months was higher in predominantly (RR 1.7), partially (RR 4.56) and non-breastfed (RR 8.66) infants compared to exclusive breastfed infants. The risk was twofold higher in non-breastfed children when compared to breastfed children aged 6–23 months.	

Appropriate complementary feeding reduces under five-mortality significantly

➔ One review[60] [*low to moderate quality evidence*] of 5 efficacy trials and 16 programmes in 14 LMICs, estimated potential reductions in under-five mortality of 2 to 13% depending on underlying malnutrition rates.

Mixed evidence for the effect of breastfeeding on postnatal depression

➔ One review[61] [*low to moderate quality evidence*], for which several studies report no relationship, 2 studies suggest breastfeeding mothers have a higher risk of post-natal depression, while several studies suggest women who formula feed have higher rates of depression than those who breastfeed. One study found exclusive breastfeeding may reduce symptoms of depression to 3 months post-partum.

Impact on nutrition

BF promotion and support have significant impact on optimal breastfeeding rates

Source	Finding	Evidence
Meta-analysis of 195 studies conducted in developing countries.[62]	• Breast feeding interventions delivered as part of routine service provision (individual counselling or group education, immediate breastfeeding support at delivery, and lactation management) increased exclusive breastfeeding by 49% (95% CI 33–68) and any breastfeeding by 66% (34–107).	High quality
	• Family and community interventions were effective at improving exclusive (RR 1·48 [95% CI 1·32–1·66]), continued (1·26 [1·05–1·50]), and any (1·16 [1·07–1·25]) breastfeeding, and tended to improve early initiation (1·74 [0·97–3·12]).	
	• Community-based interventions, including group counselling or education and social mobilisation, with or without mass media, were similarly effective, increasing timely breastfeeding initiation by 86% (95% CI 33–159) and EBF by 20% (3–39).	

➔ Combined approaches are more effective, for example, combined health system and community based interventions increase exclusive breastfeeding by 2.5 times.[63]

➔ Counselling along the continuum of care e.g. providing ante-natal and post-natal counselling are more effective than targeting only one period.[64]

➔ Over and above these interventions there are other key determinants of BF and CF practices influencing at different levels. These include: social and cultural factors, women's workload and time constraints, maternal age, education status, and confidence.[65]

Workplace legislation might influence exclusive BF

➔ The same review[66] found that the few data available suggest that maternity leave policies are effective at increasing exclusive breastfeeding (RR 1·52 [1·03–2·23]).

Breastfeeding promotion interventions have little direct effect on stunting

Source	Finding	Evidence
Meta-analysis of 35 studies[67] 6 Low, 21 middle and 8 high income countries).	• No association with significant changes in weight or length, but did lead to a modest, albeit significant, reduction in body mass index/weight-for-height z scores (-0.06 (-0.12-0.00)).	Low quality
	• BF Interventions have little direct influence on child growth but do have an indirect impact through the reduction in diarrhoea which has a direct impact on stunting.	

Breastfeeding has long term benefits reducing the risk of overweight/obesity and possibly diabetes

Source	Finding	Evidence
Systematic review of 58 studies in high, middle and low-income countries.[68]	• Breastfeeding decreased the odds of overweight/obesity by 13% (37 studies).	High quality
	• Odds ratio for type 2 diabetes the was lower among those subjects who had been breastfed [pooled odds ratio: 0.65 (95%CI: 0.49; 0.86)] (11 studies).	Low quality

Limited evidence complementary feeding education reduces stunting

Source	Finding	Evidence
Meta-analysis of 11 randomised control trials (RCTs) and seven non-RCT and Programme studies in low and middle-income countries.[69]	• CF education in food secure populations had a significant impact on height gain and weight gain but non-significant impact on stunting.	Moderate quality
	• In food insecure populations, CF education alone significantly improved HAZ and WAZ scores and significantly reduced stunting rates, however the results are largely from a single trial.	Low quality
	• In food insecure populations, CF with or without education significantly improved HAZ and WAZ Scores and underweight but not stunting (7 trials).	Moderate quality

Cash transfers may improve CF practices

➔ A review[70] found only one study *[good quality evidence]* - a randomised controlled trial from Zambia which found children under 24 months in households receiving cash transfers were significantly more likely to have had the minimum required number of feedings in the last 24 hours.[71]

Nutrition training for health workers is effective in improving young child feeding practices

➔ A review of 10 RCT and cluster RCTs *[good quality evidence]* found nutrition training for health workers significantly improved mean energy intake, feeding frequency and diet diversity in children 6 to 24 months.[72]

Cost considerations

The World Bank estimates the cost of scaling up breastfeeding promotion and support is USD 7.50 per child under 5 years and estimates cost effectiveness at USD 53 - 153 per DALY.[73] The *Lancet* series 2013 estimated that scaling up package of IYCF interventions was highly cost effective at $175 ($132–286) per life saved.[74]

Applying the evidence to design & implementation

- Breastfeeding promotion should be delivered concurrently through several channels (e.g.: individual counselling in conjunction with mass media campaign).[75]
- Expansion and institutionalisation of the Baby Friendly Hospital Initiative (BFHI) and 10 steps to successful breastfeeding should be promoted. Capacity building is required to strengthen skills of health workers to provide supportive counselling and advice along the continuum of care.[76]
- Use of community-led interventions, such as mother-to-mother support groups, participatory women's groups, and peer counselling can provide the quality, content, and frequency of counselling needed for positive impact on breastfeeding.[77] [78]
- Mothers are better able to breastfeed when they have the support of their families through encouragement and the sharing of household responsibilities.[79]
- Education on complementary feeding for food insecure populations should be combined with nutrition-sensitive interventions that promote nutritionally adequate and affordable complementary foods (e.g. cash transfers).[80]
- Education on complementary feeding should be clear and easy to understand, focusing on home-prepared foods, diversified nutrient-rich food products, and take into account women's time constraints.
- Simple food processing/preservation techniques are important to reduce women's time/workload in food preparation.
- Political support, including national policies and plans, and financial investment are needed to protect, promote and support breastfeeding and complementary feeding, if advantages to children, women, and society are to be realised.[81]

Baby Friendly Hospital Initiative (BFHI)

Launched by WHO and UNICEF in 1991, BFHI is a global effort to implement practices that protect, promote and support breastfeeding. To support its implementation, different tools and materials were developed, including a course for maternity staff, a self-appraisal tool and an external assessment tool.

A maternity facility can be designated 'baby-friendly' when it does not accept free or low-cost breastmilk substitutes, feeding bottles or teats, and has implemented The Ten Steps to Successful Breastfeeding. These can be found at: https://www.unicef.org/programme/breastfeeding/baby.htm

- **Maternity leave, financial protection and workplace provisions, e.g. on-site childcare, breastfeeding rooms**: Countries should enact the International Labour Organization's "Maternity Protection Convention 183" which addresses maternity leave and benefits for breastfeeding mothers in the workplace. The convention guarantees 14 weeks of maternity leave paid at 66% of previous earnings and allows women the right to one or more daily breaks to breastfeed their children.
- **Marketing of breastmilk substitutes:** Support governments to enact legislation on and regulate marketing of breastmilk substitutes, as per the WHO International Code of Marketing of Breast-milk Substitutes and enforce monitoring.[82]

WHO Recommendations

Mothers should initiate breastfeeding within one hour of birth and infants should be exclusively breastfed for the first six months of life to achieve optimal growth, development and health.

Thereafter, infants should receive nutritionally adequate and safe complementary foods while continuing to breast feed until 2 years or beyond to meet their evolving nutritional requirements.

Every maternity facility should practice the 'Ten Steps to Successful Breastfeeding'.

Challenges

- Substantial gaps in knowledge and skills of health staff to support breastfeeding and complementary feeding.
- Social and cultural norms and misconceptions are a significant influence on mothers' ability to choose optimal breastfeeding and adopt appropriate food and hygiene practices.
- Lack of access to affordable, nutrient-rich foods is an ongoing problem for many families, although inappropriate feeding practices are more often due to inadequate intakes than food availability.[83]
- Legislation, finance and workplace provisions often significantly undermine women's ability to continue to breastfeed.
- Growth of the breast milk substitutes industry and marketing of unhealthy food and drinks undermine efforts to increase breastfeeding and good nutrition for young children.
- Delivery of interventions through a siloed approach.[84]
- Socioeconomic factors constitute barriers to appropriate BF/CF, including household access to dietary diversity, maternal education and food hygiene.
- Women's time constraints and workload together with, in many contexts poor/no provisions for maternity leave or child care) preventing them from implementing improved BF and IYCF practices.

Monitoring and evaluation

The table below provides guidance on potential monitoring and evaluation indicators:

Activities	✓ Number of health workers trained on breastfeeding and appropriate CF counselling ✓ Number of mothers trained as peer mentors for peer to peer counselling on BF and CF
Outputs	✓ % mothers attending ANC and PNC visits receiving individual breastfeeding counselling ✓ % eligible mothers attending group BF counselling sessions/mother to mother support groups
Outcomes & Impact	✓ Early initiation of breastfeeding: Proportion of children born in the last 24 months who were put to the breast within one hour of birth ✓ Exclusive breastfeeding under 6 months: Proportion of infants 0–5 months of age who are fed exclusively with breast milk ✓ Minimum meal frequency children 6 to 23 months ✓ Minimum diet diversity – proportion of 6 to 23 months of age receiving foods from 4 or more food groups in last 24 hours

Further resources & key programming resources

The following documents may prove useful as reference documents for planning, designing, implementing, and monitoring and evaluation.

- WHO/UNICEF Global Strategy for IYCF http://www.who.int/nutrition/topics/global_strategy_iycf/en/
- WHO Indicators for assessing IYCF Practices: http://www.who.int/maternal_child_adolescent/documents/9789241596664/en/
- USAID Nutrition Brief: Addressing Barriers to Exclusive Breastfeeding: http://www.mcsprogram.org/resource/addressing-barriers-exclusive-breastfeeding-evidence-program-considerations-low-middle-income-countries/
- Information on Baby Friendly Hospital Initiative: http://www.who.int/nutrition/topics/bfhi/en/
- Information on ILO Maternity protection convention 183: http://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:C183
- Information on International Code on Breastmilk Substitutes: http://www.who.int/nutrition/publications/infantfeeding/9241541601/en/

Can Vitamin A supplementation for children 6–59 months of age or pregnant/lactating women improve health and nutrition outcomes?

An evidence-based practice brief

SYNOPSIS

- Vitamin A deficiency (VAD) is the leading cause of preventable blindness in children and increases the risk of disease and death from severe infections. In pregnant women VAD causes night blindness and may increase the risk of maternal mortality.
- WHO recommends high-dose vitamin A supplementation (VAS) for children 6–59 months of age in areas where vitamin A deficiency is a public health problem.[85] VAS is also recommended for pregnant women where VAD is a severe public health concern.
- Good evidence to suggest that VAS reduces overall risk of death and death due to diarrhoea in children aged 6 to 59 months of age who are at risk of VAD. Low/moderate evidence that VAS is associated with a reduction in child morbidity (incidence of diarrhoea and measles). No evidence that VAS reduces stunting. Good evidence that VAS reduces blindness and precursors to blindness.
- VAS is considered a cost-effective intervention.
- The choice of delivery mechanism is influenced by context such as the functionality of the health system, opportunities and barriers to reaching the target groups and linking with community approaches to VAD control.

Definition

Vitamin A is an essential nutrient which occurs naturally in human breast milk and is obtained through diet. Foods from animal sources (e.g. meat, eggs, diary produce) are the richest in vitamin A and best absorbed by the body, while other sources include sweet potatoes, carrots, dark leafy greens, winter squashes/pumpkin, lettuce, dried apricots, red peppers, mango, papaya. Insufficient dietary intake can result in vitamin A deficiency while other causes include infections (e.g. measles, diarrhoeal diseases), fat malabsorption in the gut, and liver disorders. In addition, roundworm may possibly compete for vitamin A in the intestine.[86] [87] Breastfeeding (natural source of Vitamin A), oral Vitamin A Supplementation (VAS), and fortification of staple foods, are the most direct methods for providing vitamin A to children whose diets are deficient, while still promoting dietary diversification with local available foods and biofortified crops (orange-fleshed sweet potatoes).

Rationale

Vitamin A is required for normal functioning of the visual system, maintenance of cell function for growth, epithelial integrity, red blood cell production, immunity and reproduction. Vitamin A deficiency (VAD) - most prevalent in preschool age children - impairs body functions and may increase the risk of illness and death (it increases the severity and mortality risk of measles and diarrhoeal disease).[88] The most common manifestation of VAD is night blindness. This could further develop into xerophthalmia (abnormal dryness of the eye, with inflammation and ridge formation) which can lead to irreversible damage and vision loss. However, there will be many children in the community with vitamin A deficiency but who have completely normal eyes and vision. VAD is the leading cause of preventable blindness in children. Adverse health consequences may further include susceptibility to infection, growth impairment and anaemia.[89] [90]

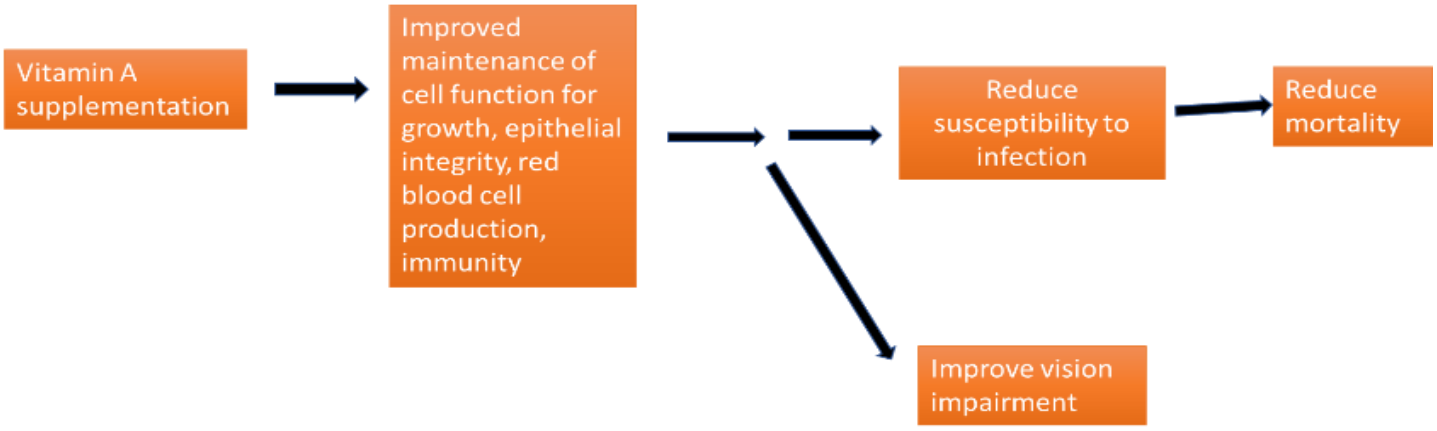


Figure 1: Impact pathway. Source: Developed by authors

Evidence of impact

Impact on health

Vitamin A Supplementation for Children 6–59 months

■ VAS has an impact on night blindness and precursors to blindness

Source	Finding	Evidence
Trial in the Sudan among 28,753 children aged 9–72 months at risk of vitamin A deficiency.[91] *	• ↓47% reduction in night blindness.	Moderate quality
Trial of 3377 rural Nepalese, non-xerophthalmic children 12–60 months of age.[92] *	• ↓68% in night blindness.	Moderate quality

* Cochrane review of 17 studies from 19 countries across Asia, Africa, Latin America, and Australia.[93]

■ VAS has a significant impact on morbidity and mortality in children 6–59 months

Source	Finding	Evidence
Cochrane review (2017) of 17 studies from 19 countries across Asia, Africa, Latin America, and Australia.[94]	• Overall risk of death and death due to diarrhoea (↓12%). • No change in the overall risk of death due to measles, meningitis, and respiratory infections.	High quality
Cochrane review (2010) of 17 studies from 19 countries.[95]	• Overall risk of death (due to reduction in death from diarrhoea and measles) (↓24%).	Moderate quality
Trial in India (1 million children).[96]	• Overall risk of death (↓11%).	Moderate quality
Cochrane review (2010) of 17 studies from 19 countries.[97]	• Reduced incidence of diarrhoea and measles.	Moderate quality

Vitamin A Supplementation for Infants 1–5 months

■ VAS in infants 1–5 months of age has no effect on morbidity and mortality

Source	Findings	Evidence
Cochrane review 18 trials in low/middle income countries.[98]	• No change in mortality first year of life.	Moderate quality
Meta-analysis.[99]	• No significant effect on mortality or morbidity in first year of life related to diarrhoea or respiratory infections.	Moderate quality

Both trials found an increase in the risk of developing bulging fontanelles indicating increase in intra-cranial pressure indicating increased intra-cranial pressure.

VAS for Pregnant and post-partum women

■ Weak evidence VAS during pregnancy or post-partum has an effect on maternal or infant mortality

Source	Findings	Evidence
Cochrane review of 14 trials in India, Bangladesh, Indonesia, Tanzania, Gambia, Zimbabwe, Kenya, Ghana, Peru, and Brazil.[100]	• No evidence that VAS during pregnancy or postpartum reduces maternal mortality.	Low quality
	• No evidence that VAS reduces infant mortality at 2–12 months. While effects on morbidity (gastroenteritis at 3 months) was uncertain.	Low quality
Cochrane review of 19 trials.[101]	• Weak correlation that VAS in vitamin-A-deficient populations during pregnancy reduces maternal anaemia but has little or no effect on maternal mortality.	Low quality

■ No evidence that VAS for Pregnant or breastfeeding women with HIV reduces Mother to Child Transmission (MTCT) of HIV

Source	Findings	Evidence
Cochrane review of 5 trials.[102]	• No evidence that VAS has an effect on the risk of MTCT of HIV.	Low quality

Impact on nutrition

■ Weak evidence VAS has an effect on growth

Source	Findings	Evidence
The trial of 1 million children in India.[103]	• VAS had no positive effect on height gain.	Moderate quality
meta analysis of 17 studies.[104]	• no significant effect of VAS on growth.	Moderate quality

Cost considerations

VAS is considered a low-cost intervention

The gelatine capsules cost approximately US$ 0.02 each, with an estimated cost of US$ 1–2 for delivery per child per year. The total cost of supplementation per death averted is estimated at US$ 200–250[105] while cost per DALY averted has been estimated as US$ 3–16.[106] Another cost effectiveness analysis found VAS costs US$2.5–5 per child per year.[107] Vitamin A capsules have a shelf life of approximately 3 years.[108]

Applying the evidence to design & implementation

While VAS can play a key role in providing individuals with immediate access to an important micronutrient, supplements and fortified food should not be considered a substitute for tackling the causes of VAD related to inadequate diets (insufficient dietary intake, insufficient diversification and/or significant unprocessed diet). Complementary strategies including breastfeeding promotion, interventions to increase access to nutrient-rich foods, as well as nutrition education to parents and carers are therefore crucial.

Deworming and Vitamin A[109]

Deworming supplements are often distributed alongside vitamin A supplements:

- ➔ Worm infections contribute to vitamin A deficiency
- ➔ One aim of deworming is to reduce anaemia: anaemia is associated with increased vitamin A deficiency.
- ➔ Worm infections and vitamin A deficiency both have serious health repercussions for a growing child and both should be prioritized in endemic countries
- ➔ Worm infections and vitamin A deficiency are public health problems in the same geographical areas.
- ➔ The target age groups for vitamin A distribution and deworming are very similar.
- ➔ Training for both interventions can easily be integrated.

There are various mechanisms to deliver supplements to children with aim to reach universal coverage of the target group:

- ➔ **Routine health services: This is the preferred option especially in stable contexts**, it supports Government-led intervention and promotes government ownership and sustainability.
- ➔ **Campaign style e.g. Child Health Weeks** reaches large number of children and can be delivered at alternative locations to a health facility. Reaches children in hard-to-reach areas (e.g. mountainous) or challenging contexts (e.g. pastoralist or nomadic, conflict). Often requires heavy investment and engagement by development partners.

- **Alongside other child survival interventions e.g. Expanded Programme on Immunization**: enables leveraging other mechanisms such as human resources, trainings, funding streams thereby enhancing cost-efficiency. However, this approach might be insufficient to reach all targeted children aged 6–59 months twice annually.

WHO Recommendation

- **Children 6–59 months:** Where VAD is a public health problem (prevalence of night blindness is ≥1% in children 24–59 months of age or where the prevalence of VAD (serum retinol ≤0.70 µmol/l) is ≥20% in children 6–59 months of age), the WHO recommends a dose of 100,000 IU for infants 6 to 12 months of age and 200,000 IU for children over 12 months of age, every 4 to 6 months.[110]
- **Children with measles:** An oral dose of 200,000 IU (or 100,000 IU in infants 6–12 months) of vitamin A per day for two days to children with measles in areas where VAD may be present.[111]
- **Pregnant women:** VAS is only recommended in areas where VAD is a severe public health problem (.≥ 5% of women in a population have a history of night blindness in their most recent pregnancy in the previous 3–5 years that ended in a live birth, or if ≥ 20% of pregnant women have a serum retinol level < 0.70 µmol/L.

VAS is not recommended for:

- **Infants 1–5 months:** Mothers should be encouraged to exclusively breastfeed infants for 6 months to achieve optimal growth, development and health.
- Postpartum women[112]
- HIV-positive pregnant women[113]

Challenges

- Inadequate investments in functional health system to deliver VAS integrated with other health services and community approaches
- Barriers for accessing healthcare will also have an effect on the success of implementing VAS
- VAS focuses on a single micronutrient and those at risk of VAD are often deficient in multiple micronutrients
- Parents should be well informed and reassured about possible side effects. One side effect is vomiting within 48 hours if taking large doses of vitamin A.
- Monitoring of doses to prevent overdosing. Symptoms of vitamin A toxicity include: drowsiness, abdominal pain, nausea, increased pressure on the brain, vision changes, swelling of bones, sensitivity to sunlight, dry, itchy or peeling skin, cracked fingernails, skin cracks at corners of mouth, mouth ulcers, jaundice, hair loss, respiratory infection and confusion. In infants and children, symptoms include: softening of skull bone, bulging fontanelle, double vision, bulging eyeballs, inability to gain weight, coma.[114]
- There are existing taboos and myths associated with Vitamin A supplements such as the perception they have an alternative use (e.g. birth control). Implementers need to be mindful of these to adequately address/manage.
- Since children with eye signs are the 'tip of the iceberg' of VAD, community approaches to control VAD are crucial.
- Nationally-representative data on VA status is outdated in many countries therefore support is needed to generate meaningful data for decision-making.

Monitoring & evaluation and measuring impact

The table below provides guidance on potential monitoring and evaluation indicators

Activities	✓ Number and geographic coverage of child health weeks organized per year
Outputs	✓ Percentage of health facilities providing 1) nutrition education and 2) routine VAS to children 6–59 months of age in the past year ✓ Number of children that received VAS during the last child health week
Outcomes & Impact	✓ Proportion of children aged 6–59 months receiving vitamin A supplements within the last 6 months ✓ Indicators on morbidity and its consequences, e.g. Percentage of children with night blindness

Further information & key programming resources

The following documents may prove useful as reference documents for planning, designing, implementing, and monitoring and evaluation.

- Nutrition International's Vitamin A in Child Health Weeks: A toolkit for Planning Implementing and Monitoring (http://www.nutritionintl.org/content/user_files/2014/08/VASToolkit.pdf)WHO Vitamin information (http://www.who. int/nutrition/topics/vad/en/)
- Klemm RD, Palmer A, Greig A, Engle-Stone R, Dalmiya N. A changing landscape for vitamin A programs: implications for optimal intervention packages, program monitoring, and safety. Food Nutr Bull 2016;37(2 Suppl):S75–86.
- Vitamin A fortification in staple foods http://www.who.int/elena/titles/vitamina_fortification/en/
- Deworming evidence brief

Can zinc supplementation for children under 5 years improve health and nutrition outcomes?

An evidence-based practice brief

SYNOPSIS

- Zinc deficiency impairs growth, decreases resistance to infections and contributes to child deaths due to diarrhoea, pneumonia, and malaria.
- WHO recommends for the treatment of all diarrhoea episodes that children 6 months – 5 years of age should be given zinc supplementation of 20 mg per day for 10–14 days (10 mg per day for infants under 6 months of age) coupled with oral rehydration salts. No recommendations for zinc supplementation to manage pneumonia or impaired growth currently exists.
- Evidence suggests zinc supplementation as a preventative approach for reducing disease, reduces the risk of death of young children and may have a very small effect on linear growth.
- Evidence suggests zinc supplementation reduces the risk of diarrhoea but not the risk of malaria, while there are mixed findings whether there is any reduction in the risk of respiratory infection.
- Zinc deficiency commonly coexists with other micronutrient deficiencies including iron, making tackling of zinc deficiency in isolation inappropriate. Increased consumption of foods with a high content of absorbable zinc is the long term sustainable solution to problems of zinc deficiency. These foods are also rich in other micronutrients.

Definition

Zinc is an essential micronutrient required for cellular growth, cellular differentiation and metabolism, normal growth and development of children, and immune function. Zinc deficiency is a public health problem in low- and middle-income countries and affects children under 5 in particular. Zinc deficiency impairs growth, decreases resistance to infections and contributes to numerous child deaths per year due to diarrhoea, pneumonia, and malaria. Frequent diarrhoea, that is also associated with chronic undernutrition, may further deplete body stores of zinc.

Deficiencies may arise from insufficient intake of foods containing zinc or insufficient absorption. Most foods high in zinc are of animal origin, such as meats, fish and dairy products. Dietary fibre and compounds called phytates, which are often found in foods such as cereals, nuts and legumes, bind to zinc and result in poor absorption. Zinc competes for absorption with other micronutrients such as iron and calcium. This, in turn, can have unintended negative consequences for children's health and development.[115] In low-income countries, complementary feeding diets for young children are usually dominated by cereal-based porridges with low nutrient density and poor mineral bioavailability (typically falling short in iron and zinc and sometimes in other nutrients).

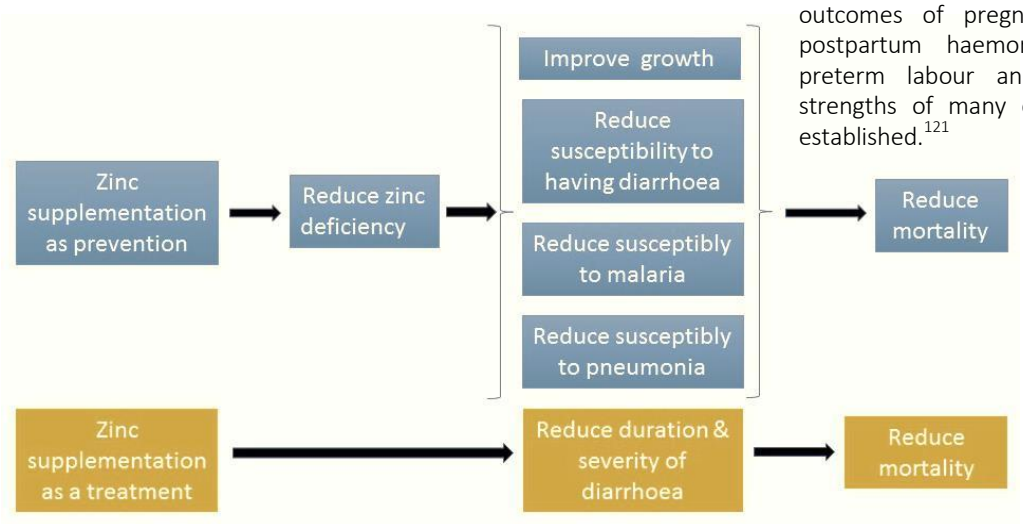


Figure 1: Impact pathway. Source: Developed by authors

Rationale

Zinc as a prevention approach – zinc is thought to help decrease susceptibility to acute lower respiratory tract infections by regulating various immune functions, including protecting the health and integrity of the respiratory cells during lung inflammation or injury. Studies have suggested that zinc supplementation may reduce the number of episodes and severity of bronchiolitis and pneumonia cases in children. (Evidence on whether multiple micronutrient powders has an effect on zinc deficiency is limited.) [116] [117] Studies have also explored the preventative effect of zinc on diarrhoea and malaria, and there are suggestions that zinc supplementation can affect growth.[118] Studies have further explored the effect of zinc supplementation on growth in low-birth weight babies.[119]

Zinc as a treatment - Supplementary zinc is thought to benefit children with diarrhoea because it is essential for protein synthesis, cell growth and differentiation, immune function, and intestinal transport of water and electrolytes. Zinc deficiency is associated with an increased risk of gastrointestinal infections, adverse effects on the structure (e.g. epithelial damage) and function of the gastrointestinal tract, and impaired immune function.[120]

Low serum zinc levels may be associated with suboptimal outcomes of pregnancy such as prolonged labour, atonic postpartum haemorrhage, pregnancy-induced hypertension, preterm labour and post-term pregnancies, although the strengths of many of these associations have not yet been established.[121]

Evidence of impact

Impact on health

Mixed evidence of zinc supplementation on reducing mortality

Source	Finding	Evidence
Cochrane review of 80 trials focusing on children 6 months - 12 years in low and middle income countries.[122]	• significantly reduced risk of death(↓46%). • ↓23% risk of death due to diarrhoea, lower respiratory tract infection (LRTI), or malaria.	Moderate quality
2 RCTs focusing on low birth weight babies from developed countries.[123]	• no significant difference in the risk of mortality.	Low quality

Mixed evidence zinc supplementation reduces risk of respiratory infections or malaria

Source	Finding	Evidence
Cochrane review of six trials focusing on children two to 59 months of age from India, South Africa, Bangladesh and Peru.[124]	• Reduced incidence and prevalence of pneumonia.	Low quality
Cochrane review of 80 trials focusing on children 6 months -12 years in low and middle income countries.[125]	• no reduction in children's risk of respiratory infection or malaria.	Moderate quality

Good evidence zinc supplementation reduces number of diarrheal episodes

Source	Finding	Evidence
Cochrane review of 80 trials focusing on children 6 months-12 years in low and middle income countries.[126]	• children given zinc experience less diarrhoeal disease: ↓13% diarrhoea incidence. ↓12% diarrhoea prevalence.	Moderate quality

Impact on nutrition

Moderate evidence preventive zinc supplementation has a small effect on growth

Source	Finding	Evidence
Cochrane review of 80 trials focusing on children 6 months -12 years in low and middle income countries.[127]	• small effect on growth, but eating more energy-dense foods would probably have larger effect.	Moderate quality

Inconclusive evidence zinc supplementation reduces pre-term births

A Cochrane review of 21 trials in low and middle-income countries found:[128] [1]

- ➔ zinc supplementation to pregnant women (with low incomes) has a small effect (14% reduction compared to placebo) on reducing preterm births.
- ➔ zinc supplementation during pregnancy does not help to prevent low birthweight babies.
- ➔ No clear differences were seen for development of pregnancy hypertension or pre-eclampsia.

The authors suggest improving women's overall nutritional status, particularly in low income areas, will do more to improve the health of mothers and babies than supplementing pregnant women with zinc alone.

Inconclusive evidence that zinc supplementation as a treatment reduces diarrhoea mortality

- ➔ A Cochrane review of 33 trials mostly from Asian countries found children who have acute diarrhoea show no effect of zinc supplementation on death or number of children hospitalized.[129]

Zinc supplementation has a positive effect on diarrhoea duration and severity in children older than 6 months, and those with malnutrition, but not in children younger than 6 months

Source	Finding	Evidence
Cochrane review of 33 trials in zinc deficient countries:[130]		
• children older than six months,	• shorter average duration of diarrhoea by around half a day. • reduced number of children whose diarrhoea persists until day seven.	Low quality Moderate quality
• children with signs of malnutrition	• effect appears greater, reduced duration of diarrhoea by around a day.	High quality
• children younger than six months	• no effect on mean duration of diarrhoea, or number of children who still have diarrhoea on day. seven	Low quality
• children with persistent diarrhoea	• average duration of diarrhoea shortened by around 16 hours.	Moderate quality

Cost considerations

A study to determine whether zinc with oral rehydration solution (ORS) is more cost effective than ORS alone in the treatment of acute diarrhoea found the use of zinc with ORS reduced the total cost and duration of acute diarrhoea (mean duration of diarrhoea was 17 hours shorter and mean total cost of treatment was 5% cheaper in the zinc than ORS group).[131]

Applying the evidence to design & implementation

- ➔ Countries should have and follow their national strategy for prevention and control of micronutrient malnutrition including zinc supplementation.
- ➔ Zinc supplementation should be provided as part of and integrated with routine service provision and other existing health programmes e.g. Integrated Community Case Management (iCCM).[132]
- ➔ Alongside the provision of zinc supplements there should be a behaviour-change strategy that promotes exclusive breastfeeding up to 6 months, continued breastfeeding beyond the first year of life especially during disease episodes, appropriate complementary feeding of children older than 6 months and a healthy diet for children older than 2 years. Effective links with water and sanitation interventions are key to prevent infections and hygiene education and diarrhoea management should also be included.
- ➔ Programmes should include training for health-care workers or other types of workers to adequately provide nutrition counselling and explain correct use of zinc supplements.

WHO Recommendation[133]

Zinc supplementation for the management of diarrhoea

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

Health care workers are encouraged to provide low osmolarity ORS solution for home use until the diarrhoea stops and to counsel mothers on the importance to continue breastfeeding.

No WHO recommendations exist related to

- Zinc supplementation and growth in children;
- Zinc supplementation in children with respiratory infections;
- Zinc supplementation for pregnant women;
- Zinc supplementation and low birth-weight infants.

[1] Women were supplemented from before conception with the shortest duration being until 26 completed weeks' gestation

Challenges of zinc supplementation

- Children who take zinc supplements may experience vomiting as a side effect.[134]
- Adherence to taking zinc supplements for 10–14 days is a challenge – health workers should ensure mothers understand the importance of the supplements.
- It is important the child not only receives the recommended amounts of zinc and ORS, but also continues to be breastfed during disease episodes. Please refer to the evidence brief on breastfeeding for challenges related to breast feeding.
- Strong and functional health systems, including functioning supply chains for zinc supplements and ORS are required to enable effectiveness of zinc supplementation with adequate links with WASH interventions.

Monitoring & evaluation and measuring impact

The table below provides guidance on potential monitoring and evaluation indicators

Activities	✓ Number of health workers trained in treatment of diarrhoea with ORS and zinc supplements
Outputs	✓ Percentage of health facilities providing zinc supplements routinely to children with diarrhoea
Outcomes & Impact	✓ Incidence and duration of diarrhoea ✓ Prevalence of diarrhoea in children under 5 during the previous 15 days ✓ Proportion of children with diarrhoea who received Zinc supplementation

Further information & key programming resources

The following document may prove useful as reference document for planning, designing, implementing, and monitoring and evaluation.

- http://www.zinctaskforce.org/

Can micronutrient powders for point-of-use fortification improve health and nutrition outcomes in children 6-23 months and children 2-12 years?

An evidence-based practice brief

SYNOPSIS

- In lower-income settings, children's diets may be primarily plant-based. A lack of animal-source foods results in insufficient amounts of key micronutrients such as vitamin A, zinc, and iron.
- WHO recommends point-of-use fortification of foods with iron containing micronutrient powders (MNP) for children 6–23 months and children 2–12 years where the prevalence of anaemia is 20% or higher in these target groups
- There is moderate evidence that MNPs reduce anaemia and iron-deficiency in children 6–23 months and 2–12 years.
- There is insufficient evidence around the effect of MNP on diarrhoea and respiratory infections or on reducing vitamin A or zinc deficiency amongst children.
- MNPs are not a replacement for vitamin A supplementation programmes or for iron supplementation for children living in settings where anaemia is highly prevalent.
- Countries should have a national strategy for prevention and control of micronutrient malnutrition based on a clear understanding of the aetiology of this problem including an integrated – multifactorial and multi- sectorial – approach, with solutions across relevant sectors.

Definition

Micronutrients are essential vitamins and minerals required by the body throughout the life cycle. Factors contributing to micronutrient deficiencies include poor diets low in micronutrient-rich foods like fruits, vegetables and animal-source foods; increased micronutrient needs during certain life stages, such as child growth, pregnancy and lactation; insufficient absorption and/or suboptimal utilisation of vitamins and minerals due to diseases, infections, or parasites.

Infants and children are one particular group amongst others (including women of reproductive age, especially pregnant and lactating women) that are most vulnerable to micronutrient malnutrition, given the increased vitamin and mineral needs to support their rapid growth and adequate development.[135]

The use of multiple micronutrient powders (MNPs) for point-of-use fortification of foods for children 6 months to 12 years is an alternative to mitigate or overcome the constraints associated with supplementation and mass fortification. (These constraints include: poor adherence to dosing regimens, low acceptability, prevailing social norms and values, poor distribution channels, low-skilled health workers, geographical barriers and insufficient resources.)

MNPs are single-dose packets of powder containing iron, vitamin A, zinc and other vitamins and minerals that can be sprinkled onto any semi-solid food at home or at any other point of use to increase the content of micronutrients in the child's diet. (Multiple micronutrient powders are usually formulated in sachets of 15 micronutrients: vitamins A, D, E, C, B1 (thiamine), B2 (riboflavin), B3 (niacin), B6, B12, folate, iron, zinc, copper, selenium, iodine.) This is done without changing the usual diet. The recommended dosage is 90 MNP sachets over a 6 month period irrespective of the age of the child.

Interventions to prevent or treat micronutrient malnutrition need to be based on the specific context and causal analysis and should be part of an integrated approach for effective control of micronutrient deficiency, but typically include exclusive breastfeeding during the first 6 months of life, dietary diversification to include foods with highly absorbable vitamins and minerals, fortification of staple and complementary foods, and provision of supplements.

Rationale

Vitamin and mineral deficiencies, particularly of vitamin A, iron and zinc, contribute significantly to morbidity and mortality in children under 5 years of age. Deficiencies of iron and vitamin A have the largest documented disease burden among micronutrients, particularly in low- and middle-income countries.[136]

Anaemia is frequently caused by iron deficiency, but other factors may contribute to anaemia, including other micronutrient deficiencies (e.g. folic acid, zinc, vitamins A and B_{12}), malaria, soil-transmitted helminths, other infectious diseases (TB, HIV/AIDS), and blood disorders (e.g. thalassaemia, sickle cell). Symptoms include tiredness, weakness and lack of energy.[137]

Iron-deficiency anaemia is associated with cognitive impairment while very severe anaemia is associated with increased childhood mortality.[138]

Vitamin A deficiency (VAD) is the leading cause of preventable blindness in children and increases the risk of disease and death from severe infections. Insufficient dietary intake can result in vitamin A deficiency while other causes include infections (e.g. measles), fat malabsorption in the gut and liver disorders. (For more information, see Evidence brief on vitamin A .)

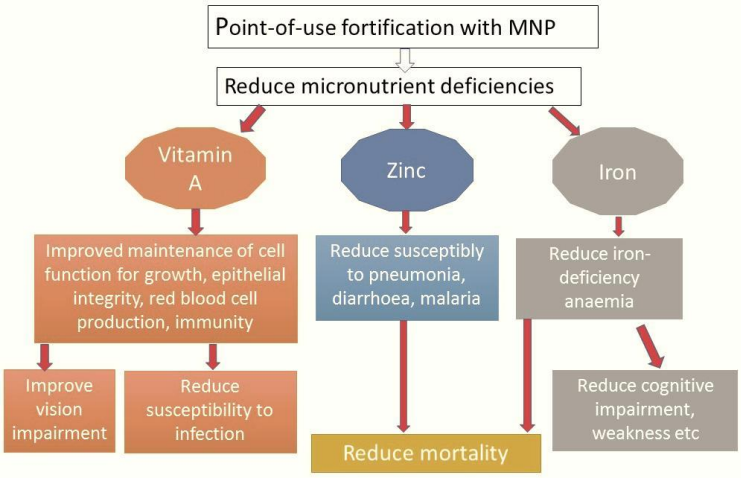


Figure 1: Impact pathway. Source: Developed by authors

Evidence of impact

Impact on health

■ **Inconclusive evidence of the effect of MNP on mortality or morbidity for children 6–23 months of age with lack of evidence on health impact for the 2–12 year age group and for pregnant women**

Source	Finding	Evidence
Cochrane review on children 6–23 months conducted in low income countries in Asia, Africa and the Caribbean.[139]	• Not possible to draw conclusions around the effect on diarrhoea due to different definitions used. • No effect on respiratory infections (1 trial). • Children receiving MNP were more likely to walk independently at 12 months of age (reflecting mental and motor development) (1 trial).	Low quality
Cochrane review of children 2–12 years.[140]	• Children receiving MNP were as likely to have diarrhoea as those children receiving no intervention or a placebo (2 trials). • Lack of evidence on effect on mortality.	Low quality

More evidence is needed for both mother and infant health outcomes to adequately evaluate the use of MNPs in pregnant women.[141]

Impact on nutrition

■ **MNPs reduce anaemia but no evidence they perform better than daily iron supplementation**

Source	Finding	Evidence
Cochrane review on children 6–23 months conducted in low income countries in Asia, Africa and the Caribbean.[142]	• MNP reduced anaemia by 31% and iron deficiency by 51%.	Moderate quality
	• MNP produced similar improvements on anaemia compared to daily iron supplementation.	Low quality
Cochrane review of children 2–12 years.[143]	• Children receiving MNP were significantly less likely to have anaemia and iron-deficiency and more likely to have a higher haemoglobin concentration.	Moderate quality

■ **MNP has no effect on growth or serum zinc concentration in children 6–23 months, limited evidence of effect on vitamin A deficiency**

Source	Finding	Evidence
Cochrane review on children 6–23 months conducted in low income countries in Asia, Africa and the Caribbean.[144]	• Daily MNP had no effect on growth.	Moderate quality
	• Findings did not reveal an effect of MNP on serum zinc concentrations (1 trial).	Low quality
	• MNP were effective in reducing rates of vitamin A deficiency (1 trial).	Low quality

■ **Insufficient evidence on the impact of MNPs for pregnant women**

➔ A Cochrane review of 2 studies revealed that MNPs had similar effect as multiple micronutrient supplements on anaemia or haemoglobin. Women were more likely to take iron and folic acid tablets than MNPs.[145]

Cost considerations

MNPs are packaged in small sachets, which are temperature and moisture resistant, giving them a long shelf-life and easing transportation and storage. The cost per sachet of locally produced MNP powder ranges from US$0.010 to US$0.015 compared to US$0.020 to US$0.025 if imported.[146]

Few studies have reported operational and cost considerations, including effective distribution mechanisms.[147]

Applying the evidence to design & implementation

➔ Countries should have a national strategy for prevention and control of micronutrient malnutrition. The choice of intervention (e.g. MNPs, fortified foods, iron supplements, biofortification) should consider costs, cost effectiveness, feasibility and acceptability and prevalence of key micronutrient deficiencies based on up-to-date data.

➔ Alongside the provision of MNPs should be a behaviour-change strategy that promotes not only correct use and preparation of MNPs, but especially appropriate breastfeeding and complementary practices, healthy diets for children older than 2 years, hand washing with soap, prompt attention to fever in malaria settings, and diarrhoea management.

➔ An integrated approach to longer-term strategies to sustainably tackle micronutrient deficiencies should be considered, including complementary nutrition-sensitive strategies such as providing the poor with access to nutritious food and shielding them from price spikes; empowering women by increasing access to education; and access to clean water and good sanitation

➔ Programmes should include training for health-care workers or other types of workers to adequately provide nutrition counselling and demonstrate the correct use of MNPs.

➔ There are research gaps in understanding the effectiveness of MNPs, including: how MNPs affect other outcomes beyond anaemia and iron-deficiency, the effect of behaviour change on the impact of MNPs, and potential short- and long-term functional, developmental, and adverse outcomes.[148]

WHO Recommendation[149]

Children 6 – 23 months

Where prevalence of anaemia in infants and young children under 2 years of age or children under 5 years of age is 20% or higher, point-of-use fortification of complementary foods with iron-containing MNPs in infants and young children aged 6–23 months is recommended, to improve iron status and reduce anaemia.

Children 2–12 years

Where prevalence of anaemia in school-age children is 20% or higher, point-of-use fortification of foods with iron containing MNPs in children aged 2–12 years is recommended, to improve iron status and reduce anaemia.

Daily iron supplementation[150]

Daily iron supplementation is recommended in settings where anaemia is highly prevalent (40% or higher) for the age group) for:

- infants and young children aged 6–23 months
- preschool-age children aged 24–59 months
- school-age children aged 60 months and older

Additional remarks from WHO:[151]

- Children diagnosed with anaemia should be treated according to WHO and national guidelines
- In malaria-endemic areas, the provision of iron in any form, including MNPs, should be implemented in conjunction with measures to prevent, diagnose and treat malaria. Iron should not be provided to children who do not have access to malaria-prevention strategies (e.g. provision of insecticide-treated bednets, prompt diagnosis of malaria and treatment with antimalarial drugs.
- MNPs are not a replacement for high-dose vitamin A supplements for children at risk of vitamin A deficiency,
- If sugar is fortified with vitamin A, vitamin A should be excluded from the MNPs. If other staple foods regularly consumed by children (e.g. oil) are fortified with vitamin A, the risk of inadequate and high intakes of vitamin A should be assessed and whether to include or exclude vitamin A from MNPs determined.
- WHO do not recommend the use of MNPs in lieu of iron and folic acid supplementation during pregnancy due to the lack of evidence.

Challenges[152]

- For many micronutrient deficits, prevalence data are scarce or outdated, making the revision of national strategies in this area a challenge.
- Data on micronutrient toxicity is also lacking – administration of iron supplements for example to children with Sickle Cell Anaemia (Disease) can be harmful.
- Mild side effects can occur with iron supplementation, such as darkened stools, gastrointestinal pain, diarrhoea, constipation and vomiting. Though MNPs do not eliminate these side effects, they appear to reduce their frequency and severity and are highly acceptable. Iron within MNPs is covered in a fat-based protective coating so any change in the taste, colour and aroma of food is minimal.
- Factors affecting adherence include: *1*) caregivers' perception of positive changes as a result of MNP use; *2*) caregivers' perceived child acceptance of food with MNPs; and *3*) caregivers' forgetfulness. Behaviour change communication channels and messages were the most frequently reported programme design features influencing caregiver knowledge and subsequent adherence. Administration regimen which may be related to caregivers' capacity to remember to give MNPs, was also a frequently cited feature affecting adherence.[153]
- A systematic review of 17 studies in mainly low-income countries found home fortification with MNP has good adherence, ranging from 50 % to over 90 % of the prescribed sachets and that MNP was well accepted by caregivers.[154]

Monitoring & evaluation and measuring impact

The table below provides guidance on potential evaluation indicators

Activities	✓ No. of trainings for health facility staff including managers ✓ MNPs procurement and distribution
Outputs	✓ Percentage of health facilities providing micronutrient powders routinely to children 6–23 months of age and children 2–12 years ✓ Proportion of schools providing MNPs to children within the 2–12 year age group
Outcomes & Impact	✓ Proportion of children who consume MNPs ✓ Indicators on anaemia

Further information & key programming resources

The following documents may prove useful as reference documents for planning, designing, implementing, and monitoring and evaluation.

- Home Fortification Technical Advisory Group (HF-TAG) www.hftag.org
- A Manual Developing And Implementing Monitoring Systems For Home Fortification Interventions. Home Fortification Technical Advisory Group http://www.hftag.org/downloads.asp?s=hftag&search=monitoring%20manual
- Other evidence briefs in this resource such as vitamin A and Women of Reproductive Age (WRA)

Can deworming for preschool and school children, women of reproductive age including adolescent girls, improve health and nutrition outcomes?

An evidence-based practice brief

SYNOPSIS

- Helminthic infections are associated with significant effects on undernutrition, and impairment of mental and physical development. Preschool-age and school age children experience the highest burden of infection and consequently the greatest morbidity.[155]
- WHO recommends periodic deworming treatment for soil transmitted helminths to all at-risk people living in endemic areas, targeted treatment for schistosomiasis in affected populations (to eliminate infecting worms) together with health and hygiene education and improvement of water and sanitation.[156 157]
- Recent evidence suggests that regular deworming has no effect on height, haemoglobin, exam results or cognition tests, although it may improve weight gain.[158] The latest independent review (2017) reinforces this finding.
- Child health and nutrition policies in worm-endemic areas should include investment to address basic determinants of worm infestations such as poverty, living conditions, water sanitation hygiene, and inequities.[159]

Definition

Helminths are a group of parasites commonly referred to as worms. The most common infections are caused by schistosomes and soil-transmitted helminths, and occur either through poor hygiene (ingestion of active worm eggs) or from skin contact with contaminated soil or fresh water.[160]

People most at risk are pre-school (1–5 years) and school-age children (5–14 years), women of reproductive age (including pregnant women in the second and third trimesters, breastfeeding women and adolescents), and adults in certain high-risk occupations such as tea-pickers or miners.[161]

Deworming is periodic treatment (usual without previous individual diagnosis) with anthelminthic (deworming) medicines of at risk population groups living in areas endemic to helminths infection.

Rationale

Helminthiases are among the most common infections in developing countries. More than 1.5 billion people, or 24% of the world's population, are infected with soil-transmitted helminth infections worldwide. Over 270 million preschool-age and 600 million school-age children are infected with parasitic worms.[162] Helminths infection can impair nutritional status by causing:[163 164]

- Intestinal tissue damage with internal bleeding which can lead to loss of iron and anaemia, and malabsorption of nutrients; in addition, roundworm may compete for vitamin A in the intestine
- diarrhoea and dysentery
- appetite loss which can reduce energy intake

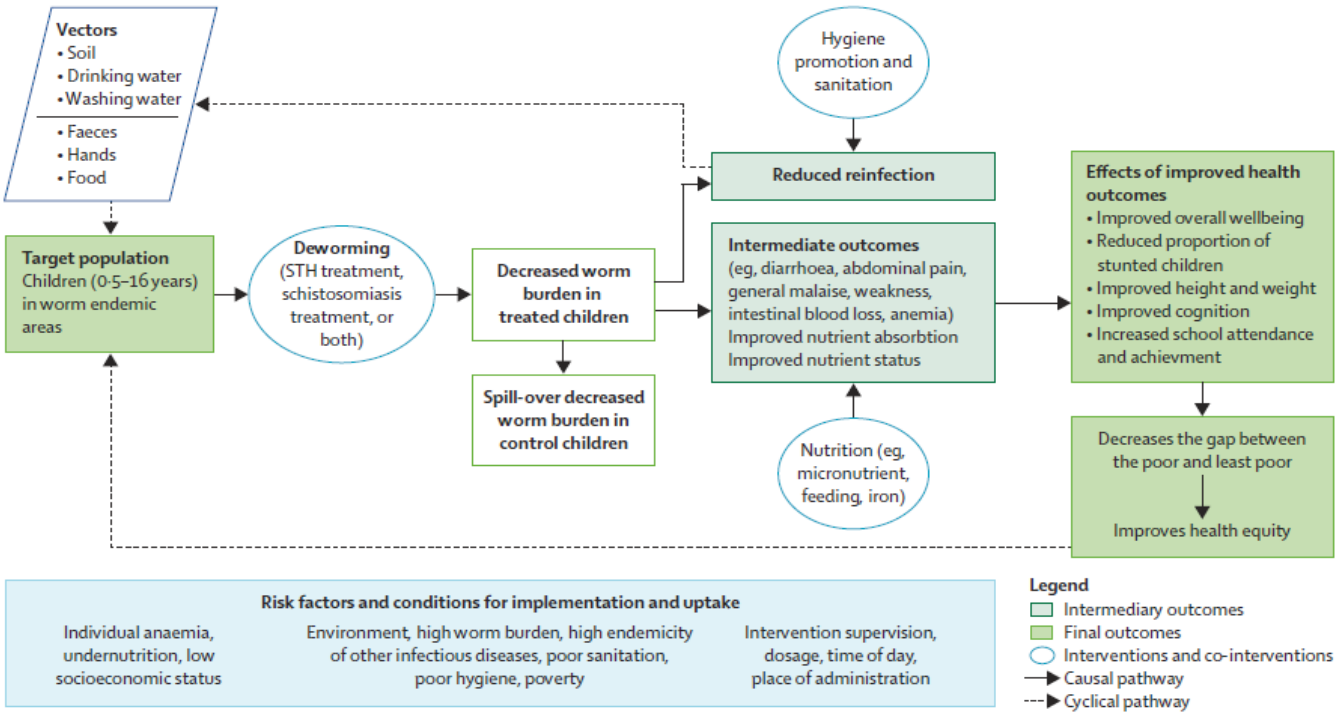


Figure 1: Impact pathway. Source: Welch et al. Mass deworming to improve developmental health and wellbeing of children in low-income and middle-income countries: a systematic review and network meta-analysis. The Lancet Global Health 5.1 (2017): e40-e50

Helminthic infections during childhood can significantly impact growth and development, [165] and can cause cognitive impairment possibly through the relationship between anaemia and cognitive development although there may be other causal factors.[166]

Although the aetiology of iron-deficiency anaemia is multifactorial, helminth infestation is a major contributor of anaemia in children and women of reproductive age in endemic areas.[167]

Chronic schistosomiasis can include a range of other symptoms and problems depending on the exact area infected.[168]

Figure 1 on previous page shows the causal pathways associated with deworming.[169]

Evidence of impact

The Lancet series on nutrition did not include deworming for either children or women in the package of high impact nutrition interventions since the authors concluded their analyses did not support causal pathway assumptions about influence of mass deworming on child health and school performance. Furthermore, a debate is ongoing as to whether mass deworming confers population health benefits at all based on recent Cochrane review findings, a meta-analysis of available robust evidence and further supported by a recent systematic review.[170]

Impact on health

No evidence of impact of mass deworming on mortality

Source	Finding	Evidence
Systematic review of 52 studies from low and middle income countries.[171]	• Mass deworming for STH amongst children age 6 months to 16 years had no effect on mortality.	High quality
a 5-year study in India.[172]	• Trial of 2 million children 1–6 years of age in lightly infected areas found deworming had little to no effect on mortality in pre-school populations.	Moderate quality

No evidence that mass deworming improves cognitive development

Source	Finding	Evidence
Cochrane review of 45 trials from endemic areas in 23 different countries.[173]	• routine deworming of school children in endemic areas does not show benefit in terms of cognition, school performance, exam performance or attendance.	Moderate quality
Systematic review of 52 trials.[174]	• mass deworming for STH and for schistosomiasis showed little to no difference in cognition measured by short-term attention or school attendance.	High quality

Impact on nutrition

No evidence that deworming during pregnancy has an effect on maternal anaemia or infant health

Source	Finding	Evidence
Cochrane review of 4 trials.[175]	• no effect of antihelminthics administered in second trimester of pregnancy on maternal anaemia, low birthweight, preterm births or perinatal deaths. No available data on the impact on infant survival at six months.	Low quality
Cochrane review of 4 trials.[176]	• The same review found no impact on maternal anaemia in studies in which iron or iron-folate was also given to pregnant women along with antihelminthic.	Low quality

Mixed evidence on impact of deworming programmes on reducing or preventing anaemia or other manifestations of malnutrition for children

Source	Finding	Evidence
Meta-analysis of 19 trials.[177]	• Anthelmintic drugs led to significant extra gains in weight, height, mid-upper arm circumference and skinfold thickness in comparison with untreated controls if the prevalence of intestinal nematodes is 50% or more but had no significant effect on haemoglobin concentration.	Low quality
Two trials covered by the above meta-analysis.	• No differences were found in the dehydroretinol to retinol ratio (forms of Vitamin A) between children treated with anthelminthic drugs and control groups.	Moderate quality
Cochrane review of 45 trials and Cochrane review of 34 trials focusing on STH in 23 countries low and middle income countries.[178]	• deworming drugs for STH may increase weight gain when treating only children 16 years or less known to be infected, but, when treating all children living in an endemic area, deworming drugs have little or no effect on average weight or height gain, or on haemoglobin.	Low and moderate quality
Systematic study of 52 trials.[179]	• Mass deworming for STH in children 6 months to 16 years in low and middle income countries showed- little to no improvement in weight over a period of about 12 months or height and little to no difference in proportion stunted.	Moderate quality
Systematic study of 52 trials.[180]	• The same study revealed that mass deworming for schistosomiasis might slightly increase weight but has little to no effect on height.	Low quality

Cost considerations

Screening tests to detect if a child is infected would be up to 12 times more expensive than mass deworming.[181]

The composite cost for treatment for schistosomiasis and STH was estimated to be $0·74 for school-aged children and $1·74 for community treatment to preschool-aged children and adults.[182]

Applying the evidence to design & implementation

- ➔ Typically, mass deworming is carried out rather than a screen-and-treat approach. The goal is to control morbidity at the population level to reduce disease transmission.
- ➔ Mass deworming alone is unlikely to lead to helminthiasis elimination. Complementary strategies, including improved access to clean water, sanitation, and hygiene and snail control for schistosomiasis, played a crucial role in settings that have achieved interruption of disease transmission.
- ➔ WHO has issued guidelines based on infection prevalence. The guidelines do not reflect the evidence from the latest Cochrane and Lancet review.
- ➔ The WHO recommended medicines are albendazole (400 mg) and mebendazole (500 mg) for soil transmitted helminths. These drugs are effective, inexpensive and easy to administer by non-medical personnel (e.g. teachers). They have been through extensive safety testing and have been used in millions of people with few and minor side-effects. For all forms of schistosomiasis the recommended treatment is praziquantel.

WHO Recommendation

- Periodic medicinal treatment for STH without previous individual diagnosis to all at-risk people living in endemic areas. Treatment should be given once a year when the baseline prevalence of soil-transmitted helminth infections in the community is over 20%, and twice a year when the prevalence is over 50%. [183]
- WHO strategy for schistosomiasis control focuses on reducing disease through periodic, targeted treatment with praziquantel (preventive chemotherapy) of affected populations. In countries with low transmission, the elimination of the disease should be aimed at through treating targeted groups including school-age children.[184]

The above deworming measures should come together with health and hygiene education and improvement of water and sanitation children

- Periodic deworming can be integrated with child health days, supplementation programmes for preschool children, or integrated with school health programmes.
- Schools provide a good entry point for deworming activities and allow provision of health and hygiene education. Mass deworming programmes do not reach out-of-school children.

Deworming and Vitamin A[185]

Deworming supplements are often distributed alongside vitamin A supplements:

- Worm infections contribute to vitamin A deficiency
- One aim of deworming is to reduce anaemia: anaemia is associated with increased vitamin A deficiency.
- Worm infections and vitamin A deficiency both have serious health repercussions for a growing child and both should be prioritized in endemic countries
- Worm infections and vitamin A deficiency are public health problems in the same geographical areas.
- The target age groups for vitamin A distribution and deworming are very similar.
- Training for both interventions can easily be integrated.

Challenges

- Plans to address helminth infections often do not adequately cover vector control or link to plans to address other social determinants of health.
- Diverting human resources within an already weak health and education system to deworming could be an unintended consequence of mass deworming.[186]
- Out of school children, including adolescent girls, may be difficult to reach if not accessing healthcare.
- Fear of side-effects; there is a need for better sensitization methods to include the local administration as well as parents.

Monitoring & evaluation and measuring impact

The table below provides guidance on potential monitoring and evaluation indicators

Activities	✓ Number and geographic coverage of child health weeks organized per year ✓ Anti-helminth drug procurement & distribution
Outputs	✓ % of health facilities in endemic areas providing 1) hygiene education 2) deworming treatment routinely to children and pregnant/lactating women in the past year ✓ % of schools with at least one trained teacher on deworming and WASH ✓ % of schools providing deworming treatment to school children
Outcomes & Impact	✓ Coverage of deworming amongst school children (reaching 75% of the school-age population is a minimum coverage target for endemic countries) ✓ % of children attending a health facility who are dewormed ✓ % of pregnant women attending antenatal visits who are dewormed during pregnancy ✓ Parasitology indicators (reduction in intensity and prevalence of STH infections ✓ Indicators on morbidity and its consequences (% of children with anaemia)

Further information & key programming resources

The following documents may prove useful as reference documents for planning, designing, implementing, and monitoring and evaluation.

- Helminth control in school-age children: A guide for managers of control programmes http://apps.who.int/iris/bitstream/10665/44671/1/9789241548267_eng.pdf
- School health, nutrition and education for all: Levelling the playing field (2008) http://www.cabi.org/cabebooks/ebook/20083132007
- National deworming programme: lessons from Kenya http://www.who.int/sdhconference/resources/draft_background_paper22_kenya.pdf
- Strengthening education-nutrition links in external assistance, an evidence –based planning resource (2016) https://europa.eu/capacity4dev/

Management of moderate and severe acute malnutrition in children, and pregnant and lactating women to improve health and nutrition outcomes

An evidence-based practice brief

SYNOPSIS

- Acute malnutrition (wasting) is a form of malnutrition that reflects recent weight loss. Whether it is moderate or severe is determined by anthropometric measurements and/or the presence of bilateral pitting oedema.
- Acute malnutrition is associated with a high risk of mortality and can increase the case fatality rate in children suffering from common childhood illnesses. A child with moderate acute malnutrition (MAM) is up to three times as likely to die as a well-nourished child, children with severe acute malnutrition (SAM) have a 9.6 times higher risk of death compared to well-nourished children. Recent estimates indicate that a child with MAM and stunting are 12.3 times as likely to die.[187]
- High burden of acute malnutrition can exist in developmental countries, fragile states and humanitarian crises.
- WHO recommends the community-based management of acute malnutrition.
- Both lipid-based nutrient supplements (LNS, also referred to as RUSF or Ready-To-Use Supplementary Food) and blended foods are effective in treating children with MAM. Use of LNS did not reduce the risk of defaulting or progression to SAM.
- Challenges associated with implementation relate to capacity of health system and overcoming high defaulters
- Comprehensive multi-sectoral strategy should be implemented to address the basic and underlying causes in order to prevent acute malnutrition.

Definition

Acute malnutrition (wasting) refers to a form of malnutrition that reflects recent weight loss. Individuals often appear very thin. It is assessed through weight-for-height or mid-upper arm circumference (MUAC) in children, through MUAC for pregnant and lactating women, and by Body Mass Index (BMI) for adults. The individual is classified as overweight/obese, normal, with moderate acute malnutrition (MAM), or severe acute malnutrition (SAM) based on specific cut-offs for interpretation of anthropometric measures. Another form of severe acute malnutrition is kwashiorkor, characterised by bilateral pitting oedema (swelling of both feet due to excess fluid retention which can spread to the legs and face as it worsens).

Programmes that treat acute malnutrition are usually established based on prevalence of global acute malnutrition (GAM) in children 6–59 months. GAM refers to the proportion of children with MAM or SAM in the population and is often used as a proxy indicator for the severity of a crisis.

WHO Crisis Classification using rates of Global Acute Malnutrition (GAM)[188]

Severity	Prevalence of GAM
Acceptable	<5%
Poor	5–9%
Serious	10–14%
Critical	>=15%

A high burden of acute malnutrition can exist in different contexts particularly fragile states and humanitarian crises where GAM prevalence can persist at over 15%. However, it can also exist in stable contexts and there can be a high burden in countries with large populations even though the GAM prevalence may not reach critical levels.

Rationale

A child with MAM is up to three times as likely to die as a well-nourished child. While the immediate risk of mortality is higher for a child with SAM than with MAM, the total number of children affected by MAM is much greater, and therefore absolute mortality is higher for MAM than SAM.[189] Recent estimates indicate that a child with MAM and stunting is 12.3 times as likely to die.[190]

Children with SAM have a 9.6 times higher risk of death compared to well-nourished children. SAM can be the direct cause of death, or it can act as an indirect cause by dramatically increasing the case fatality rate from common childhood illnesses such as diarrhoea and pneumonia.[191] Only 20% of children with SAM are treated.[192]

Children 6–59 months with moderate acute malnutrition and pregnant and lactating women are treated in targeted supplementary feeding programmes (TSFP) while children 0–59 months with severe acute malnutrition are either treated as out-patients (OTP) or in-patients (if they have medical complications). (Once the medical complications are treated, children are rehabilitated in out-patient care.) The admission criteria may include other groups e.g. children older than 59 months or adults, particularly the elderly. People with HIV and TB are also commonly included.

Lipid-based Nutrient Supplements (LNS) are fortified foods where the majority of the energy is from lipids (fats). All LNS provide a range of vitamins and minerals, and provide energy, protein, and essential fatty acids (EFA).

Patients in a TSFP can be given a fortified blended food (e.g. Corn Soya Blend +/++ (CSB) or Supercereal), or an LNS (RUSF). In OTP, children are rehabilitated with RUTF. Medical conditions are also treated as appropriate.

Community mobilisation aims to achieve early detection of cases thus reducing complications, and to improve programme effectiveness (e.g. coverage). The components of community-based management of acute malnutrition are shown in figure 1 on the next page.

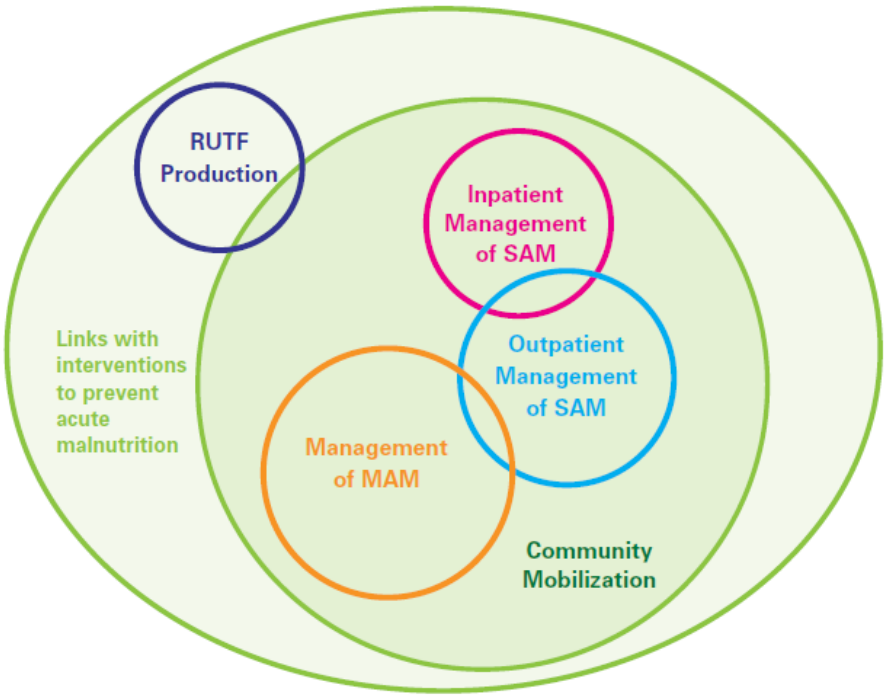


Figure 1: Components of community based management of acute malnutrition. Source: https://www.unicef.org/eapro/UNICEF_program_guidance_on_mananagement_of_SAM_2015.pdf Copyright by UNICEF. Reproduced with permission.

Evidence of impact

Impact on health

■ Weak evidence of impact of LNS on mortality for MAM and strong evidence of impact for SAM

Source	Finding	Evidence
Study comparing treatment of MAM with LNS or fortified foods in children under 5 in low- and middle-income countries.[193]	• No reduction in mortality.	Low quality
Study amongst children under 5 in low and middle income countries.[194]	• No significant differences in mortality between children who received RUTF compared to standard in-patient therapy but children receiving RUTF were 1.51 times more likely to recover from SAM.	Low quality
Analysis of 23,511 severely malnourished children treated in 21 community-based therapeutic care programmes in Malawi, Ethiopia, and Sudan.[195]	• Case-fatality rates were 4·1%.	Moderate quality
Systematic review of 10 evidence based nutrition specific interventions.[196]	• Scaling up management of SAM estimated to reduce under five mortality by 61.4% (highest of all 10 interventions).	High quality
Review of 23 MoH integrated CMAM programmes.[197]	• Median Case fatality rates 1.5%.	Moderate quality

Impact on nutrition

■ Mixed evidence on effectiveness of LNS on improving nutritional status of MAM in children under 5 years

Source	Finding	Evidence
Cochrane review of 8 trials in low and middle income countries.[198]	• LNS improved weight gain, weight-for-height and mid-upper arm circumference compared with fortified blended foods, but the improvement was modest.	Low quality
Review of 5 studies in low and middle income countries; comparing LNS and fortified food.[199]	• LNS led to a greater gain in MUAC (0.04 mm per day) and weight (0.61 g/kg/d) but the rate of height gain did not differ.	Low quality
	• children given LNS were more likely to recover.	Low quality
	• LNS did not reduce the risk of default or progression to SAM.	Low quality
	• non-response rate was significantly lower in the LNS group.	Low quality
	• LNS also induced more vomiting.	Low quality
1 prospective intervention trial in Niger.[200]	• Combining LNS with cash transfer more effective at preventing acute malnutrition and mortality than cash transfer or LNS alone.	High quality

■ Effectiveness of Targeted Supplementary Feeding Programme (TSFP) inconclusive

➔ A review of 61 TSFP in Asia, Africa and Central America revealed that only 41% of programmes are effective with respect to resulting in adequate recovery, limiting defaulting and reducing mortality. Many contextual factors and challenges affecting implementation should be taken into account (e.g. high defaulting rates in SFPs in Burundi and DRC were attributed to high levels of insecurity and population displacement).[201]

■ Moderate evidence that Community-based care is effective in achieving recovery of SAM

Source	Finding	Evidence
Review of 5 studies in low and middle income countries; comparing LNS and fortified food.[202]	• Children under 5 given RUTF as outpatients were 51% more likely to achieve nutritional recovery than the standard care group.	Low quality
Analysis of 23,511 severely malnourished children treated in 21 community-based therapeutic care programmes in Malawi, Ethiopia, and Sudan.[203]	• Case-fatality rates were 4·1%, with recovery rates of 79·4% and default rates of 11·0%. 74% of children were treated solely as outpatients. Average coverage was 72·5% higher than rates seen in comparable centre-based programmes which are often < 10%.	Moderate quality
Review of 68 studies amongst children under 5.[204]	• Community-based care of SAM was at least comparable to inpatient care in terms of effectiveness.	Moderate quality
Cochrane review of 3 trials from Malawi.[205]	• Insufficient information to determine whether RUTF improves relapse, mortality or weight gain.	Low quality

Cost considerations

A World Bank report estimates the cost of the community-based management of acute malnutrition to be US$200 per child treated.[206] One study in Ethiopia found that CMAM was two times more cost effective than in-patient care.[207] However, different contexts can lead to significant variations in cost.

Applying the evidence to design & implementation

- Based on existing evidence, WHO/UNICEF have endorsed a community-based management approach for treating acute malnutrition (including TSFP where appropriate, OTP, in-patient care and community mobilisation).[208] National guidelines should be followed wherever possible.
- CMAM is the most efficient approach to treat SAM at scale.
- The key learning from the last ten years suggests there is not a one-size-fits-all approach on how care for children with SAM is delivered. It is vital to consider capacities and constraints of health systems in countries.[209]
- Decisions on most appropriate intervention options need to be based on an analysis of the situation/context.

Community-based management of acute malnutrition

TSFPs provide a LNS or fortified blended food to individuals on a regular basis according to admission and discharge criteria based on nutritional status. TSFPs typically also include screening for medical conditions and routine health-related interventions (supplementation with vitamin A, deworming).[210]

Outpatient Therapeutic Care (OTP) is typically located in a front line health facility. Children 0–59 months with SAM but with appetite and no complications are enrolled following a medical evaluation. Routine medicines are given (antibiotic, deworming, measles vaccination and malaria treatment where relevant) and a weekly supply of RUTF is provided. Children should return once each week for follow up and a new supply of RUTF.

In-patient care: Children with SAM and no appetite and/or medical complications are admitted to an inpatient facility for close monitoring until stabilized. Inpatient care should follow standard WHO protocols[211] for the treatment of severe malnutrition. Once stabilized, patients are transferred to an OTP within reasonable distance of their homestead.[212]

WHO guidance (2013) recommends that infants who are less than 6 months of age with severe acute malnutrition with any complicating factors should be admitted for inpatient care while those without such factors should receive the same care as infants with severe acute malnutrition who are 6 months of age or older.[213]

Contact points with mother/carer during treatment should also be used as entry points for behavioural change communication with the mother/carer such as hygiene education and IYCF counselling.[214]

- The routine health system is the preferred provider of treatment for MAM and SAM with some countries showing success (e.g. Ethiopia),[215]
- In some contexts interim separate systems might be required (often supported by Development Partners) when:
  - The numbers requiring treatment exceed the capacity of the health system
  - Cases are located in hard-to-reach areas (e.g. pastoralist communities or insecure environments
  - When the health system is not functioning (e.g. in situations of conflict)
- Please refer to the evidence brief on cash transfers (p. 47) for further details on the impacts of cash transfers on acute malnutrition.

Challenges

- Building health system capacity whilst ensuring that SPHERE standards are met[2]
- Lack of access to health facilities particularly in fragile or conflict settings
- Ensuring a sustainable adequate supply of RUTF together with quality of delivery systems particularly in inaccessible areas and insecure settings
- High cost of RUTF and RUSF and still dependent on imported trademarked products since local production is limited
- Ensuring good follow-up of:
  - children that move between the different programme components (TSFP, OTP, in-patient care)
  - programme defaulters
  - children for long-term outcomes; data on long-term outcomes from two trials, showed a high rate of relapse after discharge[216]
- Understanding and addressing reasons for delay in early detection and treatment
- Understanding and addressing reasons for high default rates where they exist
- Ensuring effective community mobilisation
- Navigating the gap between MAM and SAM
- RUTF is not yet recognised globally as an essential medicine

There are still knowledge gaps:[217]

- the risk of LNS displacing breast milk or diverse local diets
- Implications for the cost of products in terms of sustainability and opportunity costs
- Whether and how imported or processed foods should be used to prevent malnutrition
- Extent of inappropriate commercial promotion of infant foods on occurrence of MAM and SAM

Monitoring & evaluation and measuring impact

The table below provides guidance on potential monitoring and evaluation indicators

Activities	✓ Training of health staff ✓ No of community mobilisers per village
Outputs	✓ No of children screened ✓ Average length of stay in the programme
Outcomes & Impact	✓ Proportion of children enrolled in MAM and SAM programmes ✓ Cure rate, defaulter rate, death rate, non-response rate ✓ Prevalence of moderate and severe acute malnutrition ✓ Under 5 mortality

[2] An internationally recognized sets of common principles and universal minimum standards for the delivery of quality humanitarian response.

Further information & key programming resources

The following documents may prove useful as reference documents for planning, designing, implementing, and monitoring and evaluation.

- Community based Therapeutic Care. A field manual first edition. Valid International. Oxford: UK; 2006 https://www.fantaproject.org/sites/default/files/resources/CTC-Field-Manual-Oct2006-508.pdf
- Programming for Nutrition-Specific Interventions https://www.wfp.org/content/nutrition-world-food-programme-programming-nutrition-specific-interventions
- http://www.severemalnutrition.org/
- http://www.sphereproject.org/about/
- www.cmamforum.org
- http://www.cmamreport.com/
- http://www.coverage-monitoring.org/
- Evidence brief on Cash Transfers, included as part of this resource (see p. 47).
- The EC, DFID UNICEF, the World Food Programme, Action Against Hunger and the Children's Investment Fund Foundation are part of the No Wasted Lives coalition. This promotes a coordinated approach to child health and nutrition, which builds on work already being done, while supporting governments, donors and NGOs to realise the synergies of cooperation. No Wasted Lives aims to make severe acute malnutrition a political and public health priority, discover and disseminate effective ways to prevent and treat severe acute malnutrition, mobilise more money and maximise effectiveness of current spending. https://www.nowastedlives.org/

Can nutrition interventions for people with HIV (human immunodeficiency virus) and/or Tuberculosis infection improve health and nutrition outcomes?

An evidence-based practice brief

SYNOPSIS

- Weight loss and undernutrition are common in people living with HIV/AIDS (PLWH) and Tuberculosis (TB). Children and pregnant women are particularly vulnerable due to their higher nutrient requirements.
- Nutrition assessment, counselling and support are key components of routine care and treatment of people with HIV and TB to prevent nutrition deficiencies.
- Evidence that supplementation reduces morbidity from HIV or TB is currently limited, despite strong impact pathways.
- Micronutrient supplementation may be beneficial in improving outcomes in HIV positive pregnant women and children.
- Infant feeding counselling and support to HIV positive mothers is key for improving HIV free survival
- Essential to integrate nutrition specific interventions with a mix of nutrition-sensitive actions to support programmes: household food security, Social Protection, community support and care systems, and access to education and life skills development for orphans, to address underlying socio-economic vulnerabilities of HIV/TB-affected households.

Definitions

Nutrition plays an important role in reducing morbidity and mortality in people living with HIV and TB.[218] Nutrition assessment, counselling and support are key components of integrated routine care and treatment of people living with HIV (PLWH) and TB from the early stages of infection to prevent nutritional deficiencies.

Nutrition interventions for HIV include:

- Infant feeding counselling and support to HIV positive mothers for improving HIV –free survival[3]
- Nutrition assessment and counselling for children, adolescents and adults living with HIV/AIDS
- Macronutrient and micronutrient supplementation
- Nutritional care of HIV-infected children < 5 years of age, including management of acute malnutrition.
- Food-based, low cost strategies

Nutrition interventions for TB include:

- Nutrition assessment and appropriate counselling.
- Nutritional supplementation for individuals
- Management of moderate and severe acute malnutrition in individuals with active TB.

This brief focuses on the above interventions, while acknowledging they need to be combined with nutrition sensitive interventions (e.g. household food security, social protection, community-based support and care and access to education) that address socio-economic vulnerabilities of HIV/TB affected households for sustainable health and nutrition impacts.

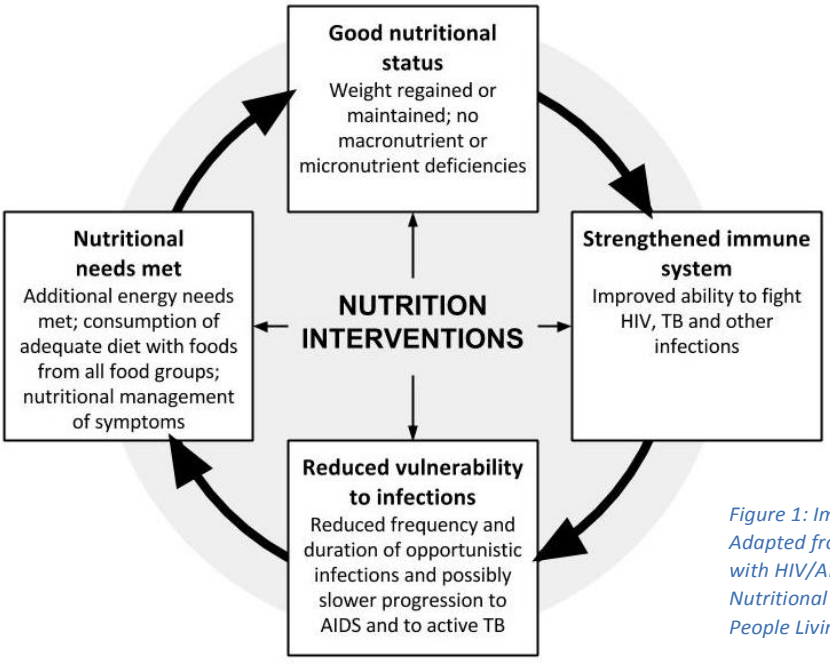


Figure 1: Impact pathway. Source: Adapted from FAO. 2002. Living Well with HIV/AIDS: A Manual on Nutritional Care and Support for People Living with HIV/AIDS. Rome.

[3] For context-specific considerations and recommendations, see WHO Guidelines on HIV and Infant Feeding. In this brief, health service support to infant feeding counselling is considered.

Rationale

Weight loss and undernutrition are common in people living with HIV/AIDS and TB, due to the vicious cycle of infection and malnutrition, the increase in nutrient requirements,[219] and opportunistic infections reducing nutrient intake. This weakens the body's resistance to infection, accelerates disease progression, increases morbidity and reduces survival. In children, HIV is associated with poor growth and weight gain.[220] HIV-infected children who are significantly underweight are more likely to die than HIV-infected children who are not malnourished.[221]

In TB, undernutrition is a risk factor for progression from tuberculosis infection to active tuberculosis disease while undernutrition at the time of diagnosis of active tuberculosis is a predictor of increased risk of death and tuberculosis relapse.[222]

As illustrated in the impact pathway on the previous page, good nutrition based on a balanced, healthy diet reduces vulnerability to opportunistic infections which in turns improves quality of life and delays progression of HIV to AIDS and of TB infection to active TB disease.[223] Good nutrition, based on balanced, healthy diet also increases effectiveness of anti-retroviral therapy and enhances adherence to medication regimens for both HIV and TB.

In pregnant women, in particular, micronutrient deficiencies are common due to increased nutrient requirements and can further compromise the health of women infected with HIV Micronutrients are important for the health of HIV-infected women and their infants due to their role in: immune functions, antioxidant activity, maintenance of intestinal integrity, placental functions, and promotion of growth and tissue repair. Giving micronutrient supplements to HIV-infected pregnant women may therefore be expected to improve the health of both the mother and baby.

Mother-to-child transmission of HIV is the primary mode of HIV infection in infants. Transmission can occur during pregnancy, birth, or through breastfeeding. Decisions on whether or not HIV-infected mothers should breastfeed their infants are generally based on comparing the risk of infants acquiring HIV through breastfeeding, with the increased risk of death from malnutrition, diarrhoea and pneumonia if infants are not exclusively breastfed. This can vary according to context and should be considered in the light of evidence that shows that antiretroviral medicines can reduce the risk of HIV transmission through breastfeeding.

Evidence of impact

Nutrition interventions for PLWH

Impact on health

■ No evidence on increased risk of HIV infections amongst infants breastfed for up to 24 months by HIV positive mothers receiving ART compared to non-breastfed infants

Source	Finding	Evidence
Systematic review of 18 cohort studies (17 in Africa, 1 in India).[224]	• HIV-free survival among breastfed infants at 12 months 89.8% (10 studies), at 18 months 89.2% (8 studies) and 24 months 89.1% (3 studies).	Low quality
	• HIV-free survival higher in breastfed compared to formula-fed infants (4 studies – 3 Africa, 1 India).	Low quality at 12 months very low quality at 24 months

■ No evidence nutrition assessment and counselling with or without food supplementation reduces mortality or morbidity in adults and children living with HIV/AIDS

Source	Finding	Evidence
Systematic review of 21 studies.[225]	• No difference in mortality rates or CD4 counts for nutrition counselling with or without food supplementation (n resource-limited settings).	Low to moderate quality
Systematic review of 14 small trials studies (7 HICs, 7 LMICs).[226]	• No evidence macronutrient supplementation compared to nutrition counselling or nutrition placebo reduces HIV disease progression or complications.	Low quality

■ Moderate evidence micronutrient supplementation in pregnant women with HIV improves health outcomes for mother and infant

Source	Finding	Evidence
Systematic review of 4 studies conducted in urban Tanzania in pregnant women not receiving ART.[227]	• Selenium supplements during and after pregnancy did not delay maternal HIV disease progression or improve pregnancy outcomes, but may improve child survival and decrease maternal diarrhoeal morbidity.	Moderate quality
	• Supplementation with multivitamins in pregnancy reduced the risk of low birth weight, very premature birth, maternal depressive symptoms, and child diarrhoea.	Moderate quality
	• Higher-dose multivitamins conferred no extra benefit over multivitamins containing the recommended daily allowance (RDA).	Moderate quality

■ Moderate evidence micronutrient supplementation in children infected with HIV improves health outcomes

Source	Finding	Evidence
Systematic review of 11 studies.[228]	• Vitamin A supplements halved mortality overall in sub analysis of 3 trials in Africa.	Moderate quality
	• Zinc reduced diarrhoeal morbidity (1 trial.)	Moderate quality
	• Multiple micronutrient supplements reduced the duration of hospital admissions in poorly nourished hospitalised children.	Moderate quality

■ Moderate evidence food assistance supplementation improves adherence to medication regimes for people with HIV or TB

Source	Finding	Evidence
Systematic review of 7 studies in resource-limited settings.[229]	• Food supplementation had a positive effect on adherence to ART as measured by medication possession ratios, pill counts or clinic visit attendance of PLWH.	Moderate quality
10 studies (low-resource settings).[230]	• Eight of ten studies reported improved adherence or treatment completion upon receiving food assistance.	Low quality

Impact on nutrition

■ Strong evidence breastfeeding counselling improves the quality of infant feeding practices among mothers with HIV on ART

Source	Finding	Evidence
Systematic review of 13 studies in low resource settings (11 Africa, 2 India).[231]	• Mothers receiving BF counselling significantly more likely to practice early initiation and exclusive BF at 3 and 6 months.	Moderate to high quality
	• Increased frequency of contact and combined individual and group counselling had more impact on EBF.	High quality

■ Limited evidence balanced macronutrient supplementation improves energy and protein intakes compared to nutrition counselling alone

Source	Finding	Evidence
Systematic review of 14 studies* (7 HICs, 7 LMICs).[232]	• Mean energy intake 393kcal/day higher (3 studies).	Low quality
	• Mean protein intake 23g/day higher (2 studies).	Low quality
	• Mean body weight 0.17kg lower (4 studies).	Moderate quality

* Meta-analysis limited due to differences in macronutrient formulas evaluated in each of the trials and considerable variability in stage and treatment status of HIV of participants.

■ Moderate evidence micronutrient supplementation in children infected with HIV improves nutrition outcomes

Source	Finding	Evidence
Systematic review of 11 studies.[233]	• Vitamin A supplements improved wasting (Risk ratio 0.25) and stunting (risk ratio 0.67) (1 study Tanzania).	Low quality
	• Multiple micronutrient supplements improved appetite and short-term growth in poorly nourished children (1 study in Africa).	Moderate quality

■ Limited evidence food assistance, cash transfers or livelihood interventions have the potential to improve food security or nutrition status of PLWH.[234]

Nutrition interventions for people with TB

Impact on health

■ Inconclusive evidence oral nutritional supplements improve TB treatment outcomes and recovery in people on anti-TB drug therapy for active TB

Source	Finding	Evidence
Systematic review of 35 trials in LMICs, including 8283 participants.[235]	Studies on macronutrient supplementation too small to be reliable.	Very low quality
	Routine multi-micronutrient supplementation has little or no effect on mortality in HIV-negative people with tuberculosis (RR 0.86, 95% CI 0.46 to 1.6; four trials, or HIV-positive people who are not taking antiretroviral therapy (RR 0.92, 95% CI 0.69 to 1.23;3 trials.	Low quality Moderate quality
	Insufficient evidence whether micronutrient supplementation improves treatment outcomes, cure or progression of disease.	Very low quality

Impact on nutrition

■ Limited evidence macronutrient but not micronutrient supplements produce weight gain in people on anti-TB therapy for active TB

Source	Finding	Evidence
Systematic review of 35 trials in LMICs, including 8283 participants.[236]	• Macronutrient supplementation probably produces a modest increase in weight gain during treatment for active tuberculosis, although not consistently across all trials	Moderate quality
	• Micronutrient supplementation has little or no effect on weight gain in treatment	Low quality

Applying the evidence to design & implementation

- ➔ Improving nutrition may delay HIV and TB disease progression. Interventions to prevent and treat malnutrition can have a greater impact if started early in the course of the disease and should be integrated into routine care and treatment.
- ➔ Children with HIV/AIDS deserve special attention because of nutritional requirements necessary for growth and development, their high risk of mortality due to malnutrition and their dependency on adults for adequate care.
- ➔ Integrating services for the treatment of acute malnutrition with HIV testing can improve uptake of HIV testing and significantly increase recovery rates from acute malnutrition.[237]
- ➔ National and local health authorities should actively coordinate and implement services in health facilities and activities in workplaces, communities and homes to protect, promote and support breastfeeding among women living with HIV[238].
- ➔ The interventions presented in this brief should be effectively integrated with nutrition-sensitive interventions that address socio-economic vulnerabilities of HIV/TB affected households.

Selected WHO Recommendations[239]

- Mothers newly identified during pregnancy or known to be HIV-infected should be provided with lifelong antiretroviral therapy or antiretroviral prophylaxis interventions to reduce HIV transmission during pregnancy, child birth and through breastfeeding.
- National or sub-national health policies should determine whether health services will principally counsel mothers known to be HIV-infected to either breastfeed and take anti-retrovirals, or, avoid all breastfeeding.
- Mothers living with HIV should breastfeed for at least 12 months and may continue breastfeeding for up to 24 months or longer (similar to the general population) while being fully supported for ART adherence
- Children under 5 years of age with severe acute malnutrition who are HIV-infected should be managed with the same therapeutic feeding approaches as children with severe acute malnutrition who are not HIV-infected[240].

On other aspects of nutrition in HIV, WHO states that further research is needed before specific recommendations can be made.

- Nutritional management of acute malnutrition in patients with active TB should be similar than for those without active TB.[241]

Challenges

- ➔ Integration of nutrition into routine care and treatment for people with HIV/TB may require broader health system strengthening inputs to be effective. Particular challenges include availability of trained health personnel and sustainable programmes for the referral of undernourished patients.
- ➔ Countries with high prevalence of HIV and TB share a high burden of undernutrition. Food insecurity affecting access to, and consumption of, quality of diet may challenge ability to achieve adequate intake of macro and micronutrients. Food insecurity is also associated with sub-optimal adherence to ART.[242]

Monitoring & evaluation and measuring impact

The table below provides guidance on potential monitoring and evaluation indicators.

Activities	✓ Number of health workers trained on nutrition assessment and counselling for HIV/TB ✓ Number of facilities providing integrated nutrition assessment and counselling services for HIV/TB ✓ Number of carers of children living with HIV receiving IYCF nutrition counselling in context of HIV
Outputs	✓ Proportion of PLWH/active TB who were nutritionally assessed ✓ Proportion of PLWH/active TB receiving appropriate nutrition counselling
Outcomes & Impact	✓ Percentage of eligible PLWH (adults & children) & active TB receiving therapeutic or supplementary food ✓ Dietary diversity score for PLWH or TB receiving nutrition care and support ✓ Nutritional status of PLWH or TB receiving nutrition care and support ✓ Percentage of HIV-exposed infants reported to be breast-fed up to 1 year

Further information & key programming resources

The following documents may prove useful as reference documents for planning, designing, implementing, and monitoring and evaluation.

- WHO UNICEF Updates on HIV and Infant Feeding 2016. Available at: http://www.who.int/maternal_child_adolescent/documents/hiv-infant-feeding-2016/en/
- WHO. Guidelines for an integrated approach to the nutritional care of HIV-infected children (6 months–14 years): handbook, chart booklet and guideline for country adaptation. Geneva: World Health Organization; 2009. (http://www.who.int/nutrition/publications/hivaids/9789241597524/en/)
- WHO Guideline 2013: Nutritional care and support for patients with tuberculosis
- WHO Guidance for national tuberculosis programmes on the management of tuberculosis in children: second edition

Both available at:

http://www.who.int/nutrition/publications/guidelines/nutcare_support_patients_with_tb/en/

Can WASH interventions delivered through health system platforms improve health and nutrition outcomes?

An evidence-based practice brief

SYNOPSIS

- Water, sanitation and hygiene (WASH) interventions delivered through health system platforms include improving access to safe water, sanitation services and promotion of improved hygiene, including at health service delivery points and nutrition centres.
- Such services are a fundamental element of infection prevention and control, ensuring staff, patient and visitor safety, upholding universal rights to water and sanitation and ultimately providing people-centred care that fulfils the aim of quality universal health coverage (UHC).
- WHO estimates that overall access to improved WASH could prevent 842,000 diarrhoeal deaths each year.
- Evidence suggests hand washing with soap can reduce diarrhoeal disease by up to 40% and soil-transmitted helminth infections by one third; improving water quality through provision of point of use water purification can reduce diarrhoea by one quarter.[243]
- Poor WASH practices are strongly associated with poor nutrition outcomes, particularly in high density populations.[244]
- Evidence suggests WASH interventions (specifically solar disinfection of water, provision of soap, and improvement of water quality) have relatively small benefits in terms of nutrition outcomes, which are greater in children under 24 months, although current evidence is limited and of low quality.
- WASH interventions are a prerequisite for good health and nutrition, but the impact of effective interventions at community level (e.g. open-defecation-free communities / community-led total sanitation) will be hugely undermined if they do not include WASH improvements at health care facilities (HCFs) as well as schools. Moreover, ensuring attention to WASH in HCFs can also be harnessed to catalyse and accelerate more effective WASH initiatives across the community in general.

Definition

WASH interventions aim to provide equitable and sustainable access to, and use of, safe water and basic sanitation services, and promote improved hygiene practices. WASH interventions delivered specifically through health system platforms (HSP) include:

- Provision of WASH services in health care facilities (HCFs) and centres for the effective management of acute malnutrition, including: availability of on-site safe, sufficient water (including its safe utilisation); adequate numbers of improved, accessible sanitation facilities for all women and men, girls and boys; safe hygiene practices by staff and patients (e.g. handwashing); and safe management and disposal of health care waste.
- Integration of harmonised and locally appropriate hygiene promotion messages into health and nutrition education sessions at health facilities at all levels and through community health care workers – to include: handwashing with soap at critical times (after defecation, after cleaning child's bottom, before preparing food or cooking, before eating or before feeding a child); safe storage and utilisation of water and water treatment; optimal use of latrine; safe disposal of babies stools; hygienic food preparation; and environmental hygiene.
- Distribution of soap, safe water kits, and water purification tablets/solution at routine health services (including antenatal visits, child health clinics) and health campaigns (such as Child Health Weeks).

Rationale

Existing evidence supports at least three direct pathways linking WASH and Nutrition through the vicious cycle of infection and undernutrition:

- repeated episodes of diarrhoea
- intestinal parasite infections
- environmental enteropathy

According to recent estimates, access to improved WASH could prevent 842,000 diarrhoeal deaths each year, including 361 000 among children under 5 years of age, representing 5.5% deaths in this age group.[245] Around one-quarter of stunting cases can be attributed to five or more episodes of diarrhoea before the age of two years. Each episode of diarrhoea may increase the possibility of stunting by 4%.[246]

Soil-transmitted helminth infections are strongly associated with childhood undernutrition.[247] Hookworm infections during pregnancy can lead to malabsorption of nutrients and maternal anaemia, which in turn are associated with stunting at birth. [248]

Environmental enteropathy, recurring inflammation and damage to the gut caused by the chronic ingestion of pathogen, leads to malabsorption of nutrients and can impair nutritional status even in the absence of diarrhoea.[249]

More generally and outside of health facilities, walking long distances in search of water and sanitation facilities may divert a mother's time away from child care[250] while childcare and other workload responsibilities may make it difficult to go to water and sanitation points if they are not easily accessible. The high cost of paying for water may redirect funds away from buying food in the poorest households.[251] Direct and indirect pathways are shown in the impact pathway below.

Lack of adequate WASH in HCFs, where the risks of contamination can otherwise be especially high, contributes to millions of infection-related deaths each year, causes prolonged hospital stays, increases the chances of long-term disability, and increases antibiotic resistance.[252] Poor hygiene practices in health facilities are associated with higher neonatal and maternal mortality. [253 254] Adequate WASH in HCFs is fundamental to infection prevention and control and the delivery of quality, people centred health care that fulfils the aim of universal health coverage (UHC). WASH interventions in HCFs provide a model of minimum standards for replication at all levels and to catalyse and reinforce more effective SBCC at community level.

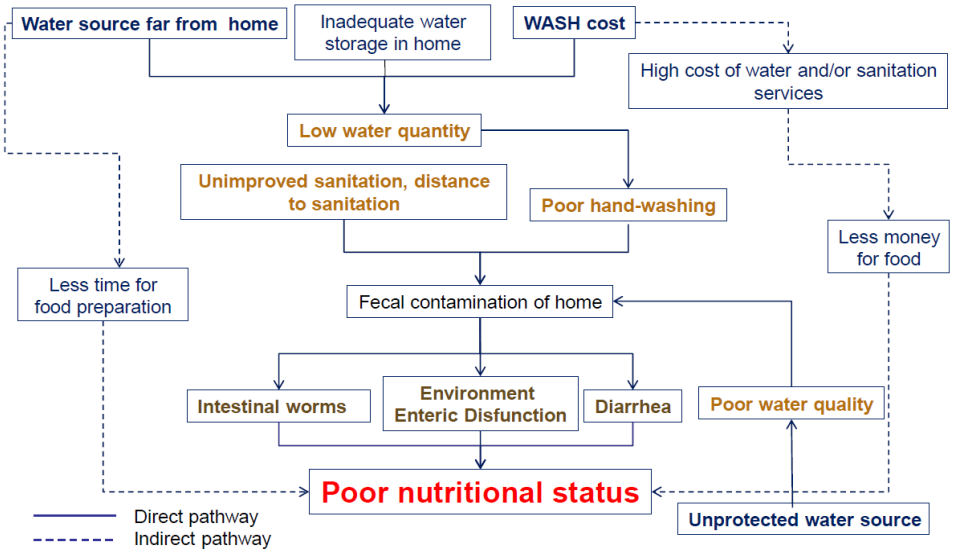


Figure 1: Impact pathway. Source: Cumming, London School of Tropical Medicine and Hygiene 2013

Source: O. Cumming, London School of Tropical Medicine and Hygiene, 2013

Evidence of Impact

Evidence presented here is regarding the impact of WASH in general on health and nutrition, rather than the impact of the delivery of WASH through the health system specifically, for which there is a lack of data.

Impact on health

Strong evidence that improved WASH reduces mortality

Source	Finding	Evidence
Retrospective analysis of data from 145 countries for Global Burden of Disease.[255]	• Improved WASH could prevent 842,000 diarrhoeal deaths each year, which includes 361,000 among children under 5 years of age, representing 5.5% of the total deaths in this age group. • Greatest reductions in diarrhoea mortality (up to 73%) can be achieved by providing safe and continuous piped water supplies and through sewerage connections that remove excreta from both households and community environments.	High quality

Strong evidence handwashing promotion reduces diarrhoea

Source	Finding	Evidence
Systematic review of 26 studies.[256]	• Promotion of handwashing with soap reduces risk of diarrhoeal disease by 40% (risk ratio 0.60, 95% CI 0.53–0.68) or 23% (risk ratio 0.77, 95% CI 0.32–1.86) when adjusted for unblinded studies. • General hygiene education alone: 24% reduction in risk of diarrhoea (RR 0.76, 95% CI 0.67–0.86).	Moderate quality
Cochrane review of 22 RCTs (13 HICs, 9 LMICs).[257]	• Hand washing promotion in LMICs probably prevents around 28% of diarrhoea episodes (rate ratio 0.72, 95% CI 0.62 to 0.83; 8 trials, 6 Asia, 1 Africa, 1 S. America). • Provision of soap may further reduce the incidence of diarrhoea over the effect of hand washing promotion alone.	Moderate quality
	• Hand washing promotion at child day-care facilities or schools in HICs probably prevents around 30% of diarrhoea episodes (9 trials).	High quality
	• Hand washing promotion at child day-care facilities or schools in LMICs may prevent around 30% of diarrhoea episodes (2 trials – Egypt & Kenya).	Low quality
Review of 3 systematic reviews.[258]	• Estimated diarrhoea reductions associated with handwashing with soap 48%, improved water quality 17% and excreta disposal 36%.	Low quality

Weak evidence interventions to improve use of clean water reduce diarrhoea

Source	Finding	Evidence
Cochrane review of 55 studies (50 LMICs).[259]	• Distribution of water disinfection products for use at the household level may reduce diarrhoea by around one quarter.	Low to moderate quality
	• Insufficient evidence to know if improved water supply in LMICs reduces diarrhoea.	Very low quality

Strong evidence that improved WASH reduces soil-transmitted helminth infections

➔ Recent meta-analyses found that improving a range of WASH services and practices in households reduces the incidence of soil-transmitted helminth infections by, on average, one third.[260]

Impact on nutrition

Good evidence of strong associations between poor sanitation practices and use of contaminated water, and poor nutrition outcomes

Source	Finding	Evidence
Analysis of data from 140 demographic and health surveys (DHS) in 65 countries.[261]	• Open defecation explained 54% of international variation in child height, in contrast with GDP, which explained 29%. Effect particularly strong for high population density areas and children under two years.	High quality
Analysis of 171 demographic and health surveys (DHS in 70 low- and middle-income countries).[262]	• Increasing access to and use of improved sanitation and improved water sources reduced the risk of stunting	High quality
Cluster randomized trial of 121 villages in Mali.[263]	• Children in communities that reduced open defecation CLTS were less stunted than in comparison villages.	High quality
Randomised controlled trial (RCT) in Chad.[264]	• Households which did not regularly clean the container for transporting water for household consumption were almost twice as likely to have an acutely malnourished child.	High quality

■ Limited evidence of the positive impact of improved water and mixed evidence for positive impact of hygiene promotion on nutrition outcomes

Source	Finding	Evidence
Cochrane review of 5 cluster RCTs in low income settings.[265]	• Small benefit of WASH (specifically solar disinfection of water, hygiene promotion/provision of soap, and improvement of water quality) on the height of children under five, with a more significant impact on children under 24 months.	Low quality: studies of short duration and limited interventions
A longitudinal study in rural Bangladesh.[266]	• Hygiene promotion significantly reduced the percentage of very underweight children (weight for age <-3 Z-scores) under the age of 24 months.	Moderate quality

Cost considerations

Hygiene promotion, including handwashing with soap (USD 3/DALY averted[267]) is regarded as one of the most cost-effective interventions to improve public health.

One study found that point of use water chlorination (USD 53/DALY averted) is more cost effective than latrine construction or household water supply (USD 200/DALY averted).[268]

Applying the evidence to design & implementation

There is a lack of studies examining the impact of WASH interventions delivered through health system platforms on health and nutrition outcomes. WHO has produced guidelines on improving WASH in health care facilities – see blue box. Available evidence does suggest the following issues are important:

- ➔ Review of national health sector policy and programmes to establish whether WASH is sufficiently addressed with corresponding indicators and a robust monitoring system.
- ➔ Given the potentially fatal implications of unsafe water and poor sanitation in HCFs, a rights based approach to ensuring minimum standards should be underscored.
- ➔ Hygiene promotion including importance of hand washing and sanitation should be integrated within routine service provision.
- ➔ Hygiene behaviour change communication programmes are most effective when built on local research and using locally appropriate channels of communication over extended periods of time.[269]
- ➔ Effectiveness of hygiene promotion interventions increases when multiple complementary channels are used concurrently to deliver consistent messages.[270]
- ➔ Target interventions to ensure the greatest gains, such as reaching pregnant women and children < 2 years (the 1,000-day window of opportunity) and areas of high population density.
- ➔ Behavioural factors are key in the uptake and long-term adoption of WASH interventions:
  - promoting 'small, doable actions' to be taken one step at a time has been shown to an effective BCC approach.[271]
  - Use of social marketing and private-public partnerships offer innovative approaches to BCC and show promise in improving uptake of soap, water purification tablets.[272]

WHO Guidelines

The overall aim expressed in the WHO WASH FIT Tool is:[273]

To improve and sustainably maintain WASH services in health care facilities. Such services are a fundamental element of infection prevention and control, ensuring staff, patient and visitor safety, upholding universal rights to water and sanitation and ultimately providing people-centred care that fulfils the aim of quality universal health coverage (UHC).

Challenges

- ➔ Improved WASH in health facilities and hygiene promotion do not necessarily address inadequate WASH in the home environment and must be integrated with other effective, rights based approaches to safe water, improved sanitation and hygiene for all. e.g. Community led total sanitation (CLTS).
- ➔ Improving WASH at health care facilities e.g. setting up handwashing stations, can promote and reinforce appropriate practices but needs to be part of coordinated effort across the community as a whole, including other public spaces e.g. schools, for greatest impact.
- ➔ Bottlenecks to greater harmonisation of water, sanitation and hygiene promotion across health service platforms include:
  - Siloed, restricted or uncoordinated planning mechanisms and funding cycles and information management systems
  - Limited staff time, capacity or incentives
  - Poor awareness regarding evidence on effective approaches
  - Uncoordinated and low capacities (technical and functional) of government ministries
  - Lack of monitoring, evaluation and reporting criteria on minimum standards for WASH in HCFs and harmonised services
- ➔ Enabling environment not conducive for WASH as a cross cutting issue for multiple sectors including health: strong leadership, good coordination and sustainable financing are all essential pre-requisites
- ➔ Limited evidence: More robust evidence on effective interventions is expected from a number of large randomised controlled trials currently underway in several low-income settings e.g. WASH Benefits in Bangladesh and Kenya, SHINE in Zimbabwe.

Monitoring & evaluation and measuring impact

The table below provides guidance on potential monitoring and evaluation indicators

Activities	✓ Number of health and nutrition education sessions including hygiene promotion organized per year ✓ Number of beneficiaries attending health, nutrition and hygiene promotion education sessions ✓ Number of households reached with community based WASH messaging ✓ Number of soap/water purification tablets/diarrhoea treatment kits (ORS + zinc) distributed
Outputs	✓ Proportion of health care facilities with safe and adequate water, sanitation and hygiene[274]. ✓ Proportion of HCF that provide effective hygiene education as part of routine service provision ✓ Proportion of areas with high malnutrition targeted with WASH activities ✓ Health policy, plan of action and proportion of programmes including minimum standards for WASH in all HCFs with corresponding budget and M&E
Outcomes & Impact	✓ Percentage of mothers practicing appropriate hygiene behaviours ✓ Incidence of diarrhoeal disease amongst children < 2 and children < 5 ✓ Prevalence of stunting among children under five ✓ Under five mortality rates

Further information & key programming resources

The following documents may prove useful as reference documents for planning, designing, implementing, and monitoring and evaluation.

- Improving nutrition outcomes with better water, sanitation and hygiene: practical solutions for policies and programmes. WHO UNICEF USAID 2015
- Water and Sanitation for Health Facility Improvement Tool (WASH FIT). Geneva: World Health Organization; 2017
- Mosler, H.J. 2012. A systematic approach to behaviour change interventions for the water and sanitation sector in developing countries: A conceptual model, a review and a guideline. *International Journal of Environmental Health Research*, Volume 22(5):431–449. Available at http://www.ncbi.nlm.nih.gov/pubmed/22292899

Can integrated Early Childhood Development programmes improve health and nutrition outcomes?

An evidence-based practice brief

SYNOPSIS

- Early Childhood Development (ECD) refers to the physical, cognitive, linguistic and socio-emotional development of a child from the prenatal stage up to age eight years. This is influenced by multiple factors including health, nutrition, security and safety, responsive care giving and early learning, each of which interact and are mutually reinforcing.[275]
- ECD interventions are multi-sectoral and can be home or centre based, formal or informal, and with or without a parental component.
- The health sector has a significant role in delivering nutrition-sensitive ECD interventions that can have significant impact on child nutrition as well as other important indicators of development.
- Evidence suggests integrated ECD and nutrition interventions can have a synergistic effect on development outcomes but not necessarily directly on nutrition outcomes, although results are mixed and only a few quality trials having been conducted to date.
- Integration of ECD into health and nutrition services is feasible, affordable and cost effective. Strategies for scaling up require: local adaptation to context, cultural beliefs and feasible delivery channels; increased human resource capacity through training of frontline health workers and engagement of families and communities and enhanced coordination, funding and accountability across sectors.

Definition

Early Childhood Development (ECD) refers to the physical, cognitive, linguistic and socio-emotional development of a child from the prenatal stage up to age eight years.[276] ECD approaches are designed to address the infant/child needs during its different developmental stages.

ECD interventions include support and services for pregnant and lactating mothers, as well as young children and their families; across multiple sectors (health, nutrition, education, child and social protection etc.) and through a variety of delivery mechanisms (home visits, community groups, facility based services, early learning centres and schools and media campaigns). There is a significant role for the health sector in the multi-sectoral delivery of an integrated package of ECD. Figure 1 maps sector-specific ECD interventions across the different age phases, identifying specific entry points and interventions and highlighting the role of the health sector and the importance of integrated approaches at all ages.

Integrated ECD and nutrition interventions may include parenting and education support, complementary feeding, micronutrient supplementation, food supplementation and stimulation packages and activities; responsive parenting goes hand in hand with responsive feeding. Breastfeeding is the classic example of how the benefits of nurturing and nutrition improve both nutrition and developmental outcomes for the child at the same time.

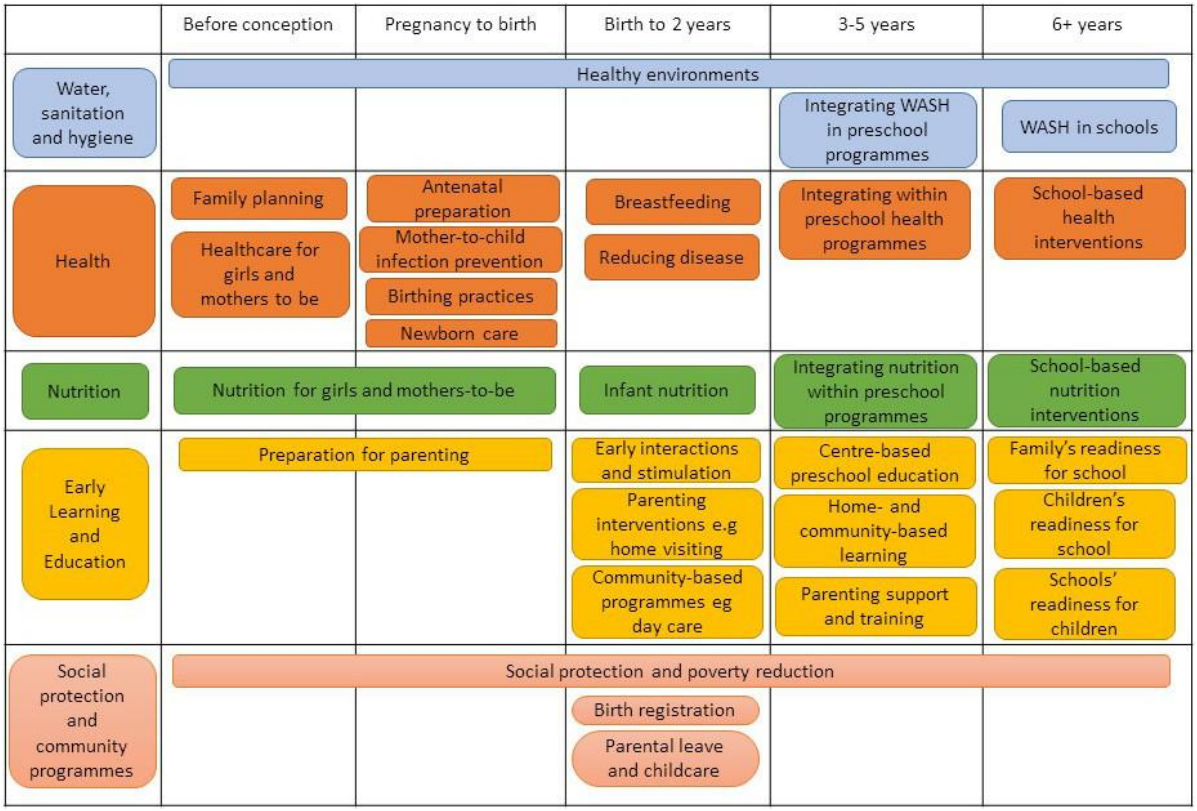


Figure 1. Mapping of sector-specific ECD interventions across the different age phases. Source: Woodhead M. Early Childhood Development. Delivering Intersectoral policies, programmes and services in low resource settings. HEART Topic Guide November 2014

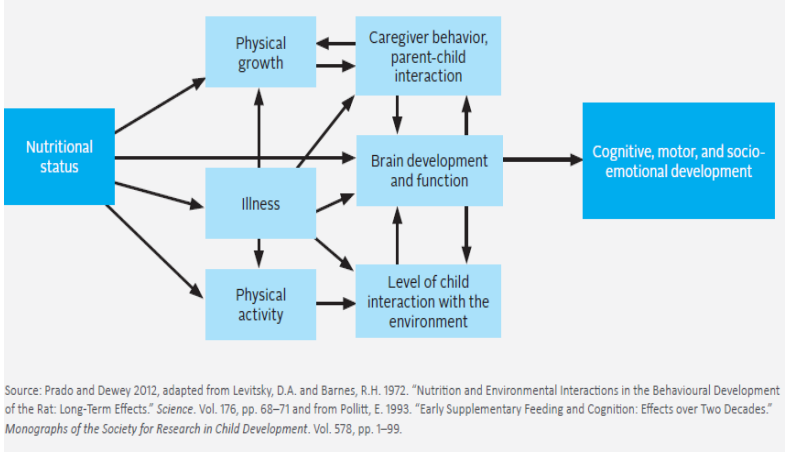
Rationale

Early childhood is the most rapid period of development in life. Child growth and brain development depend on good nutrition and stimulation and caretaker emotional responsiveness.[277] Every year more than 200 million children under 5 in developing countries will not reach their full developmental (and cognitive) potential due to a wide range of factors.

ECD approaches are aimed at using proven techniques designed to mitigate these risk factors and to encourage and stimulate the infant/child's development. The ultimate goal is to improve children's health, well-being and capacity to develop and learn.[278] Good quality ECD is crucial for ensuring more equal opportunities and a rights based approach with regard to the future learning, good health, nutrition, and well-being of every child.[279]

The failure of children to fulfil their developmental potential and achieve satisfactory educational levels plays an important part in the intergenerational transmission of poverty.[280]

The interrelationship between nutritional status and ECD is shown in figure 2.



Source: Prado and Dewey 2012, adapted from Levitsky, D.A. and Barnes, R.H. 1972. "Nutrition and Environmental Interactions in the Behavioural Development of the Rat: Long-Term Effects." *Science*. Vol. 176, pp. 68–71 and from Pollitt, E. 1993. "Early Supplementary Feeding and Cognition: Effects over Two Decades." *Monographs of the Society for Research in Child Development*. Vol. 578, pp. 1–99.

Figure 2. Impact pathway

Evidence of impact

Evidence of the impact of ECD on health and nutrition outcomes can be found in the 'Strengthening Education-Nutrition Links in External EU Assistance: An Evidence-based Planning Resource' (European Commission internal working document, 2016). Evidence for the impact of WASH, social protection, breastfeeding, micronutrient supplementation and management of acute malnutrition on health and nutrition outcomes can be found elsewhere in this document within the relevant Evidence Based Practice briefs. This brief will focus specifically on evidence of impact of integrated ECD within the health sector on health, development and nutrition.

Impact of ECD interventions on health, nutrition and development

■ No available evidence for the impact of integrated ECD interventions on health[281]

➔ Although there is good evidence that many core maternal and child health and nutrition interventions improve developmental as well as nutrition and health outcomes among children, there is a lack of available evidence for the impact of ECD interventions such as parenting programmes, maternal psychological support or pre-primary education on health outcomes.[282]

■ Strong evidence that integrated ECD and nutrition interventions consistently improve child developmental outcomes but not nutrition outcomes specifically

Source	Finding	Evidence
Systematic review of 13 trials and 8 programme evaluations in LMIC countries.[283]	• Combined child stimulation and nutrition interventions (food supplements, micronutrient supplementation, nutrition education) improved developmental outcomes but not nutrition outcomes, but there are too few studies of potential synergies to draw definite conclusions.	Moderate to High quality
A cluster-randomised factorial effectiveness trial in Pakistan.[284]	• Nutrition education and multiple micronutrient powders delivered alongside response stimulation by Lady Health workers in Pakistan had positive impact on some child development outcomes but not on child growth.	High quality
Longitudinal study of 129 stunted children aged 9 to 24 months.[285]	• Child stimulation and food supplementation showed a cumulative effect of the two interventions on cognitive development in children but not child growth.	High quality
Review of 4 programme evaluations and 7 published trials.[286]	• Mixed results from integrated child development and nutrition interventions but overall synergistic effects on development outcomes but not nutrition outcomes.	Moderate quality

■ Evidence from 2 studies that integrated ECD and nutrition interventions have a positive impact on nutrition in acutely malnourished children

Source	Finding	Evidence
Time lagged controlled study in Bangladesh.[287]	• Stimulation integrated in standard of care for severely malnourished children significantly improved development outcomes and WAZ.	High quality
Intervention study in Ethiopia.[288]	• Severely malnourished children who were provided with a combination of emotional stimulation and therapeutic feeding tended to gain weight at a faster rate than children who were only provided with therapeutic feeding.	Moderate quality

Cost considerations

Health and nutrition services have extensive reach to pregnant and lactating women, infants and young children and ECD interventions can feasibly build on these at limited additional cost.[289] Integrated programs can potentially use the same personnel, the same platforms, and the same points of contact, which may result in efficiencies, cost-effectiveness, and synergistic effects. Reduced opportunity costs for caregivers to participate in integrated programmes can result in children having greater access to nutrition and ECD services.[290]

The additional cost of incorporating ECD interventions into existing health and nutrition services is estimated at US$ 0.5 per person per year, ranging from US$0.20 in low-income countries to $0.70 in upper-middle-income countries per year, using parenting programmes and psychological support for maternal depression as the basis for estimates.[291]

Cost–benefit analysis of a combined micronutrient supplementation and early childhood stimulation programme in Nicaragua[292] found a cost benefit ratio of 1.50 (range 1.30 to 2.30) of the integrated programme, based reduced prevalence of anaemia and improved cognitive outcomes in children 2.5 to 5 years.

Applying the evidence to design & implementation

➔ The evidence supports the integration of ECD into nutrition and health programmes, as well as other sectors, to ensure a holistic approach focused on improving overall development as well as survival outcomes.

According to the evidence, to ensure optimal nutrition impact, integrated ECD programmes should:[293]

- be integrated with existing and accepted family support, health, nutrition, or educational systems and delivery channels
- be targeted toward younger children less than 5 years and ensure the inclusion of disadvantaged children
- be high quality (whether formal or informal) and results based
- include direct contact with children and their families beginning in early in life
- provide direct learning experiences to children and families, with opportunities for children to initiate their own learning and exploration of their surroundings with age-appropriate activities
- be adapted to the local context based on high quality participatory research
- provide parents and child care workers with appropriate and relevant education and support
- Facilitate community engagement and ensure gender sensitivity so that families and communities better understand the importance of ECD, the crucial role they play in this and the requirement to address gender inequalities as appropriate.

➔ Effective integration requires both competency (technical) and functional capacity building. The pre-service and in-service training of front line workers (physicians, nurses and community health workers) needs to include a structured curriculum with clear messages[294] on the essentials of ECD combined with supportive supervision to ensure the quality of services.[295]

➔ Strengthened multi-sectoral coordination at national and local levels is required - with education to promote learning, and with social and child protection to ensure a rights based approach and more equal outcomes for the most disadvantaged social groups.

➔ In emergencies, children may be particularly vulnerable to the combined effects of inadequate food and nutrition security as well as a high risk psychosocial environment. There may be disruption of established networks of care and services. The integration of ECD interventions with emergency nutrition interventions can provide an important way to address this with multiple entry points.[296]

Challenges

➔ Lack of adequate capacities to deliver an effective ECD package at scale and to include those disadvantaged groups who stand to benefit the most

➔ Most disadvantaged families may be structurally less able to benefit from ECD interventions for many reasons – including workload, travel and other opportunity costs, socio-cultural exclusion, likelihood of living in more remote areas and gender constraints.

➔ Framing and governance of ECD programmes. ECD is neither well understood nor appreciated. Clearly defined national policy frameworks with corresponding intervention strategies and oversight mechanisms (including robust M&E) are required to provide clarity regarding the roles and responsibilities of different sectors (horizontal integration) and at various levels (vertical integration).[297] Recently the World Bank[298], UNICEF[299] and WHO[300] have brought in useful tools and resources that can be applied.

➔ Inadequate and uncertain funding and inefficient flows of resources across sectors and from central to local levels of government requires increased political will and funding. ECD interventions are often dependent on non-governmental services which tend to have limited coverage and may not necessarily be sustainable.

➔ Workload, logistics, compensation and synchronised work schedules are also significant challenges to integration.[301]

➔ The challenge of an already over stretched health workforce can be addressed by expanding the role of paraprofessionals (including community health workers) and families in supporting the integration of interventions.[302]

Monitoring & evaluation and measuring impact

The table below provides guidance on potential monitoring and evaluation indicators.

Activities	✓ Number of pre- and in-service trainings for health professionals on ECD per year ✓ Number of health service personnel at different levels trained in ECD per year ✓ Number of IYCF group counselling sessions including integrated ECD messages
Outputs	✓ Percentage of mothers receiving integrated responsive feeding and responsive parenting counselling
Outcomes & Impact	✓ Minimum adequate diet 6- 23 months (gender and wealth disaggregated) ✓ Child anthropometry: Stunting and wasting prevalence ✓ Exclusive breastfeeding rates ✓ Measures of mother-child interactions e.g. HOME Scale [Home Observation for Measurement of the Environment (HOME) inventory.] ✓ UNICEF MICS4 ECD indicators[303]

Further information & key programming resources

The following documents may prove useful as reference documents for planning, designing, implementing, and monitoring and evaluation.

➔ Maalouf-Manasseh, Z; Oot, L; Sethuraman, K. 2015. Giving Children the Best Start in Life: Integrating Nutrition and Early Childhood Development within the First 1,000 Days. Washington, DC: FHI 360/FANTA.

➔ WHO UNICEF Guidance note for integrating ECD into nutrition programmes in emergencies. http://www.who.int/mental_health/emergencies/ecd_note.pdf

➔ The World Bank. (2016). Early Childhood Development. Available at: http://go.worldbank.org/BJA2BPVW91

Can cash transfers improve health and nutrition outcomes?

An evidence-based practice brief

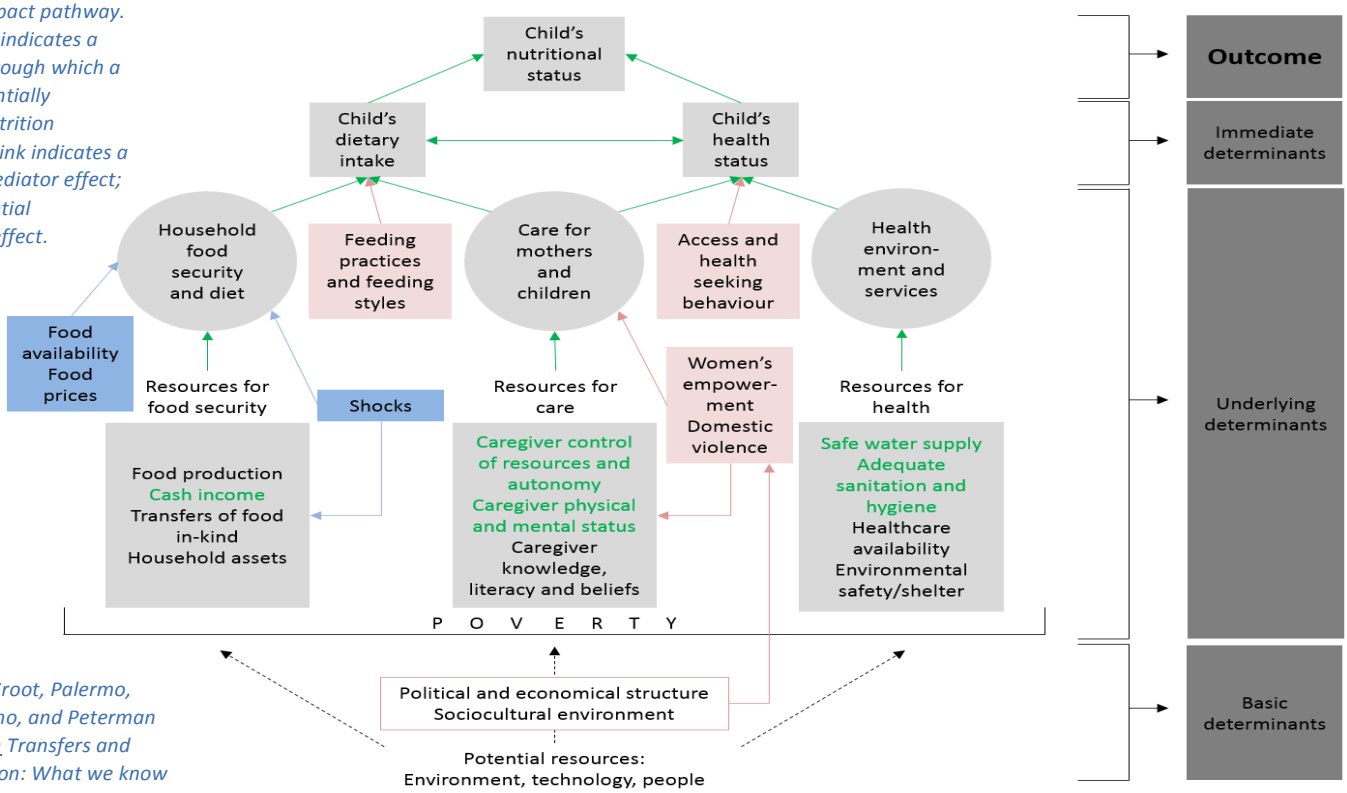
SYNOPSIS

- Cash transfers (CTs) aim at increasing poor and vulnerable households' real income through cash provision, thereby enhancing their ability to secure basic human rights.
- Current evidence suggests that cash transfers can be effective in increasing the use of health services and improving health outcomes including nutritional status, although the evidence for impact on nutrition outcomes is mixed. Variability such as the size of the transfer and existing opportunities for improved access to quality services e.g. health services or clean water or markets and weakness in nutrition goals and actions within the programmes can explain the gap between potential and actual impact.[304]
- Although there is good evidence that conditional cash transfers (CCTs) have led to increased health and nutrition service utilization, the evidence of conditionality having an additional impact in terms of health and nutrition-related outcomes is weak. There is stronger evidence to suggest targeting strategy, duration and size of the transfer are key determining factors.
- Furthermore, conditionalities may be considered disempowering, stigmatizing and potentially at odds with a rights based approach. In each context, it is relevant to consider if transfer alone, without conditionality, is sufficient to bring about improved outcomes.
- Other important considerations include: ensuring the inclusion of the most nutritionally vulnerable, ensuring that the 1000-day window is addressed, providing transfers to mothers, and the provision of complementary inputs e.g. nutrition supplements, micronutrient supplement, deworming and nutrition education.
- There is a large evidence base to suggest that cash transfers are an effective development intervention and have important and mutually reinforcing impacts on the health and nutrition and education of children. Further robust research is needed to better understand optimum programme design to maximise impacts.

Definition

Cash transfers (CTs) aim at increasing poor and vulnerable households' real income through cash provision. Conditional cash transfer (CCTs) programmes give money to households on the condition that they comply with certain pre-defined requirements. These conditions can include up-to-date vaccinations, regular visits to a health care facility, regular school attendance by children and complying with health and nutrition promotion activities (e.g. attending education sessions, growth monitoring, taking nutritional supplements, etc.). Unconditional cash transfers (UCT) have no conditions attached to the cash provided, although they may also be accompanied by the promotion of complementary activities.

Figure 1: impact pathway. Note: green indicates a pathway through which a CT can potentially influence nutrition outcomes. Pink indicates a potential mediator effect; blue a potential moderator effect.



Source: de Groot, Palermo, Handa, Ragno, and Peterman (2015). Cash Transfers and Child Nutrition: What we know and what we need to know.

Rationale

While poverty is widely acknowledged to be complex and multi-dimensional, low and inconsistent income is considered to be a key factor undermining the abilities of families to realise their human rights and invest in human capital. The idea behind CTs, therefore, is that an increased and more dependable income will support poor households to ensure and maintain acceptable levels of essential investments for example in food, schooling and healthcare, while reducing the pressure to sell productive assets, fall into debt, resort to negative livelihood strategies.

Further, by directly targeting women, CTs can play an important role in girls' and women's empowerment, which in turn can also bring broader familial and societal benefits for health, nutrition and education.[305]

CCTs are based on the theory that imposing conditions and monitoring compliance will lead to greater health, nutrition and education impact as compared to unconditional transfers. However, as yet, there is little evidence to demonstrate which programmatic component are the most significant: the perceptions of the conditions, the enforcement of conditions, the health/nutrition messaging associated with the transfer, or the additional income in itself.[306] The increased costs involved in the imposition and enforcement of conditionalities can also impact negatively on the level of the transfer.

Figure 1, on the previous page, shows the various causal pathways for nutrition impact, highlighting those by which CTs can play a key role.[307]

Evidence of impact

Impact on health

Mixed evidence for the positive impact of CT on use of health facilities

Source	Finding	Evidence
Review of 41 studies reporting on health and nutrition impacts of CTs.[308]	• Statistically significant increases reported in 9 out of 15 studies. • 2 out of 3 studies found that conditions on attending health visits led to a higher number of visits compared to transfers with no conditions.	Moderate quality
Pooled analysis of 5 studies from systematic review of 25 studies evaluating the impact of CCTs programs on the prevalence of preventive health care use by children.[309]	• Average 14% net increase among program participants compared to non-participants (MD=0.14; CI: -0.00 to 0.29). The evidence is inconsistent across studies however, with variability in study designs, only one study was reported in a peer-reviewed publication.	Low quality

Mixed evidence for the impact of CCT on immunisation coverage, vitamin A supplementation and diarrhoea management

Source	Finding	Evidence
Pooled analysis of 4 studies from systematic review of 25 studies evaluating the impact of CCTs programs on the prevalence of preventive health care use by children.[310]	• CCT increase coverage of full age - appropriate vaccination (MD=0.05; CI: -0.01 to 0.10), but this pooled estimate is not statistically significant.	Moderate quality
Pooled results of two randomized studies within the above analysis.	• CCTs may increase the coverage of vitamin A supplementation (MD=0.16; CI: -0.01 to 0.34), but this pooled effect estimate is not statistically significant.	Moderate quality
Analysis of 5 studies within the above review.	• No effect on use of ORS, continued feeding or care-seeking behaviour despite conditionalities.	Low quality

Impact on nutrition

Mixed evidence of impact of CTs on child nutrition outcomes

Source	Finding	Evidence
Meta-analysis of 15 programmes (CCTs and UCTs).[311]	• Average increase of 0.04 in height-for-age Z-Score which is neither statistically significant nor biologically meaningful. • Similar lack of significant effect for CCTs only.	Moderate quality
Review of 41 studies reporting on health and nutrition impacts of CTs.[312]	• Majority of 13 studies did not show significant improvements in stunting, wasting or underweight. • Stunting: Statistically significant improvement in 5 out of 13 studies. • Wasting: Statistically significant improvement in 1 out of 5 studies. • Underweight: Statistically significant improvement in 1 out of 8 studies.	Moderate quality
1 cluster randomised controlled trial in Pakistan of cash or food vouchers vs control.[313]	• Significantly lower odds of child being wasted after 6 but not 12 months. • Cash associated with significantly reduced risk of being stunted after 6 and 12 months.	Good quality

➔ Evidence suggests positive impacts on child anthropometry are seen in the youngest and poorest children or those receiving the transfer for long durations, in excess of 18 months.[314] [315] Conditionality has no additional effect but larger size of transfer does.

➔ Evidence from UCT in Niger suggests the addition of nutritional supplements may have a significant and substantial effect on nutritional status in the context of limited access to diverse diets.[316]

Strong evidence CTs improve indicators of household food security and dietary diversity but mixed evidence of impact on children's dietary intake

Source	Finding	Evidence
Review of 41 studies reporting on health and nutrition impacts of CTs.[317]	• 7 out of 12 studies reported statistically significant improvements to a range of household food security indicators (food consumption score, household dietary diversity).	Good quality
1 cluster randomised controlled trial in Pakistan of cash or food vouchers vs control.[318]	• Significant improvements in mother and child dietary diversity score at 6 months.	Good quality
Review of 3 studies within larger review.[319]	• No impact on child dietary intake.	Low quality

Mixed evidence CTs improve infant and young child feeding practices

Source	Finding	Evidence
Pooled analysis of 4 studies from systematic review of 25 studies evaluating the impact of CCTs programs on the prevalence of preventive health care use by children.[320]	• Feeding colostrum, early initiation and prevalence and duration of exclusive breastfeeding in children up to 6 months improved by 0.17 to 0.22 conditional on mothers' participation in health and nutrition education including breastfeeding promotion.	Low quality
RCT of Child development Grant in Zambia.[321]	• Children under 24 months in households receiving CT were significantly more likely to have had the minimum required number of feedings in the last 24 hours.	Good quality

Cost considerations

There is currently no data on the cost effectiveness of cash transfers to improve health and nutrition outcomes, although studies are underway to evaluate this.[322] Given additional administrative costs of CCTs, including the costliness of monitoring compliance by beneficiaries, and given the weakness of evidence to support the added value of conditionality, it is important to critically examine the rationale for conditions taking due regard of potential negative impacts for such. The relative cost effectiveness of investing in supply vs demand side of health services should be considered. Negative spill overs in service quality from increasing demand resulting from CCTs in particular may be greater than net gain to beneficiaries.

Applying the evidence to design & implementation

- A number of different features in the design and implementation of CTs can influence the programme impact. These include targeting, gender of the key recipient, size of the transfer[323], duration of exposure[324] and access to quality services and/or markets.
- On targeting in particular, there is growing awareness that conventional targeted cash transfer programmes often tend to involve high errors of exclusion, and that non-targeted programmes may be (paradoxically) better at 'targeting' the poor by ensuring their inclusion.
- The success of CTs is also dependent on a number of other key factors, including consideration of context, government capacity, accountability mechanisms, fiscal space and domestic political support.[325]

WHO Recommendation

Further research is required before specific recommendations can be made.

Challenges

- Potential effectiveness of CTs could be sub-optimal without opportunities for improved access to quality health services, access to markets and adequate food security and WASH as key underlying determinants of nutrition and health outcomes.
- LICs may require significant investment in capacity in order to effectively implement, monitor, and evaluate CTs.[326]
- CCTs could discriminate against already disadvantaged households, including children, who may be deprived of a transfer by their inability to meet conditions.
- CCTs in particular, entail high administrative costs and increased capacity demands. For example, CCT model in S. American countries may not appear to be automatically transferable to the contexts where the nutrition challenge is greatest – South Asia and Africa.
- More robust research is needed on the longer-term impacts of CTs on health and nutrition outcomes, how CTs influence care and feeding practices, the role conditionality plays in the effectiveness of CTs, the significance of transfer levels, and targeting for various impacts.[327] [328]

Monitoring & evaluation and measuring impact

Appropriate systems are required for monitoring and evaluating delivery, compliance, outcomes and impact. Information systems also need to be compatible with those for targeting and registration.

The table below provides guidance on potential monitoring and evaluation indicators.

Activities	✓ Increased household income including among the poorest (household disaggregated by wealth)
Outputs	✓ Number and % of CCT/UCT beneficiaries attending health and nutrition education sessions ✓ Number of children from households receiving CCT/UCTs attending regular growth monitoring checks, and mothers attending antenatal check ups ✓ Increased household income results in greater expenditure on food and healthcare (household disaggregated by wealth)
Outcomes & Impact	✓ % of children from households receiving CCT/UCTs attending regular growth monitoring checks, and % mothers attending antenatal check ups ✓ Coverage of fully immunized children ✓ Coverage of vitamin A supplementation ✓ Prevalence of exclusive breastfeeding ✓ Proportion of women consuming above minimum Dietary Diversity (MDD-W) ✓ Proportion of children under 6 to 23 months receiving minimum acceptable diet (MAD) ✓ Child anthropometry: Prevalence of stunting and wasting

Further information & key programming resources

The following documents may prove useful as reference documents for planning, designing, implementing, and monitoring and evaluation.

- Cash transfers what does the evidence say? A rigorous review of programme impact and of the role of design and implementation features. ODI/DFID/OPM July 2016
- 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. Cochrane Database of Systematic Reviews 2009.
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Addressing the Double-burden of Malnutrition

An evidence-based practice brief

SYNOPSIS

- Many low- and middle-income countries (LMICS) face a "double burden" of disease; negative health impacts of undernutrition and at the same time, rising prevalence of overweight and obesity, together with non-communicable diseases. [329]
- Childhood obesity is associated with a higher chance of obesity and premature death in adulthood while obese children experience breathing difficulties, hypertension, early markers of cardiovascular disease, insulin resistance and psychological effects.
- Childhood stunting is an increased risk for obesity as an adult.[330]Good evidence that breastfeeding reduces the risk of obesity, but mixed evidence of prevention programmes on improving children's nutrition and physical activity, although school-based interventions seem to have most potential.
- WHO promotes double-duty actions to reduce the risk or burden of both undernutrition and overweight, obesity or diet-related NCDs.[331]
- In LMICS most work has been at policy level but has not been translated into effective interventions.[332]
- Given the significance of the challenges presented by the double burden of disease, it is crucial for any national health policy to identify and address them in an integrated and coherent way. Competencies should be developed to address population's needs holistically – using innovative approaches to deliver quality integrated services.

Definition

Overweight and obesity are defined as abnormal or excessive fat accumulation. Body mass index (BMI) is an index of weight-for-height used to classify overweight (≥25 kg/m^2) and obesity (≥30 kg/m^2) in adults, while a child's weight-for-height is compared to WHO Growth standards (>2 standard deviations above median for overweight and >3 SD for obesity in children under 5, >1 SD for overweight and >2 SD for obesity in children 5–19).

In 2014, approximately 462 million adults worldwide were underweight, while 1.9 billion were overweight or obese, and 264 million women of reproductive age were affected by iron-deficiency-related anaemia.

In 2016, an estimated 41 million children under the age of 5 years were overweight or obese, while 155 million suffered from stunting (low height-for-age associated with chronic or recurrent undernutrition). Many low- and middle-income countries are dealing with the problems of infectious diseases and undernutrition while at the same time experiencing a rapid upsurge in non-communicable disease risk factors such as obesity and overweight, particularly in urban settings. [333]

The coexistence of undernutrition (including wasting, stunting and micronutrient deficiencies) along with overweight, obesity or diet-related NCDs is known as the double burden of malnutrition and represents a serious public health challenge. It can occur at the individual, household and population levels, and across all income groups in all regions of the world. [334]

Globally, there has been an increased intake of energy-dense foods high in fat and sugar and a decrease in physical activity due to the increasingly sedentary nature of forms of work, changing modes of transportation, and increasing urbanization.

There is evidence of shared behavioural, biological, environmental and socioeconomic and demographic factors that contribute to both over and under nutrition. Alterations in the expression of genes, not just the genes themselves, are thought to influence the risk of low birth weight, overweight, obesity and NCDs. These changes can be affected by, for example, intrauterine growth restriction resulting from maternal undernutrition, which leads to changes in the way the infant's body regulates energy. Poor maternal and early child nutrition are important and preventable drivers of both undernutrition and overweight. The environments in which people live, together with factors such as low incomes and the delivery of relatively cheap processed foods by the global food system affects their ability to access nutritious foods and adopt healthier nutrition habits and behaviours. These include their food, health, living, working and social environments. Poverty is a driver of both under and over-nutrition.

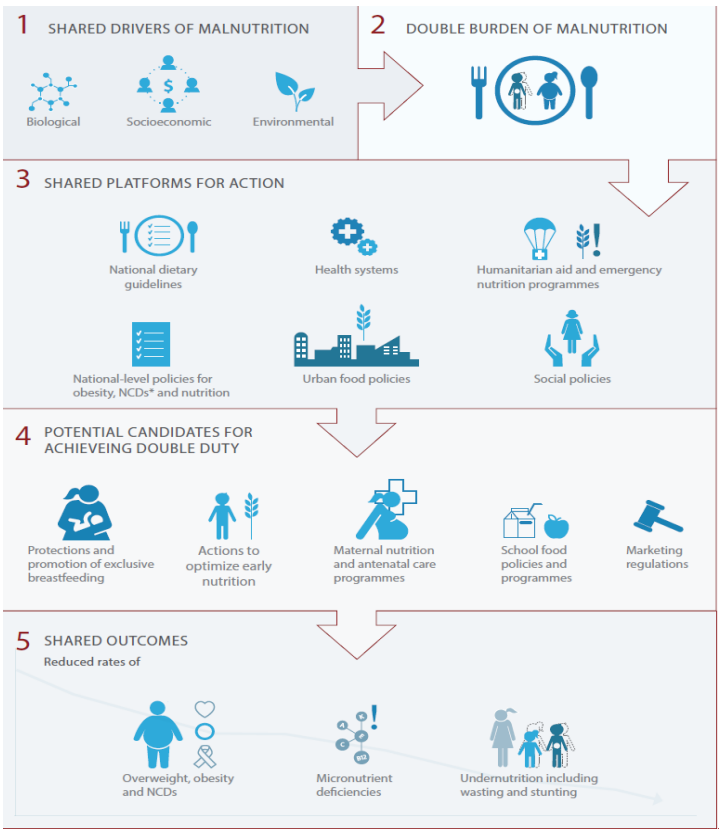

Figure 1. Shared drivers and platforms for double-duty actions. (Source: WHO. Double-duty actions for nutrition)

Rationale

Raised BMI is a major risk factor for non-communicable diseases such as cardiovascular diseases (mainly heart disease and stroke); diabetes; musculoskeletal disorders (especially osteoarthritis – a highly disabling degenerative disease of the joints); some cancers (including endometrial, breast, ovarian, prostate, liver, gallbladder, kidney, and colon). Increase in BMI leads to a corresponding increase in the risk for these non-communicable diseases.

Childhood obesity is associated with a higher chance of obesity, premature death and disability in adulthood. But in addition to increased future risks, obese children experience breathing difficulties, increased risk of fractures, hypertension, early markers of cardiovascular disease, insulin resistance and psychological effects. Figure 1 on previous page sets out the shared drivers and platforms for double duty actions.[335]

Evidence of impact

Prevention - nutrition and physical activity outcomes

- **Good evidence breastfeeding reduces the risk of obesity, but mixed evidence of prevention programmes on improving children's nutrition and physical activity**

Source	Finding	Evidence
Meta-analysis of twenty-five studies from mainly high-income countries.[336]	• Breastfeeding reduces the risk of obesity in childhood significantly.	Moderate quality
Cochrane review of 55 studies on children up to 18 years mainly from high-income countries.[337]	• Prevention programmes improve children's nutrition or physical activity to some extent, but only some have an effect on levels of fatness. • There are indications the most promising ones are related to school-focused interventions e.g. changing the curriculum, school food available and physical activity in schools.	Moderate quality
Cochrane review of 33 studies (25 in high income countries and 8 in low income countries.[338]	• Community wide programmes targeting the whole population did not increase physical activity levels.	Low quality
Review of 3 systematic reviews of which 2 reported computer-mediated interventions and 1 reported surgery and 28 studies where the interventions involved diet, physical activity, behaviour change, and combinations of these, provided via school, community, family, technology, or a combination of those methods.[339]	• Interventions, including health promotion and education, counselling on diet, physical activity/ lifestyle support, and dietary advice, showed marginal impact on reducing BMI in adolescents.	Moderate quality

- **School-based physical activity interventions for children and adolescents aged 6 to 18 are effective in increasing physical fitness and time spent on physical activity outside school.**
  - ➔ A Cochrane review of 44 studies found [*moderate quality evidence*][340]
    - Children exposed to school-based physical activity interventions are approximately three times more likely to engage in moderate to vigorous physical activity during the school day than those not exposed.
    - School-based interventions are not effective in increasing physical activity rates among adolescents, or in reducing systolic and diastolic blood pressure, blood cholesterol, body mass index, and pulse rate.

Treatment – impact of diet, exercise, cognitive behaviour therapy and surgery on weight and health outcomes in adults

Source	Finding	Evidence
Cochrane review of 43 studies from mainly high-income countries.[341]	• Exercise has positive effect on body weight and cardiovascular disease risk factors in overweight or obese adults, particularly when combined with diet, and that exercise improves health even if no weight is lost.	Moderate quality
Review of 12 studies on adolescents from HICs that that involved diet, physical activity, behaviour change, and combinations of those.[342]	• significant reduction in BMI post-intervention. Subgroups showed the largest effect for family-based interventions and the combination of the interventions.	High quality
Cochrane review of 36 studies.[343]	• Cognitive behaviour therapy significantly improved the success of weight loss. No conclusions could be drawn about other forms of therapy such as hypnotherapy.	Moderate quality
Cochrane review of 22 trials[344]	• Weight loss surgery improved people's weight loss one to two years afterwards.	Moderate quality
Cochrane review of 6 trials.[345]	• Participants on a low glycaemic index or glycaemic load diet lost a mean of one kilogramme more than those on comparison diets.	Low quality
Cochrane review of 8 trials.[346]	• No evidence that weight-reducing diets in people with hypertension had any effect on death or long-term complications and adverse events. Uncertain whether diets reduced blood pressure and weight.	Low quality
Cochrane review of 30 trials.[347]	• Anti-obesity drugs (orlistat, sibutramine and rimonabant)[4] can reduce weight but have various side effects and high drop-out rates (30–40%). No data to show any of the three drugs lowers the risk of death or cardiovascular disease.	Moderate quality

Cost considerations

The double burden of malnutrition confers a serious and negative economic impact on individuals and populations. Through its effects on health, malnutrition increases health-care costs, reduces productivity and slows economic growth, which in turn can perpetuate a cycle of poverty and ill-health.[348]

However, limited data are available on the cost effectiveness of the various approaches presented.

[4] In Europe, rimonabant is contraindicated for patients with severe depression and/or patients who are treated with antidepressive medications. Rimonabant is furthermore not recommended for patients with other untreated psychiatric conditions. [4]

Applying the evidence to design & implementation

- The Sustainable Development Goals have targets on ending malnutrition in all its forms (Target 2.2) and reducing NCDs (Target 3.4).
- WHO encourages double-duty actions that include interventions, programmes and policies with the potential to simultaneously reduce the risk or burden of both undernutrition (including wasting, stunting and micronutrient deficiency or insufficiency) and overweight, obesity or diet-related NCDs. Double-duty actions are not necessarily new actions. They are often actions that are already used to address single forms of malnutrition but with the potential to address multiple forms simultaneously.
- Of particular importance are interventions aimed at optimizing nutrition early in the life-course – ensuring the best possible start in life for the developing foetus, infant and child.

WHO Double Duty Action Policy Brief

According to WHO, the potential candidates for achieving double-duty actions are as follows:[349]

- **Initiatives to promote and protect exclusive breastfeeding in the first 6 months, and beyond.**
  Exclusive breastfeeding helps to regulate maternal weight gain in the postpartum period, which in turn provides added nutrition-related health benefits to the mother, protecting against obesity and some NCDs later in life.
- **Maternal nutrition and antenatal care programmes**
  Antenatal nutritional counselling provides knowledge of which foods, in what quantities, are required for optimal intake. This can reduce gestational weight gain and subsequently protect against gestational diabetes for the mother, and overweight and obesity later in life for the child.
- **Promotion of appropriate early and complementary feeding in infants**
  There are indications that the type and timing of complementary feeding may influence future risk of overweight and obesity.
- **School food policies and programmes**
  School food standards have been found to be effective at increasing the availability and purchase of healthy food and decreasing the purchase of unhealthy food.
- **Regulations on marketing**
  Food marketing influences children's food preferences and diet-related behaviours and outcomes.

WHO recommendation[350]

To achieve optimal growth, development and health, infants should be exclusively breastfed for the first six months of life.

Thereafter, to meet their evolving nutritional requirements, infants should receive nutritionally adequate and safe complementary foods, while continuing to breastfeed for up to two years or beyond.

- At the individual level, people can limit energy intake from total fats and sugars; increase consumption of fruit and vegetables, legumes, whole grains and nuts; and engage in regular physical activity (60 minutes a day for children and 150 minutes spread through the week for adults).
- There is an increasing evidence that the types of fluids that we drink can have a long-term impact on health, influencing the development of overweight, obesity, or metabolic diseases. Therefore, plain water is recommended as a healthy option over sweetened beverages for prevention of obesity.[351]
- It is important to support evidence-based and population-based policies that make regular physical activity and healthier dietary choices available, affordable and easily accessible to everyone, particularly to the poorest individuals e.g. a tax on sugar sweetened beverages.
- The food industry can be regulated and supported to reduce the fat, sugar and salt content of processed foods; ensure that healthy and nutritious choices are available and affordable to all consumers; restrict marketing of foods high in sugars, salt and fats, especially those aimed at children and teenagers; and ensure the availability of healthy food choices and supporting regular physical activity practice in the workplace.[352]

Challenges

- Lack of focus on interventions relating to market regulation (in particular the aggressive promotion of highly processed foods, especially targeting children), and addressing the broader set of inherent problems of the food system (encompassing production, processing, retail, consumers etc.) to ensure a more comprehensive analysis of the drivers of the DBM.
- Current available evidence is very much focused on social and behaviour change communication components of response.
- Much of the available evidence regarding SBCC is from high income countries and this highlights the need for context specific evidence from LMICs as a priority.
- There is no available evidence regarding the impact of a comprehensive approach to the problem being implemented through the health sector in a given context.
- Lack of capacity to identify, prevent and address DBM with need to strengthen:[353]
  - systematic inclusion of overweight/obesity data in nutrition surveys.
  - understanding priorities and challenges/bottle necks for country wide implementation.
  - data on outcomes in relation to measures of equity, longer term outcomes, potential harms and costs. evidence in double-burden countries.
  - capacities to effectively regulate (and enforce implementation) large scale food companies.
  - how effective preventative intervention components can be embedded within health, education and care systems and achieve long term sustainable impacts.
  - monitoring possible conflicts of interests in public/private partnerships.
- A study assessing activities, barriers and enablers of 19 international organisations tackling the DBM in LMICs found most work has been at policy level which has not yet translated into interventions. Barriers included absence of adequate government commitment and capacities; lack of funding, obesity prevention not being perceived as a life-saving intervention, lack of agency expertise, lack of guidelines and lack of impact evaluation. Shortage of evidenced interventions and donor engagement/funding particularly limit progress.[354]
- There is also an inherent tension between the focus on increasing the proportion of animal sourced foods consumed (heavy in saturated fats) in response to undernutrition, with promotion of a greater consumption of processed foods so long as these are fortified. There is a need to further explore the inherent contradictions here and to ensure optimal alignment and policy convergence.

Monitoring & evaluation and measuring impact

The table below provides guidance on potential monitoring and evaluation indicators

Activities	Trainings for health professionals
Outputs	Number of nutrition education sessions conducted in schools over the past month/year Number of children participating in physical activity sessions in schools Number of nutrition plans and strategies that include DBM % of HF with at least one trained staff in management of overweight and obesity % of targeted schools regularly conducting nutrition education sessions % of targeted schools regularly conducting physical activity sessions
Outcomes & Impact	Prevalence of overweight & obesity in children and adults Prevalence of stunting Prevalence of exclusive breastfeeding Prevalence of anaemia in women Women's dietary diversity (MDD-W) Minimum acceptable diet in children under 6 to 23 months of age (MAD) Prevalence of hypertension and type II diabetes

Further information & key programming resources

The following documents may prove useful as reference documents for planning, designing, implementing, and monitoring and evaluation.

- WHO Global Strategy on Diet, Physical Activity and Health
- WHO. Double-duty actions. Policy brief. Geneva: World Health Organization; 2017
- Ambition and Action in Nutrition 2016–2025. Geneva: World Health Organization; 2017. Licence: CC BY-NC-SA 3.0 IGO.
- WHO. The double burden of malnutrition. Policy brief. Geneva: World Health Organization; 2017.

The reciprocal links between health and nutrition are well established. Integrating health and nutrition programming in external assistance throughout the programme cycle and supporting the delivery of evidence-based nutrition interventions through national health systems, can offer valuable opportunities for achieving global targets on Universal Health Coverage and contributing to sustainable improvements in child development as compared to separate programmes. This resource summarises the latest evidence on twelve nutrition-specific and nutrition-sensitive intervention areas (as summarised in the introduction) supporting key nutrition and health goals. In addition, the decision tool (see Annex) outlines 4 steps for enhancing the delivery of priority nutrition interventions through health sector programmes, including prioritisation of interventions taking account of contextual factors as well as the evidence base. The resource emphasises the importance of strengthening national health systems at various levels, to sustainably and effectively deliver integrated services. A compelling evidence base, political commitment, leadership, and good governance, together with adequate capacity and resources, create the enabling environment for action and scale-up.

Evidence of impact

The availability, relevance and quality of evidence varies significantly across the interventions covered in this resource, and for some interventions the only evidence found was from middle- and high-income country settings. Evidence is often mixed and dependent on the particular context, and for many interventions evidence available is of moderate quality. Yet where strong plausible impact pathways exist, good analysis of local contextual factors, as well as consideration of the evidence base, can support decision making. Where possible, in each of the briefs, the distinction is made as to whether there is lack of evidence, poor quality of evidence or poor evidence of impact. The three tables below summarise the main findings regarding the impact of interventions discussed within each of the twelve briefs on selected health and nutrition outcomes.

Summary of selected outcomes of nutrition interventions: women of reproductive age

Intervention	Health Outcomes					Nutrition Outcomes		
	Pre-eclampsia	Death or serious morbidity	Stillbirth	Pre-term birth	Neural tube defect (NTD	Micronutrient deficiencies	Low birth weight (LBW)	Small for gestational age (SGA)
Peri-conceptional folic acid supplements					+++			
High-dose calcium supplements	++	++		++				
Iron supplements						++ (iron deficiency anaemia)	++	
Vitamin A supplements		0				+/- (maternal anaemia, maternal night blindness)		
Multiple micro-nutrient supplements			+			++ (maternal anaemia	++	++
Balanced energy and protein supplements			++				++	++
Nutrition supplementation for HIV positive pregnant women		0						
Deworming						0 (maternal anaemia)		

Key: Evidence of impact:

+++ strong positive impact; ++ medium positive impact; + weak positive impact; 0 no impact; +/- mixed impact; no entry means no evidence identified.

Summary of selected outcomes of nutrition interventions: adolescent girls*									
Intervention	Health Outcomes					Nutrition Outcomes			
	Pre-eclampsia	Death or serious morbidity	Stillbirth	Pre-term birth	Neural tube defect (NTD	Micronutrient deficiencies	Low birth weight (LBW)	Small for gestational age (SGA))	Body Mass Index (BMI)
High-dose calcium supplements						+ (serum calcium concentration)			
Iron supplements						++ (anaemia and serum haemoglobin levels)			
Vitamin A supplements						++ (anaemia)			
Multiple micro-nutrient supplements						++ (serum haemoglobin concentration)			
Zinc supplementation				++		++ (serum zinc and haemoglobin concentration)	++		
Obesity prevention programmes									+

*There is an overall lack of studies specifically targeting adolescent populations. This table summarises evidence available that is specific to adolescents. By definition, evidence for interventions for WRA also includes adolescent girls.

Key: Evidence of impact:

+++ strong positive impact; ++ medium positive impact; + weak positive impact; 0 no impact; +/- mixed impact; no entry means no evidence identified.

Summary of selected outcomes of nutrition interventions for infants/children										
Intervention	Health Outcomes				Nutrition Outcomes					
	Mortality	Respiratory infection incidence	Diarrhoea	Reduced risk of NCDs	Reduced risk of obesity	Stunting	Wasting	Micronutrient deficiencies	Recovery from acute malnutrition	Optimal BF
Promoting and supporting breast-feeding	++		++	++	++	0				++
Appropriate complementary feeding	+	+				+				
Vitamin A supplements	+++		+++			+		++ (Vitamin A-night blindness)		
Micronutrition supplementation	0	0	no			no		++ (anaemia & iron deficiency)		
Preventive zinc supplements	++	+/-	++			+				
Zinc to treat acute diarrhoea (age >6 months)	0		++							
Managing MAM with specially formulated foods	0								+	
Managing SAM with RUTF	++								+++	
Nutrition supplementation for HIV/TB	0	0	0			+/-	+/-			
Clean water	+++		+			+	+			
Improved sanitation	+++		++			+				
Hygiene promotion/handwashing	+		++			+				
Deworming	0					+/				
ECD						0	0		+	
Cash transfers						+	+			
Obesity prevention programmes				+/-	+/-					

Key: Evidence of impact:

+++ strong positive impact; ++ medium positive impact; + weak positive impact; 0 no impact; +/- mixed impact; no entry means no evidence identified.

Key findings regarding the evidence of impact

Women of Reproductive Age

- Evidence for the effectiveness of nutrition interventions to improve health and nutrition outcomes in women of reproductive age is mixed. Positive impacts are identified for balanced protein and energy supplements in malnourished pregnant women, peri-conceptional folic acid supplements, maternal calcium supplements, and maternal daily iron folate supplements.
- There is strong evidence that optimal breastfeeding improves health in both the child and the mother.

Adolescent girls

- Positive impact on serum haemoglobin and anaemia identified for **micronutrient supplementation** in adolescent girls.

People living with HIV and/or TB

- Evidence for the positive impact of nutrition interventions on health and nutrition outcomes in **people living with HIV and/or TB** is limited by number and quality of studies to date, despite strong impact pathways.

Infants and children

- There is strong evidence that **optimal breastfeeding** improves health of the child and that breastfeeding promotion and support has positive impacts on optimal breastfeeding rates. Evidence for the positive impact of breastfeeding promotion and appropriate complementary feeding on nutrition is limited.
- There is strong evidence that **vitamin A** supplementation has a positive impact on health in children 6 to 59 months and reduces vitamin A deficiency (night blindness).
- Evidence suggests some positive impact of point of use **multiple micronutrient powders** in reducing anaemia and iron deficiency but evidence is insufficient for health and other nutrition outcomes.
- There is mixed evidence of the effect of **zinc supplementation** on health and nutrition, with positive impacts on duration and severity of diarrhoea but not mortality and small effects on growth of children.
- The evidence base for the effects of **management of acute malnutrition** with lipid based nutrition supplements on health is limited but there is good evidence for positive impacts on recovery rates for severe acute malnutrition. CMAM is an effective management approach but cannot address the basic and underlying causes that underpin the persistence of high prevalence of acute malnutrition in many contexts.
- There is strong evidence for the impact of **WASH interventions** on health and for the association between poor WASH practices and poor nutrition. Poor sanitation is linked with stunting through its association with chronic enteropathy, independent of effects on diarrhoea. Current evidence for impact of WASH interventions on nutrition suggests small benefits mainly in children less than 24 months, although evidence is limited by small number of trials of short duration and range of interventions to date.
- The evidence on the impact of **deworming** on both nutrition and health outcomes is weak. However, there is convincing evidence on the negative impact of parasitic worm infections on children's health and development. Consequently, WHO continues to recommend periodic deworming of all school-aged children in areas endemic to worm infestations.
- The current evidence suggests that integrating **early childhood development** (ECD) and nutrition and/or health interventions has positive additional impacts on child developmental outcomes but not specifically on nutrition outcomes. However, evidence is mixed and limited by the number and quality of studies to date. Evidence is strongest for the integration of child stimulation into therapeutic feeding programmes in improving recovery rates in malnourished children.
- The evidence for the impact of **cash transfer** programmes on nutrition and health is mixed due to the large range of policies and programme designs, variations in quality of implementation and evaluation. Nevertheless, robust evidence of positive impacts does exist. Evidence suggests targeting strategy, duration and size of transfer are more important factors determining impact than conditionality.
- Childhood obesity is associated with a higher chance of obesity and premature death in adulthood while obese children experience breathing difficulties, hypertension, early markers of cardiovascular disease, insulin resistance and psychological effects. Childhood stunting is an increased risk for obesity as an adult.
- There is good evidence that breastfeeding reduces the risk of **obesity** but evidence for the effectiveness of overweight and obesity prevention programmes on children's nutrition and levels of physical activity is mixed. Evidence is mainly from high-income countries.

Implications for design and implementation

Overall, the resource highlights that any integrated health and nutrition intervention should involve:

- Careful context-specific problem, causal, risk and benefit analysis to ensure that the most appropriate intervention/s are selected and to prevent harm.
- Consideration of the existing framework of national nutrition policies and plans of action and addressing strategic gaps as a key priority.
- Prioritisation according to the following criteria: relevance, political support, effectiveness, feasibility, expected contribution to health system strengthening, ease of integration and targeting for sustainability, cost effectiveness and presence of a funding gap.
- Assessment of the capacity of the health system to deliver, identification of potential weaknesses that may require additional resources or alternative delivery mechanisms to address, and development / implementation of a road map for ongoing capacity development.
- The capacity assessment could include a stakeholder led assessment of capacities and gap analysis and an assessment of best practice for integrating Capacity Development into sector reform contracts with relevant indicators. In many contexts a multi-stakeholder and multi-level approach to capacity development will be key for effectiveness of investments in the sector
- Ensuring adequate investment across the health system building blocks and in particular in technical and functional capacities to reinforce the quality, effectiveness and sustainability of interventions.
- Recognition that weak governance coupled with inadequate resourcing and capacities is most prevalent in poorer countries, regions and communities, precisely where problems of child malnutrition are greatest.
- Use of an integrated, multi-sectoral approach (rather than siloed interventions) to achieve maximal benefits on child

nutrition and health. In particular, complementary nutrition sensitive interventions in education, WASH, agriculture, livelihoods and social protection are important to address underlying causes of undernutrition.

- In order to strengthen accountability and the relevance of the evidence base in a specific context, development of an appropriate and costed monitoring and evaluation framework at the design stage of the programme, and the generation of robust and policy relevant evidence. This might require a commitment to invest in adequate expertise.

Challenges

- Health service platforms are important for the effective delivery and coverage of nutrition interventions, particularly to mothers and children under five years of age but do not necessarily reach all vulnerable groups, in particular, adolescent girls.
- There is a need to move away from approaches that focus on a single public health problem or a single disease towards direct efforts to system approaches that improve institutions and help enhance organizational capacity in countries, as well as develop local leadership. Innovative approaches might be required tailored toward specific country context. This will promote the development of stronger health systems that can efficiently and equitably prevent and address the disease burden faced based on specific country situation analysis.[355]
- In many contexts, accessibility of primary health care services is the limiting factor in accessibility of integrated nutrition services. Populations living in regions affected by conflict, instability or very weak governance may be at a severe disadvantage. Children living in these regions are often most affected by undernutrition and would benefit most from comprehensive nutrition interventions yet face limited access due to weak and disrupted health services, WASH and other support structures.
- Behaviour modification and adherence to any form of supplements are significant challenges to achieving universal coverage and require investment in locally appropriate and context specific social behaviour change communication approaches to maximise effectiveness.
- In general terms, nutrition-specific interventions delivered through health services are estimated to reduce stunting by 20% and severe wasting by 60% if the 10 proven nutrition-specific interventions referred to in the Lancet 2013 were scaled-up from existing population coverage to 90%. This would reduce the number of children with stunted growth and development by 33 million. Although this improvement (on top of the existing trend) would mean WHA targets for 2025 can be reached, a large cohort of children would still be stunted and prevented from reaching their full potential.
- Nutrition sensitive interventions and complementary approaches through the community and across multiple sectors are therefore important to address the basic and underlying causes of undernutrition, although the contribution of each of the other sectors is largely unknown as research has not yet established this.
- Despite strong associations and plausible impact pathways, the existing evidence base for some nutrition interventions, especially nutrition sensitive approaches remains limited by number, quality and variability in design of studies.
- Increased investment is a necessary but by itself insufficient requirement for scaling-up the overall nutrition impact of the health system. A key challenge involves the development of both functional and technical capacities at multiple levels from national to community. The capacities of both public sector and civil society must be strengthened, as well as those of other key stakeholders including academic and training institutions (a precondition to sustain capacities) and the private sector. In particular, the adoption of innovative and accountable delivery models that are able to ensure the inclusion of the poorest and most vulnerable members of society will be key.
- In the face of fierce competition for resources, governments worldwide have to manage multiple objectives and competing demands. As they strive for greater efficiency and value for money, they must seek ways to achieve more equity in access and outcomes and to reduce exclusion. They are under pressure to ensure that services are effective, of assured quality and safe, and that health providers are responsive to patients' demands.[356]
- Strengthening the health sector for greater nutrition impact is a core component of the broader national commitment to a multi-sectoral and rights based strategic framework that will be essential to achieve the SDG target of eradicating malnutrition in all its forms by 2030.

Please refer to the annexes for the following:

Annex 1: Nutrition-specific interventions for neonates

Annex 2: Summary of nutrition-specific interventions for infants, children, Women of Reproductive Age and adolescent girls, based on WHO recommendations

Annex 3: Glossary

Annex 4: Grading the quality and strength of evidence

Annex 5: Decision tool for strengthening integration of nutrition within health sector programmes, including a summary table of monitoring & evaluation indicators

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Introduction

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ANNEXES

Strengthening Integration of Nutrition within Health Sector Programmes

An Evidence-based Planning Resource

Annexes

Annex 1: Nutrition-specific interventions for neonates

Annex 2: Summary of nutrition-specific interventions for infants, children, Women of Reproductive Age and adolescent girls, based on WHO recommendations

Annex 3: Glossary

Annex 4: Grading the quality and strength of evidence

Annex 5: Decision tool for strengthening integration of nutrition within health sector programmes, including a summary table of monitoring & evaluation indicators

ANNEX 1
Nutrition-specific interventions for neonates

The Lancet Series (2013) highlighted a number of nutrition-specific interventions for neonates that demonstrate positive impact on health and nutrition outcomes. These are presented in this Annex.

Delayed umbilical cord clamping

At the time of birth, an infant is still attached to the mother via the umbilical cord, which is part of the placenta. The infant is usually separated from the placenta by clamping the umbilical cord. Early cord clamping is generally carried out in the first 60 seconds after birth, whereas later cord clamping is carried out more than one minute after the birth or when cord pulsation has ceased. Delaying cord clamping allows blood flow between the placenta and neonate to continue, which may improve iron status in the infant for up to six months after birth. This may be particularly relevant for infants living in low-resource settings with reduced access to iron-rich foods.

■ Strong evidence of positive impact on newborn haemoglobin concentration

Source	Finding	Evidence
Systematic review of 15 RCTs in term neonates (HICs and LMICs).[1]	• Significant increase in newborn haemoglobin concentration. • Non-significant effects on postpartum haemorrhage.	Moderate to high quality
Systematic review of 15 RCTs in preterm neonates in HIC and LMICs.[2]	• Significant reduction in need for blood transfusion, in the risk of bleeding in the brain (intraventricular haemorrhage) and the risk of necrotising enterocolitis.	Moderate quality

WHO recommendation

Delayed umbilical cord clamping (not earlier than 1 min after birth) is recommended for improved maternal and infant health and nutrition outcomes.[3]

Neonatal vitamin K

Vitamin K injection can prevent hemorrhagic disease of the newborn. Vitamin K helps the blood to clot but the body's capacity to store it is very low. Hemorrhagic disease of the newborn (HDN) is caused by a deficiency of Vitamin K in newborns and results in life-threatening bleeding in an infant in the first hours to months of life. Classic HDN occurs on days one to seven and late HDN occurs from week 2 to 12. Some Vitamin K comes from the placenta but it is not always enough.

■ Strong evidence of positive impact on newborn clinical bleeding and coagulation status

Source	Finding	Evidence
Systematic review of 2 RCTs for intramuscular vitamin K and 11 RCTs for oral vitamin K (HICs and LMICs).[4]	• One dose of intramuscular vitamin k reduced clinical bleeding at 1-7 days and improved biochemical indicators of coagulation status. • Oral vitamin K also improved coagulation status.	Moderate quality

WHO Recommendation

All newborns should be given 1 mg of vitamin K intramuscularly (IM) after birth (after the first hour during which the infant should be in skin-to-skin contact with the mother and breastfeeding should be initiated).[5]

Kangaroo mother care

Every year, more than 20 million infants are born weighing less than 2.5kg – over 96% of them in developing countries. These low-birth-weight (LBW) infants are at increased risk of early growth retardation, infectious disease, developmental delay and death during infancy and childhood.

Conventional neonatal care of LBW infants is expensive and needs both highly skilled personnel and permanent logistic support. Kangaroo mother care involves early, continuous and prolonged skin-to-skin contact between a mother and her newborn.

Evidence suggests that kangaroo mother care is a safe and effective alternative to conventional neonatal care, especially in under-resourced settings and may reduce morbidity and mortality in LBW infants as well as increase breastfeeding. Furthermore, Kangaroo care enables earlier discharge from hospital.

■ Strong evidence of positive impact on mortality in preterm neonates and optimal breastfeeding duration in healthy neonates

Source	Finding	Evidence
Systematic review of 34 RCTs in healthy neonates (HICs and LMICs).[6]	• Significant (27%) increase breastfeeding at 1-4 months after birth. • Significant increase in duration of breastfeeding.	Moderate to high quality
Systematic review of 21 RCTs in preterm neonates in HIC and LMICs.[7]	• Significant reduction in risk of mortality, nosocomial infection or sepsis and hypothermia. • Significant increase in weight gain and any breastfeeding at 1 to 3 months.	Moderate quality

WHO recommendation

Kangaroo mother care is recommended for the routine care of newborns weighing 2000 g or less at birth, and should be initiated in health-care facilities as soon as the newborns are clinically stable.

Newborns weighing 2000 g or less at birth should be provided as close to continuous Kangaroo mother care as possible. Intermittent Kangaroo mother care, rather than conventional care, is recommended for newborns weighing 2000 g or less at birth, if continuous Kangaroo mother care is not possible.[8]

Vitamin A supplementation in neonates

Generally, infants are born with low vitamin A stores and are dependent on external sources, most importantly breast milk. In settings where vitamin A deficiency and/or undernutrition is common, infants are likely to receive inadequate amounts of vitamin A from breast milk due to poor maternal nutritional status.

Source	Finding	Evidence
Cochrane review of 12 trials in LMICs[9]	• no potential beneficial effect of vitamin A supplementation among neonates at birth in reducing mortality during the first six months or 12 months of life	High quality

Given this finding, additional research is warranted before a decision can be reached regarding policy recommendations for this intervention.

WHO recommendation

Neonatal vitamin A supplementation (that is, supplementation within the first 28 days after birth) is not recommended as a public health intervention to reduce infant morbidity and mortality.[10]

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ANNEX 2
Summary of nutrition-specific interventions for infants, children, Women of Reproductive Age and adolescent girls, based on WHO recommendations

Target group	Intervention	Recommendations
Infants and children	Breastfeeding promotion and appropriate complementary feeding	• Mothers should initiate breastfeeding within one hour of birth and infants should be exclusively breastfed for the first six months of life to achieve optimal growth, development and health. • Thereafter, infants should receive nutritionally adequate and safe complementary foods while continuing to breast feed until 2 years or beyond to meet their evolving nutritional requirements. • Every maternity facility should practice the 'Ten Steps to Successful Breastfeeding'.
	Vitamin A supplementation (children 6-59 months)	• Children 6–59 months - where VAD is a public health problem (prevalence of night blindness is ≥1% in children 24–59 months of age or where the prevalence of VAD (serum retinol ≤0.70 µmol/l) is ≥20% in children 6–59 months of age), the WHO recommends a dose of 100,000 IU for infants 6 to 12 months of age and 200,000 IU for children over 12 months of age, every 4 to 6 months. • Children with measles - an oral dose of 200,000 IU (or 100,000 IU in infants 6-12 months) of vitamin A per day for two days to children with measles in areas where VAD may be present. • VAS is not recommended for infants 1–5 months - mothers should be encouraged to exclusively breastfeed infants for 6 months to achieve optimal growth, development and health.

	Zinc supplementation (children under 5)	• Zinc supplementation for the management of diarrhoea: mothers and other caregivers should provide children with diarrhoea 20 mg per day of zinc supplementation for 10–14 days (10 mg per day for infants under 6 months of age)
		• Health care workers are encouraged to provide low osmolarity ORS solution for home use until the diarrhoea stops and to counsel mothers on the importance to continue breastfeeding.
		• No WHO recommendations exist related to
		  o Zinc supplementation and growth in children;
		  o Zinc supplementation in children with respiratory infections;
		  o Zinc supplementation and low birth-weight infants.

	Micronutrient powders (children 6-23 months and 2-12 years)	• Children 6 – 23 months - where prevalence of anaemia in infants and young children under 2 years of age or children under 5 years of age is 20% or higher, point-of-use fortification of complementary foods with iron-containing MNPs in infants and young children aged 6–23 months is recommended, to improve iron status and reduce anaemia.
		• Children 2-12 years - where prevalence of anaemia in school-age children is 20% or higher, point-of-use fortification of foods with iron containing MNPs in children aged 2–12 years is recommended, to improve iron status and reduce anaemia.
		• Daily iron supplementation is recommended in settings where anaemia is highly prevalent (40% or higher) for the age group) for:
		  o infants and young children aged 6–23 months
		  o preschool-age children aged 24–59 months
		  o school-age children aged 60 months and older
		• In malaria-endemic areas, iron in any form, including MNPs, should not be provided to children who do not have access to malaria-prevention strategies (e.g. provision of insecticide-treated bednets, prompt diagnosis of malaria and treatment with antimalarial drugs).

	Deworming (preschool and school children)	• Periodic medicinal treatment for soil-transmitted helminth (STH) infections without previous individual diagnosis to all at-risk people living in endemic areas. Treatment should be given once a year when the baseline prevalence of STH infections in the community is over 20%, and twice a year when the prevalence is over 50%.[1] • WHO strategy for schistosomiasis control focuses on reducing disease through periodic, targeted treatment with praziquantel (preventive chemotherapy) of affected populations. In countries with low transmission, the elimination of the disease should be aimed at through treating targeted groups including school-age children.[2] • The above deworming measures should come together with health and hygiene education and improvement of water and sanitation children

	Management of moderate and severe acute malnutrition in children	• Community-based management of acute malnutrition is recommended:
		  o TSFPs provide a LNS or fortified blended food to individuals on a regular basis according to admission and discharge criteria based on nutritional status. TSFPs typically also include screening for medical conditions and routine health-related interventions (supplementation with vitamin A, deworming).
		  o Outpatient Therapeutic Care (OTP) is typically located in a front line health facility. Children 0-59 months with SAM but with appetite and no complications are enrolled following a medical evaluation. Routine medicines are given (antibiotic, deworming, measles vaccination and malaria treatment where relevant) and a weekly supply of RUTF is provided. Children should ideally return once each week for follow up and a new supply of RUTF.
		  o In-patient care: Children with SAM and no appetite and/or medical complications are admitted to an inpatient facility for close monitoring until stabilized. Inpatient care should follow standard WHO protocols for the treatment of severe malnutrition. Once stabilized, patients are transferred to an OTP within reasonable distance of their homestead.
		• Contact points with mother/carer during treatment should also be used as entry points for behavioural change communication with the mother/carer such as hygiene education and IYCF counselling.

	Overweight and obesity	• To achieve optimal growth, development and health, infants should be exclusively breastfed for the first six months of life. • Thereafter, to meet their evolving nutritional requirements, infants should receive nutritionally adequate and safe complementary foods, while continuing to breastfeed for up to two years or beyond. • WHO encourages double-duty actions that include interventions, programmes and policies with the potential to simultaneously reduce the risk or burden of both undernutrition (including wasting, stunting and micronutrient deficiency or insufficiency) and overweight, obesity or diet-related NCDs.

Target group	Intervention	Recommendations
Non-pregnant adult women and adolescent girls	Iron with or without folic acid supplementation[3]	• Daily iron supplementation is recommended in menstruating adult women and adolescent girls living where the prevalence of anaemia is 40% or higher in this age group, for the prevention of anaemia and iron deficiency. • In populations where the prevalence of anaemia among non-pregnant WRA is 20% or higher, intermittent iron and folic acid supplementation is recommended in menstruating women, to improve their haemoglobin concentrations and iron status and reduce the risk of anaemia.
	Deworming[4 5]	• Periodic medicinal treatment (deworming) without previous individual diagnosis to all at-risk people living in endemic areas. Treatment should be given once a year when the baseline prevalence of soil-transmitted helminth infections in the community is over 20%, and twice a year when the prevalence is over 50%. • The WHO strategy for schistosomiasis control focuses on reducing disease through periodic, targeted treatment with praziquantel (preventive chemotherapy) of affected populations. In countries with low transmission, the elimination of the disease should be aimed at through treating targeted groups including school-age children.
Periconceptional women	Folic acid[6]	• From the moment they begin trying to conceive until 12 weeks of gestation, women should take a folic acid supplement (400 µg folic acid daily). • Women who have had a foetus diagnosed as affected by a neural tube defect or have given birth to a baby with a neural tube defect should: - receive information on the risk of recurrence - be advised on the protective effect of periconceptional folic acid supplementation - be offered high-dose supplementation (5 mg folic acid daily) - be advised to increase their food intake of folate.
Pregnant women[7]	Dietary interventions	• Counselling about healthy eating and keeping physically active. • During pregnancy it is recommended for pregnant women to stay healthy and to prevent excessive weight gain. • In undernourished populations, nutrition education on increasing daily energy and protein intake is recommended for pregnant women to reduce the risk of low-birth-weight neonates. • In undernourished populations, balanced energy and protein dietary supplementation is recommended for pregnant women to reduce the risk of stillbirths and small-for-gestational-age neonates. [i]
	Iron and folic acid supplements	• Daily oral iron and folic acid supplementation with 30 mg to 60 mg of elemental iron and 400 g (0.4 mg) of folic acid recommended to prevent maternal anaemia, low birth weight, and preterm birth. [ii] [iii] • Intermittent oral iron and folic acid supplementation with 120 mg of elemental iron and 2800 g (2.8 mg) of folic acid once weekly is recommended to improve maternal and neonatal outcomes if daily iron is not acceptable due to side-effects, and in populations with an anaemia prevalence among pregnant women of less than 20%. [iv]
	Calcium supplements	• In populations with low dietary calcium intake, daily calcium • Supplementation (1.5–2.0 g oral elemental calcium) is recommended to reduce the risk of pre-eclampsia.
	Vitamin A supplements	• Vitamin A supplementation is only recommended for pregnant women in areas where vitamin A deficiency is a severe public health problem, to prevent night blindness.[v]
	Zinc supplements	• Zinc supplementation for pregnant women is only recommended in the context of rigorous research.
	Restricting caffeine intake	• For pregnant women with high daily caffeine intake (more than 300 mg per day), lowering daily caffeine intake during pregnancy is recommended to reduce the risk of pregnancy loss and low-birth-weight neonates.[vi]
	Deworming	• Periodic medicinal treatment (deworming) without previous individual diagnosis to all at-risk people living in endemic areas. Treatment should be given once a year when the baseline prevalence of soil-transmitted helminth infections in the community is over 20%, and twice a year when the prevalence is over 50%. • The WHO strategy for schistosomiasis control focuses on reducing disease through periodic, targeted treatment with praziquantel (preventive chemotherapy) of affected populations. In countries with low transmission, the elimination of the disease should be aimed at through treating targeted groups including school-age children
Postpartum women	Iron with or without folic acid supplementation[8]	• Oral iron supplementation, either alone or in combination with folic acid, may be provided to postpartum women for 6–12 weeks following delivery for reducing the risk of anaemia in settings where gestational anaemia is of public health concern.[vii]
	Deworming[9]	• Periodic medicinal treatment (deworming) without previous individual diagnosis to all at-risk people living in endemic areas. Treatment should be given once a year when the baseline prevalence of soil-transmitted helminth infections in the community is over 20%, and twice a year when the prevalence is over 50%. • The WHO strategy for schistosomiasis control focuses on reducing disease through periodic, targeted treatment with praziquantel (preventive chemotherapy) of affected populations. In countries with low transmission, the elimination of the disease should be aimed at through treating targeted groups including school-age children

[i] In undernourished populations, high-protein supplementation is not recommended for pregnant women to improve maternal and perinatal outcomes.

[i] The equivalent of 60 mg of elemental iron is 300 mg of ferrous sulfate hepahydrate, 180 mg of ferrous fumarate or 500 mg of ferrous gluconate.

[iii] Folic acid should be commenced as early as possible (ideally before conception) to prevent neural tube defects.

[iv] The equivalent of 120 mg of elemental iron equals 600 mg of ferrous sulfate heptahydrate, 360 mg of ferrous fumarate or 1000 mg of ferrous gluconate.

[v] Vitamin A deficiency is defined as a severe public health problem if > 5% of women in a population have a history of night blindness in their most recent pregnancy in the previous 3–5 years that ended in a live birth, or if > 20% of pregnant women have a serum retinol level < 0.70 mol/L. Determination of vitamin A deficiency as a public health problem involves estimating the prevalence of deficiency in a population by using specific indicators of vitamin A status.

[vi] Includes any product, beverage or food containing caffeine (i.e. brewed coffee, tea, cola-type soft drinks, caffeinated energy drinks, chocolate, caffeine tablets).

[vii] WHO considers a 20% or higher population prevalence of gestational anaemia to be a moderate public health problem.

[1] http://www.who.int/mediacentre/factsheets/fs366/en/
[2] http://www.who.int/mediacentre/factsheets/fs115/en/
[3] WHO Global Nutrition Targets 2025 Anaemia Policy Brief
[4] http://www.who.int/mediacentre/factsheets/fs366/en/
[5] http://www.who.int/mediacentre/factsheets/fs115/en/
[6] http://www.who.int/elena/titles/folate_periconceptional/en/
[7] WHO Recommendations on antenatal care for a positive pregnancy experience. 2016
[8] WHO Global Nutrition Targets 2025 Anaemia Policy Brief
[9] http://www.who.int/mediacentre/factsheets/fs115/en/

ANNEX 3
Glossary

Terminology	Explanation
Access (to health services)	The perceptions and experiences of people as to their ease in reaching health services or health facilities in terms of location, time, and ease of approach.
Acute Malnutrition	Acute malnutrition (also known as wasting) is a form of under-nutrition. It is caused by a recent decrease in food consumption and/or illness resulting in sudden weight loss and/or bilateral pitting oedema. It is defined by low mid-upper arm circumference [MUAC] or low weight-for-height (z-scores) or the presence of bilateral pitting oedema. Acute malnutrition is calculated by comparing the weight- for-height or MUAC of a child with a reference population of well-nourished and healthy children. Often used to assess the severity of emergencies because it is strongly related to mortality.
Adolescent	The United Nations defines adolescence as a person between 10-19 years of age.
Anaemia	A condition in which the number of red blood cells or their oxygen carrying capacity is insufficient to meet physiologic needs, which vary by age, sex, altitude, smoking, and pregnancy status. Iron deficiency is thought to be the most common cause of anaemia globally, although other conditions, such as folate, vitamin B12 and vitamin A deficiencies, chronic inflammation, parasitic infections, and inherited disorders can all cause anaemia. In its severe form, it is associated with fatigue, weakness, dizziness and drowsiness. Pregnant women and children are particularly vulnerable.
Anthropometry	Measurement of the human body. It is used to measure and monitor the nutritional status of an individual or population group Assessment of the size, proportions, and composition of the human body, reflecting both health and nutritional status and predicting performance, health, and survival.
Bilateral Pitting Oedema	Bilateral pitting oedema, also known as nutritional oedema, kwashiorkor or oedematous malnutrition, is a sign of severe acute malnutrition (SAM). It is defined by bilateral pitting oedema of the feet and verified when thumb pressure applied on top of both feet for three seconds leaves a pit (indentation) in the foot after the thumb is lifted.
Body Mass Index	Body mass index (BMI) is a simple index of weight-for-height that is commonly used to classify overweight and obesity in adults. It is defined as a person's weight in kilograms divided by the square of his height in meters (kg/m2).
Breast milk Substitute (BMS)	Any food marketed or otherwise represented as a partial or total replacement for breast milk, whether or not suitable for that purpose.
Chronic Malnutrition	Chronic malnutrition is also referred to as stunting and develops as a result of inadequate nutrition or repeated infections or both, over an extended period of time; typically, during the critical window of opportunity of the first 1,000 days from conception to two years of age. It is measured by the nutritional index of HAZ and is manifested by a child being too short for his or her age. Unlike wasting, the development of stunting is a slow cumulative process that may not be evident immediately. Chronic malnutrition is possibly irreversible after 24 months of age and its prevention should be prioritised.
Cochrane Review	Systematic reviews of primary research in human health care and health policy, and are internationally recognized as the highest standard in evidence-based health care resources. They investigate the effects of interventions for prevention, treatment, and rehabilitation.
Community- Based Management of Acute Malnutrition (CMAM)	CMAM refers to the management of acute malnutrition through: 1) inpatient care for children with SAM with severe medical complications and infants under 6 months old with SAM or loss of weight, failure to gain weight and ineffective feeding; 2) outpatient care for children with SAM without medical complications 3) community participation; and 4) supplementary feeding for children with moderate acute malnutrition (MAM) that may be provided depending on the context in the country of implementation.
Complementary feeding	(Adapted from WHO definition). The transition from exclusive breastfeeding to complementary feeding – typically covers the period from 6–24 months of age. This is a critical period of growth

Terminology	Explanation
	during which nutrient deficiencies and illnesses contribute globally to higher rates of undernutrition among children under five years of age. The SUN Movement aligns with the WHO recommendation that infants should be exclusively breastfed for the first six months of life to achieve optimal growth, development and health. Thereafter, infants should receive nutritionally adequate and safe complementary foods, while continuing to breastfeed for up to two years or more. Specificities of complementary foods are their high energy density (need to provide enough energy in a small volume, given the small size of infant's stomachs), their consistency, adapted to the chewing capacities of infants. Complementary foods must also provide all necessary micronutrients, fatty acids and proteins to allow optimal growth and development, ideally in complement to the breastmilk.
Cost effectiveness	A form of economic evaluation where costs are expressed in money terms but consequences are expressed in physical units. It is used to compare different ways of achieving the same objective.
Coverage	The extent of interaction between the service and the people for whom it is intended. Coverage is not to be limited to a particular aspect of service provision, but ranges from resource allocation to the achievement of the desired objective.
Disability adjusted life years (DALYs)	A measure of overall disease burden, expressed as the number of years lost due to ill-health, disability or early death. It was developed in the 1990s as a way of comparing the overall health and life expectancy of different countries.
Double burden of malnutrition	The coexistence of undernutrition (including wasting, stunting and micronutrient deficiencies) along with overweight, obesity or diet-related NCDs. It represents a serious public health challenge and can occur at the individual, household and population levels, and across all income groups in all regions of the world.
Effectiveness	The extent to which a specific intervention, procedure, regimen or service, when deployed in the field in routine circumstances, does what it is intended to do for a specified population.
Environmental enteropathy	Environmental enteropathy is a subclinical condition caused by constant faecal-oral contamination and resulting in blunting of intestinal villi and intestinal inflammation
Evidence	Any form of knowledge, including, but not confined to research, of sufficient quality to inform decisions.
Exclusive breastfeeding	(Adapted from WHO definition). Breast milk contains all the nutrients an infant needs in the first six months of life. It protects against common childhood diseases such as diarrhoea and pneumonia, and may also have longer-term benefits such as lowering mean blood pressure and cholesterol, and reducing the prevalence of obesity and type-2 diabetes. The SUN Movement aligns with the WHO recommendation on exclusive breastfeeding whereby infants receive only breast milk, no other liquids or solids– not even water – for the first six months of life, to achieve optimal growth, development and health. Thereafter, infants should receive nutritionally adequate and safe complementary foods, while continuing to breastfeed for up to two years or more.
First 1000 days	The 1000 days between a woman's pregnancy and the child's second birthday. This timeframe is seen as a crucial window to shape a child's life. High quality nutrition interventions during the first 1000 days have an enormous positive impact on a child's cognitive development. During this time, undernutrition can have serious irreversible consequences, including stunting, cognitive impairments, a weakened immune system, and sometimes death.
Food security	When all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and preferences for an active and healthy life.
Fortification	The process of adding micronutrients, or restoring those lost during processing, to food products.
Fragile states	States that lack either the capacity, or the will (or both), to deliver core state functions for the majority of the people, including the poor. The most important functions of the state for poverty reduction are territorial control, safety and security, capacity to manage public resources, delivery of basic services, and the ability to protect and support the ways in which the poorest people sustain themselves.
Global Acute Malnutrition (GAM)	GAM is a population-level indicator referring to overall acute malnutrition prevalence, defined by wasting measured by WFH < -2 z-score (WHO standards, 2006) or the presence of bilateral pitting oedema. GAM is divided into moderate and severe acute malnutrition (GAM = SAM + MAM).
Growth failure:	The condition where an individual is shorter and/or thinner than their well-nourished counterparts and where the individual does not meet her/his growth potential. Growth may fail due to

Terminology	Explanation
	deficiencies of various micronutrients, energy, protein and/or macro-minerals.
Health Systems Strengthening	(i) The process of identifying and implementing the changes in policy and practice in a country's health system, so that the country can respond better to its health and health system challenges; (ii) any array of initiatives and strategies that improves one or more of the functions of the health system and that leads to better health through improvements in access, coverage, quality, or efficiency.
Height for-age	A measurement of height relative to chronological age. Low height-forage in children reflects stunting. Height-for-age z-score (HAZ) is a nutritional index that shows how a child's height compares to the weight of a child of the same age and sex in the WHO growth standards.
Impact	(i) The total, direct and indirect, effects of a programme, service or institution on a health status and overall health and socio-economic development. (ii) positive or negative, long-term or medium-term effects produced by a programme or intervention. (iii) the degree of achievement of an ultimate objective.
Infant and young child feeding	Term used to describe the feeding of infants (less than 12 months old) and young children (12–23 months old). IYCF programs focus on the protection, promotion and support of exclusive breastfeeding for the first six months; timely introduction of complementary feeding and continued breastfeeding for two years or beyond.
Low birth weight	Weight at birth less than 2,500 grams.
Malnutrition	Occurs when the nutrient and energy intake does not meet or exceeds an individual's requirements to maintain growth, immunity and organ functions. Malnutrition is a general term and covers both undernutrition and overnutrition (overweight/obesity).
Meta-analysis	A meta-analysis is a method for statistically combining the results of studies that are included in a systematic review, to come to a conclusion about the overall effects of an intervention. Meta-analysis determines not just whether there was a significant effect, but about the direction (positive or negative) and the magnitude of the effects (how strong they were).
Micronutrient Deficiencies	Micronutrient deficiencies are a consequence of reduced or excess micronutrient intake and/or absorption in the body. The most common forms of micronutrient deficiencies are related to iron, vitamin A and iodine deficiency.
Mid-Upper Arm Circumference (MUAC)	Low MUAC is an indicator for wasting, used for a child that is 6 to 59 months old. MUAC < 115 mm indicates severe wasting or SAM. MUAC ≥ 115 mm and < 125 mm indicates moderate wasting or MAM. MUAC is a better indicator of mortality risk associated with acute malnutrition than WFH in children 6–59 months old.
Minimum Acceptable Diet	Proportion of children 6–23 months of age who receive a minimum acceptable diet (apart from breast milk). Because appropriate feeding of children 6–23 months is multidimensional, it is important to have a composite indicator that tracks the extent to which multiple dimensions of adequate child feeding are being met. The minimum acceptable diet indicator combines standards of dietary diversity and feeding frequency by breastfeeding status. The numerator includes only those children who have received both the minimum dietary diversity and the minimum meal frequency for the child's breastfeeding status. The indicator thus provides a useful way to track progress at simultaneously improving the key quality and quantity dimensions of children's diets.
Minimum Dietary Diversity	Proportion of children 6–23 months of age who receive foods from 4 or more food groups. Dietary diversity is a proxy for adequate micronutrient-density of foods. Dietary data from children 6–23 months of age in 10 developing country sites have shown that consumption of foods from at least 4 food groups on the previous day would mean that in most populations, the child had a high likelihood of consuming at least one animal-source food and at least one fruit or vegetable, in addition to a staple food. The 7 foods groups used for calculation of this indicator are: — grains, roots and tubers — legumes and nuts — dairy products (milk, yoghurt, cheese) — flesh foods (meat, fish, poultry and liver/organ meats) — eggs — vitamin-A-rich fruits and vegetables — other fruits and vegetables.
Minimum Dietary Diversity for Women	MDD-W is a dichotomous indicator of whether or not women 15-49 years of age have consumed at least five out of ten defined food groups the previous day or night. Even though the indicator is

Terminology	Explanation
(MDD-W)	measured by asking questions of individual women, it is a population-level indicator, i.e. it is designed to tell us something about micronutrient adequacy of groups of women. Groups of women who achieve minimum dietary diversity (i.e. meet the threshold of five or more groups) are more likely to have higher (more adequate) micronutrient intakes than groups of women who do not.The 10 food groups that comprise the MDD-W indicator are: Grains, white roots and tubers, and plantains; Pulses (beans, peas and lentils); Nuts and seeds; Dairy; Meat, poultry and fish; Eggs; Dark green leafy vegetables; Other vitamin A-rich fruits and vegetables; Other vegetables; Other fruits
Minimum Meal Frequency	Proportion of breastfed and non-breastfed children 6–23 months of age, who receive solid, semi-solid, or soft foods (but also including milk feeds for non-breastfed children) the minimum number of times or more. The number of meals that an infant or young child needs in a day depends on how much energy the child needs (and, if the child is breastfed, the amount of energy needs not met by breast milk), the amount that a child can eat at each meal, and the energy density of the food offered. When energy density of the meals is between 0.8–1 kcal/g, breastfed infants 6–8 months old need 2–3 meals per day, while breastfed children 9–23 months need 3–4 meals per day, with 1–2 additional snacks as desired. Children who are not breastfed should be given 1–2 cups of milk and 1–2 extra meals per day. Acceptable milk sources include full cream animal milk, Ultra High Temperature milk, reconstituted evaporated (but not condensed) milk, fermented milk or yoghurt. For breastfed children, minimum is defined as 2 times for infants 6–8 months and 3 times for children 9–23 months. For non-breastfed children, minimum is defined as 4 times for children 6–23 months.
Moderate Acute Malnutrition (MAM)	Moderate acute malnutrition (MAM): represents the proportion of children 6-59 months in the population who are classified with WHZ ≥-3 and < -2 and or MUAC >=115 mm and <125 mm.
Monitoring	The continuous oversight of an activity to assist in its supervision and to see that it proceeds according to plan. Monitoring involves the specification of methods to measure activity, use of resources, and response to services against agreed criteria.
Multiple Micronutrient Powder	MNPs are single-dose packets of powder containing iron, vitamin A, zinc and other vitamins and minerals that can be sprinkled onto any semi-solid food at home or at any other point of use to increase the content of micronutrients in a child's diet. (Multiple micronutrient powders are usually formulated in sachets of 15 micronutrients: vitamins A, D, E, C, B1 (thiamine), B2 (riboflavin), B3 (niacin), B6, B12, folate, iron, zinc, copper, selenium, iodine.) This is done without changing the usual diet. The recommended dosage is 90 MNP sachets over a 6 month period irrespective of the age of the child.
Multiple Micronutrient Supplements	Formulated by UNICEF,WHO, and United Nations University, the international multiple micronutrient preparation (usually a pill or tablet) contains one recommended dietary allowance of 15 micronutrients and provides multiple micronutrient supplementation in pregnancy
Non-communicable diseases	Diseases of long duration and generally slow progression. The four main types of non-communicable diseases are cardiovascular diseases (like heart attacks and stroke), cancer, chronic respiratory diseases (such as chronic obstructed pulmonary disease and asthma) and diabetes.
Nutrition sensitive interventions	Approaches that address the underlying and basic causes of malnutrition through indirect but plausible pathways and take into consideration the cross-sector impact on nutrition (e.g. poverty, food insecurity, education, women's empowerment and social status).
Nutrition specific interventions	Programs and plans that are designed to address the direct causes of malnutrition and to have a specific impact on nutrition outcomes. These include: support for exclusive breastfeeding; appropriate complementary feeding; micronutrient fortification and supplementation; and treatment of acute malnutrition.
Obesity	Abnormal or excessive fat accumulation that may impair health. A person is generally classified as obese if their Body Mass Index is greater than or equal to 30.
Optimal breastfeeding	Optimal breastfeeding practices include exclusive breastfeeding (breastmilk with no other foods or liquids) for the first six months of life, followed by breastmilk and complementary foods (solid or

Terminology	Explanation
	semi-solid foods) from about six months of age on, and continued breastfeeding for up to at least two years of age or beyond, while receiving appropriate complementary foods.
Over-nutrition	A chronic condition where intake of food is in excess of dietary energy requirements, resulting in overweight and/or obesity.
Overweight	Abnormal or excessive fat accumulation that may impair health. A person is generally classified as overweight if their Body Mass Index is greater than or equal to 25.
Outcome	Those aspects of health that result from the interventions provided by the health system, the facilities and personnel that recommend them and the actions of those who are the targets of the interventions.
Output	The quantity and quality of activities carried out by a programme.
Pre-term	Preterm refers to a baby born before 37 weeks of pregnancy have been completed. Normally, a pregnancy lasts about 40 weeks.
Public health	An organized effort by society, primarily through its public institutions, to improve, promote, protect and restore the health of the population through collective action. It includes services such as health situation analysis, health surveillance, health promotion, prevention, infectious disease control, environmental protection and sanitation, disaster and health emergency preparedness and response, and occupational health, among others.
Randomised Control Trial (RCT)	A randomised controlled trial is a type of scientific (often medical) experiment which aims to reduce bias when testing a new treatment. The subjects are randomly allocated to either the group receiving the treatment under investigation or to a group receiving standard treatment (or placebo treatment) as the control. Randomisation minimises selection bias and the different comparison groups allow the researchers to determine any effects of the treatment when compared with the no treatment (control) group, while other variables are kept constant. The RCT is often considered the gold standard for a clinical trial.
Ready-to-Use Therapeutic Food (RUTF)	RUTF is an energy-dense, mineral- and vitamin-enriched food specifically designed to treat SAM. RUTF has a similar nutrient composition to F100. RUTF is soft food that can be consumed easily by children from the age of 6 months without adding water. RUTF is not water-based, meaning that bacteria cannot grow in it and that it can be used safely at home without refrigeration and in areas where hygiene conditions are not optimal. It does not require preparation before consumption. Plumpy'nut® is an example of a commonly known lipid-based RUTF.
Routine Health Services	Routine health services refer to those services provided at health facilities depending on staff capacity and facility resources. These services include the essential health care package and other services.
Scale-Up	Scale-up involves the expansion of services (e.g., from the pilot phase to the programme phase, as part of a strategy to expand geographical coverage to the targeted area or nationally).
Severe Acute Malnutrition (SAM)	SAM is defined by the presence of bilateral pitting oedema or severe wasting (WFH> <-3 Z scores and or MUAC < 115 mm). A child with SAM is highly vulnerable to infections and has a high mortality risk. SAM can also be used as a population-based indicator defined by the presence of bilateral pitting oedema or severe wasting.
Situation analysis	Analysis of the current status and expected trends in a country's health and health system. Ideally includes: (i) assessment of current and future health needs and determinants of health; (ii) assessment of expectations and demand of services; (iii) assessment of the health system performance, health sector capacity and health system resources, and the gaps in responding to current and future needs and expectations; and analysis of stakeholder positions.
Small-for-gestational age	Small for gestational age is a term used to describe a baby who is smaller than the usual amount for the number of weeks of pregnancy. SGA babies usually have birthweights below the 10th percentile for babies of the same gestational age.
Specialized nutritious foods	Refers to the range of specialized food products and supplements that provide varying levels of energy, micronutrients, and macronutrients necessary for growth and health in order to prevent or treat undernutrition. Specialized nutritious foods are often defined or categorized as follows: Ready-to-Use foods (RUF): is the existing generic term that refers to foods that do not need to be prepared, cooked, or mixed with water. Ready-to-Use Supplementary Food (RUSF) is a type of RUF that is specifically designed for the treatment of moderate acute malnutrition in children 6-59 months of age. Ready-to-Use Therapeutic Food (RUTF) is an energy-dense mineral and vitamin-

Terminology	Explanation
	enriched RUF (see glossary definition). Fortified blended foods (FBF) are a mixture of cereals and other ingredients (such as soya beans or pulses) that have been milled, blended, pre-cooked by extrusion or roasting, and fortified with a premix and with a wide range of vitamins and minerals. Micronutrient powders (MNPs) are a mix of multiple micronutrients used in programmes to prevent MND among children 6-59 months, and are also increasingly to prevent MND among school-age children through school feeding programmes. MNPs are distributed in small sachets that are added to solid or semi-solid foods after preparation and prior to consumption. MNPs are tasteless, odourless and easily dissolvable in most warm foods MNPs do not provide energy, but do provide the complete FAO/WHO recommended daily intake for each micronutrient per dose. Most countries use the 15-micronutrient formulation.
Still-birth	A stillbirth is a baby born dead after 24 completed weeks of pregnancy. If the baby dies before 24 completed weeks, it's known as a miscarriage or late foetal loss.
Stunting	Low height-for-age measurement used as an indicator of chronic malnutrition, calculated by comparing the height-for-age of a child with a reference population of well-nourished and healthy children. Defined by a height-for-age z-score (HAZ) < −2.
Supplementary Foods	Supplementary foods are specially formulated foods, in Ready-to-Use (see Specialised Nutritious foods) or in milled form, which are modified in their energy density, protein, fat or micronutrient composition to help meet the nutritional requirements of specific populations. Supplementary foods are not intended to be the only source of nutrients and are different from complementary foods, in that the latter are intended for progressive adaptation of infants 6 months of age and older, to family foods. They are also different from food supplements, which refer to vitamin and mineral supplements in unit dose forms such as capsules, tablets, powders or solutions, where national jurisdictions regulate these products as food. Supplementary foods have been used to rehabilitate moderately malnourished persons or to prevent a deterioration of nutritional status of those most at risk by meeting their additional needs, focusing particularly on children 6–59 months of age, pregnant women and lactating mothers. Examples of supplementary foods include fortified blended foods, which can be used to prepare smooth, ready-to-eat porridges, and lipid-based nutrient supplements.
Systematic review	A type of literature review that collects and critically analyzes multiple research studies or papers, using methods that are selected before one or more research questions are formulated, and then finding and analysing studies that relate to and answer those questions in a structured methodology. They are designed to provide a complete, exhaustive summary of current literature relevant to a research question. Systematic reviews of randomized controlled trials are key in the practice of evidence-based medicine.
Undernutrition:	Undernutrition occurs as a consequence of an insufficient intake of energy, protein and/or micronutrients, poor absorption or rapid loss of nutrients due to illness or increased energy expenditure. Undernutrition encompasses low birth weight, stunting, wasting, underweight, bilateral pitting oedema and micronutrient deficiencies.
Underweight	The prevalence of underweight in children under five years of age reflects child growth. It is measured as the percentage of children less than five years of age whose weights are more than 2 standard deviations below the median of a standard population such as that of NCHS/WHO table of child weights.
Wasting	(Also known as acute malnutrition). Reflection of a recent and severe process that has led to substantial weight loss, usually associated with starvation and/or disease. Wasting is calculated by comparing the weight-for-height of a child with a reference population of well-nourished and healthy children. Often used to assess the severity of emergencies because it is strongly related to mortality. Defined by a weight-for-height z-score (WHZ) < −2 or a MUAC < 125 mm.
Weight -for- age	A measurement of body mass relative to chronological age. Low weight-for- age in children reflects underweight. Weight-for-age z-score (WAZ) is a nutritional index that shows how a child's weight compares to the weight of a child of the same age and sex in the WHO growth standards.
Weight-for-height	A measurement of body weight relative to height. Low weight-for-height in children reflects wasting. High weight-for-height is described as "overweight." Weight-for-height z-score (WHZ) is a nutritional index that shows how a child's weight compares to the weight of a child of the same length/height and sex in the WHO growth standards.

Terminology	Explanation
Women of reproductive age	Refers to all women aged 15 to 49 years.
Z-score	A statistical measure in units of standard deviations (SD) of a value from the mean, describing how far and in what direction an individual's anthropometric measurement deviates from the median in the 2006 WHO Child Growth Standards for his or her sex. An individual's z-score can be used to classify how malnourished he or she is. A mean z-score can also be calculated to determine the nutritional status of a population group.

ANNEX 4
Grading the quality and strength of evidence

This Annex explains how the quality of evidence presented in the evidence practice briefs was graded as high, moderate or low, and how conclusions on the strength of the body of evidence were reached.

Where the evidence had already been graded

Researchers commonly use a tool called GRADE (Grading of Recommendations, Assessment, Development and Evaluations) for grading the quality of evidence and for making recommendations. Much of the evidence cited by this resource had already been graded using this tool.

GRADE has four levels of evidence: very low, low, moderate, and high. GRADE starts with a baseline rating of high for randomised control trials (RCTs) and low for non-RCTs. The level is increased or decreased based on several factors including risk of bias, inconsistency, indirectness, imprecision, publication bias.

GRADE quality ratings	What it means
Very low	The true effect is probably markedly different from the estimated effect
Low	The true effect might be markedly different from the estimated effect
Moderate	The true effect is probably close to the estimated effect
High	The true effect is similar to the estimated effect

Source: BMJ Best Practice, http://bestpractice.bmj.com/info/toolkit/learn-ebm/what-is-grade/

In this resource tool the grading levels were applied as follows:

Grading levels used in this resource	GRADE levels
High	High
Moderate	Moderate
Low	Low and Very Low

Where the evidence had not already been graded

For evidence where the quality of the evidence has not been cited, the same grading levels were used (high, moderate and low) based on similar criteria, i.e. rating of high for RCTs and low for non-RCTs, then increasing or decreasing the levels based on several factors including risk of bias, inconsistency, sample size, publication bias etc.

Summarising the strength of the body of evidence for each intervention

In each of the briefs in this resource, statements are made summarising the strength of the overall evidence relating to the interventions and their impact on health and nutrition. The authors have reviewed the body of evidence presented in the brief and considered the following aspects to determine the strength of evidence: the number of studies, the effect shown by the studies and the quality of the studies.

In this resource tool the levels were applied as follows:

Strength of evidence levels	What it means
No evidence	No effect was seen by the studies
Limited evidence	The number and/or quality of studies was low
Inconclusive evidence	The effect shown by the studies was not consistent enough to make a conclusion
Weak evidence	The number and/or quality of studies was low even though there may have been an effect
Mixed evidence	The evidence from different studies showed different effects
Moderate evidence	The number or quality of studies was moderate even though there may have been an effect
Strong evidence	The number, quality and effect were high

It is important to bear in mind that that no, limited or weak evidence does not necessarily mean that an intervention should be de-prioritised, as in fact it may simply represent the challenges of proving impact and / or the fact that the number of studies has been low.

ANNEX 5
Decision tool for strengthening integration of nutrition within health sector programmes

Using a step approach to guide EU investments

The purpose of this tool is to facilitate an effective process for the identification of priority nutrition investments within health sector programmes using a health-system-strengthening approach and taking the country context into account. It is intended to complement the evidence base for the interventions presented in the main body of the resource and support decision making.

The tool follows a series of steps illustrated in Figure A5-1. These are a situational and causal analysis (Step 1), identifying response priorities for the health sector (Step 2), identifying commitments and capacities (Step 3) and Strategy for EU engagement (Step 4). Each of these steps is described more fully in subsequent sections. The evidence and corresponding analysis presented in the twelve evidence-based practice briefs can be used to inform the process, e.g. which interventions are relevant depending on the nutrition situation (Steps 1 and 2), what are the current commitments and health systems capacity to deliver the selected priority interventions (Step 3), and what should be the strategy for EU engagement and which indicators can be used to monitor progress and the results of EU investment (Step 4). A number of useful tools and resources already exist and these are presented or referred to under each of the steps. Finally, a decision tree is presented that shows how each of the steps leads to a decision-making process.

Figure A5-1. Steps to guide EU investments

Situational and causal analysis: understanding the problem and main drivers (causal analysis), and analysis over time

- Understanding the nutritional situation - who is malnourished and why? Where do they live? What are the different forms of malnutrition that coexist? Are there particular times of the year when they are more vulnerable to malnutrition and why? (Requires disaggregated analysis by wealth, sex, age, location/region and identification of data gaps).
- Understanding national legislation and regulations, and extent of implementation.
- Understanding national policies, strategies and programmes (and related funding envelope), and extent of implementation, as well as national coordination and governance for nutrition.
- Understanding coverage/access to existing services (requires disaggregated data: see above).

Identifying response priorities for the health sector

- Based on step 1, identify gaps in availability and implementation of legislation/regulations and policies, and priority services to be enhanced/delivered.
- Drawing on the evidence presented in the evidence briefs, select relevant cost-effective high impact nutrition interventions.

Identifying commitments and capacities

- Comprehensive assessment of the capacity of the health system to deliver (priority) nutrition interventions (based on step 2), and development of costed capacity building roadmap (this would cover not only human resources, but also an appraisal of the supply chain and national information systems).
- Resource mapping for the sector and in particular in support of selected priority interventions (based on step 2) (including donors, Civil Society Organisations, community networks/initiatives).

Strategy for EU engagement

- Based on steps 1–3, decisions can be made on how EU investments can best support the delivery or scaling-up of the selected priority interventions through health system programmes - supporting policy development, system strengthening, programme delivery and monitoring, including related capacity development as required.
- Identification of modalities for assistance, taking account of country context.
- Robust M&E needed to monitor whether interventions are effective and to enable adjustments based on findings.
- Data from M&E can influence national policy and strategies of other donors.

Step 1
Situational and causal analysis: Understanding the problem and main drivers

Purpose of a Situational and Causal Analysis

The purpose of a situational analysis is to assess and understand the nutritional situation including underlying factors (causal analysis) which can subsequently inform which nutrition interventions to prioritise.

Situation–causal–response analysis should ideally be conceived and undertaken as a comprehensive process (i.e. a causal analysis can only be as robust as the information it is premised on, and is only as useful as the practical application of its findings). The processes should be focused not only on knowledge but crucially also on learning and capacity development, such that the process is understood from the outset to be at least as important as the product. Furthermore, key stakeholders (whether national, district, community etc.) should optimally participate and collectively advance their understanding and analytical skills.

WHAT intervention to support and WHY?

This should include an assessment of national legislation, regulations and policies and extent to which these have been implemented, as well as an assessment of national programmes and their reach. Disaggregated data will be required (wealth, sex, age, geographic distribution) to determine population groups most affected. This information will be crucial for the prioritisation of specific policy response and for targeting to ensure those most vulnerable will be reached.

The analysis will provide key information on immediate, medium and more sustainable longer term solutions to address identified malnutrition problems, for which involvement of other sectors might be crucial (as highlighted in the various evidence based practice briefs).

For example, if levels of wasting are classed as 'Acceptable' according to thresholds (see acute malnutrition brief) and interventions to identify acute malnutrition early and address it are integrated within health sector programmes, then EU Investment might be better directed towards addressing basic or underlying causes of acute malnutrition or towards other nutrition interventions. The EU Country Fiches will already provide a useful starting point for the situation analysis.

WHO requires support, WHERE and WHEN?

1. WHO: Determining who suffers from which types of malnutrition will also guide EU investments. For example, is iron-deficiency anaemia a public health problem amongst children and women or just one of these groups?

2. WHERE: It is further important to know how investments should be targeted geographically. If vitamin A deficiency amongst children under 5 is identified as a problem, does this apply to the entire country or are there particular pockets (or districts) that are affected?

3. WHEN: Are there particular times of the year when the nutritional situation worsens? For example, do levels of acute malnutrition significantly increase during the lean (pre-harvest) seasons? Are appropriate young child complementary feeding rates affected by women going out to harvest?

How is the nutritional situation likely to change if at all over time? Is there conflict which may worsen? How will climate change affect the nutritional status of the population?

WHAT is the current RESPONSE?

How is the Government addressing the undernutrition problems? Is there a National Nutrition Action Plan? How is coverage/access to existing services? How are donors and other stakeholders responding? Are all the nutrition problems being adequately addressed? Are there funding gaps?

Please refer to the appendix to this annex for **(**1) a figure showing the key areas of situational analysis, (2) a table showing the data sources for each of the questions in diagram 1, (3) useful tools and resources and (4) example TORs for nutrition situation and causal analysis. The appendix related to step 1 also provides a list of useful resources including sample Terms of Reference for conducting a nutrition situational and causal analysis.

Step 2
Identifying response priorities for the health sector

Purpose of prioritising interventions

The situational and causal analysis covered under Step 1 above should assist in identifying the nutritional problems and basic and underlying causes. Setting criteria for selection of interventions, allows for the systematic choice of the most appropriate intervention to address those problems. The National Nutrition Policy and Plan of Action, if available, should provide guidance in that respect. Setting the right criteria will optimise cost-effectiveness and enhance objectivity in the choice of interventions. Drawing on the evidence presented in the various briefs (which is also further analysed in the Conclusions section and summarised in the Executive Summary) will also support the process. Criteria should be agreed by key stakeholders such as relevant government staff involved in the (national) nutrition programme implementation (i.e. beyond Ministry of Health and also include Ministry of Agriculture, Ministry of Planning, Ministry of Women and Social Affairs and other relevant Ministries), donors, UN agencies, relevant NGOs, and community representatives. For Scaling Up Nutrition Countries, working through SUN networks will be particularly important.

Example list of criteria to prioritise interventions

The following table (table A5-1) provides an example list of criteria to guide the selection of interventions. Please refer to the Appendix to this Annex for the following: (1) a table describing the intervention selection criteria identified in Step 2, and (2) a section on useful tools and resources.

Table A5-1. Criteria to guide selection of interventions

Criteria
1. Relevance to the defined nutritional problem
2. Political support: already incorporated into national policies
3. Feasibility
4. Integration with existing similar problem
5. Effectiveness ▪ Nutritional and Health impact - Duration of effect - Role of supervision - Reduction of inequalities and inequities ▪ Participation of key stakeholders and increased self-reliance ▪ Strengthening of health systems ▪ Other developmental effects
6. Ease in targeting
7. Cost-effectiveness
8. Ease in monitoring and evaluation
9. Likelihood of the selected intervention(s) to be fully integrated into ongoing long-term national programmes
10. Presence of a funding gap

Step 3
Identifying commitments and capacities supporting the delivery mechanisms

Purpose of assessing the health system

Determining the capacity of the health system will inform decision-makers whether the nutrition interventions can be delivered entirely through the national health system without external support or whether the health system has weaknesses and requires external resources including funding to help strengthen it. In some circumstances, such as in conflict situations, short-medium term parallel structures may be necessary.

The assessment will also determine any health system constraints or challenges affecting coverage. What are the key barriers to scale up, including reaching vulnerable population groups from the demand side and supply side?

Recent joint health system reviews, health system bottleneck analysis or evaluations of the Joint Emergency Preparedness Program (JEPP) when available will most likely provide key information required.

This information together with information on available funding and support from other development partners (Donors, Civil Society Organisation, private sector and community based initiatives) will be crucial to identify and prioritise EU Investments for nutrition interventions delivered through the health sector and identify funding modality options. Furthermore this resource mapping will highlight where the comparative advantage of the EU lies. Similarly, this information will be crucial to identify whether joint programming could be further explored.

Framework for assessment of health system capacity and status of integration of nutrition interventions within health sector programmes

A useful framework for assessing the health system capacity and status of integration of priority nutrition interventions is using the six WHO health systems building blocks as a starting point:

- leadership and governance
- health financing
- information system
- workforce
- Supplies and supply chain management
- Service delivery

The table in Appendix 3 (to step 3) highlights key questions that may be included in a health system capacity assessment, using the 6 WHO health system building blocks as starting point and including the demand for the health service by the people. Under each of the 6 building blocks the current capacity as well as possible challenges and bottlenecks for integration and scale up of identified priority interventions are summarised. Subsequently, opportunities for actions that can be taken to strengthen the system to enable full integration and scale up of priority nutrition interventions delivered through health sector programmes are identified. The development of a costed capacity building roadmap across the 6 building blocks can further support the process.

Other useful resources for the assessment of the capacity of the health system to deliver priority nutrition interventions can be found in Step 3 Appendix.

Step 4
Strategy for EU Engagement Supporting Policy, Programming, and Monitoring and Evaluation

Planning EU Investments

Information from the Situation Analysis (Step 1) and further analysis as part of step 2 will support identification of priority interventions, while based on step 3 a decision can be made on how EU investments can best support the delivery or scaling-up of selected priority interventions through health sector programmes - supporting policy development, system strengthening, programme delivery and monitoring, including related capacity development as required. Care must be taken that the criteria for prioritising EU investment for nutrition delivered through the health sector are well defined and fully understood by everyone. Robust donor/resource mapping (Step 3) is an important prerequisite to this to clarify the comparative advantage of the EU.

Multi-sectoral work and work across the development-humanitarian nexus

Internally within the EU opportunities should be optimised for strengthening linkages with and complementarity of nutrition interventions delivered through health sector programmes and ongoing or planned agriculture/food security programmes, social protection programmes, WASH and education programmes to optimise nutrition and health outcomes. In fragile and conflict affected countries who also receive humanitarian aid, opportunities to establish and strengthen linkages between development and humanitarian programmes should be identified during the programming stage and ongoing close collaboration be ensured.

A strong vision is needed whereby further improving integration of nutrition and health programmes in both humanitarian settings and in routine service provision will ultimately result in improved nutrition and health outcomes and contribute to achieving the EU commitments and the SDGs.

Importance of monitoring and evaluation

Robust monitoring and evaluation (M&E) is important to assess progress of nutrition initiatives against set milestones and targets so that obstacles can be revealed and appropriate corrective actions taken, and successes scaled up in a timely manner. Reliable M&E data will be essential to assess effectiveness and value for money of EU investment. Reliable data are also crucial to inform national evidence-based planning and policy formulation, as well as strategies of other donors. The availability of robust data supports the tracking of country progress towards relevant World Health Assembly targets and SDG indicators.

Summary table of M&E Indicators

The table below summarises some of project based M&E indicators presented in the twelve practice briefs, plus examples of health system indicators to measure the health system strengthening aspect of EU support.

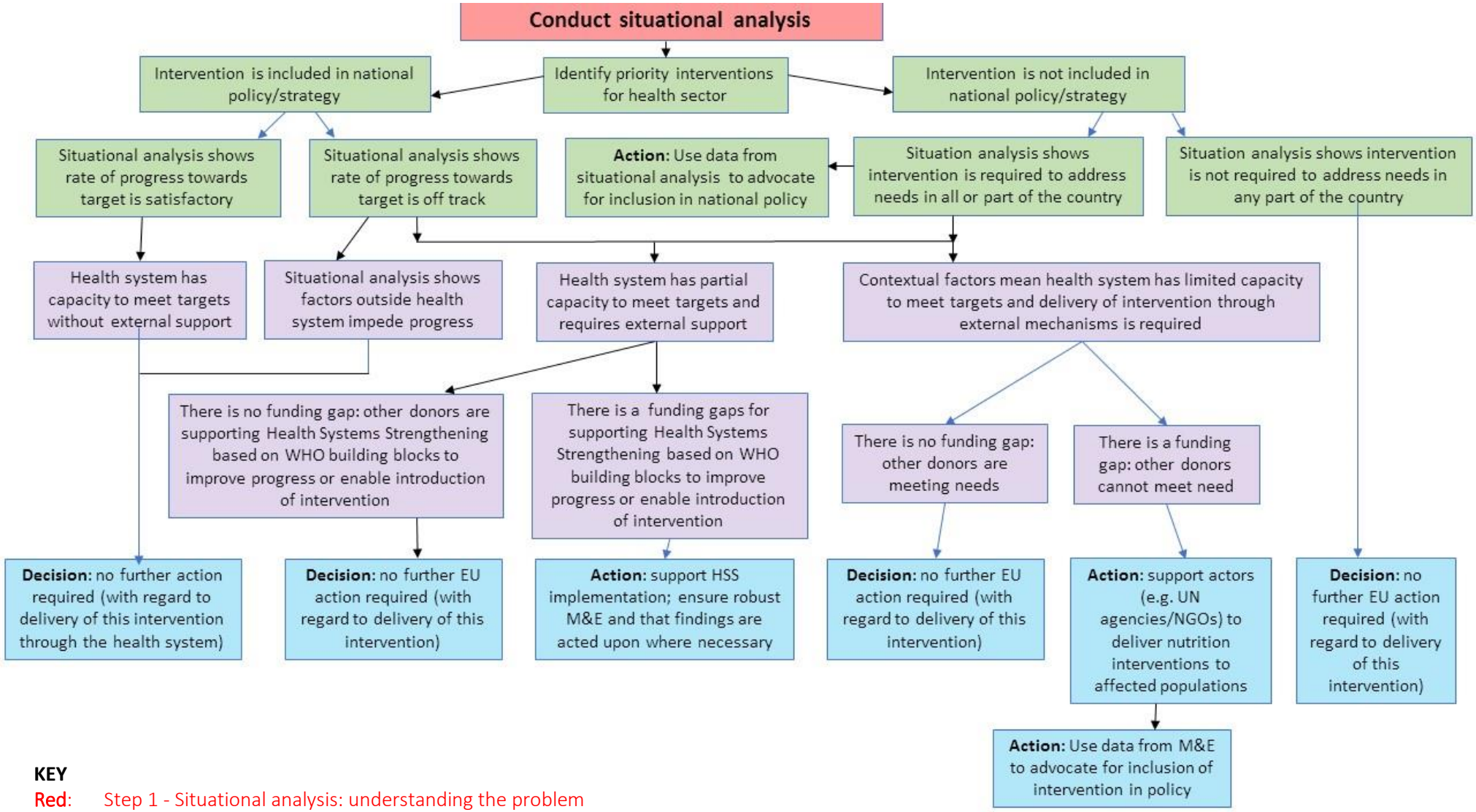
Please refer to the Appendix to Step 4 for: 1) EU support to shaping policy and planning, 2) monitoring and evaluation processes and 3) useful tools and resources.

Table A5-2. Summary table of indicators

Level	Examples of indicators	Source / means of verification	Comments
Impact	Nutrition anthropometry - Stunting – height for age - Wasting – weight for height (children 6 to 59 months) - Prevalence of overweight and obesity Nutrition biochemical indicators - Anaemia - Vitamin A status - Iodine deficiency Health - Child Mortality - Child morbidity – incidence and duration (diarrhoea, other)	Household survey – DHS, MICS, Nutrition SMART survey	- Programme will only CONTRIBUTE to a reduction due to many contextual factors - Significant improvements only visible after several years - Milestones & Targets should match national targets on rate of reduction - Appropriate for all nutrition specific and sensitive interventions - Underweight (weight for age) not generally used
Outcome	IYCF indicators - Breastfeeding indicators – frequency, duration, completion[1] - Minimum Acceptable diet – children 6 to 23 months - Minimum dietary diversity – children 6 to 23 months Management of acute malnutrition - Coverage rates for treatment of acute malnutrition - Cure and defaulter rates for MAM/SAM Micronutrient interventions - Intervention coverage rates e.g. MNP, vitamin A, iron-folate Other - % of households showing improved carer-child interactions as measured through Home Observation for Measurement of the Environment (HOME)[2] - % of households meeting Family Care Indicators[3] - % of mothers/children handwashing at appropriate times - % of women of reproductive age achieving Minimum dietary diversity (MDD-W) Health system strengthening[4] - Existence of an up-to-date national health strategy linked to national needs and priorities - Government expenditure on health as a % of total government expenditure - Number and distribution of health facilities per 10,000 population - Number and distribution of health workers per 10,000 population (physicians, assistance doctors, nurses, midwives)	Household surveys; DHS; MICS	- Programme INFLUENCES outcomes - Programme influences nutrition knowledge, skills or practices and behaviours - HOME or FCI useful when early child development also targeted - Population level results expected to result from the outputs

Level	Examples of indicators	Source / means of verification	Comments
	- % of districts that submit timely, complete, accurate health information reports to national level - Average availability of 14 selected essential medicines in public and private health facilities		
Outputs	- % of front line workers at community and facility level trained - % of district, regional, national level workers trained - Number of children screened/treated for acute malnutrition - % health facilities providing zinc supplements routinely to children with diarrhoea - % health facilities providing micronutrient powders routinely to children 6-23 months of age and children 2-12 years - % health facilities providing micronutrient supplements routinely to women - % of HCFs that provide effective hygiene education as part of routine service provision - % of HCFs with acceptable WASH standards - Number of children from households receiving CCT/UCTs attending regular growth monitoring checks, and mothers attending antenatal check ups - % of carers/beneficiaries attending BCC sessions	Programme monitoring / progress reports; HMIS	- The products of the activities and the intervention
Activities	- Number of BCC sessions conducted - Number of trainings held - Number of BCC materials developed - Number of micronutrient supplements/RUTF cartons procured - Number of CHWs recruited	Programme monitoring / progress reports	- The set of processes by which intervention resources are used in pursuit of the expected results

Combining steps 1–4 into a decision tree. Figure A5-2 below illustrates how these four steps combine to form a decision-tree that enables decisions regarding the introduction or strengthening of any particular evidence-based nutrition intervention within a health system, whether an external delivery system is required (for example in a fragile state) and what are the gaps in funding that may help to steer EU investments.



KEY

Red: Step 1 - Situational analysis: understanding the problem

Green: Step 2 - Identifying priority interventions

Purple: Step 3 - Identifying capacities, commitments and challenges

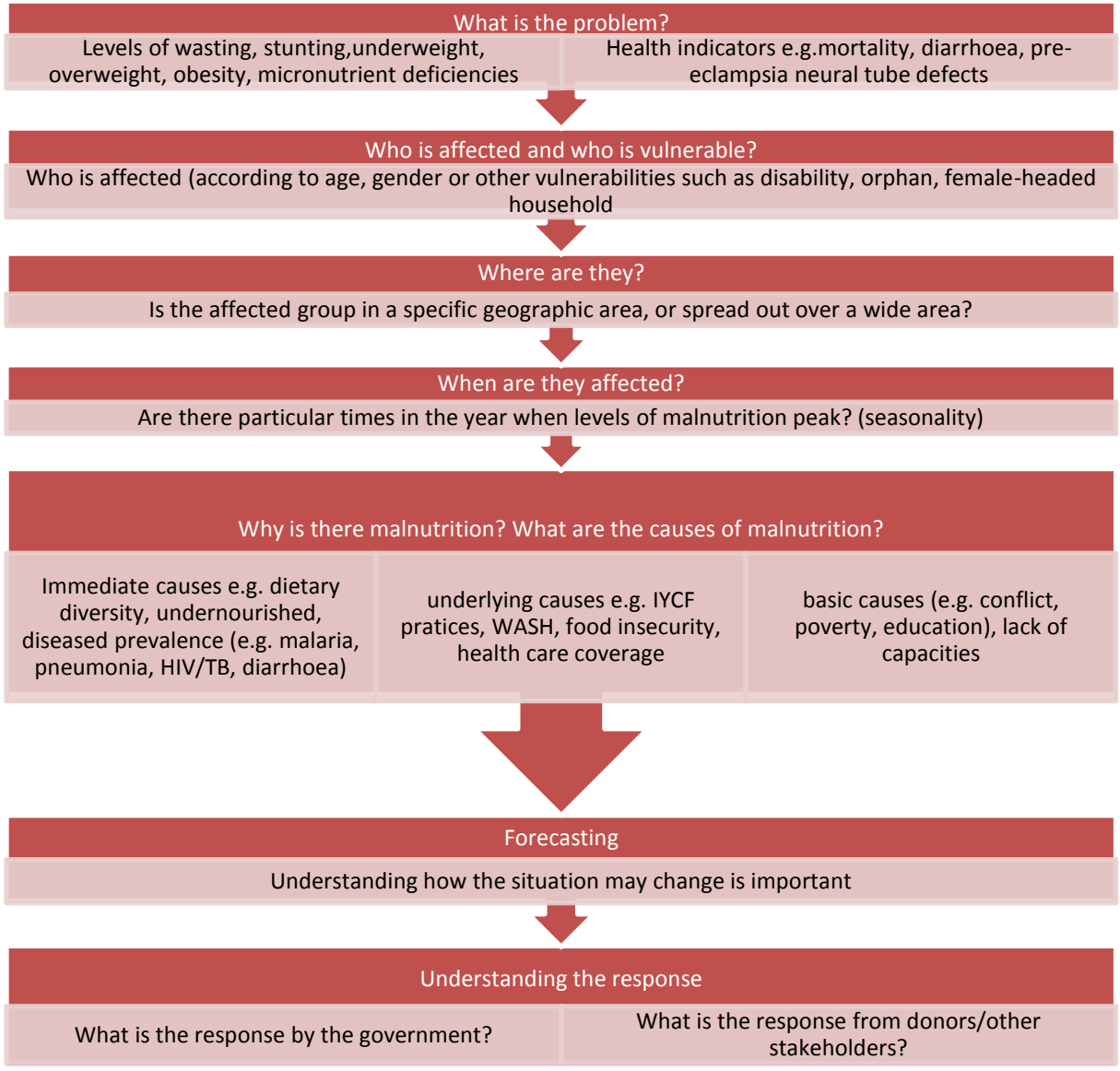
Blue: Step 4 - Strategy for EU engagement

Figure A5-2. Decision Tree for introduction or strengthening of nutrition interventions within health sector programmes (adapted from draft EU Integrating Evidence-based Nutrition Interventions into Health Systems: Instruments for identifying interventions to be improved or introduced)

Appendix 1 (Step 1). Situation and Causal Analysis: Understanding the problem and main drivers

This appendix includes the following additional information:
(1) a figure showing the key areas of situational analysis,
(2) a table showing the data sources for key questions,
(3) useful tools and resources, and
(4) example TORs for nutrition situation and causal analysis.

Key question areas of situational and causal analysis – Figure A5-3



Data sources for the different questions – Table A5-3

Data source	What is the problem?	Who is affected?	Where?	When?	Why?	Forecasting	Response
Nutrition and health surveys (e.g. DHS, MICS, SMART)	✓	✓	✓		✓	✓	
HMIS	✓	✓	✓	✓	✓		
Nutrition coverage survey (SQUEAC/SLEAC)					✓		
Food security surveys					✓		
Early warning data						✓	
Agricultural data					✓		
Causal analysis					✓		
Cost of Diet studies	✓				✓		
PROFILES, Global Nutrition Report, WHO Landscape Analysis	✓	✓	✓	✓	✓	✓	
National nutrition and health plans							✓
Capacity assessments					✓		✓
Donor strategies							✓

Useful tools and resources

The following resource can guide a situational analysis

- FANTA. Nutrition Program Design Assistant: A Tool for Program Planners (NPDA). Reference Guide. Version 2, Revised 2015 http://www.coregroup.org/storage/documents/Resources/Tools/NPDA/NPDA-Workbook-April2015.pdf
- Scaling Up Nutrition – checklist for quality national nutrition plans. http://scalingupnutrition.org/news/the-first-ever-checklist-for-quality-national-nutrition-plans-is-launched/
- Guidance Package on Undertaking a Nutrition Inventory at Country Level, includes a sample TOR for the lead facilitator, a classification framework and accompanying spreadsheet as well as templates for analysis and visual presentation. http://scalingupnutrition.org/sun-supporters/un-network-for-sun/un-network-for-sun-tools-and-resources/
- EuropeAid. Addressing undernutrition in external assistance: An integrated approach through sectors and aid modalities. September 2011. Prepared by the European Commission, Germany, Ireland, France, Poland and the United Kingdom. This document has information on understanding the nutritional situation and assessing priorities.
- Coverage Monitoring Network - Resource for Coverage Surveys: http://www.coverage-monitoring.org/
- Methodology for SMART assessments http://smartmethodology.org/
- Tools for Household Economy Approach and the Cost of Diet: http://www.heawebsite.org/
- Nutrition Causal Analysis - http://linknca.org/tools.htm. The Link NCA is a mixed method combining a strong and expert level qualitative component with a descriptive quantitative component to answer the following research questions:
  - What is the prevalence and severity of wasting and/or stunting in the study population?
  - What is the prevalence of key risk factors for under-nutrition among the population?
  - What are the causal "pathways of under-nutrition" ?
  - How have the prevalence and causes of stunting and/or wasting in this population changed over time?
  - Which causal pathways are likely to explain most cases of under-nutrition?
  - What recommendations can be made for improving nutrition security programming?

Sample ToRs for Nutrition Situation and Causal Analysis

The Box below shows an example of objectives and activities that could be included in TORs for Nutrition Situation and Causal Analysis. Other examples of ToRs can be found at the following places:

- ➔ Annex 6 of https://ec.europa.eu/europeaid/sites/devco/files/methodology-tools-and-methods-series-addressing-undernutrition-201109_en_2.pdf
- ➔ Guidance Package on Undertaking a Nutrition Inventory at Country Level, includes a sample TOR for the lead facilitator, a classification framework and accompanying spreadsheet as well as templates for analysis and visual presentation. http://scalingupnutrition.org/sun-supporters/un-network-for-sun/un-network-for-sun-tools-and-resources/
- ➔ https://www.accioncontraelhambre.org/sites/default/files/terms_of_reference_for_the_link_nutrition_causal_analysis.pdf

Example of objectives and activities that could be included in Terms of Reference for nutrition situation and causal analysis:

(Specific ToRs should be carefully adapted (in consultation with key stakeholders) to a given context, level of analysis, capacities, timeframe, resources, priorities etc.)

Objective 1: Conduct a Nutrition Causal Analysis (NCA) following the Action Against Hunger (AAH) – NCA guidelines.

- Preparatory phase, desk analysis and review for planning Explaining the methodology, Defining objectives, study population and appropriate methodology and study plan of action to the coordination team of Partners (AAH, Unicef and WFP) along with Ministry of Health (Federal and State), as well as to the field teams
- Identify causal hypothesis for Nutrition causal factors, secondary data review & analysis
- existing data
- Conducting Technical expert workshop at State level to share the findings
- Qualitative enquiry, development and pre testing of field survey instruments
- NCA team training and pilot test, data collection and analysing evidence of causes
- Quantitative survey (risk factors survey/SMART)
- Development of household survey instruments
- Pre-Test of the household survey instruments
- Discuss and define with nutrition stakeholders an action plan based on the findings and recommendations of the NCA.
- Descriptive analysis, Rating risk factors, Weighting the different sources of information,
- Rating Risk Factors with communities

Objective 2: Team Management

- Identify human resource requirements for the study
- Participate in the recruitment of its team with the HR and Field Coordinator
- Supervise and manage its direct employees
- Train its team to NCA survey methodology

Objective 3: Communication on the NCA

- Produce an executive summary of the final NCA report
- Ensure the publication of the study.
- Support the advocacy work

Objective 4: Represent and liaise with Government Ministries, Bureau of Statistics, UN agencies, NGOs and local partners

- Facilitate coordination meetings in line with NCA
- Work closely with Nutrition Working Group for validation of the findings of NCA.

Activities of Response Analysis

- Revision of operational recommendations from the Link NCA study: categorising recommendations accepted and those rejected by operational teams
- Ranking of recommendations by order of priority (according to technical strategy but also feasibility, impact, operational priorities…)
- Identification of operational response options.
- Selection of operational response to prioritise and planning for implementation.

Appendix 2 (Step 2). Identifying response priorities for the health sector

This appendix includes the following:
(1) a table describing the intervention selection criteria identified in Step 2, and
(2) useful tools and resources.

Example list of criteria and associated description to guide the selection of interventions

Criteria	Description
1. Relevance to the defined nutritional problem	An intervention is relevant when it is potentially able to correct nutritional problems in the area. The 2-pagers set out when each intervention is recommended and the situational analysis can highlight which nutritional problems exist, for whom, where, when and why.
2. Political support: already incorporated into national policies	Interventions that have political support may have better chances of being integrated into national policies, plans and structures
3. Feasibility	An indication of the extent to which an intervention may be implemented with success. It is determined on the presence or absence of those requirements essential for implementation and on the analysis of constraints capable of preventing or impeding it. Requirements and constraints may differ for each intervention and their nature may be technical, financial, cultural or political.
4. Integration with existing similar problem	As far as possible an intervention should be integrated with existing infrastructure and programmes in a manner that strengthens national programmes and health service delivery and does not require setting up of new structures. The health information system should provide satisfactory data to be able to monitor the interventions according to the indicators set out in the twelve 2 pages. The EC supported National Information Platforms for Nutrition (NIPN) provide support to governments to strengthen their information systems for nutrition and to improve the overall and joined up analysis of data so as to better inform the strategic decisions they are faced with to prevent malnutrition and its consequences.
5. Effectiveness	The extent to which results correspond to objectives indicates the effectiveness of an activity. Evidence has been presented in the twelve practice briefs and summarised in the conclusion and executive summary of the main document.
▪ **Nutritional and Health impact**	The impact of a nutrition intervention delivered through health sector programmes can be expressed in terms of nutrition impact or health impact (please refer to step 4 for further details), A number of aspects ought to be kept in mind (as relevant for specific intervention and country context). (a) The duration of the effect and the distinction between short-term and long-term impact and sustainability of supported change processes; (b) The important role of intensive supportive supervision for reaching and sustaining results cannot be overstated (c) Whether the impact may be observed only in the target population of whether the effect is observed on the total population (d) Whether the intervention will reduce inequalities and inequities between socioeconomic groups, age categories, sexes or geographical zones and inequities or (sometimes unintentionally) might create further inequalities and inequities.
▪ **Participation of key stakeholders and increased self-reliance**	Opportunities to positively engage with relevant beneficiaries and stakeholders. Participation and self-reliance are embedded in the concept of sustainable development.

Criteria	Description
▪ **Strengthening of health systems**	Most interventions have less impact by themselves than in combination with others. The question should be asked: to what extent does the proposed intervention, besides meeting its own objectives, contribute to strengthening health systems and routine health service provision to ensure sustainability of desired positive outcomes. A crucial criteria will therefore be whether the proposed investment will help build stronger health systems through strengthening one (or more) of the 6 health system pillars
▪ **Other development effects**	These could be harmful or positive
6. Ease in targeting	Targeting means focusing the impact of the intervention on a selected group instead of attempting to reach every individual in the population. Three aspects should be considered: (a) Ease in defining the target group (b) Ease in identifying them in practical terms; that is, the characteristics that make it possible to recognize them among the others. (c) Ease in actually reaching the target groups by means of intervention.
7. Cost-effectiveness	Which investment will provide best results with least costs. This is a form of economic evaluation where costs are expressed in money terms but consequences are expressed in physical units. It is used to compare different ways of achieving the same objective.
8. Ease in monitoring and evaluation	Will it be possible to regularly monitor and to evaluate the outcome/impact of the intervention to inform further planning? Please refer to Step 4 for further details.
9. Likelihood of the selected intervention(s) to be fully integrated into ongoing long-term national programmes	The likelihood of the selected intervention(s) to be fully integrated into ongoing long-term national programmes will differ between the interventions and country context including, human and financial resources required to sustainably integrate the intervention(s). A common pattern is for some interventions to last only as long as non-recurrent inputs (government, community or external) are available to support them. The desire is for the intervention to become an on-going budgeted activity.
10. Presence of a funding gap	An intervention which meets most or all of the above criteria but which is not funded through other means, may be a desirable choice for EU funding. Care should be taken to avoid duplicating what other donors are doing and the comparative advantage of the EU should be clear.

Useful tools and resources

- ➔ WHO's OneHealth Tool helps countries to integrate nutrition into existing health-care programmes and systems, which improves cost efficiency. It is primarily intended to inform sector wide national strategic health plans and policies. For instance, the OneHealth Tool makes it possible to compare different scaling-up scenarios in terms of resource and capacity-development needs, both human and financial. It includes both nutrition-specific and sensitive actions and been applied by >25 countries already). http://www.who.int/nutrition/publications/onehealth_tool/en/
- ➔ The Lives Saved Tool (LiST) is a model that estimates the impact of scaling up health and nutrition interventions on maternal, newborn, and child health, and stillbirths. LiST is a part of Spectrum, a software package maintained by Avenir Health. The model has been used for over 10 years and is regularly updated to incorporate the latest evidence from the scientific literature and household survey data. http://www.livessavedtool.org/how-list-works
- ➔ Selecting Effective Interventions slide pack, Centers for Disease Control and Prevention, https://www.cdc.gov/globalhealth/healthprotection/fetp/training_modules/7/selecting-interventions_ppt_final_09252013.pdf

Appendix 3 (Step 3). Identifying commitments and capacities supporting the Delivery Mechanisms

This appendix includes two sections:

(1) useful tools and resources in support of identifying commitments and capacities supporting delivery mechanisms, and

(2) a framework for assessment of health system capacity and status of integration of nutrition interventions within health sector programmes.

Useful tools and resources

There are a number of tools to assess the capacity of the health system to fully integrate and deliver relevant nutrition intervention through routine health services, and on health systems strengthening

- DIVA (Diagnose, Intervene, Verify, Adjust) is UNICEF's approach to strengthening district health systems. The DIVA Bottleneck Analysis Tool allows practitioners to identify bottlenecks at different levels in these local health systems. Available at: https://www.communitysystemsfoundation.org/uploads/1/9/9/2/19920247/[p0287]_unicef_hq_ba_tool_r2.pdf
- UN Network for SUN (UNN) Nutrition Capacity Assessment Guidance Package. Available at: http://scalingupnutrition.org/news/un-network-sun-q2-quarterly-update/
- ACF Manual for Health System Strengthening. Available at: http://www.ennonline.net/fex/49/acfmanual
- The Health System Assessment Approach: A How -to Manual Version 2.0. Available at: http://apps.who.int/medicinedocs/documents/s19838en/s19838en.pdf
- A workable conceptual framework for nutrition related capacity assessment and development for the health sector has been developed by Shrimpton et al. (2013). Available at: http://archive.wphna.org/wp-content/uploads/2013/05/CB-Shrimpo-paper-as-published.pdf
- Also the more recent, 'Monitoring public health nutrition capacity development' Shrimpton et al (2017) https://www.researchgate.net/publication/318993245_Monitoring_public_health_nutrition_capacity_development

A framework for assessment of health system capacity and status of integration of nutrition interventions within health sector programmes

Health system Building Block	Capacity assessment	How this applies to the interventions in this resource	Full capacity for integration	Inhibiting factors / bottlenecks /challenges	Opportunities for strengthening actions
Leadership and Governance	• Is there a nutrition a) strategy b) policy c) action plan, and related legal framework/regulations? • Is there a HSS plan? Does it include nutrition? • Are there specific nutrition policies e.g. food fortification • Are there nutrition co-ordination mechanisms at a) national level b) sub-national level. How well do they function?	• Government policies and plans may indicate which nutrition interventions have been prioritised, where and why. They give an indication of the Government's commitment to nutrition. Aligning investments to Government plans enhances sustainability. • If co-ordination mechanisms exist and are functional, they are a way of co-ordinating interventions and highlighting gaps	• Policies, strategies, guidelines include evidence based nutrition interventions • Integrated health and nutrition coordination mechanisms with MoH and other key Ministries at national and sub national level	• Out of date policies & guidelines • Siloed, unaligned ministries /sectors • Weak coordination/leadership capacities • Information is often not translated into policy and policy needs to be implemented and result in programmes. Often there is a lack of knowledge and accountability within governments and organisations to do this.	• Evidence building and advocacy • Policy update and adaptation • Building multi-sectoral partnerships • Strengthening governance capacities
Financing	• Is there a domestic budget for nutrition? • Is spending on nutrition tracked? • Are there any funding gaps	• The level of domestic funding for nutrition gives an indication of the Government commitment to nutrition and for which interventions. • Financial tracking data will provide information on whether commitments are off-track and whether there are any funding gaps	• Nutrition interventions fully incorporated into costed health action plans • Domestic financing of nutrition including staff, supplies etc • Financial tracking tool	• Limited inclusion of nutrition in action plans or budget • Absence of, or inadequate, budget line for nutrition • Weak planning and budgeting capacities • Limited financial tracking vis-à-vis nutrition targets	• Development of costed nutrition action plan • Strengthening MoH planning and budgeting to include nutrition • Advocacy for increased domestic financing of nutrition
Information systems	• Is there an information system? Are there nutrition indicators in the HMIS? How comprehensive are they? How integrated are the different sources of data e.g. HMIS, nutrition and food security surveys etc? Is the country establishing a National Information Platforms for Nutrition?	• If adequate data cannot be generated by the routine health reporting system, then additional support will be required. Indicators for nutrition-specific interventions may be included but there may be gaps in linking with nutrition-sensitive activities e.g. ECD • The information system should enable a timely response where appropriate	• Nutrition indicators integrated into HMIS • Timely and complete reporting with feedback mechanism • Relevant data from different multisector sources (e.g. HMIS, early warning systems, food security and nutrition surveys) are coherent feed into overall analysis and decision-making • Information system linked with supply chain	• Nutrition information collected in parallel • Weak information system with poor quality and incomplete reporting • No feedback mechanism or performance monitoring • Weak Heath information systems - can we have a core set of indicators to track? Are the WHO indicators fit for purpose? How do we choose the right indicators to track progress of integrated programmes? • Do government policies support integration? and how? • Lack of guidance, evidence and a theory of change for integration	• Support to integration of nutrition in HMIS • Use of innovative information and communication technology to support integration, monitoring of performance and supply chain management e.g. m Dashboard • Use of technology to improve information gathering and dissemination e.g SMS • Establishment of National Information Platforms for Nutrition

Health system Building Block	Capacity assessment	How this applies to the interventions in this resource	Full capacity for integration	Inhibiting factors / bottlenecks /challenges	Opportunities for strengthening actions
			management • Effective Information sharing and knowledge management	(especially in low and middle income countries and FCAS).	
Workforce/ Human Resources	• Does the health work force have the capacity, including different competencies at different levels, to deliver nutrition interventions at all levels? • Is there an effective supportive supervision mechanism integrated with continuous education in place? • Are nutrition modules integrated in the pre-service/in-service efforts of appropriate ministries?" • Is nutrition part of the curricula in nursing, midwifery, and medicine schools.	• If the staff of the health system cannot deliver the nutrition services, investments can strengthen the workforce for health or in some contexts (e.g. conflict) parallel structures may be required. • Different interventions require different skills e.g. support for breast-feeding and complementary feeding requires counselling skills whereas the treatment of acute malnutrition requires different knowledge	• Health workers trained (pre and in-service) and supported to deliver integrated nutrition interventions • Provision for appropriate number of skilled, motivated health workers, proximate to their communities • Continuous education and learning, professional development & supportive supervision	• Shortage of trained health workers affected by high attrition and low motivation • Inadequate adaption / integration of nutrition into pre-service curriculum • Under-sourced and irregular supportive supervision • Lack of standardised job descriptions and responsibilities for integrated activities • Poorly trained and supported staff can give poor quality service and reduce outcomes – well delivered, appropriate training and support can improve quality of delivery • Adding additional components to services without additional resource can overload staff	• Mentoring, supportive supervision, job aids • Adaptation of pre-service curriculum • More systematic and comprehensive in service training on nutrition • E-learning, professional development, peer support with effective models to combat turnover • Task shifting e.g use of community health workers
Supplies and supply chain management	• Is there an essential medicine list? Are nutrition commodities included? • Who is responsible for the procurement and delivery of supplies? •	• Those nutrition commodities that are beyond the budget of the Government may need financial support. The Government may be more able to fund micronutrient supplies than RUTF for example. If the supply chain cannot delivery nutrition commodities without pipeline breaks, it may need to be strengthened or in some contexts (e.g. conflict) parallel structures may be required	• Nutrition commodities including RUTF included in essential drug and medical supplies list • Nutrition commodities fully integrated into MoH supply chain management	• Nutrition commodities not in essential drugs and medical supplies list • Problem getting nutrition commodities if they aren't on national and WHO EMS. • Weak logistic and management system with poor ICT • Limited supply management capacities • High risk of stock outs • Theft /abuse of supplies • Few facilities producing RUTF – UNICEF monopoly - long transport needed - supply chain issues (linked to infrastructure)	• Advocacy for inclusion of nutrition commodities in essential drugs and medical supplies list • Strengthen capacities for supply chain management at all levels • Use of ICT

Health system Building Block	Capacity assessment	How this applies to the interventions in this resource	Full capacity for integration	Inhibiting factors / bottlenecks /challenges	Opportunities for strengthening actions
Service delivery	• Does the population have access to a health facility? • Where needed, what is the availability and regularity of outreach services? • Does the health system consider equity principles e.g. gender-sensitive, accessible for disabled persons etc	• If the facilities cannot deliver nutrition services, it may need to be strengthened or in some contexts (e.g. conflict) parallel structures or different models may be required. • Some interventions can be delivered through Child Health days (e.g. vitamin A supplementation) whereas others need to be delivered routinely e.g. zinc supplementation for diarrhoea	• Nutrition interventions integrated at all levels of health service delivery – community, primary and second health care and across contact points - routine child, antenatal, delivery & postnatal, community outreach	• Health workers already overloaded • Poor adherence to protocols / guidelines • Limited community outreach • Weak referral system and defaulter tracing for IMAM	• Identify time required for integration and advocate for adequate Staffing to deliver Integrated services • Establish community and enhanced case finding and referral system (IMAM) • Information and communication system for continuum of care • Integration into iCCM or IMCI
People (demand side)	• What are the barriers for accessing healthcare	• A holistic approach should be taken so that all nutrition and health interventions can be delivered at the same contact	• People using nutrition related services appropriately • People practising appropriate nutrition behaviours	• Limited participation of key actors in design, planning, implementation and monitoring of services • Limited community engagement, low awareness limiting service access and poor adoption of appropriate behaviours	• Participatory design, planning and M&E systems • Enhanced community outreach • Committees, social groups engaged in people centred quality care • Improved involvement, accountability and ownership

Appendix 4 (Step 4). Strategy for EU Engagement Supporting Policy, Programming, and Monitoring and Evaluation

This appendix includes:

(1) shaping policy and planning; identifying rationale and opportunities for addressing malnutrition,

(2) monitoring and evaluation processes,

(3) useful tools and resources.

Shaping policy and planning: Identifying the rationale and opportunities for addressing malnutrition across stakeholders

Based on a comprehensive assessment of available information and on consultations with stakeholders, conclusions and recommendations should be formulated on how the government and stakeholders can best address the identified nutrition challenges, taking into account current action and any pre-identified options for future cooperation. Conclusions and recommendations should feed into the country analysis, response strategy and possibly the identification of focal cooperation sectors. They should address (but not necessarily be limited to) the following aspects:

(1) rationale for considering nutrition in areas of cooperation, in order to address nutrition constraints and opportunities as appropriate — safeguards may include, for example, proposals for institutional strengthening and capacity building;

(2) recommendations to ensure that nutrition concerns are taken into consideration when identifying new projects and programmes in different cooperation sectors — information gaps preventing this work from being accomplished should be identified;

(3) opportunities for coordination on nutrition issues with other donors, seeking to achieve complementarities and synergies in order to more effectively deliver development objectives;

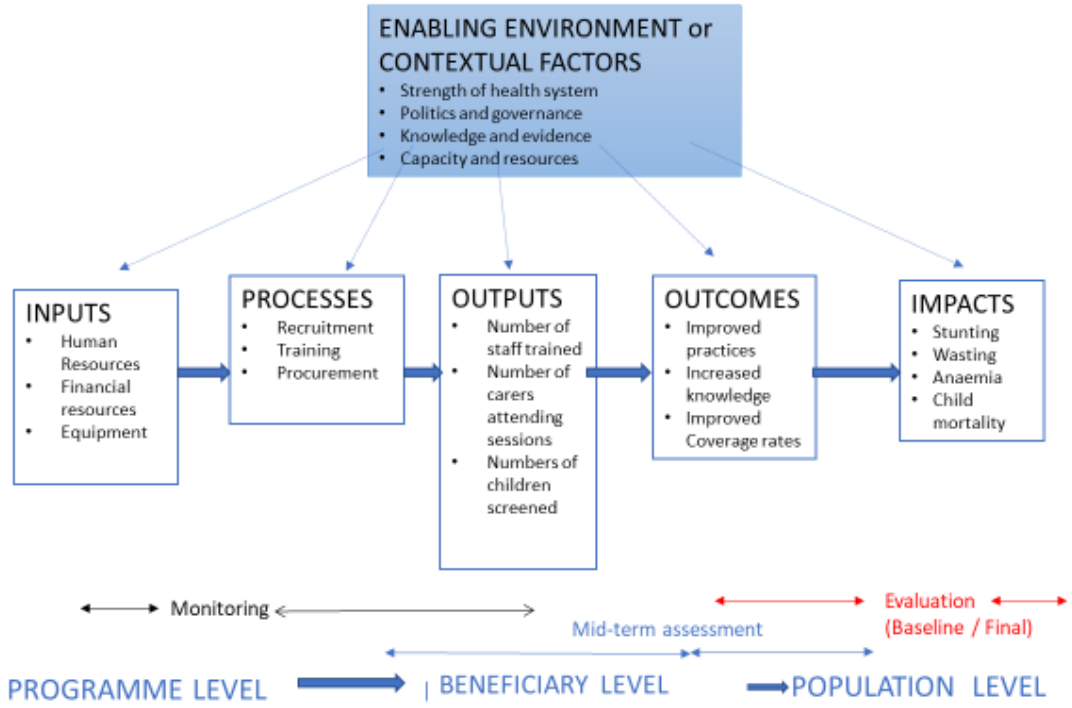
(4) proposals for nutrition-relevant indicators to be considered during the formulation of cooperation actions — the proposed indicators should be chosen taking account of the availability of data and actual capacity to monitor their evolution.

Taken from: EuropeAid. Addressing undernutrition in external assistance: An integrated approach through sectors and aid modalities. September 2011. Prepared by the European Commission, Germany, Ireland, France, Poland and the United Kingdom. This document has information on understanding the nutritional situation and assessing priorities.

Monitoring and evaluation processes

The graphic below (Figure A5-4) aims to show the M&E processes from the EU programme cycle perspective (adapted from FANTA Technical Note No. 10 Monitoring and Evaluation Framework for Title II Development orientated Projects February 2006). It highlights the distinction between programme, beneficiary and population level indicators for monitoring, mid-term assessment and evaluation over different stages of the programme cycle, giving examples and the contextual factors that influence them.

M&E processes from the EU programme cycle perspective



Example of data flow

Figure A5-5 below shows how data may flow within the health system reporting mechanism and highlights how data reported upwards can influence national policy and strategy development and the importance of feedback loop downwards to provide the information to improve learning and programme adjustment in real time.

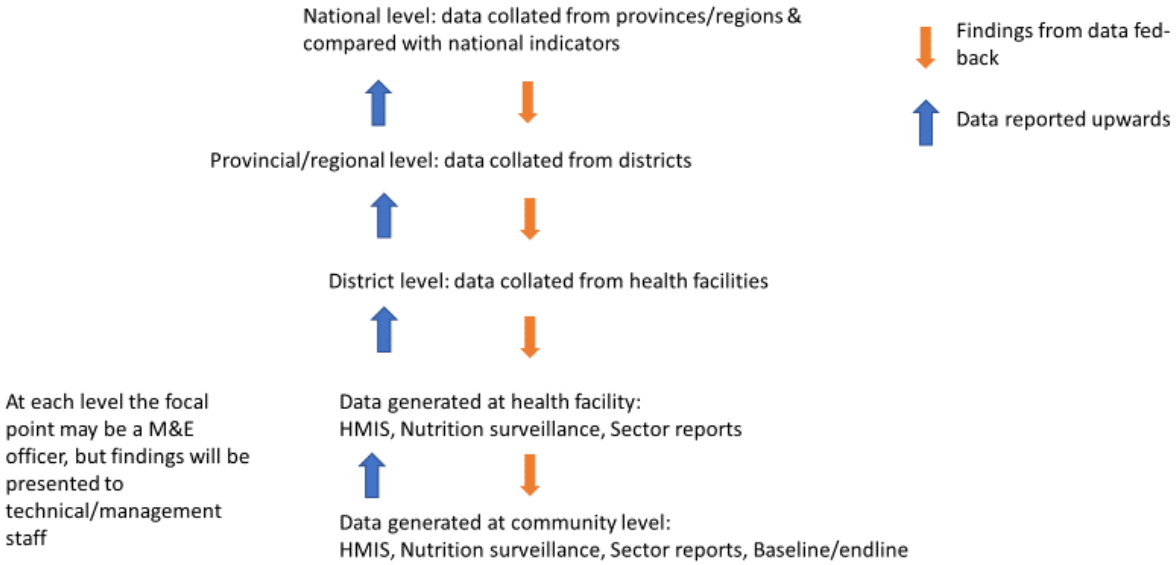


Figure A5-5. M&E processes from the EU programme cycle perspective

Useful tools and resources

- National Information Platforms for Nutrition (NIPN) is an initiative of the European Commission to provide support to countries to strengthen their information systems for nutrition and to improve the analysis of data so as to better inform the strategic decisions they are faced with to prevent malnutrition and its consequences http://www.nipn-nutrition-platforms.org/
- Indicators for the Global Monitoring Framework on Maternal, Infant and Young Child Nutrition http://www.who.int/nutrition/topics/indicators_monitoringframework_miycn_background.pdf?ua=1
- Nutrition Indicators and their measurements - http://conflict.lshtm.ac.uk/page_119.htm
- Terms of reference for evaluating programmes for nutrition outcomes: Source: Annex 7 of EuropeAid. Addressing undernutrition in external assistance: An integrated approach through sectors and aid modalities. September 2011. Prepared by the European Commission, Germany, Ireland, France, Poland and the United Kingdom. Available at: https://ec.europa.eu/europeaid/sites/devco/files/methodology-tools-and-methods-series-addressing-undernutrition-201109_en_2.pdf

Sample ToR for Donor Mapping

The box below shows an example of objectives and activities that could be included in a ToR for donor mapping

Examples of objectives and approach included in a TOR for donor mapping exercise in Chad:

(Specific ToRs should be carefully adapted (in consultation with key stakeholders) to a given context, level of analysis, capacities, timeframe, resources, priorities etc.)

Objectives of this work are:

1. Identify donors working in nutrition (nutrition-specific or nutrition-sensitive support), what interventions / budgets they have planned, what level of implementation and perceived effectiveness of their interventions.

2. Identify gaps and duplication of these interventions in terms of coverage (areas / areas), to see where to focus future efforts.

3. Identify financial gaps and support advocacy to increase resources to prevent malnutrition.

Approach:

1. Donor identification and financial data

Donors considered are any non-state actor contributing financially to nutrition or a nutrition-sensitive sector. A concise inventory of their missions and agenda will be made.

1.1 Focus on Major Donors

Some stakeholders are only donors (e.g. EU or USAID), others are both operators involved in implementation and financially contribute to nutrition. This is particularly the case of some UN agencies and some NGOs.

1.2. Identify projects or programmes

For each donor, the list of programme(s) funded by the donor will be drawn up.

1.3. Status and duration of funding

It involves identifying current and planned projects. The data will be disaggregated for fiscal years e.g.:

- The expenses 2015
- The expenses 2016
- The budget planned for 2017
- The budget planned for 2018

For multi-year projects, an estimate of the distribution of the budget over the different years should be made. The number of beneficiaries targeted should be taken into account.

1.4. Trends in donor funding

This will assess donor trends in funding for nutrition. Is the funder increasing or decreasing its investments? For what reasons? Is the donor interested in new sectors?

2. Categorisation of actions in favour of nutrition

Financial information on nutrition-specific actions and nutrition-sensitive actions will be collected. The projects studied will have to:

a. Implement actions specific to nutrition

OR

b. Tackling the underlying causes of malnutrition

AND

c. Have an explicit nutritional goal, preferably linked to a result (e.g. stunting, acute malnutrition or anaemia)

OR

Have a nutrition component, even discreet, that permits a nutritional impact

These criteria are a guide, but each donor's knowledge of their level of funding for nutrition-sensitive programs will ensure that each nutrition-sensitive project is included.

Source: Terms of Reference for donor mapping exercise in Chad. 2017

[1] WHO 2010 Indicators for assessing infant and young child feeding practices.

[2] Totsika, V. & Sylva, K. 2004. The home observation for measurement of the environment revisited. *Child and Adolescent Mental Health*, 9 (1): 25–35. Iltus, S. 2006. Significance of home environments as proxy indicators for early childhood care and education. Background paper prepared for the Education for *All Global Monitoring Report 2007 Strong foundations: early childhood care and education*. New York, USA, UNESCO. Available at: http:// unesdoc.unesco.org/images/0014/001474/147465e.pdf.

[3] Hamadani, J.D., Tofail, F., Hilaly, A., Huda, S.N., Engle, P. & Grantham- McGregor, S.M. 2010. Use of Family Care Indicators and Their Relationship with Child Development in Bangladesh. *J Health Popul Nutr* 28 (1): 23–33. Available at: www.ncbi.nlm.nih.gov/pmc/articles/PMC2975843/.

[4] WHO 2010. Monitoring the building blocks of health systems: a handbook of indicators and their measurement strategies. Available at: http://www.who.int/healthinfo/systems/WHO_MBHSS_2010_full_web.pdf

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