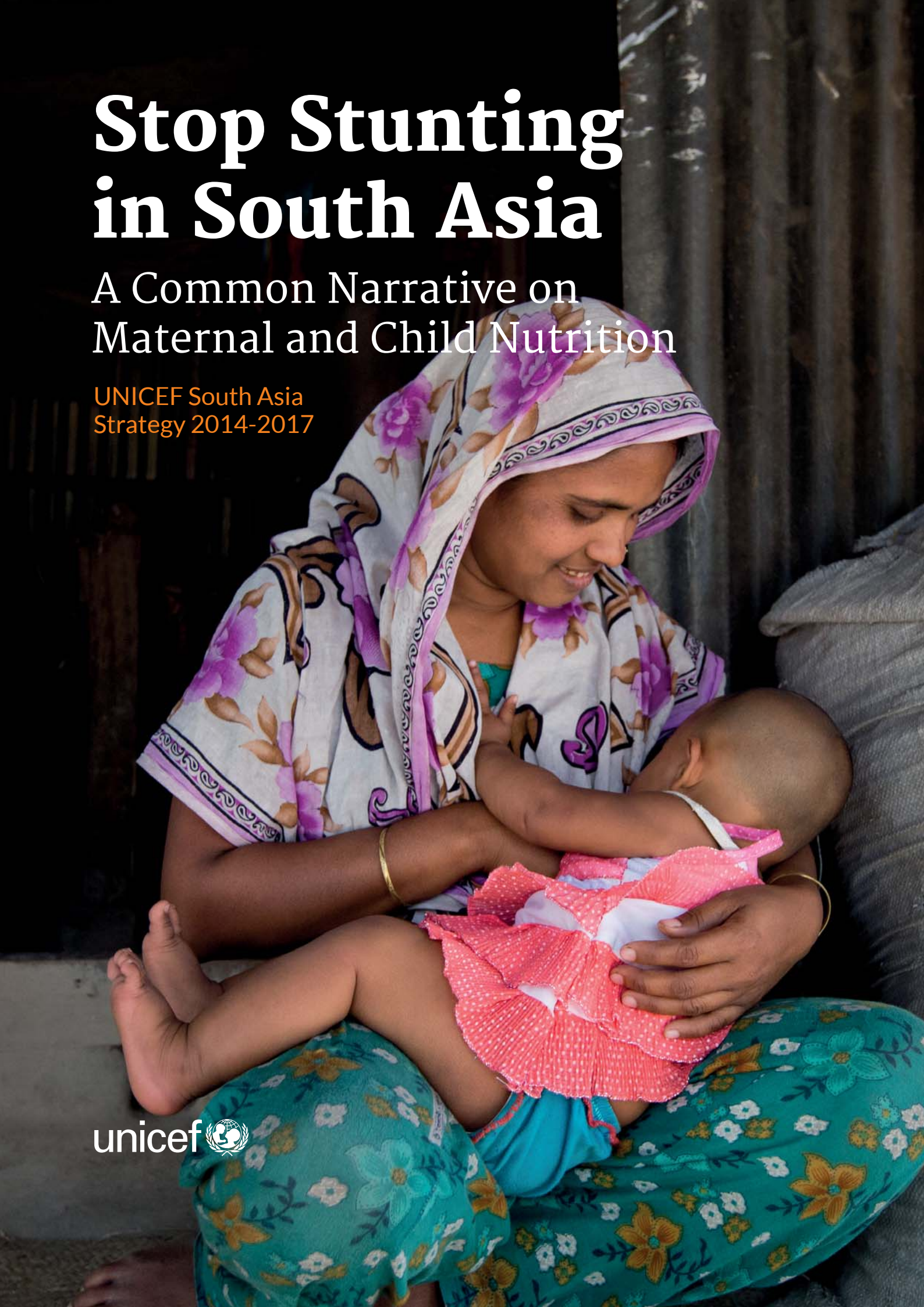


# Stop Stunting in South Asia

A Common Narrative on  
Maternal and Child Nutrition

UNICEF South Asia  
Strategy 2014-2017

unicef 



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Strategy 2014-2017

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Printed in October 2015

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Printer Jagadamba Press, Kathmandu, Nepal

## Headline Result

The number of stunted children aged 0–59 months is reduced by 12 million between 2014 and 2017

## Stop Stunting

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# Stop Stunting

## A common narrative on maternal and child nutrition for UNICEF South Asia

Stunting in early childhood has severe consequences for children's survival, growth and development, and for the growth and development of nations. Globally, 24% of children aged 0-59 months (159 million children) have stunted growth. South Asia's high prevalence of stunting (38%) combined with its large child population explain why the region bears about 40% of the global burden of stunting. This situation is compounded by a slow rate of decline in the prevalence of stunting and significant performance differentials discriminating against the most vulnerable children: children born in poorer households, children who live in rural areas, children of families with specific social identity (caste/ethnicity), and children born to uneducated/disempowered women. UNICEF South Asia places the 1,000-day window of opportunity – from conception to age two years – at the center of its programming, and supports the scale up of evidence-based nutrition-specific interventions and nutrition-

sensitive development. We work with regional bodies, national and sub-national governments, development partners, research and academic institutions, national and international NGOs, civil society organizations, and the media to achieve a headline result for maternal and child nutrition, namely to reduce the number of stunted children aged 0-59 months by 12 million between 2014 and 2017, with emphasis on greater equity for greater impact. This document has three objectives: (1) summarize UNICEF programmatic priorities and strategies to achieve the headline result on stunting reduction in South Asia; (2) review the evidence base on nutrition-specific and nutrition-sensitive interventions to address maternal and child undernutrition in low-income and middle-income countries; and (3) create a common narrative on maternal and child nutrition across UNICEF programmes in South Asia.



## 1. Child stunting in South Asia. Large burden, slow decline, high disparities

Recent global estimates indicate that 24% of children under five years of age (159 million children) have stunted growth (UNICEF-WHO-WB 2015). The prevention of stunting in early childhood has gained international attention in recent times. There are good reasons for it as stunting affects large numbers of children and has severe consequences for children's survival, growth and development, and for the growth and development of nations. Recent analyses indicate that stunting is the cause of an estimated one million child deaths annually. Moreover, stunting in early life is associated with adverse functional consequences including poor cognition and educational performance, low adult wages, lost productivity and, when accompanied by excessive weight gain later in childhood, increased risk of nutrition-related chronic diseases (Victora et al 2008; Dewey et al 2011; Black et al 2013).

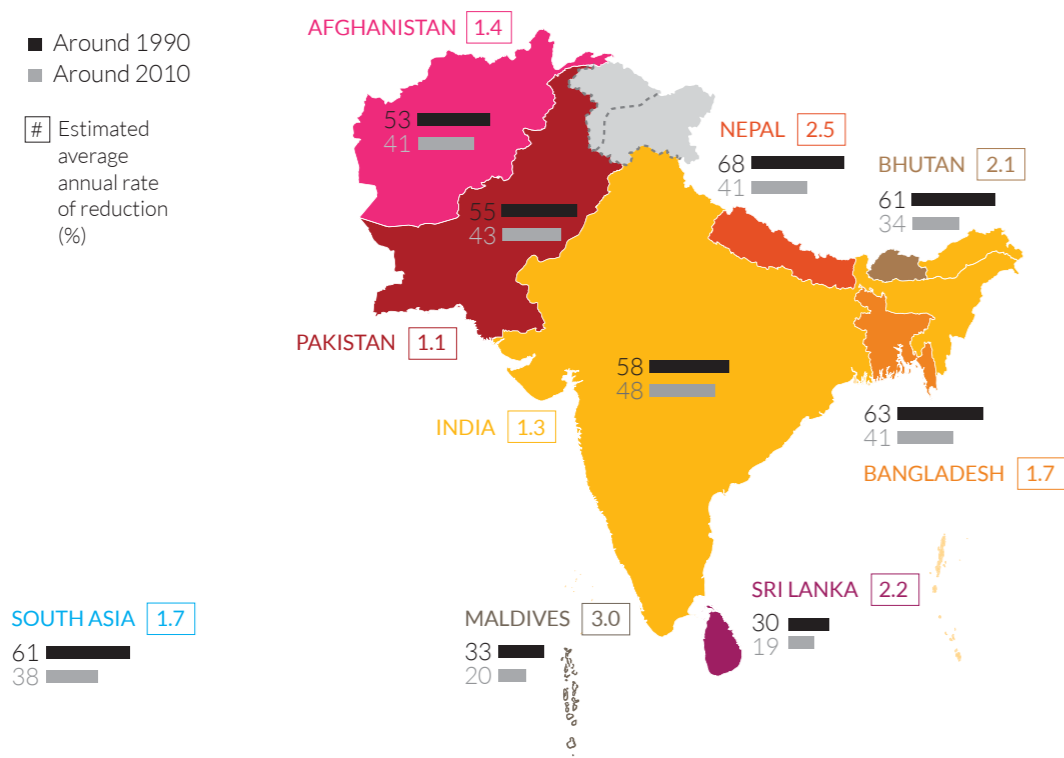
The prevalence of stunting is highest in South Asia. The latest data indicate that 38% of South Asia's

underfives are stunted. Levels of child stunting in South Asia are comparable to those in sub-Saharan Africa (37%), twice higher than those in the Middle-East and Northern-Africa (18%) and over three times higher than those in East Asia and the Pacific (12%) or Latin America and the Caribbean (11%). The high prevalence of stunting in South Asia combined with the region's large child population (26% of the world's underfives) explain why South Asia bears about 40% of the global burden of child stunting (UNICEF South Asia 2014; UNICEF 2015).

The prevalence of child stunting in South Asia declined from about 61% in ~1990 to about 38% in ~2012, which represents a 38% decline over the last two decades. The average annual rate of reduction (AARR) was 1.7% (ranging from about 1.1% in Pakistan to about 3% in the Maldives) (figure 1), a pace that is insufficient to achieve South Asia's share of the global target to reduce the number of stunted children by 40% by 2025. Furthermore, regional and national averages hide important disparities.

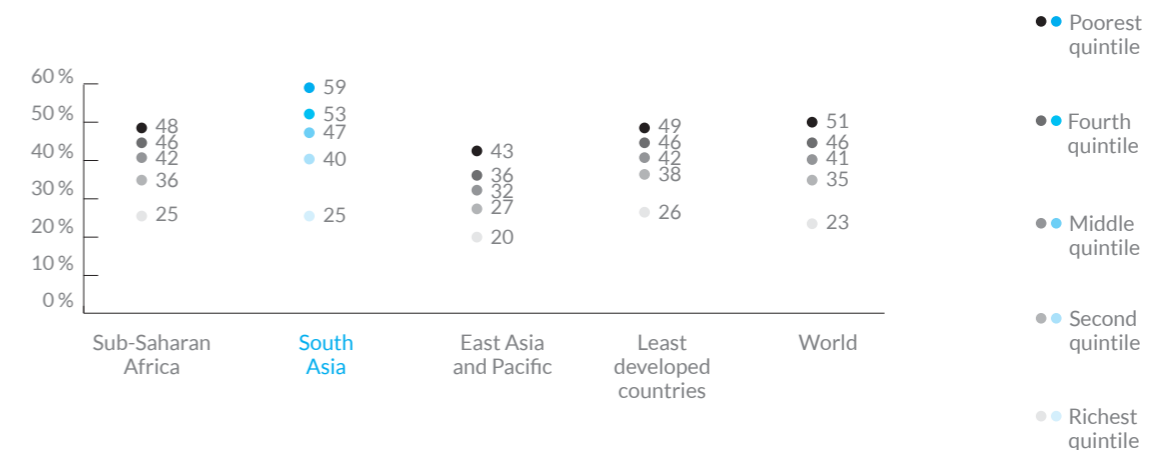
Globally, child stunting is significantly more common in the poorest segments of society. However, the difference between the rich and the poor is particularly marked in South Asia (UNICEF South Asia 2015).

FIGURE 1 - PREVALENCE (%) OF STUNTING AMONG CHILDREN UNDER FIVE, South Asia, 1990-2010



Source: Improving children's lives, transforming the future. UNICEF South Asia, 2014

FIGURE 2 - PREVALENCE (%) OF STUNTING IN CHILDREN AGED 0-59 MONTHS BY WEALTH QUINTILE AND GEOGRAPHICAL REGION (2006-2012)



Adapted from: Improving child malnutrition. The achievable imperative for global progress. UNICEF, 2013.

The most recent data indicate that the prevalence of stunting in the poorest wealth quintile (59%) is 2.4 times higher than in the richest quintile (25%). In sub-Saharan Africa, the prevalence of stunting in the poorest wealth quintile (48%) is 1.9 times higher than in the richest quintile (25%) (figure 2). Moreover, declines in the prevalence of child stunting in South Asia have often been more pronounced in the richer wealth quintiles. For example between 1993 and 2006, the prevalence of stunting in India declined by 42% in the richest wealth quintile while the reduction in the poorest quintile was 14% (UNICEF 2013).

Overall, the highest prevalence of child stunting in South Asia is recorded among children born to the poorest households, children who live in rural areas, children from families with specific social identity (caste and ethnicity), and children born to particularly vulnerable women (young, uneducated, disempowered). Therefore the situation in South Asia is one marked by an overall slow rate of decline in the prevalence of child stunting with significant performance differentials discriminating against the most vulnerable children (UNICEF South Asia 2015).



## 2. Accelerating progress in reducing stunting. A headline result for UNICEF South Asia

Governments in South Asia are progressively acknowledging that child stunting is both a marker and a maker of poor development. UNICEF regional and country offices in South Asia work with regional bodies, national and sub-national governments, development partners, research and academic institutions, national and international NGOs, civil society organizations, and the media to accelerate progress towards the target set by the World Health Assembly to reduce the number of children under five who are stunted by 40%, from 171 million in 2010 to about 100 million in 2025 (WHO 2015). Specifically, UNICEF supports South Asian countries to achieve the following results:

- Headline result: In South Asia, the number of stunted children aged 0-59 months is reduced by 12 million between 2014 and 2017;
- Equity result: In South Asian countries, the average annual rate of reduction in the prevalence of stunting in the lowest wealth quintile is  $\geq 3\%$ .

These results are aligned with UNICEF Strategic plan 2014-17 (UNICEF 2014) the World Health Assembly's Comprehensive implementation plan on maternal, infant and young child nutrition (WHO 2012), and the post-2015 Sustainable Development Goals (UNGA 2015).

### 3. One thousand days, a life-long difference. A theory of change for UNICEF South Asia

There is global consensus that the 1,000 days from conception to the second year of a child's life – when children's linear growth and brain development are most sensitive to feeding and care – offer a critical window of opportunity. In line with UNICEF's Global approach to scaling up nutrition programming (UNICEF 2013) and with the Framework for actions to achieve optimum fetal and child nutrition and development (Lancet 2013; figure 3), UNICEF South Asia places the 1,000-day window of opportunity at the center of its Maternal and Child Nutrition programming and supports the scale up of evidence-based nutrition-specific and nutrition-sensitive interventions, with emphasis on greater equity for greater impact.

#### 3.1. Programmatic priorities

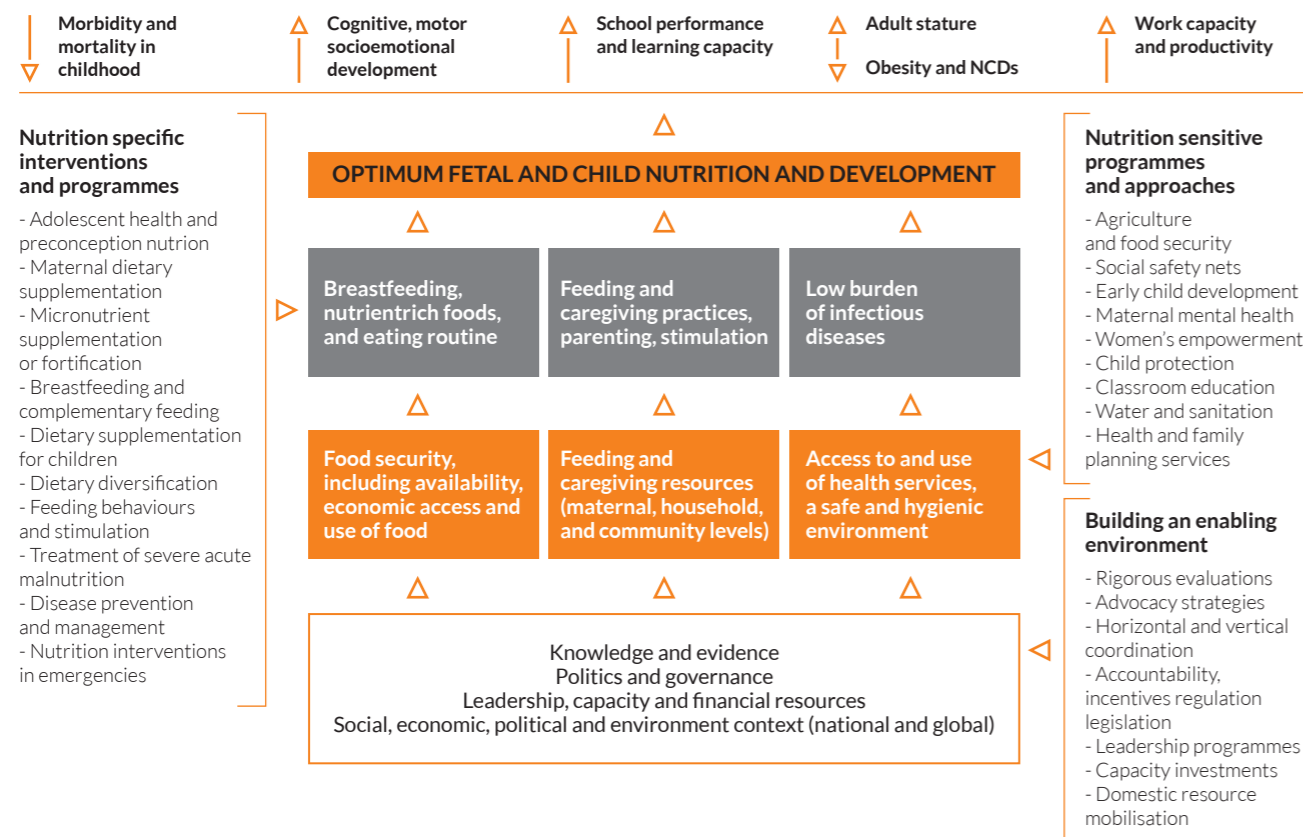
Programmatic priorities encompass nutrition-specific

and nutrition-sensitive interventions. Nutrition-specific interventions aim to improve outcomes in four focus areas (figure 4):

- Infant and young child feeding and care in the first two years of life.
- Micronutrient nutrition and anemia control in young children.
- Early detection and treatment of severe wasting in young children.
- Women's nutrition, with emphasis on adolescent girls and mothers.

Nutrition-specific interventions – if scaled up with quality and equity – will have a significant impact in reducing the prevalence and the severity of child stunting. As with most development outcomes, a sustainable reduction in the prevalence of child stunting cuts across a variety of sectors. Therefore, UNICEF South Asia promotes multisectoral nutrition-sensitive strategies to reduce the prevalence of child stunting, with emphasis on the interface between Maternal and Child Nutrition and a selected number of critical sectors (figure 4).

FIGURE 3: FRAMEWORK FOR ACTIONS TO ACHIEVE OPTIMUM FETAL AND CHILD NUTRITION AND DEVELOPMENT; LANCET 2013



#### 3.1.1. Nutrition-specific interventions

UNICEF Maternal and Child Nutrition programmes in South Asia support the scale up of 10 Essential Nutrition Interventions as those with the highest potential for impact in reducing the prevalence of child stunting in South Asia (figure 5). These Essential Nutrition Interventions are:

**1. Early initiation of breastfeeding within one hour of birth.** Objective: Newborns start breastfeeding within one hour of birth to take advantage of their intense suckling reflex and alert state and to stimulate breast milk production. Good breastfeeding skills – including proper positioning and attachment – are established to increase the newborn's suckling efficiency, mother's breast milk production, and infant's breast milk intake.

**2. Exclusive breastfeeding during the first six months of life.** Objective: Infants are exclusively breastfed in the first six months of life. Infants are fed only breast milk and are not given any fluids, milk or foods, not even water. Exclusive breastfeeding, with frequent, on-demand feeds is established to ensure maximum protection against undernutrition, disease, and death, and contribute to child spacing and lower fertility rates.

**3. Timely introduction of complementary foods at six months:** Objective: Infants start receiving complementary foods by the beginning of the seventh month of life while breastfeeding continues until 23 months and beyond. Introducing complementary foods in the first six months of life is both unnecessary and dangerous. Timely introduction of appropriate complementary foods ensures that infants' energy and nutrient requirements are met.

**4. Age-appropriate complementary foods, adequate in terms of frequency, density and diversity for children aged 6–23 months.** Objective: Children aged 6–23 months are fed age appropriate, energy and nutrient dense, diverse complementary foods with increased quantities, frequency and nutrient density as the child ages. Child feeding is responsive and active. Children are given prophylactic iron and folic acid supplements to prevent anemia.

**5. Safe handling of complementary foods and hygienic complementary feeding practices.** Objective: Children aged 6–23 months are fed using safe handling (preparation and storage) of complementary foods and hygienic complementary feeding practices, including washing caregivers'

hands before food preparation, washing children's hands before eating, serving foods immediately after preparation, and using clean utensils, and avoiding feeding bottles.

**6. Preventive supplementation and deworming to control micronutrient deficiencies.** Objective: Children are protected against micronutrient deficiencies and anemia through the routine use of deworming tablets and micronutrient supplements delivered to them (alone or in combination) in the form of syrup, tablets, or powders as a prophylactic measure, with a particular focus on the prevention of iron, iodine, vitamin A, and zinc deficiencies.

**7. Frequent, appropriate, and active feeding for children during and after illness.** Objective: Children are fed – actively and frequently – age appropriate, nutrient rich foods, during and after illness, while frequent breastfeeding continues to increase fluid and nutrient intake. Children with diarrhea receive appropriate rehydration therapy and a full course of zinc supplements as per national guidelines for the treatment of diarrhea.

**8. Timely and quality therapeutic feeding and care for all children with severe wasting.** Objective: Children with severe wasting are provided with therapeutic feeding and care in a timely manner for life saving weight gain and immunological recovery. This requires early case detection – before medical complications develop – and optimal therapeutic foods and protocols for facility- and community-based care in line with WHO recommendations.

**9. Improved food and nutrient intake for adolescent girls particularly to prevent anemia.** Objective: Adolescent girls – school going and out of school – are protected against nutritional deficiencies and anemia through dietary counselling, weekly iron and folic acid supplementation, twice yearly (six months apart) deworming prophylaxis, access to foods fortified with micronutrients, and – in food insecure settings – supplementary foods.

**10. Improved food and nutrient intake for women, including during pregnancy and lactation.** Objective: Women have access to foods adequate in quality and quantity – particularly during pregnancy and lactation – including access to and consumption of fortified foods, iodized (> 15 ppm) salt, iron and folic acid supplements and supplementary foods (in food insecure settings) to improve women's well-being and pregnancy and lactation outcomes.

### 3.1.2. Nutrition-sensitive interventions

UNICEF South Asia promotes intersectoral nutrition-sensitive strategies to reduce the prevalence of child stunting, with a particular emphasis on the interface between Maternal and Child Nutrition and selected number of critical sectors (figure 4).

#### Health, Hygiene, and Sanitation

With Primary Health Care programmes the main focus is to support the provision of essential health services for children and women, with particular emphasis on improving antenatal care coverage and quality, strengthening immunization services, and preventing and treating pneumonia, diarrhea and malaria. With Water, Hygiene and Sanitation programmes, the main focus is to reduce the incidence and severity of infection in children while controlling environmental enteropathy and its potential negative impact on children's linear growth. This encompasses efforts to maintain an adequate water supply, both in terms of quality and quantity, sufficient means of sanitation (encouraging community-based approaches that seek to eliminate the practice of open defecation), and improved hygiene practices, particularly hand washing with soap at critical times.

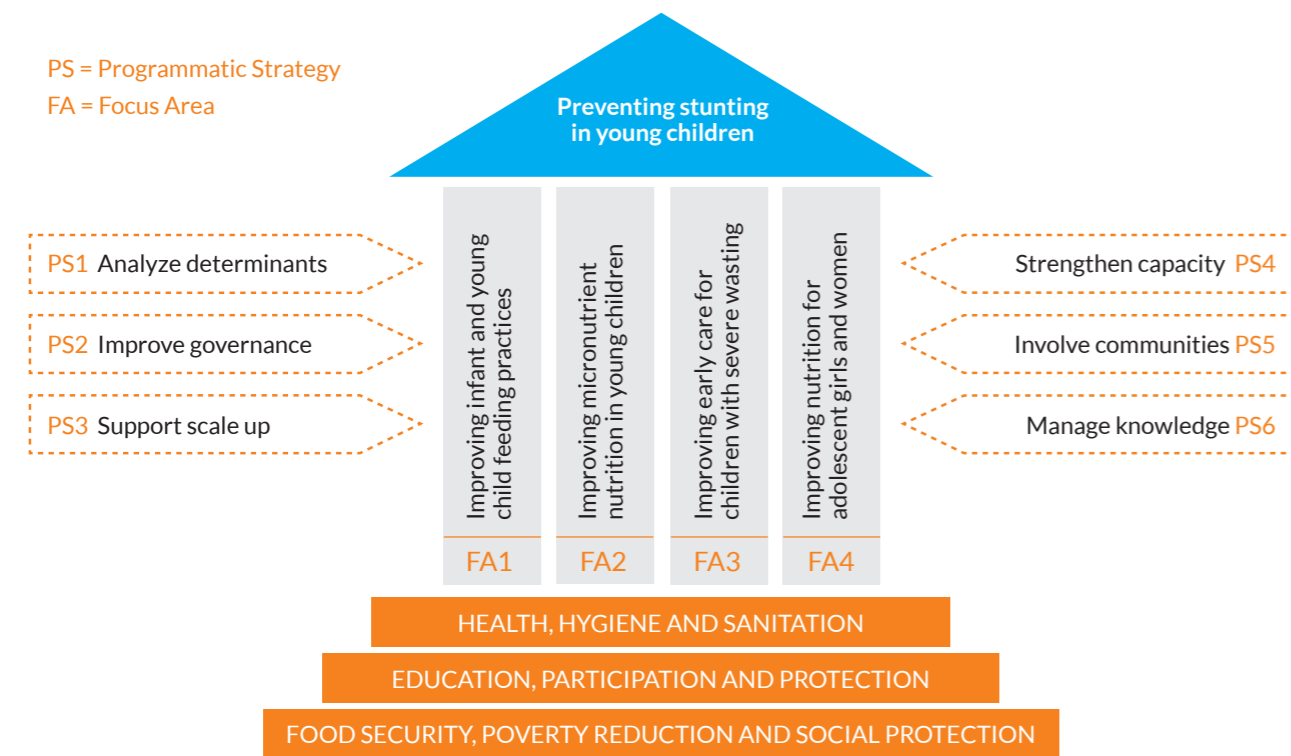
#### Education, Participation, and Protection

With Early Childhood Development (ECD) programmes the main emphasis is to improve early stimulation and learning (child-focused ECD interventions) and parenting education and support (caregiver-focused ECD interventions). With Education programmes the main emphasis is to improve girls' enrollment and retention in primary and secondary education while using schools as delivery platforms for nutrition interventions, including – but not limited to – adolescent girls. With Protection and Participation programmes the main focus is to reduce the incidence of child marriage and adolescent pregnancy while supporting the participation of adolescent girls and boys in decisions that affect their lives.

#### Food Security, Poverty Reduction, and Social Protection

With Agriculture and Food Security the main focus is to ensure that they contribute to improving diets – particularly for mothers and young children – through increased availability of and accessibility to diverse nutrient dense foods coming from production, value-chain interventions or markets. With Poverty Reduction and Social Protection programmes the main focus is to reduce nutrition vulnerability and support livelihoods among the poor and socially-

FIGURE 4: UNICEF FRAMEWORK FOR ACTION TO REDUCE THE NUMBER OF STUNTED CHILDREN BY 12 MILLION IN SOUTH ASIA (2014-2017)



disadvantaged populations. UNICEF works with national and sub-national governments to promote nutrition-sensitive safety nets that increase access to and use of food, entitlements and services including through conditional and unconditional cash/social transfers that provide or substitute for income.

### 3.2. Programmatic strategies

UNICEF South Asia uses six programmatic strategies to achieve the goal of reducing the number of stunted underfives by 12 million between 2014 and 2017. These six interrelated strategies are adapted from UNICEF's Global approach to scaling up nutrition programming (UNICEF 2013) to UNICEF South Asia's headline

result on stunting reduction. The six programmatic strategies are (figure 4):

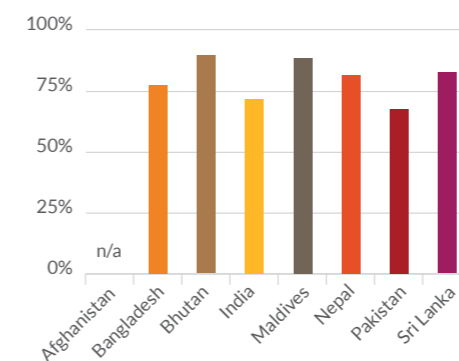
1. Analyze the distribution and determinants of child stunting.
2. Strengthen governance and accountability for reducing child stunting.
3. Support the scale up of evidence-based interventions to reduce stunting.
4. Strengthen institutional capacity on Maternal and Child Nutrition.
5. Foster community participation and community-based approaches.
6. Manage knowledge to improve policies, programmes, advocacy and research.

### How many children are benefitting from the essential nutrition interventions?

FIGURE 5: TRACER INDICATORS

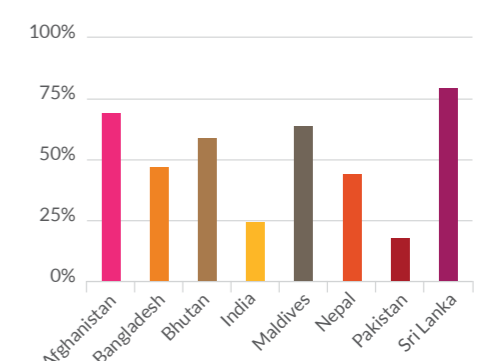
#### ① Minimum weight at birth

Percentage of children born with a birth weight > 2,500 g



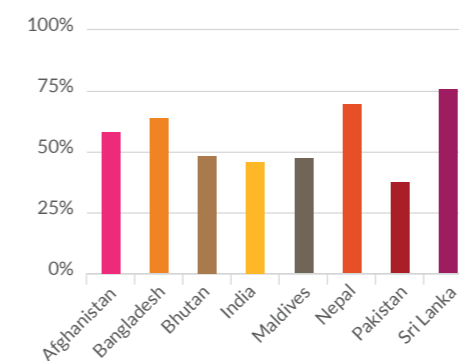
#### ② Early initiation of breastfeeding within one hour of birth

Percentage of children who are breastfed within one hour of birth



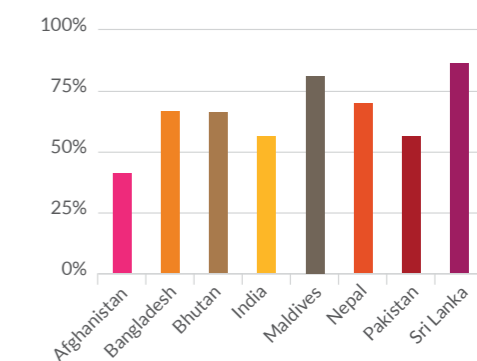
#### ③ Exclusive breastfeeding in the first six months of life

Percentage of infants under six months who are fed exclusively with breast milk



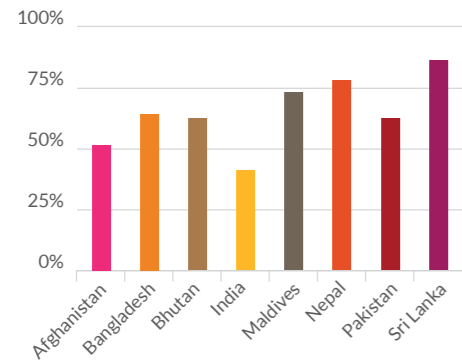
#### ④ Timely introduction of complementary foods at 6 months

Percentage of infants 6-8 months old who are fed complementary foods



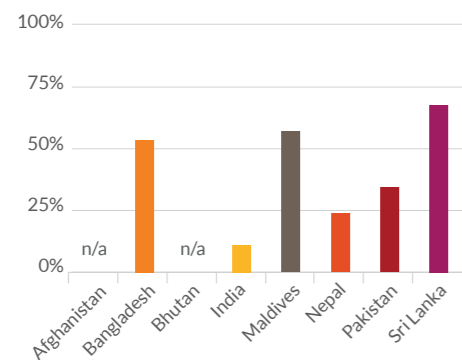
**5 Minimum meal frequency**

Percentage of children 6–23 months who are fed the minimum number of times per day or more



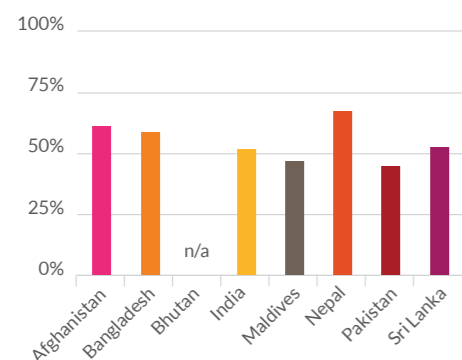
**7 Micronutrient-rich foods**

Percentage of children 6–23 months old who are fed iron-rich foods



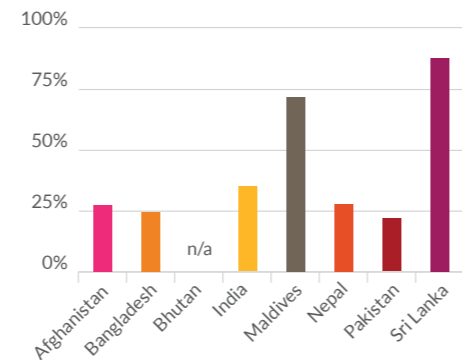
**9 Minimum adequate nutrition for adult women**

Percentage of women 20–49 years old with a healthy BMI (18.5–24.9 kg/m<sup>2</sup>)



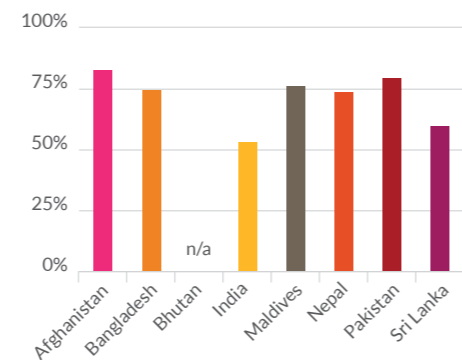
**6 Minimum dietary diversity**

Percentage of children 6–23 months old who are fed foods from a minimum number of food groups



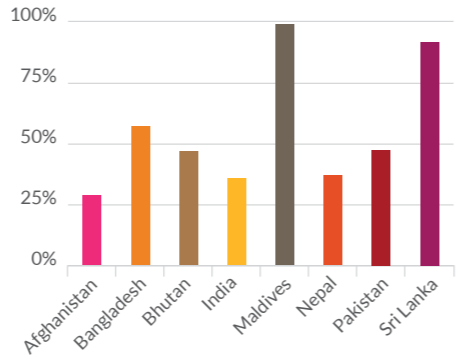
**8 Minimum adequate nutrition for adolescent girls**

Percentage of adolescent girls 15–19 years old with a BMI >18.5 kg/m<sup>2</sup>



**10 Safe hygiene and sanitation practices in the household**

Percentage of households using improved sanitation facilities



Data Source for Essential Nutrition Interventions 1 and 10: UNICEF State of the World's Children 2015. Data Sources for Essential Nutrition Interventions 2–9: Afghanistan, NNS 2013; Bangladesh, DHS 2011; Bhutan, MICS 2010; India, NFHS 2006; Maldives, DHS 2009; Nepal, DHS 2011; Pakistan, DHS 2012; Sri Lanka, DHS 2007.

**3.2.1. Analyze the distribution and determinants of child stunting**

A rights-based, equity-focused, and evidence-informed situation analysis of the prevalence, severity and disparities in the distribution of child stunting is critical for countries, governments and development partners to identify child stunting as a key development issue; document its underlying causes; reach consensus with national and international partners on which actions should be prioritised; formulate and refine policies; design programmes and results-based frameworks; review the theory of change of Maternal and Child Nutrition programmes; earmark resources; and agree on the roles and responsibilities of partners. UNICEF South Asia facilitates consultative processes with national, regional and global stakeholders to promote ownership of the discovery and decision process. Actions include:

- Assess and document the nutritional status of the population – using the prevalence of child stunting as the key indicator – disaggregated by age, gender, geography, rural/urban residence, income and multidimensional poverty, and social identity.
- Conduct analyses of the determinants of stunting in children, particularly among disadvantaged populations; make strategic decisions with partners about which determinants to address.
- Facilitate institutional, human resources, and budget analyses; conduct an analysis of stakeholders working in nutrition-specific and nutrition-sensitive programmes and of existing coordination mechanisms across government, civil society and partner networks.
- Analyze key policy documents and legislative frameworks and assess risks, vulnerabilities, and capacity gaps that will further impact on the nutritional status of children and women.

**3.2.2. Strengthen governance and accountability to reduce stunting**

Good governance and accountability are critical to create an enabling environment for the reduction of child stunting. They entail strengthening policy and legal frameworks, institutional coordination, strategic programme design, and results-based management, implementation and reporting, with a priority focus on the most disadvantaged children and women. UNICEF South Asia advocates for adequate budgetary commitment for maternal and child nutrition; provides evidence and knowledge to support nutrition champions; invests in partnerships

and supports transparency, public accountability and coordination mechanisms. Actions include:

- Generate knowledge for advocacy purposes and lead strategic advocacy to ensure that the reduction of child stunting features prominently on national development agendas.
- Advocate that governments meet their obligations to realize the rights of children to grow and develop to their full potential.
- Provide technical leadership in adopting, monitoring and enforcing up-to-date national legislation, policies, and guidance on how to implement, monitor and evaluate stunting reduction programmes, including issues related to industry and the private sector.
- Share timely information on nutrition indicators and programme results, report on barriers and bottlenecks and strategies to address these, and share information to promote transparency and stronger governance in nutrition.

**3.2.3. Support the scale-up of evidence-based interventions to reduce stunting**

This programmatic strategy seeks to achieve and sustain high levels of effective and equitable coverage of nutrition interventions to reduce child stunting, with emphasis on the most disadvantaged populations. UNICEF South Asia supports national and sub-national governments to scale up multisectoral evidence-based interventions in a way that responds to the local context; provides technical advice to support the implementation of national nutrition programmes; supports convergence and linkages across multiple sectors; builds national capacity where capacity is weak; supports context-specific communication strategies; and identifies and promotes innovations in programme scale up. Actions include:

- Provide technical expertise to inform regional and national strategic directions to scale up multisectoral nutrition programmes to reduce child stunting, particularly among the most disadvantaged populations.
- Support the design and implementation of evidence-based service delivery and communication strategies that are sensitive to individual practices and social norms that influence maternal and child nutrition.
- Develop, adapt, and disseminate guidance materials and tools for nutrition-specific and nutrition-sensitive programming to reduce child stunting.



- Test innovations, support evidence generation, and ensure that the knowledge generated by programme innovation and scale up is documented and shared with governments and partners.

### 3.2.4. Strengthen institutional capacity for Maternal and Child Nutrition

This programmatic strategy is critical to strengthen the capacity of national governments and partners to ensure availability of and access to services, and to strengthen systems that reduce child stunting sustainably. At national and sub-national levels, UNICEF South Asia works to strengthen the capacity of governments on programme design, management, monitoring and reporting. UNICEF provides up-to-date technical guidance to strengthen human resources for maternal and child nutrition, including district level staff and community-level workers. While the situation analysis identifies capacity gaps in human resources, this programmatic strategy focuses on devising capacity development priorities and strategies. Actions include:

- Use capacity gap analyses to engage with partners and jointly develop strategies to build national capacity to design and implement programmes to prevent child stunting.
- Support the development of education systems and training programmes to address short- and longer-term capacity gaps in nutrition both within and outside the nutrition sector.
- Build capacity and support for community cadres and workers, including support to empower communities to understand their rights and entitlements and how to claim them.
- Build capacity among UNICEF staff and partners to prepare for and respond to seasonal food insecurity – which can greatly increase the incidence of low birth weight and stunting.

### 3.2.5. Foster community participation and community-based approaches

This programme strategy seeks to empower communities with the knowledge and tools to prevent stunting in their children. It focuses on empowering communities to participate actively in the development of context specific solutions, demand nutrition services and use them appropriately, and take ownership of improving the nutritional status of women and children. UNICEF South Asia works to promote individual practices and social norms

that support positive maternal and child nutrition outcomes. Actions include:

- Support communities to access the knowledge and services to prevent child stunting.
- Consult and participate with families and communities to better contextualize community actions for the protection, promotion, and support of optimal maternal and child nutrition.
- Ensure that relevant behaviour and social change approaches are appropriately embedded into nutrition programmes.
- Partner with appropriate civil society, consumer, private sector and other groups who can help facilitate positive demand for practices and services.
- Support the design and implementation of large scale mass-media communication initiatives for behaviour and social change.

### 3.2.6. Manage knowledge to improve policies, programmes, advocacy and research

This programme strategy focuses on supporting effective monitoring, evaluation and knowledge management systems, which are critical to ensure that knowledge informs policy, programme, advocacy and research prioritization for stunting reduction. UNICEF South Asia generates, acquires, adapts and uses knowledge to inform all stages of the advocacy, policy, programme, communication and research continuum. Actions include:

- Support national level monitoring and information systems to generate, analyse and use data and information for the prevention of child stunting.
- Support formative research and evaluation of nutrition programmes. Identify knowledge gaps and prioritize specific programme areas and/or processes to document lessons learned.
- Communicate and disseminate programme results and experiences, including operational and implementation research.
- Incorporate lessons learned in programming and develop knowledge management systems for nutrition that include learning from innovations and scale up.
- Keep up-to-date with new knowledge and adapt and incorporate knowledge to improve the design and implementation of programmes to stop stunting.

## 4. Stop Stunting. The role of UNICEF Regional Office for South Asia (ROSA)

UNICEF Regional Office for South Asia (ROSA) supports regional institutions, UNICEF country programmes, national governments and their development partners in achieving the regional headline results on child stunting:

- **Headline result:** In South Asia, the number of stunted children aged 0–59 months is reduced by 12 million between 2014 and 2017.
- **Equity result:** In South Asian countries, the average annual rate of reduction in the prevalence of stunting in the lowest wealth quintile is  $\geq 3\%$

UNICEF Regional Office for South Asia uses four programmatic strategies to support the achievement of the headline results on child stunting (figure 6).

### Expert advice and technical support

UNICEF ROSA provides expert advice and support to UNICEF country programmes and national and regional partners to ensure that policies,

programmes, advocacy and research on Maternal and Child Nutrition are in line with internationally-agreed upon guidelines and better practices.

### Data and knowledge management

UNICEF ROSA disseminates, generates and consolidates data and knowledge on how nutrition makes progress globally and in South Asia, including better practices and lessons learned in improving coverage, equity, outcomes, and impact on maternal and child nutrition.

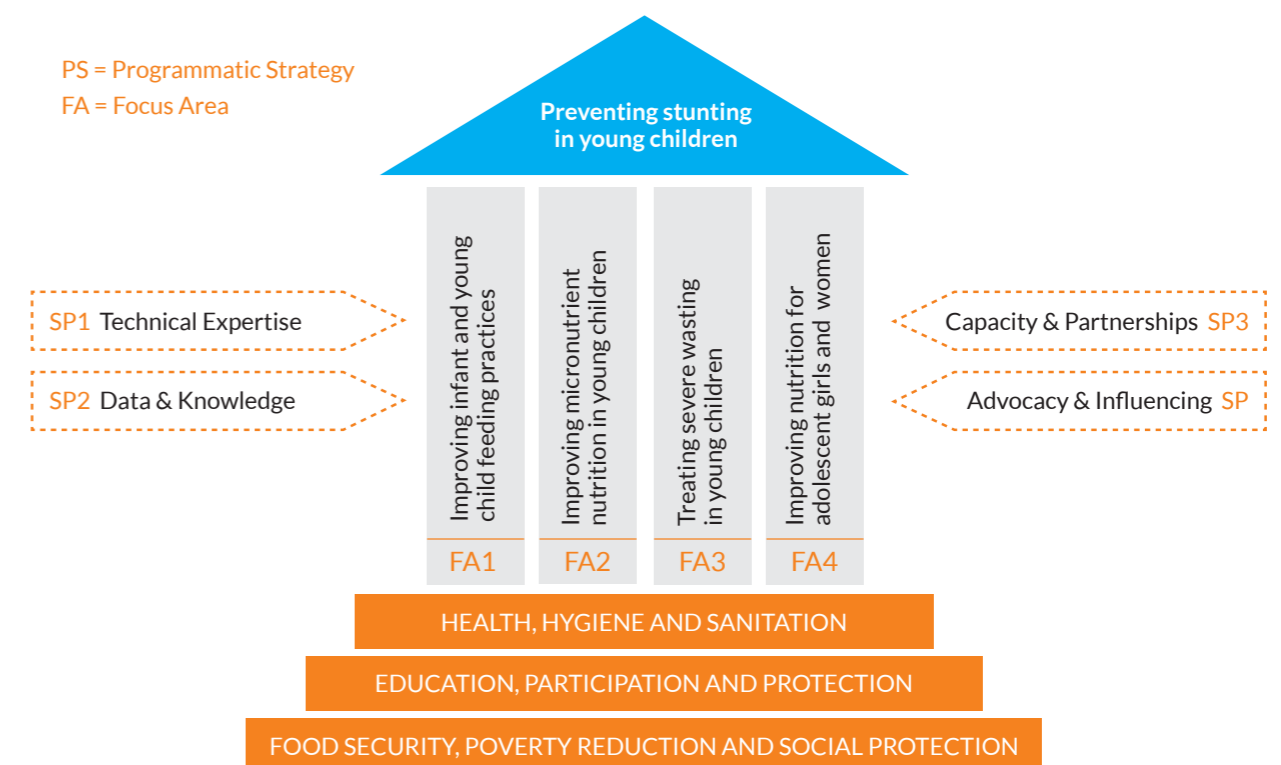
### Networks and partnerships

UNICEF ROSA builds networks and partnerships with regional and international organizations, with a particular emphasis on the use of data and knowledge to advance advocacy, policies, programmes, research and results on maternal and child nutrition in South Asia.

### Advocacy and influencing

UNICEF ROSA uses technical expertise, knowledge, data, networks and partnerships to advocate for large scale, evidence-based, equity-focused intersectoral policies and programmes to improve maternal and child nutrition and reduce the burden of child stunting in South Asia.

FIGURE 6: UNICEF REGIONAL OFFICE FOR SOUTH ASIA FRAMEWORK FOR ACTION TO SUPPORT UNICEF COUNTRY PROGRAMMES AND NATIONAL AND REGIONAL PARTNERS IN SOUTH ASIA TO REDUCE THE NUMBER OF STUNTED CHILDREN BY 12 MILLION (2014-2017)



# The evidence base Addressing maternal and child undernutrition in low-income and middle-income countries<sup>1</sup>

Globally, an estimated 159 million children aged 0–59 months (about 25% of children in this age group) are stunted as a result of persistent deprivation of the nutrients that are essential for child growth and development. In this chapter we review evidence-based interventions to address maternal and child undernutrition in low-income and middle-income countries. First we review six nutrition-specific interventions that address the direct causes of poor maternal and child nutrition. These interventions are: breastfeeding, complementary feeding, and therapeutic feeding practices for infants and young children; micronutrient supplementation for children and women; maternal dietary supplementation during pregnancy; and food fortification for

children, women and the general population. Secondly we review six nutrition-sensitive interventions that aim at addressing the underlying determinants of nutrition in children and women by incorporating nutrition objectives and actions in six non-nutrition sectors and programs: agriculture; water hygiene and sanitation; early childhood development; education; social policy; and women and gender. Lastly, we argue that strong evidence and advocacy narratives, good political will and governance, and adequate capacity and financial resources are the three key ingredients of the environment that is needed to enable nutrition-specific and nutrition-sensitive programs to improve maternal and child nutrition outcomes.



<sup>1</sup> – A first version of this paper was published as: Aguayo VM and Paintal K. Addressing maternal and child undernutrition in low-income and middle-income countries. A review of nutrition-specific and nutrition-sensitive interventions. In: Pritchard B, Ortiz R, and Shekar M (eds). The Routledge Handbook of Food and Nutrition Security. 2015.

## 1. Introduction

Globally, an estimated 159 million children aged 0–59 months old are stunted. This represents 25% of children in this age group, and is largely the result of persistent deprivation of the nutrients that are essential for child growth and development. In addition, anemia affects half a billion women of reproductive age worldwide, representing 29% of non-pregnant women and 38% of pregnant women. It is estimated that half of the burden of anemia in women is due to iron deficiency.

In light of this unacceptable number of undernourished children and women, in 2012 the World Health Assembly endorsed a Comprehensive Implementation Plan on Maternal, Infant and Young Child Nutrition with specified nutrition targets, including goals to reduce by 40% the number of under-five children who are stunted and to reduce anemia in women of reproductive age by 50% between 2010 and 2025 (UNICEF 2012; WHO 2012).

Given the global commitment to reduce maternal and child undernutrition, it is important to have a common understanding of the interventions with the highest potential to drive the expected decline in the number of undernourished children and women. In this paper we review evidence-based interventions to address maternal and child undernutrition in low-income and middle-income countries, where the burden of maternal and child undernutrition, and related disease and disability, are higher.

We are guided by two key and complementary frameworks: The Lancet 2013 Maternal and Child Nutrition Series; and the World Health Organization (WHO) Essential Nutrition Actions: Improving Maternal, Newborn, Infant and Young Child Health and Nutrition (Black et al. 2013; WHO 2013). Both frameworks indicate that the direct and underlying determinants of undernutrition can be positively changed to enhance maternal and child nutrition outcomes. These changes include nutrition-specific interventions that address the direct causes of poor maternal and child nutrition, and nutrition-sensitive interventions that address the underlying determinants of undernutrition in children and women by incorporating nutrition-specific goals and actions in non-nutrition sectors and programs.

First we review six nutrition-specific interventions that aim at addressing the direct causes of poor

maternal and child nutrition. These interventions are: breastfeeding, complementary feeding, and therapeutic feeding practices for infants and young children; micronutrient supplementation for children and women; maternal dietary supplementation during pregnancy; and food fortification for children, women and the general population.

Secondly, we review six nutrition-sensitive interventions that aim at addressing the underlying determinants of undernutrition in children and women by incorporating nutrition objectives and actions in six non-nutrition sectors and programs: agriculture; water hygiene and sanitation; early childhood development; education; social policy; and women and gender.

## 2. Nutrition-specific interventions: addressing the immediate causes of undernutrition

We review six nutrition-specific interventions that aim at addressing the immediate causes of poor maternal and child nutrition. These interventions are: breastfeeding, complementary feeding, and therapeutic feeding practices for infants and young children; micronutrient supplementation for children and women; maternal dietary supplementation during pregnancy; and food fortification for children, women and the general population.

### 2.1. Improving breastfeeding practices in the first two years of life

As a global public health guideline, WHO recommends that newborns be put to the breast within one hour of birth, infants be exclusively breastfed for the first six months, and children continue to breastfeed until two years of age or older.

Delaying the clamping of the umbilical cord allows the blood to flow longer between the placenta and the newborn, which increases hemoglobin and serum ferritin concentration at six months and lowers the risk of anemia and iron deficiency in infancy (McDonald and Middleton 2009). Skin-to-skin contact between mother and newborn as soon as possible after delivery increases breastfeeding rates at one to four months, and the duration of breastfeeding (Moore et al. 2012; WHO 1998). Early initiation of breastfeeding reduces the risk of neonatal mortality and favors exclusive



breastfeeding and a longer duration of breastfeeding. Studies have shown a causal association between early breastfeeding and reduced infection-specific neonatal mortality (Edmond et al. 2007; Mullany et al. 2008). A recent systematic review concluded that initiating breastfeeding after the first hour doubled the risk of neonatal mortality (Khan et al. 2014).

Infants who are exclusively breastfed for six months experience less morbidity from gastrointestinal infection than those who are mix-breastfed (Kramer and Kakuma 2009). Furthermore, infants 0–11 months old who are breastfed are at a lower risk of death from diarrhea or pneumonia than children who are not breastfed (WHO 2000). Breastfeeding continues to be important beyond the first year of life as breastfed children 12–23 months old receive on average 35%–40% of total energy needs from breastmilk (Dewey and Brown 2003), with the remaining 60%–65% covered by complementary foods. This impact is most evident during illness, when children's appetite for other foods decreases but breastmilk intake is maintained (Brown et al. 1990). Longitudinal studies demonstrate that in developing countries, a longer duration of

breastfeeding is associated with greater linear growth (Onyango et al. 1999; Simondon et al. 2001).

Evidence shows that community-based integrated packages to improve maternal and neonatal health had a positive impact on the initiation of breastfeeding within one hour of birth (Lassi et al. 2010). Similarly, counseling and education interventions increased exclusive breastfeeding by 43% at day one; by 30% until one month; and by 90% from one–five months, while the proportion of mothers not breastfeeding declined by 32% at day one; 30% until one month; and 18% for one–five months. What's more, prenatal counseling had a significant impact on breastfeeding outcomes at four–six weeks. While both prenatal and postnatal counseling were important for exclusive breastfeeding at six months, combined individual and group counseling seemed to be better than individual or group counseling alone (Imdad et al. 2011; Bhutta et al. 2013). Much needs to be done to improve breastfeeding policies and practices for working women. A review of interventions in the workplace to support breastfeeding for women found no trials (Abdulwadud and Snow 2012).

## 2.2. Improving complementary feeding practices in the first two years of life

As a global public health guideline, WHO recommends that after the initial six-month exclusive breastfeeding period, children receive safe and nutritionally adequate complementary foods while breastfeeding continues for up to two years of age or beyond.

Complementary feeding refers to the timely introduction of safe and nutrient rich foods, in addition to breastmilk, that are typically provided from 6–23 months of age. Studies in low-income and middle-income countries have shown that better complementary feeding practices are positively associated with height-for-age Z scores (HAZ) (Ruel and Menon 2002). Besides timely introduction, other factors including frequency of feeding; the diversity of the complementary foods; and the consumption of a minimum acceptable diet are positively associated with improved growth in children (Arimond and Ruel 2004; Marriot et al. 2012). On the basis of this and other evidence, WHO has developed global guiding principles for complementary feeding of breastfed and non-breastfed children 6–23 month old (PAHO and WHO 2003; WHO 2005).

Systematic reviews of the existing evidence on interventions to improve the quality of complementary foods and feeding practices have shown that nutrition education and counseling in food secure populations led to a significant increase in height and HAZ whereas the effect on stunting was not statistically significant. A positive effect was also observed on weight gain while no effects were noted on weight-for-age Z scores (WAZ). Studies on education and counseling in food insecure populations show significant effects on HAZ, stunting, and WAZ. Counseling of mothers and caregivers, coupled with appropriate behavior change communication strategies that focus on other family and community members with the capacity to influence infant feeding decisions, are essential for improving complementary feeding of children 6–23 months old, especially in the presence of trained health workers (Wuehler et al. 2011; Zaman et al. 2008).

The provision of complementary foods in food insecure populations was associated with significant gains in HAZ and WAZ, whereas the effect on stunting did not reach statistical significance (Dewey and Adu-Afarwuah 2008; Lassi et al. 2013). The use of nutrient-rich, animal-source foods has beneficial effects on growth and developmental outcomes.



It is recommended to maximize the utilization of locally produced foods. Additional products should be considered only if they can fill a critical nutrient gap as a complement to continued breastfeeding and the local diet, but not as a replacement (WHO 2013). Where locally available foods alone cannot satisfy the nutrition requirements of infants and young children, products such as centrally-produced fortified foods, micronutrient powders for point-of-use fortification, or lipid-based nutrient supplements can be considered. Careful monitoring of these interventions is recommended to document their uptake and impact on children's morbidity, growth and development (WHO 2013).

## 2.3. Improving therapeutic and supplementary feeding for infants and young children with severe or moderate acute malnutrition (SAM/MAM)

As a global public health guideline, WHO recommends that children with SAM/MAM receive therapeutic/supplementary feeding and care either as inpatients (if there are medical complications) or as outpatients in their communities (if medically uncomplicated). SAM is defined as bilateral pitting oedema, weight-for-height z-score < -3, or mid-upper-arm circumference (MUAC) < 115 mm. It can be identified by community health workers or volunteers using simple colored plastic strips designed to measure MUAC. Community workers and volunteers can also be trained to recognize bilateral pitting oedema. Children with medically-complicated SAM and/or without appetite, need to receive in-patient care. Once medical conditions are treated, micronutrient deficiencies are corrected and sustained weight gain starts, children can continue treatment at home through a community-based program for the management of acute malnutrition (CMAM), with regular visits to a health center.

Evidence indicates that most children with SAM (> 85% in most settings) can be treated as outpatients through CMAM programs. CMAM involves early detection of SAM in the community, treatment with ready-to-use therapeutic foods (RUTF) or other nutrient-dense foods at home, and regular (weekly/bi-weekly) monitoring at the health facility. Programmatic evidence supports the use of RUTF for community-based treatment (Collins 2004; Hall et al. 2011). RUTF can be produced easily and safely in most settings worldwide; thus WHO has developed international standards for the local production of RUTF that include detailed nutrition composition

and safety measures (WHO et al. 2007). If properly combined with facility-based care, CMAM can prevent the deaths of hundreds of thousands of children. However, there is agreement that RUTF is only one input to CMAM programs and that emphasis needs to be placed on the quality of program design and implementation to achieve scale, impact and sustainably.

Children with SAM coexist with a larger number of children with MAM (weight-for-height between -2 to -3 z-scores, and without oedema). Overall, the dietary management of children with MAM is based on the optimal use of locally available foods to improve children's nutritional status and prevent SAM. Thus, care for children with MAM should emphasize the protection, promotion and support of optimal breastfeeding and complementary feeding practices. In situations of food insecurity or where local diets lack specific nutrients, supplementary foods can be used to treat children with MAM. Evidence-informed recommendations on the composition of supplementary foods used to treat children with MAM are in development. In the meanwhile, WHO has issued a technical note that summarizes the principles of the dietary management of children with MAM (WHO 2012).

## 2.4. Improving micronutrient intake in children and women through micronutrient supplementation interventions

Micronutrient supplementation can play a role in controlling micronutrient deficiencies in children and women (WHO 2013). For non-pregnant women, intermittent iron supplementation has been shown to reduce anemia by 27%; daily iron supplementation during pregnancy has been shown to reduce anemia, iron deficiency anemia (IDA), and the incidence of low birthweight (Fernandez-Gaxiola and De-Regil 2011); folic acid supplementation during the periconceptional period has been shown to prevent neural tube defects (De-Regil et al. 2010); and folic acid supplementation during pregnancy has been shown to improve mean birthweight and reduce the incidence of megaloblastic anemia (Lassi et al. 2013). WHO recommends daily iron+folic acid supplementation for pregnant women and intermittent iron+folic acid supplementation for menstruating women in populations at risk of iron deficiency (WHO 2011; WHO 2012).



A recent Cochrane review reported an 11–13% reduction in low birthweight and small-for-gestational age births following multiple micronutrient supplementation during pregnancy, with similar effects on anemia and IDA to those of iron+folic acid supplementation (Haider and Bhutta 2012). Thus there is increasing consensus on the need to replace iron+folic acid supplementation during pregnancy with multiple micronutrient supplementation in populations at risk (WHO 2013). Calcium supplementation during pregnancy in women at risk of low calcium intake reduces maternal hypertensive disorders, preeclampsia, and preterm birth (Imdad and Bhutta 2012; Hofmeyer et al. 2010; WHO 2013). Additionally, where iodine deficiency and/or vitamin A deficiency are severe public health problems, iodine supplementation and vitamin A supplementation during pregnancy are recommended (WHO and UNICEF 2007; WHO 2011).

For children, vitamin K is commonly given to newborns to reduce the risk of bleeding resulting from vitamin K deficiency in the first weeks of life (Puckett and Offringa 2010). The evidence on the

benefits of neonatal vitamin A supplementation is still inconclusive while the positive impact of vitamin A supplementation on the survival of children 6–59 months old is well established. Reviews of over 40 randomized trials have shown that vitamin A supplementation reduces all-cause mortality by 12–24% (Imdad et al. 2010; Awasthi et al. 2013). Thus, in settings where vitamin A deficiency is a public health problem, vitamin A supplementation is recommended in infants and children 6–59 months of age to reduce child morbidity and mortality (WHO 2013). As infants and young children have higher iron requirements because of their rapid growth, it is recommended that where the diet does not include fortified foods, or the prevalence of anemia in children at approximately 12 months of age is severe (above 40%), iron supplements (2 mg/kg of body weight/day) should be given to children 6–23 months old (WHO 2001). In malaria endemic areas, iron supplementation may lead to increased morbidity in children. Thus in such settings, WHO recommends the administration of iron supplements if malaria prevention and treatment are available (WHO 2010). Zinc supplementation should be part of the management of diarrhea in children (WHO 2006), and iodine supplementation for young children is recommended in settings where less than 20% of households have access to iodized salt (WHO and UNICEF 2007).

### 2.5. Improving the quality of maternal diets through food supplementation and/or dietary advice during pregnancy

Maternal undernutrition during pregnancy can lead to intra-uterine growth restriction and poor pregnancy outcomes. In 2003, a Cochrane review concluded that balanced protein-energy supplementation was associated with modest increases in maternal weight gain and mean birthweight, and a substantial reduction of small-for-gestational-age (SGA) births and stillbirths (32% and 45% respectively). A larger effect on birth weight was observed in undernourished women and during the hungry season. Dietary advice to increase energy and protein intake was effective in increasing pregnant women’s nutrient intake but no consistent benefit was observed on pregnancy outcomes. It was also concluded that high-protein or balanced-protein supplementation alone was not beneficial and could be harmful to the fetus, particularly due to a significantly higher risk of SGA births (Kramer and Kakuma 2003).

In 2011, a meta-analysis of the impact of balanced

protein-energy supplementation (proteins providing less than 25% of the energy content) concluded that balanced protein-energy supplementation resulted in a 32% reduction low birth weight in the intervention group compared with the control group [RR 0.68; 95% CI 0.51–0.92]. There was also a reduction of 34% in SGA newborns [RR 0.66; 95% CI 0.49–0.89] and a 38% reduction in stillbirths in the intervention group [RR 0.62; 95% CI 0.40–0.98]. Pooled analysis showed a positive impact on birthweight in the intervention group compared with the control group [mean difference 73.78 g; 95% CI 30.42–117.15]. This effect was more pronounced in undernourished women [mean difference 100.86 g; 95% CI 56.14–145.58] compared with adequately nourished women [mean difference 22.58 g; 95% CI -27.17–72.32] (Imdad and Bhutta 2011; Imdad and Bhutta 2012). The authors concluded that balanced protein-energy supplementation is an effective intervention to reduce the prevalence of LBW and SGA births, especially in undernourished women.

The use of lipid-based nutrient supplements (LNS) is being explored to improve outcomes in pregnant women. A randomized controlled trial in Burkina Faso with LNS (373 kcal/d and multiple micronutrients) showed a positive effect on birth weight and birth length compared to multiple micronutrient supplementation alone. Subgroup analyses showed clinically important treatment effects on birth length (+12.0 mm; P = 0.005) and birth weight (+111 g; P = 0.133) for underweight pregnant women (BMI < 18.5 kg/m<sup>2</sup>). The authors recommended that in women with a suboptimal pre-pregnancy nutritional status, micronutrient supplementation should be complemented with a balanced energy and protein supplement to produce a clinical effect on birth size (Huybregts et al. 2009). A series of trials are underway in Africa and Asia to assess the benefits on child growth of combined pre- and post-natal home fortification with small-quantity LNS.

### 2.6. Improving the quality of diets in the general population through food fortification strategies

For more than a century, food fortification has been implemented in industrialized countries as a cost-effective strategy to prevent micronutrient deficiencies (WHO 2006). Food fortification has the greatest potential for impact when it is implemented within a comprehensive nutrition strategy. There are four types of fortification:

- Universal fortification (such as salt iodization and wheat/maize flour fortification with iron, folic acid, vitamin B12, vitamin A and other micronutrients) is one of the most cost-effective preventive strategies to reach populations (Horton et al. 2008). It is particularly effective when salt and flour are industrially-produced and regularly consumed by large population groups, and when fortification is mandatory for industries through national legislation (WHO 2006).
- Targeted fortification is important for nutritionally vulnerable population groups, including children aged 6–23 months. A meta-analysis of micronutrient fortification of milk and cereal food for young children showed a 57% reduction in anemia, and an increase in vitamin A serum concentrations (Eichler et al. 2012). Targeted fortification is also effective in resource poor settings where family foods do not include animal-source foods that are typically necessary to meet nutrient requirements of the population. A meta-analysis of 60 trials showed that iron fortification of foods resulted in a 52% reduction in iron deficiency and 41% reduction in anemia (Gera et al. 2012).
- Point-of-use fortification (sometimes referred to as home fortification) involves the addition of nutrients directly to food in the form of micronutrient powders or lipid spreads. Micronutrient powders are increasingly used in programs to address iron and micronutrient deficiencies in children. A review of 16 trials concluded that micronutrient powders reduced retinol deficiency by 21% and iron deficiency anemia by 57% (Salam et al. 2013). Evidence of benefits to children’s linear growth is inconclusive. Some reports have associated the use of micronutrient powders with an increase in the incidence of diarrhea in children, underscoring the need for additional research (Soofi et al. 2013: 29–40).
- Biofortification of food crops is the process by which the nutritional quality of food crops is improved through biological means such as conventional plant breeding. Biofortification is an alternative to conventional fortification and is rapidly advancing in technology. Examples of biofortification projects include: iron-biofortification of rice, beans, sweet potato, cassava and legumes; zinc-biofortification of wheat, rice, beans, sweet potato and maize; provitamin A carotenoid-biofortification of sweet potato, maize and cassava; and amino acid and protein-biofortification of sorghum and cassava. According to WHO, further research is needed before specific recommendations can be made (WHO 2012).

### 3. Nutrition-sensitive interventions: addressing the underlying causes of undernutrition

We review six nutrition-sensitive interventions that aim at addressing the underlying determinants of undernutrition in children and women by incorporating nutrition objectives and actions in six non-nutrition sectors and programs: agriculture; water hygiene and sanitation; early childhood development; education; social policy; and women and gender.

#### 3.1. Nutrition and agriculture programs

Agriculture and nutrition have a synergistic influence on each other. Poor nutrition can negatively affect agricultural production, while poor agricultural productivity can impact negatively the nutritional status of individuals and households (Meeker and Haddad 2013; Ruel and Alderman 2013). Hence, agriculture programs have the potential to improve nutrition by: increasing access and availability of food for own consumption; increasing own income through the marketing of agricultural commodities or income from wages; modulating the quality and/or price of the foods available; being sensitive to the role of women in agriculture and food production; and/or contributing to overall economic growth (Meeker and Haddad 2013; Harris and Drimie 2013; Van den Bold et al. 2013).

Well-designed nutrition-sensitive agriculture programs can improve children's and households' food consumption and diet quality through several distinct pathways: 1) incorporating nutrition objectives and indicators into the design of agriculture programs and trade policies; 2) addressing the nutritional needs of the most vulnerable/poor farmers and their families through a package of essential interventions and/or through incentives for small scale farmers to produce nutrient rich foods; 3) supporting systems that promote homestead food production and the use of products from local home gardens for school feeding programs so as to expand livelihoods and provide additional income for farmers; 4) strengthening the capacity of farmers to minimize post-harvest losses; 5) using the agriculture sector as a platform to disseminate key nutrition information; 6) addressing food safety issues and food-borne diseases and their impact on nutrition; and 7) engaging women in agriculture production, enhancing their livelihoods and income flow, empowering them to manage

their own health, time, resources and assets, and increasing their decision-making power regarding intra-household allocation of food, health and care (WHO 2012; Meeker and Haddad 2013).

However, despite the clear nutrition potential of agricultural interventions, the evidence base for the relationship between agriculture and nutrition is still weak. Many agriculture programs were not designed with clear nutrition objectives from the outset, were rather retrofitted to be 'nutrition-sensitive', and show limited evidence of impact. The challenge ahead is: 1) to make agriculture policies and programs nutrition-sensitive by design to enhance children's, women's and household's access to diets that are adequate in quantity, quality and diversity, by increasing the production of nutritious foods, expanding markets for nutrient-rich foods, and ensuring that the most vulnerable population groups have access to these markets; and 2) to improve the monitoring systems and evaluation strategies to measure the impact of agriculture policies and programs on children's and women's nutrition, or at least on some key intermediate determinants of children's and women's nutrition such as access to a diverse and nutritious diet.

#### 3.2. Nutrition and water, hygiene and sanitation programs

In developing countries, unsafe water and poor sanitation and hygiene (WASH) detrimentally impact the nutrition, growth and development of children through repeated bouts of diarrhea, parasitic infections or soil-transmitted helminths, and or/environmental enteropathy (Dangour et al. 2013; Walker et al. 2013). In regions where nutrition, hygiene and sanitation are poor, the convergence between the Nutrition and WASH sectors is vital to prevent and control infectious diseases – particularly those transmitted through the fecal-oral pathways (food, fluids, feces, flies) and improve nutrient intake and absorption (Ngure et al. 2014).

WASH programs need to comprise a range of essential interventions delivered at critical times to interrupt disease transmission (Greenland et al. 2013). These include: 1) providing clean piped drinking water and ensuring access to it; 2) improving household and environmental sanitation, including enhanced facilities for the disposal of excreta; and 3) improving personal, food and environmental hygiene practices, including the safe disposal of child feces and washing



hands with soap at critical times (UNICEF 2010). The synergies between WASH and nutrition are being increasingly considered and researched. Most of the available evidence focuses on the integration of WASH in the existing maternal and child nutrition programs, with a particular emphasis on improving caregivers' behaviors and practices related to hygiene and sanitation (Walker et al. 2013). However, there is limited programmatic evidence detailing how to make large scale WASH programs more nutrition-sensitive, what barriers these programs face, and what stakeholders believe is necessary for successful inter-sectoral synergy (Teague et al. 2014). There is evidence that the WASH sector is still very infrastructure-led. However with the Community-Led Total Sanitation (CLTS) approach, efforts are increasingly focusing on how to improve social norms and community hygiene and sanitation practices, and how to emphasize the sustainable use of safe, affordable, user-friendly sanitation facilities. Evidence about the feasibility and effectiveness of mainstreaming nutrition interventions in the CLTS or the WASH sectors is still lacking (Gill et al. 2013).

#### 3.3. Nutrition and early childhood development programs

Children who develop to their full potential during the 1,000 day period from conception to age two are healthier, stay longer in school, have better learning achievements, grow up to be productive adults and become more responsible parents to their own children (Irwin et al. 2007; WHO 2013). Moreover, evidence shows that children who are

given food supplements and stimulation attain better development scores than those who receive supplementation or stimulation only (Walker et al. 2011).

Many countries are implementing early childhood development (ECD) programmes. Most of these programs target younger children (0-3 years old) and/or children at a greater risk of poor development. In general, ECD interventions fall into two categories: 1) child-focused interventions that provide stimulation and direct learning opportunities to children; and 2) caregiver-focused interventions (including parents, teachers and childcare workers) that improve knowledge and skills related to childcare (Engle et al. 2011).

While more work is needed to integrate nutrition interventions into ECD programs, there is evidence that significant scope exists for synergies (Spratt 2013). Child-focused ECD interventions can be made nutrition-sensitive by integrating the promotion of optimal and responsive breastfeeding and complementary feeding practices, psycho-social stimulation and engaged parenting. For children enrolled in crèches or early childhood learning centres, ECD programs can be made nutrition-sensitive by integrating the promotion/use of multiple micronutrient supplements, fortified foods, iodized salt, and deworming tablets to prevent micronutrient deficiencies and anemia in children. In the case of undernourished children, ECD programmes that address developmental delays along with stimulation can deliver nutritious supplementary foods to address nutrient gaps and help improve cognition, school readiness, and learning outcomes (Walker et al. 2007). Caregiver-focused ECD interventions can be made nutrition-sensitive by: 1) integrating key nutrition messages on infant and young child feeding and nutrition in all information, education and communication materials; 2) developing the skills of caregivers on optimal feeding practices, caregiver-child interactions and psychosocial stimulation; and 3) supporting mothers and primary caregivers to adopt healthy lifestyles to improve their nutritional status and that of their young children. These interventions can be delivered through multiple platforms such as home visits, community-based group sessions, mother/caregiver support groups, and community participation among others (Irwin et al. 2007; Walker et al. 2011; Grantham et al. 2007).

In socially adverse environments – where the most vulnerable children and women live – mothers are

more likely to be the poorest, most undernourished, mentally vulnerable and/or depressed and less responsive to their children's needs. In such settings, programs can combine nutrition interventions to improve women's nutrition with mother-child stimulation interventions to address maternal psycho-social needs so that mothers are better equipped to provide optimal childcare (UNICEF and WHO 2012).

### 3.4. Nutrition and education programs

Education and nutrition have a cyclical relationship. Well-nourished children are more likely to enroll in school timely, complete schooling, and reach their academic potential; produce more and earn better as adults; and give birth to and care for healthier and better nourished children (Gillespie et al. 2013). Maternal primary and secondary education are consistently associated with reduced risk of stunting in children (UNICEF and WHO 2012). Therefore, the positive global trend in girls' education is encouraging from a nutrition perspective as it has the potential to drive a decline in the prevalence of child undernutrition. However, despite this positive trend in girls' schooling, only about one-fifth of adolescent girls in sub-Saharan Africa and two-fifths of girls in South Asia are enrolled in secondary education (Meeker and Haddad 2013).

By investing in nutrition-sensitive education programs, children have a higher likelihood to enroll and stay in school, achieve better learning outcomes, and have a more productive adult life. In schools, nutrition-sensitive interventions may include: 1) food fortification and micronutrient supplementation to ensure that children receive the right quantities of essential vitamins and minerals, such as iodine and iron, to prevent micronutrient deficiencies and improve learning outcomes; 2) iron and folic acid supplementation programs for adolescent girls to prevent and control anemia; 3) regular deworming for children to control intestinal worm infestation, enhance school participation and boost learning capabilities; 4) school feeding programs, which can improve school enrolment, attendance, overall performance and learning outcomes; 5) integrating nutrition in the school curriculum to improve nutrition knowledge and practices and prepare school children for their future parenting role in adulthood; and 6) appropriate and girl-friendly water and sanitation facilities to improve school attendance, especially among girls (Adelman et al. 2008; Bundy et al. 2009).



In the long term, investing in nutrition-sensitive education programs can: 1) help promote early childhood development by stimulating cognitive development and addressing the developmental delays caused by undernutrition in early life; and 2) promote that girls complete secondary education, grow up to be well-informed and empowered women who marry and bear children at a later age (Walker et al. 2011; UNICEF and WHO 2012). Investing in education is a strong determinant of the nutrition of the next generation (Meeker and Haddad 2013). Innovative approaches like fee waivers and cash transfers can be used to enhance school enrollment and ensure that children stay in school and complete more years of schooling (UNICEF and WHO 2012).

### 3.5. Nutrition and social protection programs

Social protection programs are designed to protect the most vulnerable groups of society against livelihood risks and economic insecurities, and to enhance social status and rights of the marginalized (Marini et al. 2013; Slater et al. 2014; UNICEF 2014). Social protection programs provide vulnerable families with opportunities to access essential social services, enhance food security and income in poor households, and support vulnerable populations to grow out of the vicious cycle of poverty (Mokomane 2013; UNICEF 2014).

When targeted at women and young children, social protection programs can foster linkages with nutrition services and other allied sectors like health and water and sanitation to reduce the prevalence of undernutrition (Adelman et al. 2008; UNICEF 2012;

Alderman 2014; UNICEF 2014). Examples of how social protection programs can be made nutrition-sensitive include: 1) employment generation programs targeted at the poorest and most vulnerable households have given less laborious work to pregnant women, have ensured flexible work schedules for working women with young children, and/or have provided working women with mobile crèches so that mothers can provide appropriate nutrition care for their children; 2) health insurance programs have subsidized health care costs and have improved access to primary health and nutrition care services for families with young children; 3) microfinance schemes have promoted savings and household food security so that vulnerable households are more resilient to climate change and seasonal shifts in agricultural production; and 4) community development programs have integrated nutrition and involved communities and civil society so that nutrition services are brought closer to homes of vulnerable populations (Davies et al. 2013; UNICEF 2014).

Protective and preventive social protection programs like cash transfers, in-kind transfers, fee waivers (protective) and/or pension plans, subsidies, social securities, and insurance (preventive) provide basic facilities such as food, health care and alleviate chronic or transitory poverty (Marini et al. 2013). Such transfer programs are well-positioned to improve nutrition outcomes because they supplement family income, enhance food availability and accessibility and also empower women to spend the additional income to improve the diets of children and families, including improved diet diversity (Adelman et al. 2008; UNICEF 2012; Marini et al. 2013). These programs also include nutrition education to enhance care-giving and health-seeking practices, improve children's growth, support optimal child feeding and nutrition, and promote home gardening (UNICEF 2012; Marini et al. 2013).

Many of the world's poor have benefited from cash transfer-based social protection programs. The bulk of evidence indicates these enhance caloric intake and utilization of healthcare services, however their effects on reductions in stunting or anemia remains contested (Smith et al. 2003; Agüero et al. 2006; Adelman et al. 2008; Adato and Bassett 2009: 60-75; Amarante et al. 2011; Engle et al. 2011; Meeker and Save the Children 2012; UNICEF 2012; Haddad 2013). The potential of other forms of social protection programs to be nutrition-sensitive remains largely untapped.

### 3.6. Nutrition and women and gender programs

Gender inequities and dynamics are a major social determinant of nutrition outcomes in young children, particularly in South Asia (UNICEF 2011). Women with lower status have weaker control over household resources, poor decision-making power, tighter constraints on their time, restricted access to information and services, and poor mental health, self-confidence and self-esteem. In addition, women are harder hit by poverty than men because of their childbearing role and specific or additional nutrient requirements. Women's deprivations affect their children's birth weight as well as the nutrition, growth and development of children in infancy and early childhood, thus triggering a vicious cycle of poverty and undernutrition (Quisumbing 2003; Adato and Bassett 2009; World Bank 2011; Torheim and Arimond 2013).

Gender-specific nutrition interventions such as daily/weekly iron and folic acid supplementation programs for pregnant women/adolescent girls respectively, and food and calcium supplementation programs for women of reproductive age, pregnant women and/or breastfeeding mothers are examples of nutrition programs that aim to address the specific needs of women (Save the Children 2012). However, beyond the realm of women-specific nutrition programs, mainstreaming gender equity in nutrition relevant sectors such as agriculture, health, education, water and sanitation, social protection and poverty reduction can lead to: increased agricultural productivity and food security; reduced poverty and exclusion; improved school enrollment and learning outcomes; increased access to health and nutrition services; and declining rates of maternal and child undernutrition (UNICEF 2014).

Gender-sensitive programs include interventions that aim to enhance women's empowerment, participation and leadership; access to and control of financial assets; investment in infrastructure and labor-saving technologies to support working women, including women who work in the agriculture sector; protect and promote women's access to housing, property and land (including rights to inheritance); and address gender-based violence (WHO 2002; Adato and Bassett 2009; Alderman 2014). Gender parity in education, health, nutrition and economic opportunities result in economic and social empowerment of women, increased investments

in children's health, education, and nutrition, and improved development outcomes in the next generation (Torheim and Arimond 2013). A recent review has documented how gender inequities impact children's survival, health and nutrition and the benefits of gender-sensitive programs to women and children, however it should be noted that the documented evidence on this issue is still limited (Adato and Bassett 2009).

#### 4. Conclusion

There is a range of nutrition-specific and nutrition-sensitive interventions that have the potential to reduce undernutrition in children and women. In the last decade, efforts to scale up nutrition programs have given encouraging results and a number of countries have been able to significantly reduce undernutrition in children and women (IFPRI 2014). Despite their diverse environments, these countries have in common a set of 'success factors':

- Political commitment at the highest level that has translated into robust situation analyses and evidence-based nutrition-specific and nutrition-sensitive policies and programs.
- Strong governance systems, a multi-sectoral approach, dedicated program budgets, and

equitable action plans and objectives to address child undernutrition with emphasis on the 1,000-day period from conception to the age two years.

- Adequate human and institutional capacity in public health nutrition at national and sub-national level, encompassing both knowledge on public health nutrition and management skills (leadership, decentralized planning, and budget monitoring) to scale up nutrition programs.
- Results-based management systems with strong monitoring, evaluation and knowledge management frameworks to document program coverage, quality, equity and impact, and allow governments and other stakeholders to make real-time programmatic decisions and remain accountable.
- The involvement and participation of communities sustained by effective communication and advocacy (Haddad et al. 2012; Zulfiqar et al. 2013; Bruno et al. 2014; SAARC 2014; Sunguya et al. 2014; UNICEF 2014).

Therefore, strong evidence and advocacy narratives, good political will and governance, and adequate capacity and financial resources seem to be the three key ingredients of the environment that is needed to enable nutrition-specific and nutrition-sensitive interventions and programs to improve maternal and child nutrition outcomes.



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