Synthesis of Evidence of Multisectoral Approaches for Improved Nutrition

November 2017
Acknowledgements

*Synthesis of Evidence of Multisectoral Approaches for Improved Nutrition* is a product of Banking on Nutrition Partnership, an initiative of the African Development Bank (AfDB), undertaken with the support of Big Win Philanthropy and Aliko Dangote Foundation and with technical assistance provided by Results for Development (USA).

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The team extends a special thanks to the following experts who reviewed findings pertaining to different sections of this report: Harold Alderman (IFPRI), Anna Herforth (Columbia University), Sue Horton (University of Waterloo), Mduduzi Mbuya (Cornell University) and Caroline Wilkinson (UNHCR).
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Foreword

The determinants of nutritional status are multifaceted and include individual health status and access to health care; access to safe, nutritious, and diverse foods; access to safe water and proper sanitation facilities; conduction of optimal feeding, caregiving, and hygiene practices; and adequately spaced birth intervals.

A 2013 Lancet series on maternal and child nutrition underscored that both nutrition-specific and nutrition-sensitive interventions are necessary to eliminate maternal and child malnutrition. Nutrition-specific interventions help to ensure adequate food and nutrient intake and proper feeding, caregiving, and parenting practices. Nutrition-sensitive interventions address food security; availability of adequate caregiving resources at the maternal, household, and community levels; and access to health services and a safe and hygienic environment.

Multi-sectoral nutrition programming enables donors, countries, and implementers to address the multifactorial causes of national nutrition challenges by linking and integrating program design, delivery, and evaluation across disciplines and sectors.

Nutrition offers an opportunity for the AfDB to act on, and invest in one of the most important paths to sustainable development outcomes. Investments in nutrition—particularly in support of grey matter infrastructure - are at the heart of the AfDB’s equitable growth agenda, including the Bank’s Ten-Year Strategy (2013-2022) and Poverty Reduction Strategy (2014-2018). To accelerate progress on green and inclusive growth, the Bank has developed the “High-5s” priorities (Light Up and Power Africa, Feed Africa, Industrialize Africa, Integrate Africa, and Improve the Quality of Life for Africans). Nutrition is an integral part of the Feed Africa strategy, and is strongly embedded and contributes to the High Five “Improve the Quality of Life for Africans”.

The Banking on Nutrition Partnership
November 2017
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<th>Description</th>
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<td>AAIFP</td>
<td>African Alliance for Improved Food Processing</td>
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<td>AfDB</td>
<td>African Development Bank</td>
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<td>ASF</td>
<td>animal-source food</td>
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<td>BCC</td>
<td>behavior change communication</td>
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<td>BMI</td>
<td>body mass index</td>
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<td>CAN</td>
<td>Compendium of Actions for Nutrition</td>
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<td>CIFF</td>
<td>Children's Investment Fund Foundation</td>
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<td>CLM</td>
<td>Fight Against Malnutrition Unit</td>
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<td>CLTS</td>
<td>Community-Led Total Sanitation</td>
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<tr>
<td>DALY</td>
<td>disability-adjusted life year</td>
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<tr>
<td>DFID</td>
<td>Department for International Development</td>
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<td>DHS</td>
<td>Demographic and Health Survey</td>
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<td>DRC</td>
<td>Democratic Republic of Congo</td>
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<tr>
<td>EBF</td>
<td>exclusive breastfeeding</td>
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<td>ECD</td>
<td>early childhood development</td>
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<td>FAO</td>
<td>Food and Agriculture Organization of the United Nations</td>
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<td>GAIN</td>
<td>Global Alliance for Improved Nutrition</td>
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<tr>
<td>GDP</td>
<td>gross domestic product</td>
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<tr>
<td>GNP</td>
<td>gross national product</td>
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<tr>
<td>GNR</td>
<td>Global Nutrition Report</td>
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<tr>
<td>HAZ</td>
<td>height-for-age Z-score</td>
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<tr>
<td>HIV</td>
<td>human immunodeficiency virus</td>
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<tr>
<td>IFAD</td>
<td>International Fund for Agricultural Development</td>
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<td>IFPRI</td>
<td>International Food Policy Research Institute</td>
</tr>
<tr>
<td>IPC</td>
<td>Integrated Food Security Phase Classification</td>
</tr>
<tr>
<td>IPTc</td>
<td>intermittent preventive treatment in children</td>
</tr>
<tr>
<td>IPTp</td>
<td>intermittent preventive treatment in pregnancy</td>
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<td>ITN</td>
<td>insecticide-treated net</td>
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<td>IYCF</td>
<td>infant and young child feeding</td>
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<tr>
<td>KMC</td>
<td>Kangaroo Mother Care</td>
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<tr>
<td>LMICs</td>
<td>low- and middle-income countries</td>
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<td>LNS</td>
<td>lipid-based nutrient supplements</td>
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<td>MAM</td>
<td>moderate acute malnutrition</td>
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<tr>
<td>MDG</td>
<td>Millennium Development Goal</td>
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<tr>
<td>MMN</td>
<td>multiple micronutrient</td>
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<td>MNI</td>
<td>Mainstreaming Nutrition Initiative</td>
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<td>MSG</td>
<td>monosodium glutamate</td>
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<tr>
<td>MSN</td>
<td>multisectoral nutrition</td>
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<td>MSNP</td>
<td>Multisectoral Nutrition Plan</td>
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<td>N4G</td>
<td>Nutrition for Growth</td>
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<tr>
<td>Acronym</td>
<td>Full Form</td>
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<td>NFHS</td>
<td>National Family Health Survey</td>
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<td>NGO</td>
<td>Nongovernmental Organization</td>
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<td>NNP</td>
<td>National Nutrition Programme</td>
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<td>NPC</td>
<td>National Planning Commission</td>
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<td>ODA</td>
<td>official development assistance</td>
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<td>OECD</td>
<td>Organization for Economic Co-operation and Development</td>
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<tr>
<td>OFSP</td>
<td>orange-fleshed sweet potato</td>
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<tr>
<td>PAHO</td>
<td>Pan American Health Organization</td>
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<tr>
<td>PDS</td>
<td>Public Distribution System</td>
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<td>QPM</td>
<td>quality protein maize</td>
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<tr>
<td>R4D</td>
<td>Results for Development</td>
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<tr>
<td>RCT</td>
<td>randomized controlled trial</td>
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<td>RDA</td>
<td>recommended daily allowance</td>
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<tr>
<td>REACH</td>
<td>Renewed Efforts Against Child Hunger</td>
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<td>RUTF</td>
<td>ready-to-use therapeutic food</td>
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<tr>
<td>SAM</td>
<td>severe acute malnutrition</td>
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<tr>
<td>SDG</td>
<td>Sustainable Development Goal</td>
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<tr>
<td>SFP</td>
<td>supplementary feeding program</td>
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<tr>
<td>SGA</td>
<td>small for gestational age</td>
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<tr>
<td>SME</td>
<td>small and medium enterprise</td>
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<td>SUN</td>
<td>Scaling Up Nutrition</td>
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<tr>
<td>UN</td>
<td>United Nations</td>
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<tr>
<td>UNCDF</td>
<td>United Nations Capital Development Fund</td>
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<tr>
<td>UNICEF</td>
<td>United Nations Children's Fund</td>
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<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
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<tr>
<td>WASH</td>
<td>water, sanitation, and hygiene</td>
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<tr>
<td>WAZ</td>
<td>weight-for-age Z-score</td>
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<tr>
<td>WB</td>
<td>World Bank</td>
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<tr>
<td>WFP</td>
<td>World Food Programme</td>
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<td>WHA</td>
<td>World Health Assembly</td>
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<tr>
<td>WHO</td>
<td>World Health Organization</td>
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<tr>
<td>WHZ</td>
<td>weight-for-height Z-score</td>
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Chapter 1 : Investing in nutrition

The value of investing in nutrition in Africa

Good nutrition is essential for human, social and economic development. It is the foundation for individual flourishing and for community prosperity.

Malnutrition, however, is a prevalent and pervasive challenge in the world and in Africa. Undernutrition remains one of the largest contributors to global child mortality and is linked to about 45 percent of deaths among children under age 5 (Black et al. 2013). In sub-Saharan Africa, child and maternal malnutrition are leading risk factors for disability (Forouzanfar et al. 2015) because malnourished children may be less resilient and more susceptible to disease and illness (Rice et al. 2000; Caulfield et al. 2004; Rytter et al. 2014). Children who are stunted—a largely irreversible outcome resulting from inadequate nutrition and frequent infections in infancy and early childhood—can also suffer from impaired cognitive development thereby limiting their ability to learn in school (Dewey and Begum 2011). Lacking key nutrients in the crucial first 1,000 days from conception to the age of two, stunted children grow into adulthood permanently shorter, weaker, and with cognitive deficits. As a consequence, malnourished children suffer from poorer productivity and health, resulting in lower incomes. Investments in nutrition are therefore an essential building block for a country’s brainpower—its “grey matter infrastructure”—and productive capacity.

As noted by President Akinwumi Adesina of the African Development Bank (AfDB), ending malnutrition is not only a moral obligation but also an economic imperative. According to a recent estimate, malnutrition is responsible for an 11 percent loss of gross domestic product (GDP) annually in Africa (IFPRI 2016). Studies have shown that a 1 percent loss in adult height as a result of childhood stunting is associated with a 1.4 percent loss in productivity (Shekar et al. 2006). Likewise, eliminating anemia, which has a direct impact on adult productivity, can result in a 5 to 17 percent increase in adult productivity, which is equivalent to 2 percent of GDP in the most-affected countries (Shekar et al. 2006). In fact, the Global Nutrition Report (GNR) 2015 Africa Brief notes a 16:1 benefit-cost ratio to scaling up nutrition interventions in low- and middle-income countries (IFPRI 2015), which makes the long-term return on investment in children’s ‘grey matter infrastructure’ far superior to the return on many traditional development investments which aim to boost productivity.

In Africa, some efforts to reduce the prevalence of malnutrition have proven successful, demonstrating that devoting resources to nutrition can have an immediate and profound impact. Algeria, Egypt, Ghana, Kenya, Liberia, Morocco, Swaziland and Tunisia are all on course to

“To empower people out of poverty, we must first invest in the grey matter infrastructure that will truly fuel this progress—the minds of our children. Nutrition is not just a health and social development issue; nutrition is an investment that shapes economic growth for all African nations.”

— Akinwumi Adesina, AfDB President at the 2016 AfDB annual meeting in Lusaka
meeting the 40 percent stunting reduction target, and 17 African countries are on the course to meeting the target of reducing and maintaining wasting rates to no more than 5 percent (IFPRI 2016). This progress is the result of strong leadership and political commitments at the highest level of governments; strong multisectoral plans and coordination mechanisms, and investments in packages of prioritized and cost-effective interventions. The progress has been supported by global mechanisms such as the Scaling-Up Nutrition (SUN) Movement and the World Health Assembly (WHA) nutrition targets for 2025, which are now part of the Sustainable Development Goals (SDGs).

However, there is a long way to go. Compared to other regions, Africa has experienced slow progress in reducing stunting rates and the absolute numbers of stunted and overweight children have increased (Figure 1.1) (UNICEF/WHO/World Bank Group 2017). 14 million children are wasted (low weight-for-height), indicating acute malnutrition. And, amidst widespread undernutrition, overweight and obesity is rising in Africa: 9.8 million children in Africa are overweight (Figure 1.2), up from 6.6 million in 2000. In fact, nutrition remains critically underfinanced by both countries and donors. Governments in Africa spend little on nutrition-specific programming, and donors spend less than one percent of official development assistance on basic nutrition (Shekar et al. 2016).¹

Now is the time to end malnutrition in Africa. In the past decade, the continent has experienced tremendous economic growth and has strong potential to continue on this path due to increased investments and a rapidly growing workforce. These returns could be especially impactful in the context of Africa’s

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¹ Authors’ calculations from Creditor Reporting System data (Source: OECD.Stat).
emerging ‘demographic dividend’—as most of the advanced economies are facing declining workforces, Africa’s working age population is increasing, meaning that its productive potential will rise. Investing in nutrition could harness this potential productivity and strengthen the human capital and economic development of Africa’s future.

Box 1.1 shows how all the “High-5s” of the African Development Bank can be linked with nutrition and grey matter infrastructure.

<table>
<thead>
<tr>
<th>Box 1.1: How the High-5 priorities link to nutrition</th>
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<tr>
<td><strong>Feed Africa</strong>: The Feed Africa strategy identifies eliminating hunger and malnutrition as one of its key goals.</td>
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<tr>
<td><strong>Improve the Quality of Life for the People of Africa</strong>: Strengthening grey matter infrastructure will directly and indirectly contribute to improved quality of life for the people of Africa: good nutrition will improve physical health and cognitive development, and these in turn will contribute to increased educational attainment, productivity, and prosperity. Key activities pursued under this High-5s priority can also be instrumental in supporting grey matter infrastructure—for example, the Jobs for Youth agenda can improve livelihoods (contributing to improved nutrition for families), can support training and job promotion in fields such as agribusiness, and can increase their income to enable them to buy safe and nutritious foods, which in turn will support improved nutritional outcomes in broader society.</td>
</tr>
<tr>
<td><strong>Industrialize Africa</strong>: Industrializing Africa can contribute to enhanced nutrition and grey matter infrastructure at the household level through job creation and poverty reduction, which can help families improve food consumption and health for children. Industrializing Africa can also contribute to nutrition at the systems level, as the large, medium and small enterprises are the engine that can supply safe and nutritious foods.</td>
</tr>
<tr>
<td><strong>Integrate Africa</strong>: Many activities proposed under the Integrate Africa priority will contribute to improved nutrition and enhanced regional food systems, including promoting regional trade, harmonizing quality assurance standards, scaling up regional infrastructure investments and supporting regional agricultural value chains.</td>
</tr>
<tr>
<td><strong>Light Up and Power Africa</strong>: Power is critical to building and maintaining the value chains within safe and nutritious food systems, including through mechanized agriculture implements, cold chain equipment and vehicle transportation of agriculture commodities to markets, among many other applications. Additionally, solar-powered cooking stoves as well as solar-powered equipment for food processing and drying can help women allocate more time towards education and childcare, which in turn improves nutritional outcomes.</td>
</tr>
</tbody>
</table>
Given the right investments in “grey matter infrastructure” at the right time, every child can achieve his or her full potential. As the World Bank noted in *An Investment Framework for Nutrition*, the payoffs from these investments are durable, portable and inalienable: investments made during the critical 1,000 day window of opportunity last a lifetime without need for replenishment, and they belong to those children wherever they go and however their lives unfold (Shekar et al. 2016).

“We always focus on the negatives about nutrition: if you miss the window you can never replace it, it’s a lost opportunity, etcetera. But remember, flip it over, and the positive is equally true: once a child attains her full potential height—her full cognitive potential—nothing can ever take that away or reverse it. Think about how many other development investments you can make that are durable, portable, and that have lifecycle impacts that extend well beyond one lifetime.”


For the AfDB to make the right investments at the right time—for it to deliver sustainable nutrition efforts on the ground and generate long-term economic growth across Africa—it must know what the right investments are. This report broadly outlines what works in nutrition so that the Bank can both support the scale-up of proven interventions and identify where further evidence of intervention effectiveness is needed.

**Further reading**


Chapter 2 : Determinants of nutrition

Nutrition is an outcome resulting from complex interactions between individuals, households and broader social and economic conditions, as depicted in the framework shown in Figure 2.1. This simplified framework draws on established frameworks used by UNICEF (2015) and the Lancet Maternal and Child Nutrition Series (Black et al. 2013) to outline key drivers of malnutrition in society and informs suggestions in this report on how the AfDB might work to address nutrition.

**Figure 2.1: Modified framework for determinants of nutrition**

The framework broadly outlines how various factors affect children’s nutritional status, including conditions of undernutrition and overnutrition. The immediate causes are related to inadequate dietary intake and exposure to disease or illness, and the related interventions are mostly in the health sector. The underlying causes relate to the household and the community, which affect household food security, maternal and child care practices and the health environment. The agriculture, water and sanitation (WASH), social protection and education sectors and the gender and emergency contexts are known to significantly affect the underlying causes of malnutrition and are areas in which AfDB units are making sector-specific investments. Several economic, political and environmental factors also contribute to an enabling environment for interventions that address the immediate and underlying causes of malnutrition. This report addresses several such factors, with a particular focus on the role of the private sector.

The wide range of contributing factors suggests a need for a multisectoral approach to nutrition; the report therefore also examines what is required for countries to implement a multisectoral nutrition strategy.
Chapter 3 : Purpose and methods of the review

This report examines evidence for impact on both nutrition outcomes and intermediate outcomes.

- **Nutrition outcomes** include outcomes related to stunting, wasting, anemia, breastfeeding and low birthweight that are included in the WHA targets.

- **Intermediate outcomes** in nutrition-sensitive sectors are addressed in the report because the evidence base on nutrition outcomes is limited. Many of the studies have not been designed to evaluate impact on nutrition outcomes and have therefore been statistically underpowered (Masset et al. 2012). In addition, because nutrition-sensitive interventions target underlying causes of malnutrition rather than immediate causes, it is challenging to capture or control for all key variables along the extensive impact pathway (Masset et al. 2012; Herforth and Ballard 2016).

This high-level literature review was conducted from January to March 2017, and literature published after that date was not included in the review. This report focuses on interventions and programs for which there is a growing consensus among researchers and practitioners that they work for nutrition. Rather than trying to capture the entire universe of interventions, the report reviews only key literature, including available epidemiological studies, quantitative studies that demonstrate associations, and qualitative studies that offer guidance from organizations. **Figure 3.1** shows the general approach taken to reviewing the literature.

**Figure 3.1: Literature review process**

1. **Step 1** involved examining publicly available systematic reviews, such as the Lancet Maternal and Child Series, Cochrane reviews, and others,\(^2\) that assess the impact of a wide range of

\(^2\) For further details, refer to individual chapters and references provided by chapter at the end of this report.
nutrition-specific interventions on nutrition outcomes and then manually searching for updated literature to confirm interventions with evidence on nutrition outcomes.

**Step 2** involved examining sector-specific sources listed in the Compendium of Actions for Nutrition (UN Network for SUN/REACH Secretariat 2016) and other widely cited and publicly available literature to identify promising interventions with evidence on intermediate outcomes. It included synthesizing the evidence using a matrix diagram, with rows listing the interventions included in the review and columns listing the nutrition outcomes and sector-specific intermediate outcomes (similar to the example presented in Figure 3.2). For each intervention, the strength of the evidence for impact for each of the included outcomes was given one of the following ratings:

- **Synthesized evidence demonstrating effectiveness.** A comprehensive review has synthesized existing evidence and concluded that, on the balance, the intervention has a positive impact on the outcome.
- **Multiple primary studies demonstrating effectiveness.** Several individual studies published in peer-reviewed journals have demonstrated that the intervention has a positive impact on the outcome, but the evidence has not yet been synthesized in a review.
- **Multiple primary studies not demonstrating effectiveness.** Several individual studies have evaluated the intervention, but taken together they do not clearly indicate that the intervention has a positive impact on the outcome.
- **Synthesized evidence not demonstrating effectiveness.** A comprehensive review has synthesized evidence on the intervention, but it did not conclude that the intervention has a positive impact on the outcome.
- **Minimal evidence.** Few studies have evaluated the impact of the intervention on the outcome.

**Figure 3.2: Example evidence summary matrix**

| Nutrition outcomes         |  |  |
|----------------------------|  |  |
|  | Height-for-age | Weight-for-height | Anemia |
| Intervention A | | | |
| Intervention B | | | |
| Intervention C | | | |
| Intervention D | | | |
| Intervention E | | | |
| Intervention F | | | |

**Legend**
- Green: Synthesized evidence demonstrating effectiveness
- Light green: Multiple primary studies demonstrating effectiveness
- Light gray: Multiple primary studies not demonstrating effectiveness
- Yellow: Synthesized evidence not demonstrating effectiveness
- Dark gray: Minimal evidence

**Step 3** involved reviewing guidance from key organizations in the field, such as the World Health Organization (WHO) and the United Nations Food and Agriculture Organization (FAO), to ensure that the review captured commonly agreed-upon practices that make existing interventions more nutrition-sensitive or help create an enabling environment that would increase the impact of
nutrition-sensitive interventions. Capturing the role of the enabling environments is important because it is critical for other interventions to work.

**Step 4** involved synthesizing the overall review findings and presenting them to a few key experts in the field (listed in Appendix 1) to validate the findings and suggest further research to capture additional nuances.

**Step 5**, the final step, involved synthesizing and presenting the findings for this report.

**Scope of report**

The report focuses primarily on undernutrition, with some attention paid to overnutrition. While overnutrition is a growing problem, especially in North Africa, and is likely to contribute to increased burden of non-communicable diseases in the future, undernutrition continues to be a critical development issue in a majority of countries in Africa with serious consequences for health, cognitive development (“grey matter infrastructure”) and economic productivity. For undernutrition, the literature review maps to individual AfDB departments—Health, Agriculture, WASH, Social Protection, Education and Transition Support Facility (here, covered in Emergency Contexts). The first four are treated as priority sectors, given the size of investments made by those AfDB departments in programs that could potentially be nutrition-sensitive; the review is less detailed for Education and Emergency Contexts.

For each of the four priority sectors, the report reviews the evidence base for:

- Interventions with evidence of impact on nutrition outcomes
- Promising interventions with a growing body of evidence showing impact on a range of intermediate outcomes that are known to influence nutrition outcomes
- Guidance on how existing interventions can be made more nutrition-sensitive

The report also highlights ways of making nutrition investments more gender-sensitive and describes the role of the private sector, including providing examples of cases where the private sector has been engaged effectively. Given the consensus that the private sector has an important role to play in improving nutrition, understanding the role of the private sector within each area is critical.

Finally, the report outlines what countries need in order to implement a successful multisectoral nutrition strategy.
Chapter 4: Health interventions

This chapter reviews evidence on the impact of nutrition-specific and other health interventions on nutritional status. Each intervention is evaluated against the key nutrition outcomes used in the WHA targets for nutrition, as well as small for gestational age and micronutrient status (zinc and vitamin A), in addition to the closely related intermediate outcome diarrhea incidence. This chapter draws heavily on The Lancet’s influential 2013 maternal and child nutrition series and its 2016 breastfeeding series, in addition to other sources. The chapter closes with a discussion of the role of the private sector and cost-effectiveness of evidence-backed interventions. Cost-effectiveness is included here, though not in other chapters, because there is much more evidence available in the health sector than in other sectors.

Health interventions included in the review

The review includes a variety of health interventions targeting adolescent girls, women of reproductive age (WRA), pregnant women, newborns and young children that likely affect nutrition, as listed in Figure 4.1. They include interventions from The Lancet’s series on maternal and child nutrition (2013) as well as those from the SUN/UN REACH Network’s Compendium of Actions for Nutrition (2016) and the World Bank publication An Investment Framework for Nutrition: Reaching the Global Targets for Stunting, Anemia, Breastfeeding and Wasting (Bhutta et al. 2013; UN Network for SUN/REACH Secretariat 2016; Shekar et al. 2016).

Figure 4.1: Reviewed health interventions

*Numerous interventions supporting optimal breastfeeding are reviewed individually in the text. **Control of household air pollution can target WRA and pregnant women as well as infants and children. Caused by solid fuels used with simple stoves to cook and heat, household air pollution is associated with stillbirth, low birthweight, stunting and childhood mortality. Note: Salt iodization, also included in the Lancet priority package, is reviewed in Chapter 5.
Evidence for nutrition-specific health interventions
In this section, we present evidence on the impact of nutrition-related health interventions from epidemiological studies, including randomized controlled trials (RCTs). The evidence is related to the following outcomes, which include undernutrition indicators used in the WHA targets for nutrition:

- Height-for-age (HAZ)
- Weight-for-height (WHZ)
- Small for gestational age (SGA)
- Anemia and hemoglobin
- Exclusive breastfeeding
- Low birthweight
- Micronutrient status (vitamin A and zinc)

The evidence is also related to one health indicator, considered an intermediate outcome, known to be closely tied to nutrition status:

- Diarrhea incidence

The evidence, drawn predominantly from existing systematic reviews, is summarized in Figure 4.2. Interventions in green have evidence for impact on at least one of the included nutrition outcomes, while interventions in blue have evidence of impact on the intermediate outcome. Appendix Figure 4.1, Appendix Figure 4.2 and Appendix Figure 4.3 provide detailed information on the level of evidence for each intervention’s impact on the included outcomes.

The first 1,000 days of life have been identified as a critical window for nutrition and child development. To reflect the importance of this window, the review begins with evidence for interventions targeting the first 1,000 days, starting with interventions targeting pregnant women, followed by newborns and then infants and children. The section concludes with a review of interventions targeting adolescent girls and women of reproductive age, whose health and nutrition can affect their children.
Pregnant women

Because maternal nutritional status plays a key role in fetal health and development, interventions targeting pregnant women can improve child nutrition. Of the 10 priority nutrition interventions identified by *The Lancet*, four target pregnant women: peri-conceptional folic acid supplementation, multiple micronutrient (MMN) supplementation in pregnancy, maternal calcium supplementation, and maternal balanced energy protein supplementation. The evidence also recommends iron or iron-folate supplementation, intermittent preventive treatment of malaria in pregnancy (IPTp); giving women antimalarial medicine at routine antenatal care visits regardless of their malaria status) and use of insecticide-treated nets (ITNs) (*Appendix Figure 4.1*).

**Interventions with evidence of impact on nutrition outcomes**

**Balanced energy and protein supplementation**, which typically provides about 25 percent of calories through protein, is recommended for undernourished pregnant women. A recent Cochrane review concluded that balanced energy and protein supplementation is likely to significantly reduce risk of SGA and stillbirth and increase birthweight (Ota, Hori, et al. 2015). It also found that nutritional education focused on increasing energy and protein intake reduced risk of preterm birth and low birthweight while increasing head circumference at birth.

**Supplementation with iron and folic acid** has been shown to improve nutrition outcomes, with even greater impact when these micronutrients are included in MMN supplements. Folic acid supplementation near conception prevents neural tube defects (defects of the brain or spinal cord, such as spina bifida), and a systematic review of five trials showed that folic acid during pregnancy...
increases birthweight and reduces risk of megaloblastic anemia (Bhutta et al. 2013). Iron supplementation in women of reproductive age reduces prevalence of anemia, and iron supplementation in pregnant women has been shown to greatly reduce both prevalence of anemia at term and low birthweight (Bhutta et al. 2013). However, a recent Cochrane review concluded that MMN supplementation including iron, folic acid, and other micronutrients is superior to iron and folic acid alone (Haider and Bhutta 2015). Compared to iron and iron-folate supplementation, MMN supplementation is associated with decreased prevalence of low birthweight, SGA and stillbirth.

**Calcium supplementation** during pregnancy is also recommended for women at risk of low calcium intake. A 2014 Cochrane review concluded that high-dose calcium (>1 g/day) helps prevent preeclampsia and preterm birth, as well as reducing the risk of maternal death or serious blood-pressure-related problems. These findings are especially true for women with low-calcium diets (Hofmeyr et al. 2014).

**Malaria treatment and prevention and maternal deworming** have been proposed as interventions that potentially benefit maternal nutrition and, in turn, child nutrition. The evidence base recommends the use of IPTp and ITNs. Trials from Nigeria, the Gambia, Kenya, Mozambique, Uganda, Cameroon, Burkina Faso and Thailand indicate that IPTp not only reduces malaria but also increases birthweight and reduces risk of low birthweight and severe antenatal anemia (Radeva-Petrova et al. 2014). ITNs for pregnant women have not been shown to affect malaria or anemia, but they do reduce low birthweight and fetal loss (Bhutta et al. 2013).

Maternal micronutrient supplementation with zinc, omega-3 fatty acids and vitamin D has also been studied, but recent Cochrane reviews have not suggested they should become standard practice (Moon et al. 2016; Delgado-Noguera et al. 2015; Bhutta et al. 2013; Ota, Mori, et al. 2015; De-Regil et al. 2016). A recent review of deworming in pregnancy also failed to find evidence of impact on nutrition outcomes (Salam et al. 2015). Since the evidence does not clearly support these interventions, they are not currently recommended. Similarly, although maternal mental health has clearly been linked to child growth and development, there is not good enough evidence that mental health screening and treatment during pregnancy affects infant outcomes (Bhutta et al. 2013).

**Newborns**

While many interventions in newborns have been shown to benefit health, there is less evidence for impact on key nutrition outcomes *(Appendix Figure 4.2)*. Delayed cord clamping is the only reviewed intervention that has been shown to affect the included nutrition outcomes.

**Delayed cord clamping**, in which the umbilical cord is not clamped until more than a minute after birth, has been shown to increase birthweight, hemoglobin levels and infant iron reserves up to six months after birth. Early cord clamping was previously believed to reduce postpartum hemorrhage, but evidence from 15 RCTs found no evidence of this effect. However, infants who had their cord cut late were more likely to require phototherapy for jaundice, so the relative benefits of delayed cord clamping should be evaluated with care in settings in which access to phototherapy may be lacking (McDonald et al. 2013).
Infants and children

Many effective interventions target infants and children (Appendix Figure 4.3). Most of them fall into one of four categories: promotion of breastfeeding and appropriate complementary feeding, micronutrient supplementation, management of acute malnutrition, and prevention or management of infectious disease.

Interventions with evidence of impact on nutrition outcomes

Promotion of breastfeeding and appropriate complementary feeding

Optimal breastfeeding has been recognized as a key determinant of child survival, health and development. WHO recommends initiation of breastfeeding within one hour of birth, exclusive breastfeeding (EBF; i.e., no additional foods) until six months of age and continued breastfeeding until 2 years of age. Despite global recognition of its importance, global breastfeeding remains far below international targets (IFPRI 2016). This problem should be viewed within its sociocultural and economic contexts because these structural factors often present barriers to breastfeeding (Rollins et al. 2016). Despite current difficulties, several interventions, policies and programs that effectively promote optimal breastfeeding have been identified (Table 4.1).

Table 4.1: Interventions that effectively promote optimal breastfeeding

<table>
<thead>
<tr>
<th>Baby-friendly support in health systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual or group counseling and education focused on infant feeding and breastfeeding</td>
</tr>
<tr>
<td>Special training of health staff</td>
</tr>
<tr>
<td>Maternal leave policies</td>
</tr>
<tr>
<td>Workplace support for breastfeeding</td>
</tr>
<tr>
<td>Integrated mass media, counseling and community mobilization</td>
</tr>
<tr>
<td>Kangaroo mother care</td>
</tr>
</tbody>
</table>

Source: Rollins et al. 2016

The most widely recommended intervention to promote breastfeeding is counseling and education, which is included in The Lancet’s 10 priority interventions. Antenatal counseling focuses on infant feeding decision-making and preparation for breastfeeding, while training after birth focuses on establishing exclusive breastfeeding, addressing challenges and promoting continued breastfeeding. No matter where they are delivered, counseling and education increase early initiation of breastfeeding, EBF and continued breastfeeding past one year of age (Rollins et al. 2016; Majamanda et al. 2014). Counseling appears to be most effective when individual and group sessions are combined (Bhutta et al. 2013). Kangaroo mother care (KMC)—which involves near-constant skin-to-skin contact between mother and baby, early and continued breastfeeding and early hospital discharge—has been shown to increase exclusive breastfeeding in both healthy and low-birthweight infants (Conde-Agudelo and Díaz-Rossello 2016; Moore et al. 2016). In addition, it increases weight, length and head circumference in low-birthweight infants (Conde-Agudelo and Díaz-Rossello 2016).

Interventions that target health systems, communities and workplaces are also effective. Training health staff on breastfeeding and implementing baby-friendly breastfeeding support in hospitals increase early initiation of breastfeeding and EBF. In the work environment, maternal leave policies and workplace support for breastfeeding (e.g., lactation rooms, paid lactation breaks) have been shown to increase EBF in high-income countries. In the community, integrated mass media campaigns, counseling and community mobilization has been shown to increase both early
initiation of breastfeeding and EBF. Combined approaches that work across multiple settings have demonstrated the greatest impact (Rollins et al. 2016).

Appropriate complementary feeding beginning at six months improves child growth. Two main approaches have been used to promote complementary feeding: education and public provision of food. In food-secure populations, nutrition education leads to increases in height, weight and HAZ, although evidence for impact on stunting is lacking. In food-insecure populations, nutrition education significantly improves HAZ and WAZ and reduces stunting. Provision of complementary foods in food-insecure populations increases both HAZ and WAZ (Rollins et al. 2016).

Management of acute malnutrition
Wasting, which encompasses severe acute malnutrition (SAM; WHZ less than -3) and moderate acute malnutrition (MAM; WHZ between -2 and -3), remains a significant problem in low- and middle-income countries (LMICs). Management of both MAM and SAM often involves provision of ready-to-use therapeutic foods (RUTFs), which have been shown to promote nutritional recovery and, to a lesser extent, weight gain (Lenters et al. 2013). MAM should be prevented from developing into SAM using the interventions discussed in this chapter, including provision of complementary and supplementary foods. Once SAM develops, it can be treated in a facility or in the community. The WHO protocol currently recommends inpatient treatment for complicated SAM, with stabilization and appropriate treatment of infections, fluid management and dietary therapy; uncomplicated SAM can be treated as an outpatient condition (WHO 2013). Though not evaluated in the same manner as other nutrition interventions, the WHO protocol is supported by both research-based evidence and expert opinion (Bhutta et al. 2013). Management of MAM and SAM is included in The Lancet’s 10 priority interventions.

Micronutrient supplementation
**Preventive vitamin A supplementation and zinc supplementation** are widely recommended and are among The Lancet’s 10 priority interventions (Bhutta et al. 2013). In addition to decreasing prevalence of micronutrient deficiencies, a nutrition outcome included in this review, they also reduce child mortality and diarrhea incidence. A review of 43 RCTs found that vitamin A supplementation in children aged 6 months to 5 years who were at risk of vitamin A deficiency significantly reduced mortality, including diarrhea-related mortality, in addition to reducing incidence of diarrhea and measles. Likewise, according to a review of 80 RCTs, zinc supplementation in children aged 6 months to 12 years reduces diarrhea, significantly improves zinc status and probably leads to a small increase in height (Mayo-Wilson et al. 2014). The review also found that zinc supplementation might reduce mortality. The authors conclude that the balance of the evidence recommends zinc supplementation in populations with relatively high zinc deficiency.

**Daily oral iron supplementation** in children under 2 halves the risk of anemia and reduces the risk of iron deficiency by three quarters. While there has been worry about iron supplementation in malaria-endemic areas, a recent Cochrane review concluded that iron supplementation should

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3 The worry is that iron supplementation increases iron levels in the blood, which could promote growth of the malaria-causing Plasmodium parasite (Neuberger et al. 2016).
not be withheld from children in malaria-endemic regions as long as malaria prevention or management services are available (Neuberger et al. 2016).

Provision of MMNs, including iron, has been advanced to address concurrent micronutrient deficiencies common in children in LMICs. Two common modes of delivery for MMNs are supplementation and point-of-use fortification. Evidence from 18 RCTs suggests that, relative to supplementation with one or two micronutrients, MMN supplementation causes small increases in both height and weight (Bhutta et al. 2013). Point-of-use fortification with micronutrient powders (in which a packet of vitamins and minerals in powder form is sprinkled onto ready-to-eat food) is increasingly used in LMICs, especially in areas where other interventions are difficult to implement. Data from 16 RCTs indicates that point-of-use fortification significantly improves hemoglobin levels and reduces iron-deficiency anemia and retinol deficiency (with no effects noted on zinc deficiency, stunting, wasting, underweight, HAZ or WHZ). However, point-of-use fortification also increases incidence of diarrhea (Bhutta et al. 2013). Despite this, WHO recommends it for populations in which childhood anemia is common (WHO 2017e).

Lipid-based nutrient supplementation (LNS) is another way to meet children’s micronutrient requirements. Consisting of vegetable oil, peanut butter, milk powder, sugar, vitamins and minerals, LNS is given in small doses alongside normal diets (Bhutta et al. 2013). The Lancet’s 2013 review of LNS concluded that, while a few trials in Malawi and Ghana had demonstrated impact on height and iron status, more studies were needed. Since then, several additional RCTs have been published. A trial in Burkina Faso found that LNS increased hemoglobin and length while decreasing stunting and wasting (Hess et al. 2015). In Bangladesh, a cluster RCT found that LNS increased HAZ and WHZ and decreased stunting among children under 18 months; chickpea- and rice-lentil-based formulations also proved beneficial for HAZ, although only chickpea affected WHZ and stunting (Christian et al. 2015). A trial in a Haitian slum area found that six months of LNS increased HAZ and WAZ in children under 18 months (Lannotti et al. 2014). However, a trial in Malawi found no evidence of impact on length or stunting (Maleta et al. 2015). Overall, the developing body of evidence for LNS is promising.

Treatment and prevention of illness
Given the nature of diarrhea, food-based approaches to managing the illness have long been proposed. A review of 29 studies found that, during episodes of acute diarrhea, children on lactose-free diets experienced reduced diarrhea and less frequent treatment failure compared to children on diets containing lactose (Bhutta et al. 2013).

Deworming in children with confirmed infections has been shown to increase hemoglobin levels (Bhutta et al. 2013). Routine childhood deworming, currently recommended by WHO for all children, is a common health practice in LMICs (WHO 2017a). Deworming drugs are effective at eliminating or greatly reducing worm infections. In addition, while there has been some controversy, mass deworming also seems to increase child weight. There is limited evidence, however, that benefits extend to wasting or other health, nutrition and educational outcomes (Taylor-Robinson et al. 2015; Welch et al. 2017; Croke et al. 2016).

Malaria remains a common problem across much of Africa. Existing strategies for preventing malaria in children, including intermittent preventive treatment in children (IPTc), indoor
residual spraying and ITNs, are effective at reducing the burden of malaria. In addition to these health outcomes, there is good evidence that IPTc reduces risk of moderately severe anemia (Bhutta et al. 2013).

Adolescent girls and women of reproductive age
Nutrition interventions targeting adolescent girls and women of reproductive age are aimed at improving the nutritional status of women before they become pregnant, with the aim of (1) improving pregnancy outcomes for their newborns and (2) improving their health to reduce pregnancy complications.

Micronutrient supplementation for women of reproductive age and adolescent girls may benefit nutrition outcomes, with the strongest evidence for iron supplementation. Iron supplementation has been shown to increase hemoglobin levels and decrease anemia in women of reproductive age (Bhutta et al. 2013). Folic acid supplementation is also commonly proposed, but the evidence to date has demonstrated impact on health but not nutrition outcomes (Bhutta et al. 2013). These supplements have also been suggested for adolescents specifically, but studies have not typically evaluated the impact of supplementation on adolescents separate from other populations (UN Network for SUN/REACH Secretariat 2016).

Family planning for delaying first pregnancy, appropriate birth spacing, and reducing unwanted pregnancies can reduce some of the risks associated with pregnancy in general. Adolescent pregnancies are particularly dangerous because they are associated with significantly higher risk of stillbirth, neonatal death, preterm birth, low birthweight and asphyxia. Adolescent pregnancies are also more dangerous for mothers: adolescents are more likely to experience complications such as obstructed and prolonged labor, vesico-vaginal fistula (a tear between the vagina and the bladder) and infection. However, evidence that these interventions are effective for adolescent girls is scant (Bhutta et al. 2013).

The role of the private sector
While many health interventions are primarily delivered by the public health sector, the private sector can also play a significant role. To support nutrition through health, the private sector can produce and market products for nutrition-specific interventions; appropriately market fortified complementary nutritious foods; promote nutrition in the workplace; and promote access to nutrition information and services. Each of these routes is further explored in the following paragraphs.
The private sector’s most important contribution to health interventions for nutrition is **producing, marketing and often distributing inputs for nutrition-specific interventions** (Box 4.1). Products such as micronutrient supplements, drugs and ITNs are typically manufactured by the private sector.

**Box 4.1: Renata and BRAC partner to market micronutrient powder in Bangladesh**

In Bangladesh, BRAC and the Global Alliance for Improved Nutrition (GAIN) have partnered with Renata, a Bangladesh-based pharmaceutical company, to manufacture and market a micronutrient powder called Pushtikona, or “grain of nutrition.” The powder contains the recommended daily intake of 15 vitamins and minerals. Pushtikona is distributed through two channels: Renata distributes the sachets through retail pharmacies and its network of doctors and sales representatives, while BRAC distributes it through its network of community health volunteers. At the same time, concerted demand-generation activities have built a market for the product. BRAC organized a large behavior change communication campaign, assisted by the local organization Social Marketing Company, while Renata ran promotional advertising campaigns. By June 2012, Renata was selling 3 million sachets per month and BRAC was distributing an additional 1 million sachets (GAIN 2012). Nutrition impacts have not yet been assessed.

Donors, governments and nongovernmental organizations (NGOs) are the main buyers for public-sector distribution, but these products may also be sold or marketed directly to consumers, as is often the case with ITNs (Kilian 2013).

The private sector also has a critical role with regard to **breastfeeding and fortified complementary foods** for infants older than six months (Box 4.2). Care must be taken to ensure that marketing reinforces the importance of exclusive breastfeeding during the first six months, as well as continued breastfeeding alongside complementary feeding. Businesses should comply with the International Code of Marketing of Breastmilk Substitutes to avoid harm to breastfeeding (Gillespie et al. 2013).

**Box 4.2: Nutri’Zaza markets locally produced fortified porridge for infants in Madagascar**

In Madagascar, Nutri’Zaza sells a locally produced fortified porridge for infants known as Koba Aina. Koba Aina, which provides infants with a complete meal, is sold door to door and through baby restaurants. It is also offered as a precooked flour that can be added directly to food. Koba Aina products are also sold directly to social institutions, which provided 800,000 Koba Aina meals between February and September of 2013. During the same period, Nutri’Zaza sold 1.4 million meals directly to 34,000 active consumers, comprising 17% of infants in neighborhoods served by baby restaurants. Currently supported by a mix of grants and investments, Nutri’Zaza aims to become self-sustaining after five years of development (SUN Business Network 2015). Nutrition impacts have not yet been assessed.

Businesses can also promote **nutrition in the workplace**. Promoting nutrition in the workplace is good not only for nutrition but also for employee health, productivity and satisfaction. As
described in the previous section, policies such as paid maternity leave have the potential to improve breastfeeding practices, as do breastfeeding-friendly work environments such as those that offer paid breastfeeding breaks and private breastfeeding facilities. In addition, companies that provide meals to employees should strive to provide nutritious meals or provide vouchers for nutritious meals. Employers can also organize nutrition education activities for employees (SUN Business Network 2015).

Finally, specific industries such as mobile technology providers can promote access to nutrition information and services (Box 4.3). Mobile phone operators can support both data collection and dissemination, with collection focusing on existing health and nutrition practices and dissemination focusing on best practices in health and nutrition (SUN Business Network 2015).

Box 4.3: MAMA public-private partnership delivers health information to pregnant women and new mothers in Bangladesh

The Mobile Alliance for Maternal Action (MAMA) launched in Bangladesh in 2012 under the name Aponjon. Supported by the Bangladeshi social enterprise Dnet as well as the Ministry of Health and Family Welfare, the program is a voice and text message system that provides pregnant women and new mothers with personalized messages containing health and nutrition information. By May 2013, the program had reached nearly 60,000 women and was on track to reach more than 2 million by 2015. An evaluation showed that women who subscribed to the program were more likely to adopt recommended behaviors such as antenatal care visits, facility-based birthing and EBF (SUN Business Network 2015).

Value for money of health interventions

There is evidence that many of these interventions with evidence of impact on nutrition also deliver good value relative to their cost. For instance, the 2012 Copenhagen Consensus findings of Nobel Laureates and other experts identified bundled micronutrient interventions as among the best buys in development, with a benefit-cost ratio of at least 15:1, and potentially much higher (Hoddinott, Rosegrant and Torero 2012).

The World Bank’s Investment Framework for Nutrition included one of the most comprehensive examinations of value for money in nutrition, although this was not the primary focus of the Framework. In it, the World Bank modeled the cost per case averted and cost per death averted for many of interventions included in its overall analysis (Shekar et al. 2016). As shown in Table 4.2 and Table 4.3, interventions addressing stunting and anemia have a wide range of cost per case or death averted. Among interventions addressing stunting, infant and young child nutrition counseling, complementary feeding education, and vitamin A supplementation for children appear to have among the lowest cost per case of stunting or death averted, while balanced energy-protein supplementation for pregnant women has among the highest. Among interventions addressing anemia, fortification and supplementation appear to cost less per year of anemia averted than IPTp, but IPTp costs less per death averted.
Table 4.2: Estimated cost-effectiveness of interventions addressing stunting

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Cost per case of stunting averted (USD)</th>
<th>Cost per death averted</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>For pregnant women and mothers of infants</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antenatal micronutrient supplementation (MMN including iron and folic acid)</td>
<td>3,637</td>
<td>7,376</td>
</tr>
<tr>
<td>Infant and young child nutrition counseling (complementary feeding education and breastfeeding promotion)</td>
<td>467</td>
<td>7,353</td>
</tr>
<tr>
<td>Complementary feeding education</td>
<td>273</td>
<td>16,122</td>
</tr>
<tr>
<td>Breastfeeding promotion</td>
<td>4,761</td>
<td>4,347</td>
</tr>
<tr>
<td>Balanced energy-protein supplementation for pregnant women</td>
<td>29,949</td>
<td>37,054</td>
</tr>
<tr>
<td>IPTp in malaria-endemic regions</td>
<td>1,535</td>
<td>6,594</td>
</tr>
<tr>
<td><strong>For infants and young children</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin A supplementation for children</td>
<td>266</td>
<td>4,270</td>
</tr>
<tr>
<td>Prophylactic zinc supplementation for children</td>
<td>988</td>
<td>23,642</td>
</tr>
<tr>
<td>Public provision of complementary food for children</td>
<td>1,724</td>
<td>67,787</td>
</tr>
</tbody>
</table>

Source: Shekar et al. 2016

Table 4.3: Estimated cost-effectiveness of interventions addressing anemia

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Cost per case-year of anemia averted (USD)</th>
<th>Cost per death averted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antenatal micronutrient supplementation</td>
<td>11</td>
<td>6,740</td>
</tr>
<tr>
<td>IPTp in malaria-endemic regions</td>
<td>62</td>
<td>4,531</td>
</tr>
<tr>
<td>Iron and folic acid supplementation for nonpregnant women</td>
<td>10</td>
<td>26,914 (both combined)</td>
</tr>
<tr>
<td>Staple food fortification</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

Source: Shekar et al. 2016

In addition to this information, Shekar et al. estimated that treatment of SAM costs $10,500 per death averted (2016). Other estimates have found treatment of acute malnutrition averts 26-39 disability-adjusted life years (DALYs; a metric used to combine the effects of both morbidity and mortality) per US dollar (Horton and Levin 2016).

Other recommended health interventions may require further study before conclusions regarding their cost-effectiveness can be drawn. For instance, although it is one of The Lancet’s ten priority interventions for nutrition, calcium supplementation has not been widely implemented and relatively little data on its cost and cost-effectiveness has been collected.

Evidence for cost-effectiveness outside of the health sector remains sparse, with evidence available for only a few interventions. For instance, staple food fortification can avert a case-year of anemia for a cost of 7 USD and a DALY for $12-$56, depending on the crop (Birol et al. 2014;
Shekar et al. 2016). Biofortification is even more cost-effective: depending on the micronutrient and the crop, its cost per DALY saved ranges from less than 1 USD to 32 USD (Birol et al. 2014). Cost-effectiveness of other nutrition-sensitive interventions needs much more research and therefore has not been discussed in other chapters.

**Conclusion**

A variety of interventions that target adolescents, women of reproductive age, pregnant women, newborns, infants and children have the potential to improve child nutrition. *The Lancet’s* 2013 Maternal and Child Nutrition Series recommended that a priority package of interventions be scaled up rapidly. This review found that a number of other interventions have also demonstrated impact on nutrition outcomes, including IPTp and ITNs for pregnant women, iron and iron-folate supplementation for pregnant women, delayed cord clamping, iron supplementation for children, MMN supplementation including iron for children, lipid-based nutrient supplementation for children, lactose-free diets during acute diarrhea, deworming for children and IPTc. Furthermore, many of these interventions have been proven to be cost-effective strategies for improving nutrition and saving lives.

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4 Iron is included in MMN supplements, which are recommended. MMN supplementation should be implemented in place of iron supplementation wherever feasible.
Chapter 5: Agriculture interventions

Agriculture remains an integral part of the African economy accounting for just over 60 percent of jobs across the continent (Diop 2016). Consequently, it is a major source of income for many African households and plays a critical role in improving household food security and individual nutritional status. While many factors interact to determine an individual’s nutritional status, dietary intake and household food security are clearly crucial. Access to enough food and a quality diet for all household members throughout the year is necessary for improving maternal and child nutritional status. These factors are critically tied to food availability and, in turn, to food production.

This chapter builds on the concept of nutrition-sensitive value chains, which consider the pathway from agricultural production to individual consumption (Gelli et al. 2015). Nutrition-sensitive value chains can promote and preserve nutrition along every step, including processing, storage, retail, purchase and consumption. This chapter reviews evidence on the impact of agricultural interventions on nutrition and intermediate outcomes. It also provides general guidance on how to make agricultural programs more nutrition-sensitive, and it closes with a discussion of how private sector actors in agriculture can feasibly promote and support nutrition.

Agriculture interventions included in the review

The review includes interventions that seek to influence different elements of the “farm-to-fork” value chain (Figure 5.1). The interventions are primarily drawn from the Compendium of Actions for Nutrition, as well as other reviews (UN Network for SUN/REACH Secretariat 2016; DFID 2014). Descriptions of each intervention are available in Appendix Figure 5.1.

Figure 5.1: Reviewed agricultural interventions
Evidence for nutrition-sensitive agriculture interventions

The goal of the review is to synthesize evidence on the effect of agricultural interventions on nutrition, including evidence on undernutrition outcomes included in the WHA targets and several intermediate outcomes along the causal pathway that are associated with improved nutrition outcomes (Masset et al. 2012; Webb Girard et al. 2012).

Included outcomes were determined according to the pathways through which agriculture can impact nutrition. Agricultural interventions have the potential to affect both health outcomes and nutritional status through two main pathways (Figure 5.2). In the first pathway, households grow nutrient-rich food and consume them directly, potentially leading to improved diets, increased nutrient intake and ultimately improved nutritional status. In the second pathway, households sell the food they produce, potentially increasing both household income and expenditure on food and health and ultimately improving nutrition and health outcomes. The impact of increased income on food consumption is mediated by food prices.

**Figure 5.2: Agriculture and nutrition theory of change**

Given these two pathways, the following intermediate outcomes are included in this review:

- Consumption of nutrient-rich foods (e.g., consumption of vitamin-A-rich foods, consumption of fruits and vegetables)

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5 Agriculture is said to affect nutrition through three underlying factors: food access, the health environment and care practices. This chapter primarily addresses food access because it is the focus of most studies and reviews; the health environment and care practices are addressed in the “General guidance” section of this chapter. Increased production of nutritious food, which can improve food access both on farms and in markets (where increased availability may also lower prices), is covered in the theory of change in Figure 5.2. The health environment can be preserved by protecting natural resources and safeguarding against health risks. Care practices can be affected through women’s empowerment and behavior change communication, which may be included alongside agricultural interventions (Herforth and Ballard 2016).
Evidence of impact on the included outcomes is summarized in Figure 5.3. Interventions in green have evidence for impact on at least one of the included nutrition outcomes, while interventions in blue have evidence of impact on at least one intermediate outcome. Appendix Figure 5.1 and Appendix Figure 5.2 provide detailed information on the level of evidence for each intervention’s impact on the included nutrition and intermediate outcomes.

Figure 5.3: Evidence for impact of agriculture interventions on included outcomes

Interventions that promote **biofortified crops** improve micronutrient status, height-for-age and weight-for-height in children, demonstrated by studies of effectiveness of orange-fleshed sweet potatoes (OFSP; varieties of sweet potatoes with particularly high beta-carotene or pro-vitamin A content) and quality protein maize (QPM, a variety of maize with improved amino acid composition). Three studies—two on OFSP and one on biofortified millet—have demonstrated

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6 Numerous other biofortified crops—such as vitamin-A-fortified cassava, maize and iron-fortified beans and pearl millet have been developed, several of which have demonstrated impact on nutritional status when consumed in efficacy studies (Bouis and Saltzman 2017; Haas et al. 2016; Gannon et al. 2014;
that biofortified crops can improve the nutritional status of children aged 22 months to 5 years (DFID 2014). Specifically, studies of OFSP-promotion interventions in Uganda and Mozambique demonstrated that the programs led to increased OFSP intake, vitamin A intake and ultimately improved vitamin A status in children (Hotz, Loechl, Lubowa et al. 2012; J. W. Low et al. 2007b; J. W. Low et al. 2007a). Three studies have also demonstrated impact of biofortified foods on anthropometrics. The studies, all on QPM, found that increased QPM intake was associated with weight and height growth (two of the studies tracked height-for-age and weight-for-age, while one tracked weight and height directly) (Singh et al. 1980). In addition, studies of biofortified crops show impact on consumption of biofortified crops and intake of vitamin A (Hotz, Loechl, Lubowa, et al. 2012; Hotz, Loechl, Brauw et al. 2012; J. W. Low et al. 2007a).

Governments around the world are promoting biofortified crops, often in partnership with HarvestPlus. By 2016, approximately 20 million people in 4 million farming households in 8 countries (6 of which are African) were growing and consuming biofortified crops. Iron beans are being grown in Rwanda, the Democratic Republic of Congo (DRC), and Uganda, with 453,000, 175,000, and 39,000 households reached in 2015, respectively. Meanwhile, vitamin A cassava is being scaled up in Nigeria and the DRC, with more than half a million farmers adopting the crop in 2015 in Nigeria and more than a quarter of a million adopting it in the DRC. OFSP has been launched in Uganda, with 132 million households reached in 2015 (Box 1). The Zambian government also officially launched vitamin A “orange” maize in 2015, with seeds produced in partnership with the private sector and distributed in part by the subsidized Farmer Input Support Programme; an estimated 126 million households were reached that year (Bouis and Saltzman 2017; HarvestPlus 2016).

**Mass fortification** has a positive and significant impact on micronutrient status and prevalence of anemia but has non-significant effects on height-for-age and weight-for-height. **Salt iodization** has the strongest evidence for health and nutrition impacts. A meta-analysis on the effectiveness of salt iodization showed that it greatly reduces the prevalence of iodine deficiency, in addition to reducing risk of health conditions related to iodine deficiency (including goiter, cretinism and low cognitive function) (Aburto et al. 2014; Das et al. 2013). **Iron fortification** (most commonly of flour) has positive effects on anemia prevalence, hemoglobin levels and serum ferritin (Das et al. 2013; Gera, Sachdev and Boy 2012; Pachón et al. 2015). **Multiple micronutrient fortification** positively affects hemoglobin levels in women and children, as well as risk of anemia in children (but not women), (Das et al. 2013). There is also evidence of impact on serum ferritin and zinc7 in both children and women and serum retinol in women (Das et al. 2013). **Vitamin A fortification** of foods—including monosodium glutamate (MSG), sugar and flour—has been shown to increase hemoglobin and serum retinol levels in children; however, studies have failed to demonstrate impact on vitamin A deficiency (Das et al. 2013). There is a weak body of evidence that **zinc fortification** increases serum or plasma zinc (Shah et al. 2016). **Vitamin D fortification** of milk

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Talsma et al. 2016; Moura et al. 2014). Zinc-fortified wheat and rice are also being tested, with current studies focusing on the bioavailability of zinc (Islam et al. 2013; Rosado et al. 2009).

7 Impact on serum zinc in children is significant when including studies from LMICs, but not when including all studies.
has been shown to have a positive impact on serum vitamin D and serum parathyroid hormone (also related to vitamin D) in children (Das et al. 2013).

Currently, WHO recommends iodizing salt, fortifying maize flour and corn meal with iron and folic acid, and considering fortifying wheat flour with suitable micronutrients in countries where it is widely consumed (WHO 2017b; WHO 2017c; WHO 2017d). Mass fortification of commonly consumed foods is almost always instigated, mandated and regulated by governments; both public and commercial mills are then required to fortify foods as directed (Allen et al. 2006). Although mass fortification most commonly results from government mandates, market-driven fortification—in which companies voluntarily fortify food to increase demand—is also a significant source of fortification (Box 5.2, Box 5.4, and Box 5.5). Ultra-processed foods should not be promoted within public health programs, even if fortified (PAHO 2016).

Existing evidence indicates that home gardens may improve micronutrient status (vitamin A), in addition to intermediate outcomes including nutrient intake, dietary diversity and intake of specific nutrient-rich foods. Evidence for impact on vitamin A status is not consistent, and recent reviews have concluded that while there might be an effect, the evidence is weak (Masset et al. 2012; Webb Girard et al. 2012; DFID 2014). There is also evidence that home gardening can increase intake of specific nutrient-rich foods (e.g., fruits and vegetables), intake of vitamin-A rich foods, vitamin A intake and overall dietary diversity (Masset et al. 2012; Webb Girard et al. 2012; DFID 2014).

Interventions with evidence of impact on intermediate outcomes

Aflatoxins—a family of toxins produced by fungi found on crops including maize, groundnuts, oilseeds and tree nuts—are known to cause liver cancer and have also been linked to stunting and underweight in children. Studies from Benin, Togo, Ghana, Iran, Kenya, the Gambia and the United Arab Emirates have demonstrated an association between aflatoxin exposure (measured as aflatoxin levels in consumed foods or in blood) and child growth, with the strongest evidence for impact on stunting and underweight (Khlangwiset, Shephard and Wu 2011). Aflatoxin exposure may occur through maternal food intake in utero, breastfeeding and direct consumption of contaminated foods (Khlangwiset, Shephard and Wu 2011). However, a variety of agricultural interventions have been shown to reduce aflatoxin levels in food by as much as 99 percent (Khlangwiset and Wu 2010). Effective interventions include aflatoxin resistance breeding, biocontrol using competitive fungi, irrigation and insecticide use, and post-harvest processing techniques such as improved drying techniques (Khlangwiset and Wu 2010). While direct evidence linking these interventions to decreases in stunting and underweight is absent, the causal linkages between aflatoxin levels in food, aflatoxin absorption and nutrition outcomes are far more clear-cut than they are for other agricultural interventions.

Cash cropping has been shown to increase household income and food expenditure, but it has mixed effects on diet and evidence is not convincing for its impact on health and nutrition outcomes. Seven studies have demonstrated an increase in household income resulting from cash cropping; however, three of them also found that households did not spend the extra income

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8 The theory of change for food safety and aflatoxins is distinct from that of other interventions. The chain begins with presence of toxic materials in food, developed either pre- or post-harvest, and then moves to bioavailability of the toxins and finally to health and nutrition outcomes (Khlangwiset and Wu 2010).
on food (DFID 2014). To the contrary, another review found that cash cropping generally led to increased food expenditure (World Bank 2007).

Reviews have found mixed evidence on the impact of homestead and extensive animal rearing on health and nutrition outcomes, but some recent studies have found an effect. Although reviews have found inconsistent evidence for the effect of animal rearing on nutrition outcomes, several more recent studies found impact on health and nutrition outcomes including weight-for-height, height-for-age and anemia (Olney et al. 2016; Hoddinott 2016; Olney et al. 2015; Rawlins et al. 2014; DFID 2014; Masset et al. 2012; Webb Girard et al. 2012). There is more consistent evidence on the impact of animal rearing on intermediate outcomes, including intake of milk (Masset et al. 2012; Webb Girard et al. 2012; DFID 2014), household income (DFID 2014; Leroy and Frongillo 2007) and food expenditure (Leroy and Frongillo 2007).

Existing evidence for aquaculture and capture fisheries does not consistently demonstrate an effect on any health or nutrition outcomes, but there is evidence of impact on intermediate outcomes, including intake of fish, nutrient intake and household income. Most studies indicate that aquaculture interventions increase consumption of fish (Masset et al. 2012; DFID 2014; Leroy and Frongillo 2007). A very small amount of evidence (two studies) also suggests that aquaculture interventions alone can increase women’s vitamin A intake, although the addition of fish is not likely to be the cause (Webb Girard et al. 2012). There is also slight evidence of a positive impact on children’s iron intake and on household income (Masset et al. 2012; Leroy and Frongillo 2007; DFID 2014).

Irrigation can have both positive and negative effects on health and nutrition. Although few studies have explicitly evaluated its impact on nutrition outcomes, there is a small amount of evidence on its impact on vegetable consumption and household income. Two studies have found that irrigation increases vegetable consumption, and two studies have also found evidence of an increase in household income associated with use of irrigation (Domenech and Ringler 2013). Irrigation interventions typically target smallholders or microbusinesses.

Evidence on the effect of price policies, such as taxes and subsidies, on nutrition outcomes in LMICs is scant. However, there is some evidence of impact on consumption of nutrient-rich foods, an intermediate outcome: reviews of evidence from upper-middle-income and high-income countries have found that taxes and subsidies on foods typically influence the consumption of the taxed or subsidized food in the expected direction (Afshin et al. 2017; Alagiyawanna et al. 2015). Individual studies from LMICs have looked at other outcomes of taxes and subsidies, but none have a large enough body of evidence to draw conclusions (Alagiyawanna et al. 2015). Another systematic review of the effect of agricultural pricing policies on nutrition confirmed this lack of evidence (Dangour et al. 2013).

The impact of the remaining interventions on the included outcomes has not been evaluated rigorously enough to make any statements about their effectiveness. This lack of evidence should not be interpreted to mean that these interventions do not work, but rather that they require further study. In fact, many of these interventions have strong theoretical arguments for impact and have been shown to affect outcomes earlier in the causal chain than those included in this review (FAO 2013a). Others, such as behavior change communication (BCC), have been shown to be effective
outside the context of LMICs and undernutrition (Hawkes 2013; Dudley, Cotton and Peralta 2015; Gordon et al. 2006; Howerton et al. 2007). BCC has also been identified as a key enabler of other interventions; this role is discussed further in the next section.

**General guidance**

In addition to the interventions and enabling factors described above, there is a substantial literature on how to make agricultural programs better serve nutrition. The guidelines capture the knowledge of experienced practitioners that is not always represented in the formal evidence base. The guidelines also discuss how to create an effective enabling environment, which, though critical to successfully intervention scale-up, has not typically been reviewed by traditional research studies.

The most comprehensive guidance document is Food and Agriculture Organization of the United Nations (FAO)’s *Synthesis of Guiding Principles on Agriculture Programming for Nutrition*. It is based on a review of literature and guidelines produced by various other organizations in the field (FAO 2013b). Identified documents were coded for themes, and overall themes were identified using an iterative process. The document’s authors confirmed the validity of their findings by sharing an early draft with authors of the reviewed documents, and a later draft was shared widely. More than 70 individuals and 30 institutions provided documents or comments during the review process.

The findings of the FAO review, which were summarized in *Designing Nutrition-Sensitive Agricultural Investments: Checklist and Guidance for Programme Formulation* (FAO 2015b), are presented below. The guidelines fall into two broad categories: those that recommend specific types of investments likely to affect nutrition and those that provide guidance on how to make existing programs more nutrition-sensitive (Box 5.1). The key recommendations are outlined below:

**Invest in ways that are especially likely to impact nutrition**

The FAO guidelines recommend three types of investments that are especially likely to affect nutrition. Most of the content in the following section has been adapted from the FAO’s *Designing Nutrition-Sensitive Agricultural Investments: Checklist and Guidance for Programme Formulation* (FAO 2015b).

**Facilitate production diversification and increase production of nutrient-dense crops and small-scale livestock.** Diversified production systems promote nutrition by enabling more diverse food consumption, protecting vulnerable producers from climate and price shocks, reducing seasonal fluctuations in food and income, and promoting income generation for both men and women. Several studies have linked diversity of production and consumption, although the effect tends to diminish as market access increases (Kumar et al. 2016; Sibhatu, Krishna and Qaim 2015; Fanzo et al. 2014). Production diversification is also linked to climate-smart
agriculture because production diversity increases resilience to environmental shocks, which are likely to become more common in the future (CGIAR Research Program on Climate Change, Agriculture and Food Security 2017).

Increasing production of nutrient-dense, context-appropriate crops—potentially including horticultural crops, animal-source foods, underutilized crops and biofortified varieties—is especially beneficial. Cash crops should be promoted with care: without mitigation strategies, cash cropping can reduce diet diversity, food security and gender equality.

**Box 5.1: FAO guidelines for designing nutrition-sensitive agricultural investments**

*Invest in ways that are especially likely to impact nutrition*

- Facilitate production diversification and increase production of nutrient-dense crops and small-scale livestock
- Improve processing, storage and preservation
- Incorporate nutrition promotion and education into food and sustainable food systems that build on existing local knowledge, attitudes and practices

*Enhance program design to improve nutrition*

- Assess the context at the local level to design appropriate activities to address the types and causes of malnutrition
- Incorporate explicit nutrition objectives and indicators into program design, and track and mitigate potential harms
- Target the vulnerable and improve equity
- Collaborate and coordinate with other sectors
- Maintain or improve the natural resource base
- Empower women
- Expand markets and market access for vulnerable groups, particularly for marketing nutritious foods

*Source: FAO 2015*

...improve the nutritional value of food (Box 5.2). Certain processing techniques—such as roasting, germination and fermentation—can increase the nutritional value of food, and processing and storage techniques can also make healthy foods more convenient to prepare. By increasing shelf life, improved storage and preservation can also decrease seasonal food insecurity. At the same time, these improvements can add value to crops, increasing both income and profit margins.

In addition, food processing, storage and preservation initiatives can reduce post-harvest losses. For instance, cold chain improvements can reduce food spoilage. Reducing post-harvest loss can increase availability of food, decrease prices and improve affordability. This is especially relevant to nutrition because losses of some micronutrient-rich foods, such as fruits, vegetables and fish, tend to be far higher than losses of staple foods like cereals. Addressing post-harvest loss is also recommended from a climate-smart agriculture perspective because reducing food waste increases food system sustainability while reducing environmental impact (FAO 2013a).
Good processing, storage and preservation techniques are also critical to food safety. Poor sanitation in fields, warehouses and markets can lead to contamination of food by infected food handlers, flies and rodents, while weak cold chains contribute to growth of dangerous natural toxins. Since infections from foodborne pathogens can decrease nutrient absorption, food safety is critical to nutrition (Global Panel on Agriculture and Food Systems for Nutrition 2016).

Incorporate nutrition promotion and education that build on existing local knowledge, attitudes and practices. Nutrition education is a key enabler because it encourages people to adopt healthy diets and in turn increases demand for nutrient-rich foods. While behavior change communication for agriculture has not typically been evaluated on its own, it has been noted that interventions that incorporate BCC or education alongside other interventions are more likely to improve nutrition (Webb and Kennedy 2014; Webb Girard et al. 2012; Olney et al. 2015; J. Low et al. 2005). Topics here can include nutritional requirements and healthy diets, food safety, food preparation and storage, and strategies to increase and diversify family food supplies. To maximize impact, educational campaigns should be based on existing theory and identified best practices.

Enhance program design to improve nutrition
Assess the context at the local level to design appropriate activities to address the types and causes of malnutrition. Any project that aims to include impact on nutrition should be based on a thorough analysis of the context. This should include the nutritional status of the population and the causes of any nutritional problems, as well as potential food resources, agro-ecology, seasonality of production and income, access to productive resources, gender dynamics and roles, and local priorities.

Incorporate explicit nutrition objectives and indicators into program design, and track and mitigate potential harms. Setting explicit nutrition goals ensures accountability for a project’s impact on nutrition. Tracking indicators along the length of the impact pathway provides the most insight into program effects, including areas that are not working as planned. Indicators for

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**Box 5.2: African Alliance for Improved Food Processing supports processors in Ethiopia**

In October 2012, Partners in Food Solutions, a nonprofit consortium then consisting of General Mills, Cargill and DSM, announced a new partnership with USAID through its Feed the Future initiative. Implemented by the nonprofit TechnoServe, the partnership, called the African Alliance for Improved Food Processing (AAIFP), aimed to share technical and business expertise with small and growing food processors in sub-Saharan Africa (TechnoServe 2012).

AAIFP began working in Ethiopia soon after. By 2015, the public-private partnership had provided technical assistance to 20 medium- and large-scale wheat processors in Ethiopia. It also partnered with several wheat processors to fortify flour. In 2015, the ASTCO Food Complex, an Addis Ababa-based company selected because of its large local market share and potential reach, successfully launched Ethiopia’s first locally fortified wheat flour (USAID 2015). Nutrition impacts have not yet been assessed.
potential harms should also be included to ensure that any damage is quickly recognized and addressed.

**Empower women.** The impact of agricultural programs on women should be carefully evaluated, with emphasis on tradeoffs between child care and agricultural production. Agricultural programs can empower women by increasing their access to productive resources, income-generating opportunities, extension services and information, credit, and labor and time-saving technologies such as energy and water services. Such programs are also favored by climate-smart agriculture because they can improve yields and reduce environmental impact (CGIAR Research Program on Climate Change, Agriculture and Food Security 2017). For more on the link between women’s empowerment and nutrition, see Chapter 10.

**Target the vulnerable and improve equity.** Agricultural programs can improve equity by encouraging vulnerable groups (such as smallholders, women, food-insecure households, youth, the landless, urban food producers, the unemployed, and marginalized groups) who may be particularly vulnerable to malnutrition to participate, granting them access to resources or creating employment opportunities for them.

**Collaborate and coordinate with other sectors.** Sectors are more likely to improve nutrition when they work together by linking related programs and by sharing indicators, funding and organizational structures. Funders seeking to improve cross-sectoral linkages can specify cross-sectoral collaboration as a condition in proposals.

**Maintain or improve the natural resource base.** Agricultural programs should use natural resources sustainably, promote adaptations needed to maintain food production and nutrition in the face of climate change, and maintain wild biodiversity and the natural resource base.

**Expand markets and market access for vulnerable groups, particularly for marketing nutritious foods.** Strengthening value chains can improve nutrition by promoting the production, sale and purchase of nutritious foods or by generating income for vulnerable groups. Improving market access for producers, processors and retailers increases their sales and revenue while improving availability and affordability of nutritious foods for consumers. Farmers’ associations, market information systems, production of marketable foods and small-scale processing micro-enterprises can all improve market access.

**The role of the private sector**

Most agricultural activity occurs in the private sector, so the private sector has great potential to improve nutrition through agriculture. Agribusiness can improve the food environment through **action along the entire farm-to-fork value chain (Figure 5.4)**. Private entities can also contribute by **acting as financial intermediaries** linking development agencies and governments to small and medium enterprises (SMEs) and smallholders. Increased **international trade**, enabled by **international food safety standards** can facilitate and enhance the impact of these other actions. In all these areas, **government** can support and influence the private sector through incentives, regulatory structures, and direct partnerships.
Agribusinesses can promote nutrition through actions in production, processing and storage, distribution and transport, and promotion and retail (Box 5.3). At the beginning of the farm-to-fork value chain, agribusiness can increase the supply of nutrition foods by encouraging their production. For example, businesses can produce diverse nutrient-rich foods, such as fruits, vegetables, legumes and biofortified varieties. This includes providing and financing nutritious inputs, such as fruit and vegetable seeds. Agribusiness can also promote good nutritional farming practices by providing farmer training and supporting small-holder organizations.

Agribusiness can also increase and preserve nutrition value through improved processing and storage. Key actions include fortifying staple crops and condiments to increase nutritional value, promoting production of healthy and nutritious processed foods, promoting food safety and aflatoxin control, and investing in new technologies to reduce post-harvest losses occurring in processing and storage, such as grain silos.

Distribution and transport is also critical to ensure that nutritious foods are available and accessible to all. Actions that benefit nutrition include distributing diverse nutrient-rich foods broadly to increase accessibility in remote areas and improving cold chains to reduce post-harvest losses, especially of fruits and vegetables vulnerable to spoilage (SUN Business Network 2015). At the end of the value chain, businesses can build demand for nutritious foods. Businesses respond to existing demand when designing products and strategies, but they also wield
substantial market-shaping power. By educating consumers about nutrition (including dietary diversity and the value of fruits, vegetables, biofortified varieties9 and fortified foods), bringing nutritious products to market and using modern advertising strategies to promote them, businesses can not only improve nutrition but also potentially increase consumers’ willingness to pay for goods (Box 5.4). Consistent increased demand would enable farmers to grow more nutritious crops and further incentivize other players in the value chain, including suppliers, distributors, processors and retailers, to invest in nutritious foods.

Box 5.3: Darsh Industries builds a stronger market for tomatoes in Tanzania

Fifteen years ago, many tomato farmers in Tanzania struggled to sell their tomatoes in local markets before they went bad, reducing their incomes and contributing to post-harvest loss. That began to change when Darsh Industries launched its REDGOLD line. Founded in 1999, Darsh Industries is now the leading manufacturer of fruit and vegetable products in the industrial area of Arusha. By 2014, Darsh was guaranteeing about 500 growers a buyer for their entire harvest of a nutritious tomato variety. In addition to purchasing the tomatoes, Darsh provides farmers with technical training and plastic crates. By preventing tomatoes from being crushed in transport, the plastic crates have dramatically reduced spoilage.

Darsh processes the tomatoes into well-known REDGOLD-branded sauces, pastes, chutneys and jams. During processing, Darsh separates seeds and skin from pulp, retaining pulp for its own products while returning seeds and skin to farmers. Farmers then use the skins for fertilizer and sell the cleaned seeds to regional seed companies, which has doubled their income. Darsh has also created jobs: the Arusha production facility employed 300 people in 2013, with plans for future expansion (McClafferty and Zuckerman 2014). Nutrition impacts have not yet been assessed.

Box 5.4: Grameen-Danone partnership in Bangladesh

Grameen Danone Foods Ltd., a partnership formed in 2006 between Grameen Bank and the French multinational food company Group Danone, had the twin goals of improving nutrition among poor Bangladeshi children and livelihoods in the poorest communities. The partnership worked with the Global Alliance for Improved Nutrition to develop a fortified yogurt, known as Shokti Doi, that meets children’s nutritional needs. In addition to providing 12.5 percent of the recommended daily allowance (RDA) of calcium, each serving of Shokti Doi is fortified with 30 percent of the RDA of zinc, iron, vitamin A and iodine.

The project involved the local community all along the value chain. The yogurt was produced in micro-factories from milk sourced from cooperative micro-farms financed by Grameen. Once produced, the yogurt was either sold directly to shops with refrigerators or distributed by local saleswomen. Each saleswoman sold about 50 cups of yogurt each day, earning about 85-100 Bangladeshi taka, or about US$30 per month. As of 2012, the partnership employed about 900 saleswomen, accounting for about 20 percent of sales (Social Innovator 2017; FAO 2013a). Nutrition impacts have not yet been assessed.

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9 Nutrition education is especially important for unfamiliar biofortified crops which may look and taste different from traditional varieties.
Private-sector entities can also support efforts to implement and scale up these actions by acting as financial intermediaries for development agencies and governments. By accepting investments from larger institutions, impact investors and others that aim to support development can enable large development agencies to support SMEs. Similarly, microfinance institutions allow larger institutions to support smallholder farmers.

Promoting international trade and regional integration would enable and enhance the private sector’s impact on nutrition. In low-income countries with limited trade, food supply diversity depends on domestic production diversity: the more diverse the foods produced domestically, the more diverse the supply. However, as countries grow richer and international trade increases, the link between production diversity and supply diversity weakens. In high-income countries, production diversity is often low, but food imports maintain diversity in the supply (Fanzo et al. 2014). Building trade linkages therefore enables agricultural specialization without compromising diversity of food supply and, in turn, diet diversity. Increased food trade could also improve food security by reducing the effects of food shocks, such as those resulting from local droughts.

Regional agreements on food safety and quality could enable regional trade. In the past, failure to meet international food safety quality standards or align regional standards has severely limited the scope of African exports. National food safety regulation and surveillance across the food value chain would enable significant trade expansion in the future (Global Panel on Agriculture and Food Systems for Nutrition 2016).

Across the value chain, government can support and influence the private sector to take actions that benefit nutrition through the creation of incentives, regulations, and partnerships. Private sector actors may not have the risk appetite to engage in actions that benefit nutrition, especially when demand is poor or when profit margins will be low. Government incentives and regulations can decrease risk to make actions that benefit nutrition more appealing to companies.

Box 5.5: The Kenya National Food Fortification Alliance

Formed in 2005, the Kenya National Food Fortification Alliance brings together stakeholders from the wide range of organizations involved in food fortification. Led by the Ministry of Health, the Alliance now includes industrial players working in flour, oil and salt; the Kenya Bureau of Standards; GAIN; and consumer organizations (European Commission 2017). Since its formation, the Alliance has worked towards widespread food fortification in numerous ways. In 2006, the Alliance partnered with the Micronutrient Initiative and the Rapid Results Institute to jumpstart voluntary fortification in the country (Manitsky and McLachlan, n.d.). In 2012, when the fortification of wheat flour become a national requirement, the Alliance launched the national food fortification logo. The logo, called kuboresha afya, or improving health, makes it easier for consumers to identify fortified foods. In parallel, the Alliance partnered with international NGO Population Services International (PSI) to run a consumer awareness and education campaign to teach consumers about the benefits of fortification and of buying foods marked by the national logo (PSI Impact 2012). Fortification of flour is now widespread in Kenya, with estimates as high as 100% of industrially produced flour being fortified (Food Fortification Initiative 2017).
Likewise, public-private partnerships can combine the strengths of the two sectors while sharing costs and revenues in sustainable ways. One of the areas in which public-private collaboration has been most successful is food fortification. While there is still progress to be made, many countries have successfully implemented mandatory fortification legislation, and several have also benefited from food fortification alliances that bring together stakeholders from across sectors (Box 5.5).

Conclusion

The interventions with the strongest evidence of impact on nutrition are biofortification, mass fortification and home gardening. The evidence also suggests that aflatoxin control, animal rearing, aquaculture, irrigation and pricing policies may influence nutrition. Production diversification; improvement of processing, storage and preservation; and nutrition education are also supported by consensus guidelines. In addition, program design measures have the potential to increase impact on nutrition. For example, it is helpful to include nutrition indicators in program monitoring and evaluation frameworks; however, further research on appropriate nutrition-sensitive indicators is needed before this recommendation can be fully implemented.

It is likely that many other agricultural interventions for which there is not good evidence also benefit nutrition. Evidence on the impact of agricultural interventions on nutrition is generally weak, and both more studies and better-designed studies are needed. Many of the interventions that lack evidence on nutrition outcomes have been in use for years and are recognized by practitioners as effective. When prioritizing interventions, policymakers should remember this and consider what level of evidence they require to support an intervention.
Chapter 6 : Water, sanitation and hygiene interventions

Water, sanitation and hygiene (WASH) interventions play an important role in creating a healthy environment for communities, which in turn reduces disease incidence for children in the first 1,000 days and beyond. Poor water, sanitation and hygiene can prevent children from obtaining the maximum nutritional value from the food that they eat and can result in prolonged stress for growing children, preventing them from becoming healthy adults. As WASH interventions often provide impact at the community level, they can often leave communities with improved attitudes about healthy WASH behaviors, as well as sanitation and water infrastructure.

This chapter reviews evidence on the effectiveness of WASH interventions that are relevant to nutrition. It also offers general guidance on how to make WASH programs more nutrition-sensitive and highlights a few ways in which the private sector can be involved.

WASH interventions included in the review

Interventions included in this review fall into three broad categories:

- **Hygiene interventions** that aim to curb the spread of fecal contamination through handwashing practices
- **Sanitation interventions** that aim to increase latrine coverage through various promotion strategies
- **Water interventions** that aim to improve quality of and access to safe water

Interventions may also combine approaches from across these categories.

Figure 6.1: Reviewed WASH interventions
Most of the interventions included in this review are drawn from the Compendium of Actions for Nutrition and are grouped in accordance with the "Water and Sanitation, and Hygiene for Good Nutrition" section (UN Network for SUN/REACH Secretariat 2016; DFID 2014). However, a few categories have also been added based on the ways in which studies have examined WASH interventions. Figure 6.1 lists the interventions; Appendix Table 6.1 provides a brief description of each intervention.

**Evidence for nutrition-sensitive WASH interventions**

WASH systems are complex and include a host of factors that contribute to exposure to fecal contamination. In their review, Dangour et al. present a conceptual framework of how poor water, sanitation and hygiene can impact nutritional status, both directly and indirectly (2013). Figure 6.2 presents a simplified version of that framework that includes direct pathways only; indirect pathways, mostly focused on time collecting water, are not shown.

![Figure 6.2: WASH and nutrition theory of change](image)

Adapted from Dangour et al. 2013

Limited access to safe water, improved sanitation and hygiene are exacerbated by factors like urban and rural poverty. Safe water can be expensive and of limited quantity, and sanitation infrastructure may also be unavailable. Without access to latrines for safe disposal of human...
waste, adequate quantities of safe water for drinking, and water for handwashing, fecal contamination spreads to hands, food, water and soil.

Fecal contamination, if ingested, can result in three key intermediate health conditions that affect nutrition outcomes. As described in Ngure et al. 2013, the three health conditions are:

- **Diarrhea**: Frequent liquid bowel movements that result in decreased dietary intake through dehydration
- **Nematode infections**: Intestinal parasites that deprive the host of nutrients, resulting in decreased dietary intake through malabsorption
- **Environmental enteropathy**: A subclinical state of chronic intestinal inflammation and improper gut function resulting from poor sanitation and hygiene over extended periods of time that result in malabsorption of nutrients (Ngure et al. 2013)

This chapter addresses evidence on the above-mentioned intermediate outcomes, in addition to direct evidence on nutrition outcomes included in the WHA targets, in particular height-for-age and weight-for-height. The review does not include other intermediate outcomes mentioned in the reviewed studies, such as the presence of fecal coliform in gut flora and latrine use and construction, among others, because these outcomes are farther from nutrition outcomes in the causal pathway.

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10 Environmental enteropathy was not included in this review as no reviewed studies included it as an outcome.
Evidence of impact on the included outcomes is summarized in Figure 6.3. Interventions in green have evidence for impact on at least one of the included nutrition outcomes; interventions in blue have emerging evidence of impact on at least one intermediate outcome.

**Figure 6.3: Evidence for impact on nutrition and health outcomes**

Appendix Figure 6.1 and Appendix Figure 6.2 provide detailed information on the level of evidence for each intervention’s impact on the included nutrition and intermediate outcomes.

**Interventions with evidence of impact on nutrition outcomes**

Only one systematic review has assessed the impact of WASH interventions on the nutritional status of children. In that review, Dangour et al. find no evidence of the impact of WASH interventions on weight-for-age or weight-for-height, but a borderline statistically significant effect of solar disinfection of water, provision of soap, and improvement of water quality on stunting. These interventions were seen to have an effect on height-for-age among participants under 5 (Dangour et al. 2013).

This review also indicates that few studies have examined the impact of WASH interventions on nutrition outcomes, and most of those that have are observational rather than experimental. Consequently, there is an urgent need for future studies to assess the impact of WASH interventions on the nutrition outcomes of children, especially in the first 1,000 days. Future studies should focus on understanding the effects of water supply and sanitation on nutrition outcomes and consider assessing the impacts of WASH interventions over a longer duration of time (Dangour et al. 2013).
Interventions with evidence of impact on intermediate outcomes

While there is limited evidence on the impact of WASH interventions on nutrition outcomes, several studies have synthesized evidence of WASH interventions’ impact on intermediate indicators related to diarrhea. Reviewed interventions include handwashing education and promotion and provision of handwashing supplies, especially soap (Freeman et al. 2014; Fewtrell et al. 2005; Waddington and Snilstveit 2009; Dickinson et al. 2015; Touré et al. 2013); household water treatment and safe storage (Clasen et al. 2007; Fewtrell et al. 2005; Fink, Gunther and Hill 2011; Waddington and Snilstveit 2009; Wolf et al. 2014; Dickinson et al. 2015); and access to improved sanitation including sewer connections (Waddington and Snilstveit 2009; Fewtrell et al. 2005; Wolf et al. 2014)

**Handwashing education and promotion** in schools has been shown to have an effect on diarrhea. In India, children participated in community or in-school skits and ceremonies where they pledged to commit to hygienic practices. After a year, the children were still committed to the practice (Biran et al. 2014). Furthermore, a review of handwashing interventions concluded that handwashing promotion programs may result in a 30 percent reduction in diarrhea incidence (Ejemot-Nwadiaro et al. 2015). A number of other review articles have shown that handwashing with soap, in particular, has a significant effect on diarrhea indicators.

Studies of **household water treatment and safe storage** showed that interventions using chlorinated water contributed to a reduction in diarrhea. In an example from Kenya, chlorinated water resulted in decreased diarrhea risk (Garrett et al. 2008). A randomized controlled study of safe water storage in Liberia showed that households in disaster affected populations who treated and stored their water were able to reduce diarrhea by 90 percent (Doocy and Burnham 2006). In an example from Malawi, using a water bucket to limit hand exposure when storing water was shown to reduce diarrhea in children under 5 when the water was from a treated source (Roberts et al. 2001).

Fewtrell et al. reviewed four studies on **access to improved sanitation**, and, in a meta-analysis of two studies, found that sanitation interventions had a pooled relative risk of 0.68 (2005). A more recent review examined 11 studies of different designs and found that improved sanitation resulted in a 28 percent decrease in diarrheal diseases. The authors also found **sewer connections** to have a larger association with reduction in diarrheal diseases; however, given that this finding stems from limited evidence, it should be considered preliminary (Wolf et al. 2014).

Interventions with synthesized evidence of impact on nematode infections were **hygiene education and promotion provision of handwashing supplies, access to improved water, household water treatment and storage and access to improved sanitation** (Strunz et al. 2014). A primary study of Community-Led Total Sanitation (CLTS), a community-based sanitation approach showed no impact on nematode infections (Belizario et al. 2015). In a population-based study in Ethiopia, mothers and infants who used water outside their household compound had a higher risk for soil-transmitted helminth infection than those using water on the compound (Belyhun et al. 2010). In a cross-sectional study in Kenya, preschool-aged children living in areas with poor WASH in an informal settlement were shown to have higher rates of soil-transmitted helminth infection when a latrine was located off the premises (Worrell et al. 2016). Studies of the effect of hygiene on nematode infections have included hygiene education. In one study in China,
children who were told to wash their hands before and after consuming food had reduced rates of ascaris infection (Xu et al. 2001).

Limitations and nuances of the evidence for impact on nutrition outcomes
When considering the evidence for impact of WASH interventions on nutrition outcomes, it is important to note that many studies were not designed to evaluate the effects of WASH interventions on nutrition. Many WASH studies have focused on scaling up hardware such as latrines and handwashing facilities rather than on health outcomes (Ngure et al. 2013). Almost all of the studies examined in this review had minimal evidence on nutrition outcomes; only one review explicitly examined nutrition outcomes (Dangour et al. 2013). Many interventions—including sanitation marketing, sanitation support for the elderly and disabled and infants and toddlers, food hygiene promotion, environmental hygiene promotion and provision of water under special circumstances—had minimal evidence of impact on the included nutrition outcomes. There is evidence of the effects of sanitation marketing on latrine coverage, but it was not included as it is too far removed on the causal pathway for nutrition impact (Garn et al. 2016). There was little evidence for sanitation support for infants and toddlers and the elderly and disabled. In the case of food hygiene promotion, there is evidence of reductions in thermotolerant and fecal coliform in stool samples (Gautam 2016; M.S. Islam et al. 2012). It is not clear how much these interventions affected diarrhea incidence though.

It is equally important to note that most evidence in the WASH sector comes from observational studies, since experimentally assessing the impact of certain types of WASH interventions—such as water supply—poses several challenges. In addition, while this review did not detail the evidence base on combined WASH interventions, it is important to note that many WASH interventions may work best in combination with other WASH interventions. WASH interventions are often part of a system that seeks to eliminate fecal contamination from multiple exposure points. WASH interventions also target communities to limit exposure to contamination, and broad compliance is necessary for interventions to have impact. For this reason, combination interventions that address water supply, water quality, access to sanitation, and hygiene may have the greatest impact on health outcomes (USAID 2014). For instance, the WASH Benefits study of pregnant women in rural Kenya and Bangladesh involved two cluster-randomized trials that included water quality, sanitation, handwashing, and child nutrition interventions separately and in combination. The study, which is ongoing, seeks to determine whether combined interventions have significant effects on health (Arnold et al. 2013).

General guidance
In addition to the studies mentioned above, there is a growing body of literature on how to make WASH interventions more nutrition-sensitive. The organization Action Contre la Faim (ACF) offers guidance on how to integrate WASH initiatives into nutrition planning in “WASH’Nutrition: A Practical Guidebook on Increasing Nutritional Impact Through Integration of WASH and Nutrition Programmes” (ACF 2017). The guidance was prepared by a group of more than 20 WASH practitioners and experts from across the globe and reviewed by others in the sector. Highlights from the ACF guidance are presented below.
Identify opportunities to align WASH and nutrition programming. Areas of alignment may come from context-specific joint priorities for WASH and nutrition, such as access and security, mandates and national laws and positioning of key donors. Stakeholders in WASH and nutrition should be aligned on program activities, and information should be shared widely across sectors. This integration should take place in the public sector, bilateral and multilateral organizations, national government organizations and ministries, and academic institutions. Options for alignment include nutrition strategies with WASH as a cross-cutting area or strategies in which WASH has a main focus of strategic importance.

Integrate WASH and nutrition through joint planning, program components, objectives, and measurement and evaluation. In addition to aligning WASH within nutrition planning, it is important to include measurement in the program design to allow for impact measurement through joint planning. This can be done through integrated program components, geographical targeting, and communication between WASH and nutrition actors. These actions can aid in the creation of a joint monitoring and evaluation strategy that shares indicators and program objectives. This planning would likely lead to joint program activities that are sustainable and cost-effective.

Focus on the mother-and-child dyad by targeting the first 1,000 days of life and other crucial stages in a child’s life. The first 1,000 days are most critical for the mother and child. Contamination through poor food hygiene, contaminated drinking water and environmental exposure can affect child growth at important stages. Sick children are deprived of their dietary needs, and severe acute malnutrition can peak during this period. A mother must also stay healthy during this period so she can continue to breastfeed and care for her child.

Emphasize behavior change. Knowledge, attitudes, behaviors and social norms influence the effectiveness of WASH interventions. WASH interventions that introduce new hardware cannot stand on their own; they must be accompanied by behavior change efforts to ensure sustainability.

Ensure a WASH minimum package for households and health care facilities. The minimum package includes WASH service delivery and awareness-raising around the importance of safe hygiene practices that at a minimum are needed to prevent WASH-related diseases and keep the mother and child healthy. The minimum package is adapted to specific in-country situations as well as social and cultural norms. In addition, access to products and services must be available at local markets. The ACF guide provides standards that include access to adequate quality and quantity of drinking water; dignified, safe and hygienic sanitation; and food and personal hygiene.

The role of the private sector
The private sector can play an important role in providing services and supplies to support WASH interventions. Private-sector involvement can also include sanitation marketing, supplying water through government contracts, and supplying soap to help scale up handwashing interventions.

Community-based sanitation interventions and marketing of diverse sanitation options
Opportunities exist for collaboration with the private sector in sanitation marketing. Many community-focused behavior change interventions, such as CLTS, have created demand for latrine construction (WSP 2011). CLTS combines a community-level “triggering” intervention to
influence latrine use and construction. At the conclusion of the behavior change intervention, households are encouraged to select a latrine type that best suits their needs (IDS, n.d.). Such interventions have created a market for private latrine construction and latrine manufacturers. As a result, households gain more agency in their latrine selection when accompanied by a strong, diversified market and households that can afford to pay for the technology, through affordable price points and targeted smart subsidies to disadvantaged communities and households, helping ensure sustainability (WSP 2010).

Latrine construction and manufacturing is currently carried out by small-scale and local manufacturers and installation companies, and they may be government-approved and endorsed (Box 6.1).

**Box 6.1: Private latrine construction in Benin**

In Benin, a subsidy-free latrine construction program supported by the Assistance Program for the Development of the Water Supply and Sanitation (PADEAR) informed households about their sanitation options. Private providers offered skilled expertise, assisting with the latrine selection process. More people invested in latrines, bringing costs down, allowing private construction to thrive, and decentralizing the latrine market (WSP 2011). The nutrition and health impacts for this program have not yet been assessed.

**Water privatization and public-private partnerships**

Water privatization is a contentious issue among WASH stakeholders and advocates, and there seems to be no gold standard for water privatization in sub-Saharan Africa. Households in rural areas or informal settlements may want better access, but they are often neglected because they cannot afford services (Marin 2009).

However, there is also some evidence that water privatization increases access and operational efficiency of water systems and improves quality of service. It is advantageous for resource-poor governments to remove themselves from the markets and allow private service providers to enter. Public-private partnerships can help keep costs low by controlling tariffs while ensuring access for more households (Marin 2009) (Box 6.2).

**Box 6.2: Public-private partnerships in Uganda**

In Uganda, the government facilitated growth of the domestic water sector by introducing one-year performance area contracts to private companies. This helped improve the quality of service, as evidenced by higher customer satisfaction levels. The government then provided contracts to these companies to design, build and operate water systems. This led to increased access for communities outside of metro areas, and as of 2010, 18 companies were operating 95 water systems in small towns. One of these contracts went to a public-private partnership in the town on Busembatia, which was funded by the Global Partnership on Output-Based Aid (World Bank 2014).

**The Global Private Partnership for Handwashing**

Handwashing interventions can also be supported by public-private partnerships. The Global Private Partnership for Handwashing (GPPHW) brings together stakeholders from the private and
public sectors to promote handwashing, a highly cost-effective intervention. Member organizations include civil society organizations, government aid agencies, academics, multilateral institutions and large companies (GHP 2017). GPPHW seeks to “strengthen enabling environments to foster handwashing progress” and “improve handwashing programming” (GHP 2017). GPPHW also promotes Global Handwashing Day, pushing for awareness around the value of handwashing interventions. The partnership is a strong example of integration in the WASH sector.

Conclusion
Improvements to household water treatment and handwashing have been shown to have impact on nutrition outcomes, and a broader set of interventions have been shown to address key intermediate outcomes. It is important to note that more work remains to be done in determining the best ways to integrate WASH and nutrition interventions before such actions can be scaled up to influence nutrition outcomes more broadly.
Chapter 7 : Social protection interventions

LMICs direct an estimated one-third of their development budgets to some form of social protection—a greater share than budgeted for health and agriculture combined (H. H. Alderman 2016). One of the most common social protection interventions is the use of safety nets—also referred to as social assistance and noncontributory transfers. Globally, nearly 2 billion people receive some form of social safety net assistance (H. H. Alderman 2016).

Because social protection schemes target the economically vulnerable and often include components that bolster women’s empowerment, they can be significant platforms for improving nutrition and underlying determinants of malnutrition. This chapter examines evidence on the impact of social protection interventions on nutrition, offers guidance on making social protection programs more nutrition-sensitive, and discusses the role of the private sector.

Social protection interventions included in the review

The review includes a number of social protection interventions—which can include a diverse array of social assistance, social insurance and labor market programs that are bolstered by specific enabling policies—and reflect programs that have the clearest influence on nutrition outcomes (Figure 7.1). As in the previous chapter, the interventions are primarily drawn from the Compendium of Actions for Nutrition as well as other reviews (UN Network for SUN/REACH Secretariat 2016; H. H. Alderman 2016). Descriptions of each intervention are available in Appendix Table 7.1.

Figure 7.1: Reviewed social protection interventions

<table>
<thead>
<tr>
<th>Social assistance</th>
<th>Social insurance</th>
<th>Labor market protections</th>
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<tbody>
<tr>
<td>Conditional cash transfers (CCTs)</td>
<td>Health insurance</td>
<td>Skills training and asset transfer</td>
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<tr>
<td>In-kind food transfers</td>
<td>Social security insurance</td>
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<tr>
<td>Unconditional cash transfers (UCTs)</td>
<td>Weather-based insurance for crops and livestock</td>
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<td>Vouchers for maternal health services</td>
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<td>User fee removal (health services)</td>
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<td>Money vouchers for food</td>
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<td>Public works programs</td>
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<td>School feeding</td>
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<tr>
<td>Social transfers (child support grants and noncontributory pensions)</td>
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<tr>
<td>Take-home food rations</td>
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<tr>
<td>Vouchers for child daycare for children to support infant and young child feeding</td>
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Evidence for nutrition-sensitive social protection interventions

The goal of the review is to examine evidence on which social protection interventions affect nutrition, including evidence on undernutrition outcomes included in the WHA targets and
intermediate outcomes that are closest to nutrition outcomes in the causal chain shown in Figure 7.2 (H. H. Alderman 2016).

**Figure 7.2: Social protection and nutrition theory of change**

Social protection programs can have different effects on factors such as household income, prices of commodities and behaviors. Household income can be directly increased through social protection arrangements, such as conditional and unconditional cash transfers or payment arrangements for participation in public works. Reducing the price of commodities, through either vouchers or food subsidies, can increase household food consumption and improve the amount of food a family can purchase, even without increases in income. In some cases, food may be directly given to households through in-kind transfers, either as general rations or through supplementary feeding programs. Finally, behaviors can be influenced with financial incentives—and by reducing barriers to access—for health and nutrition services, and by establishing linkages between social protection plans and other social services. These pathways ultimately affect food purchasing, health service use and child care; by bolstering these three mediators, individuals can become healthier and better nourished and households can become more resilient and achieve greater economic stability and prosperity (H. H. Alderman 2016).

Given these pathways, the following intermediate outcomes are included in this review:

- Consumption of nutrient-rich foods (e.g., vitamin-A rich foods, fruits and vegetables)
- Dietary diversity and intake of macronutrients and micronutrients (e.g., protein, iron)
- Household income (combined income of all members of the household)
- Food expenditure (total household expenditure on food)
- Food insecurity and meal frequency
- Utilization of maternal health services

It is important to bear in mind that most social protection interventions have traditionally been designed to reduce poverty rather than malnutrition, and that many social protection schemes may be worth investing in for reasons unrelated to nutrition. Increased household income may be an important target outcome and development objective in its own right. Other outcomes—such as improved enrollment, attendance and participation in school—may not strongly influence the
Evidence of impact on the included outcomes is summarized in Figure 7.3. Interventions in green have evidence of impact on at least one of the included nutrition outcomes, while interventions in blue have evidence of impact on at least one intermediate outcome. Appendix Figure 7.1 and Appendix Figure 7.2 provide detailed information on the level of evidence for each intervention’s impact on the included nutrition and intermediate outcomes.

Figure 7.3: Evidence for impact on nutrition and intermediate outcomes

| Social assistance                              | Conditional cash transfers (CCTs) |
|                                               | In-kind food transfers           |
|                                               | Unconditional cash transfers (UCTs) |
|                                               | Vouchers for maternal health services |
|                                               | User fee removal (health services) |
|                                               | Money vouchers for food          |
|                                               | Public works programs            |
|                                               | School feeding                   |
|                                               | Social transfers (child support grants and non-contributory pensions) |
|                                               | Take-home food rations           |
|                                               | Vouchers for child daycare for children to support infant and young child feeding |

| Social insurance                              | Health insurance |
|                                               | Social security insurance |
|                                               | Weather-based insurance for crops and livestock |

| Labor market protections                      | Skills training and asset transfer |

Studies show evidence of impact on nutrition outcomes
Studies show evidence of impact on intermediate outcomes
Studies show mixed or minimal evidence on outcomes included in the review

Interventions with evidence of impact on nutrition outcomes

Cash transfers are among the most common social protection interventions worldwide. In Africa, they have been implemented in countries such as Burkina Faso, Kenya, Lesotho, Madagascar, Malawi, Niger, Tanzania, and Uganda (Bastagli et al. 2016; World Bank 2016). Evidence on and evaluations of conditional and unconditional cash transfers comprise the largest share of the nutrition-sensitive social protection literature, with little or no data on the impact of other social protection interventions on nutrition. This is in part because cash transfers are among the most commonly implemented social protection programs, and there are thus fewer examples of alternative programs to study and evaluate.

A cash transfer program involves the payment of money from the social protection implementer to a beneficiary. Transfers can come in the form of an electronic bank account transfer (or e-transfer) or through the direct distribution of cash currency. These funds can then be used by families to purchase food, or to pay for additional health services.
Cash transfers may have conditionalities, or requirements that beneficiaries must meet in order to continue to receive payment. In **conditional cash transfers**, beneficiary responsibilities may include the enrollment of children in school, up-to-date immunization records or utilization of health care services (Box 7.1). Some cash transfers may have no conditions at all; these **unconditional cash transfers** instead distribute cash to families without any requirements or restrictions on how the cash is to be spent.

**Box 7.1: Prospera social inclusion program in Mexico**

One of the earliest and best-known conditional cash transfer programs, Prospera (formerly known as Oportunidades and Progresa), is Mexico’s flagship social welfare program. The program, first implemented in 1997, combines food and nutrition supplements in order to strengthen social rights, nutrition, health and education. This conditional cash transfer program was originally designed to be a multisector approach to reducing household poverty and breaking the cycle of intergenerational poverty through investments in the young.

Beneficiary households in the Prospera program must meet co-responsibilities in order to receive their monthly benefits. These co-responsibilities include health checkups for family members—where children receive growth monitoring and supplementary food assistance—and school attendance for children. In 2016, the program had nearly 7 million beneficiary households, with nearly 30 million individual beneficiaries. With an average monthly benefit of US$50, the program budget was roughly 92 billion Mexican pesos, or US$4.4 billion in 2016.

Evaluations of Prospera have found impact on dietary diversity, caloric consumption, micronutrient intake, food expenditure and frequency of child health checkups, with modest impact on height-for-age and anemia (Bastagli et al. 2016; Holmes and Bhuvanendrah 2013; Lagarde, Haines and Palmer 2009; Manley et al. 2011). Studies have found no significant effect on risk of children becoming stunted (Bastagli et al. 2016).

Evaluations of conditional and unconditional cash transfers have found that—despite their proven ability to address poverty by increasing household income and the utilization of health services by low-income families—they have very limited impact on anthropometric measures of malnutrition (H. H. Alderman 2016; Lagarde, Haines, and Palmer 2009; Hoddinott and Bassett 2008; Martins et al. 2013; de Groot et al. 2015; Bastagli et al. 2016; ICAI 2017). There is mixed evidence on the impact of cash transfers on stunting and height-for-age; within six reviews of cash transfers, four studies found no statistically significant impact on height-for-age or prevalence of stunting (Martins et al. 2013; Hoddinott and Bassett 2008; Manley et al. 2011; Bastagli et al. 2016). A statistically significant impact on the incidence of stunting was observed in Nicaragua’s Red de Protección Social, which indicated that beneficiaries under 5 were 5.5 percent less likely to be stunted compared to children in control localities (Hoddinott and Bassett 2008; Bastagli et al. 2016). A similar decrease in prevalence was observed in Mexico’s Progresa program (Hoddinott and Bassett 2008), but a study of the logarithmic odds of a beneficiary being stunted or not was found to be statistically insignificant (Bastagli et al. 2016).

One systematic review has found evidence of modest impact of cash transfers on anemia and hemoglobin (Lagarde, Haines and Palmer 2009). One study in Nicaragua identified a modest
impact on the percent of children under 5 who were underweight (Maluccio 2010), and one pilot study in Bangladesh indicated a small impact on the prevalence of wasting (Sharif and Ferre 2014). The conditionalities within these cash transfer programs were similar, in that families were required to ensure infants attended growth monitoring sessions, children received scheduled preventative healthcare, and caregivers/mothers attended nutrition and health educational workshops. However, in general, the impact of conditional cash transfers on nutrition indicators has been found to be minimal. In some instances, cash transfers have been linked to negative nutritional indicators, such as higher body mass index and higher blood pressure (Forde et al. 2012; Fernald, Hou and Gertler 2008).

There are a number of reasons why the evidence on cash transfers suggests a limited impact on nutrition outcomes. One reason is methodological: most cash transfers focus on children under 5, not targeted specifically at the 1,000-day window of optimal opportunity for nutrition interventions that target child and maternal malnutrition. Thus, the targeting of cash transfers may not always align with the optimal period for intervention (H. H. Alderman 2016). Another possibility is that intermediate outcomes—such as increased health care utilization—may have a more limited impact on nutrition and health outcomes than expected due to poor quality. For instance, increased participation in a maternal health service via a conditional cash transfer may improve health outcomes in some settings, but if the health system itself is inadequate and of poor quality, increased participation and attendance at health centers may be of little value to patients (while adding strain to under-resourced systems) (Fiszbein, Schady and Ferreira 2009). Furthermore, the modest additional household income that is available from a cash transfer program may not be sufficient to purchase markedly improved health care, even in settings where such high-quality health care is available privately.

Although there have been numerous studies on cash transfers and their impact on health and nutrition, systematic reviews have consistently indicated that additional research is needed (Lagarde, Haines and Palmer 2009; Bastagli et al. 2016), particularly on the impact of different cash transfer modalities, including conditionalities, recipient and method of payment. As social protection programs are likely to continue to command substantial portions of government budgets and reach large numbers of vulnerable mothers and children, better evidence on how to increase the contribution of these programs to nutrition could have a significant impact. Furthermore, while many cash transfer programs have explicitly sought to reduce poverty, fewer have explicitly sought to improve nutrition; more such programs, and more studies on such programs, may benefit nutrition.

**Interventions with evidence of impact on intermediate outcomes**
Cash transfers have been observed to have a positive effect on food security, improving the quantity and quality of food consumed (de Groot et al. 2017). **Unconditional cash transfers**, like conditional cash transfers, have been observed to have positive impact on household income and may improve dietary diversity and food consumption patterns. A common concern with unconditional cash transfers is that the lack of conditions may result in poor health service utilization. Some reviews (Bastagli et al. 2016) have observed that unconditional cash transfers have shown poorer rates of health service utilization than conditional cash transfers; however,
neither form of cash transfer has demonstrated markedly better performance on final health and nutrition outcomes (H. H. Alderman 2016).

Evidence on the effect of **food transfers** (a form of in-kind transfers) on nutrition outcomes is limited; however, a broader evidence base indicates that food transfers improve food security, increase meal frequency and improve nutrient intake. Three studies of specialized food transfers, two in Bangladesh and one in Ecuador, reported higher per capita food expenditure (Ahmed et al. 2009), higher intake of wheat (Del Ninno and Dorosh 2002), higher per person caloric intake per day (Ahmed et al. 2009) and higher intake of protein, fat and various micronutrients (Lutter et al. 2008). These interventions can also be coupled with food fortification (discussed in **Chapter 5** on agriculture) to cheaply boost micronutrient intake; in Gujarat, India, the Public Distribution System replaced wheat grain with iron fortified flour at an incremental cost of less than US$0.50 per ton (Fiedler et al. 2012). However, food transfers have been observed to be far more logistically challenging than cash transfer programs and thus much more expensive to deliver (sometimes by a factor of two to four), with only marginal differences in outcomes (Gentilini 2016; Margolies and Hoddinott 2014; Hidrobo et al. 2014). Program planners should factor in the relative strengths and costs of in-kind and cash transfers and carefully select the program that is most appropriate to the local context and needs.

**Asset transfers** have been piloted and implemented only recently, so the evidence base is limited. Findings from Rwanda’s livestock asset transfer program indicate that providing poor rural families with cows and **training** in how to care for the animals helps increase milk production, milk yields, household earnings and overall asset accumulation (**Box 7.2**; Argent, Augsburg and Rasul 2014). Improved household earnings can boost economic stability and reduce vulnerability to economic shock; less data is available, however, on the impact of asset transfers on diet, health care utilization or nutrition outcomes.

**Box 7.2: Girinka livestock asset transfer program in Rwanda**

A highly visible and well-known example of an asset transfer social protection program is Rwanda’s Girinka (One Cow per Poor Family) program, which was initiated in 2006 and has since provided a cow to more than 130,000 poor rural families (Argent, Augsburg and Rasul 2014). The program has been jointly implemented by the Ministry of Agriculture, other government organizations and multiple nongovernmental organizations (NGOs), including Heifer International and Send a Cow. NGOs were primarily involved in the distribution of cows; some NGOs included skills training with the livestock transfer.

Beneficiaries of the program were able to increase their household income from the production and sale of milk and the use of fertilizer to boost agricultural yields and accumulate more assets (Petherick 2017). Although the program has shown promise in reducing extreme poverty, its impact on nutrition outcomes is less clear.

A number of social protection interventions have been found to improve health care utilization specifically: **user fee removal**, **vouchers for maternal health services** and **health insurance**. Studies of these interventions have shown that they generally increase participation in health care (Bassani et al. 2013; Lagarde and Palmer 2011; Bellows et al. 2013; Nguyen et al. 2014).
However, there is far less evidence on whether this increased utilization translates to better health outcomes. Increased health insurance in Africa, for instance, has been linked to increased access to health care (Spaan et al. 2012), but there is not sufficient evidence to indicate whether this increase in utilization has had substantial impact on morbidity and mortality. Poor-quality health care may actually mitigate the impact of higher utilization. Furthermore, user fee removal requires that financing shift from household out-of-pocket spending to other sources, most likely the general government budget. This could lead to a drop in funding if the loss in financing were not adequately addressed.

The impact of the remaining interventions on the included outcomes has not been evaluated rigorously enough to make any statements about their effectiveness. Due perhaps to the literature’s general focus on cash transfers, data are lacking on the impact of alternative social protection programs on intermediary and final outcomes in nutrition. This is unfortunate because, as Alderman (2016) notes, conditional and unconditional cash transfers “are not the only safety net programs that can be designed to be nutrition-sensitive.” Robustly designed studies that measure outcomes across different social protection interventions using commonly accepted intermediate and final outcome measurements would greatly increase our understanding of how social protection affects nutrition. These interventions have shown promise in limited settings—as in the case of noncontributory pensions (Duflo 2003), weather-based insurance (Hill and Viceisza 2012; Cole et al. 2012) and school feeding (Bundy et al. 2009)—which indicates the need for further study.

**General guidance**

A recent summary of evidence on nutrition-sensitive social protection programs by Alderman (2016) gave the following guidance on making social protection programs “work” for nutrition:

- **Target activities to the most nutritionally vulnerable populations**, particularly within the 1,000-day window between conception and a child’s second birthday. This will increase the likelihood that interventions will have the greatest impact on nutrition outcomes.

- **Include educational activities and behavior change communication (BCC)** in social protection interventions to increase household awareness of health and nutrition caregiving and health-seeking behaviors. Studies have found that interventions to increase household income (such as through cash transfers) or increase the availability of nutritious foods have limited impact on nutrition without BCC and concurrent nutritional messaging within the social protection program (Garcia and Pinnstrup-Andersen 1987; Ruel 2001; H. H. Alderman 2016).

- **Enhance the quality of nutrition services delivered within social protection interventions**, particularly within transfer programs. To enhance quality of care, services could include growth promotion (not merely growth monitoring) and interventions to improve dietary quality. In addition, some social protection interventions (such as public works) could be made more nutrition-sensitive by including nutrition-sensitive conditionalities (such as participation in BCC) for determining eligibility. This was done in Djibouti, which has scaled up a nutrition-sensitive public works program in which a prerequisite for a household member to be eligible for participation in public works is the
participation of women in community BCC to improve health and nutrition (H. H. Alderman 2016).

- Use **school feeding programs** as a platform for nutrition-specific activities, such as micronutrient supplementation and BCC (Bundy et al. 2009; Alderman 2016), as well as for tackling overweight and obesity through education programs for children and their families (Winch 2011).
- **Scale up social protection interventions during crises** to reduce the long-term negative impacts of economic shocks.

Many of these recommendations echo guidance provided by the UN Food and Agriculture Organization (FAO) (2015a) for maximizing the impact of social protection on nutrition. Additional guidance provided by FAO includes:

- **Incorporate explicit nutrition objectives and indicators into social protection interventions**, including monitoring and evaluation plans. This will help promote accountability and ensure that nutrition remains an explicit objective for social protection programs.
- **Empower women and make them the recipients of social protection benefits.** With food transfers and cash transfers, it has been noted that women are more likely to devote resources to the health and nutrition of children and other family members. In public works programs, considering women’s time and caloric constraints (particularly if they are pregnant or lactating), when designing workloads can enhance women’s participation.
- **Promote dietary diversification and strengthening of livelihoods** to build resilience and reduce vulnerability to economic shocks.
- **Strengthen linkages to health and sanitation services** to increase coverage of nutrition-specific interventions and increase education on health-related issues and hygiene.

It has also been observed that many social protection interventions (e.g., vouchers) rely on well-functioning markets. In certain settings, markets may be weak or nonfunctional, particularly after a disaster or during an emergency. Information about market strength is needed to inform the selection of appropriate social protection mechanisms.

**The role of the private sector**

While social protection interventions are most often delivered through the public sector, the private sector may have a role to play in service delivery. For example, cash transfers may be executed digitally through private banks to enhance coverage and ensure that participants can access funds. Digital payments—in which funds are electronically transferred not only to beneficiaries’ local banks but directly into their personal bank accounts or mobile wallets (rather than requiring pick-up of cash from a specific location)—can not only improve the efficiency of transfers, reduce their cost, and increase their transparency, but also serve as an entry point to formal financial services. By nudging individuals without bank accounts into the formal financial sector, digital payments support financial inclusion and economic empowerment, particularly among the women, youth, and vulnerable populations who frequently receive cash transfers (USAID, n.d.). Because women’s empowerment is beneficial to nutrition—their own and their children’s—digital
Cash transfers may also have the potential to improve nutrition (see Chapter 10 for more on women’s empowerment).

Digital payments are used increasingly for social programs in LMICs. For instance, in Kenya, two private-sector banks have facilitated electronic payments to recipients of a cash transfer program targeting orphans and vulnerable children (Spray 2015); this was done to ensure that beneficiaries had easy and convenient access to payments. In Nepal, a similar cash transfer intervention—the Human Development Social Protection Pilot—was launched in two districts using a private bank as the payment service provider (UNCDF 2017). Through the pilot program, beneficiaries received a smart card and a savings account with the bank; each household thus had access to formal financial services and more financial options.

Yet digital social payments are not without challenges. A recent report identified several key risks that recipients face (Zimmerman and Baur 2016). First, because recipients often live in poor and remote locations, the mobile network service required to access payments can be unreliable. Second, ATMs may not have sufficient liquidity to meet demand when many recipients seek to withdraw payments on a single day. Third, complex user interfaces and payment processes can be challenging to users, who often have little experience with digital systems and low literacy levels. Lack of recourse mechanisms and fraud targeting the recipient also pose challenges. Future social protection programs using digital payments should keep these challenges in mind to maximize impact.

**Conclusion**

Evidence on the impact of social protection interventions on nutrition is mixed and limited. Cash transfers, the most rigorously examined of these interventions, have been shown to have minimal to no impact on child anthropometrics; in certain settings, however, they have been found to have a positive impact on levels of hemoglobin and anemia. The evidence suggests that cash transfers, as well as asset transfers, in-kind transfers and user fee removal / vouchers for health services can improve intermediate outcomes for health, including food expenditure, dietary diversity, household income and participation in health services.

As governments increase spending on social protection and experiment with new systems for shielding populations from shock, the evidence base for nutrition-sensitive social protection mechanisms will likely grow. The current state of evidence is generally weak and concentrates predominately on conditional cash transfers. More studies on the diverse array of social protection schemes, and greater systematic reviews of their impact on intermediate and final outcomes, are needed. Many of the interventions referenced in the literature have been piloted with modest success or are grounded in practice-based studies, showing that practitioners have experienced success in using the intervention. In choosing which social protection programs to implement, policymakers should evaluate the state of the evidence and how the outcomes observed in previous studies will integrate with theories of change for improvement in nutritional status.
Chapter 8: Early childhood development and education interventions

There is increasing recognition of the importance of childhood to a healthy and productive life, with early childhood seen as an especially critical window for cognitive development. Good nutrition early in life is critical to child development, and the evidence is strong that poor nutrition harms cognitive development and school performance (Engle et al. 2007). The reverse is also true: cognitive development and schooling can benefit nutrition for the next generation. The connection between child nutrition and development has led to much interest in the interaction between nutrition and child development interventions. For instance, while cognitive development and schooling may not directly affect nutrition, their coincidence with key nutrition interventions and their potential to increase earning and empower women suggest potential impact on nutrition. This chapter reviews evidence on early childhood development (ECD) interventions and nutrition-sensitive interventions delivered in schools for their impact on undernutrition.

ECD and education interventions included in the review

Early childhood development interventions
ECD interventions fall in the critical 1,000-day window for nutrition. The most common intervention that promotes ECD is **stimulation**. Stimulation interventions, which typically promote play and parent-child interaction for children under 2 years of age, seek to improve cognitive and social development. Since health and nutrition interventions that promote proper childhood development fall in this same period, the benefits of delivering nutrition and stimulation interventions at the same time have been a focus of study. These combined interventions are the main focus of this chapter.

School-based interventions
Given that children in school are beyond the critical 1,000-day window, interventions delivered in schools might have less nutrition impact than earlier interventions. Nevertheless, school-based interventions can address nutrition directly, such as through iron supplementation in schools, or indirectly, such as through general education, which is viewed as a nutrition-sensitive intervention. This chapter reviews some nutrition programs delivered in schools, including programs that educate about, and promote healthy diets, physical activity and good nutrition. It also reviews the impact of education itself on nutrition.

Several related interventions are reviewed in other chapters. Chapter 4 on health reviews interventions that target young children, such as breastfeeding and supplementation, as well as interventions that target adolescents, such as iron supplementation, family planning and birth spacing. Chapter 4 also covers adult education about child nutrition, including infant and young child feeding (IYCF) education. Chapter 7 on social protection reviews school feeding, and Chapter 12 on multisectoral nutrition discusses education for building a nutrition workforce.

Evidence for nutrition-sensitive ECD and school-based interventions

ECD interventions
Studies have found conflicting evidence on the impact of combining stimulation and nutrition interventions in early childhood on cognitive development and nutrition outcomes. While nutrition
interventions improve nutrition and sometimes cognitive development, and stimulation improves cognitive development, it is unclear whether there is any specific benefit to delivering nutrition and stimulation interventions together. One recent review concluded that there is some evidence of an additive effect associated with delivering the interventions together rather than separately (Ruel et al. 2013), while another concluded that such synergies probably do not exist (Grantham-McGregor et al. 2014). However, both acknowledge that more studies designed to test for synergies are needed before a conclusion can be drawn.11

It has also been proposed that delivering the interventions together, and therefore sharing some resources, could reduce costs and increase cost-effectiveness. Unfortunately, the cost-effectiveness of combining programs has not been well studied (Batura et al. 2015; H. Alderman et al. 2014). Further studies in this area would help determine whether there is an economic rationale for delivering the interventions together.

School-based interventions

The role of education

Among interventions delivered in schools, the strongest evidence on improved nutritional status is for investments in education and efforts to increase school enrollment, especially for girls.

Globally and in Africa, children are now receiving many more years of education than children did 20 years ago. In sub-Saharan Africa, enrollment of primary-school-aged children in primary school has increased from 54 percent in 1994 to 79 percent in 2014, with boys only 4 percent more likely to be enrolled than girls. By secondary school, girls are 90 percent as likely to be enrolled as boys (World Bank 2017a). While there is still room for progress, this represents significant improvement.

This increase is relevant to nutrition because parental education is associated with reduced child undernutrition. For instance, children whose mothers have some primary schooling are 11 percent less likely to be stunted than children whose mothers do not. Furthermore, children whose mothers have some secondary schooling are 25 percent less likely to be stunted than children whose mothers do not. Paternal education also improves nutrition, but to a lesser extent: 4 percent for primary education and 15 percent for secondary. This effect is partly explained by the fact that schooling increases individual and national income, which can lead to improved nutrition for the next generation. Ruel et al. 2013 present various other pathways which have been hypothesized but not evaluated, including:

- Schooling could impart information about health and nutrition directly
- By increasing literacy, schooling could assist caregivers in acquiring information and possibly nutrition knowledge

11 One of the strongest relevant studies was a long-term evaluation in Jamaica focused on the effects of a combined stimulation and food supplementation program targeted at stunted children aged 9-25 months on cognitive development and linear growth. It found an additive effect on cognitive development in the short term but no evidence of an additive effect on growth. It found no impact on nutritional status but identified other long-term benefits, including greater educational attainment and improved social behavior (Walker et al. 2005; Walker et al. 2011; Grantham-McGregor et al. 1991).
• Schooling could provide exposure to new knowledge and environments, making individuals more receptive to modern medicine. Education could increase girls’ confidence, enhancing women’s voices in family decisions, including those about health.
• Schooling could provide women with the opportunity to form social networks, which can be especially important in isolated rural areas.

It is unclear which of these possible pathways contributes most to improved nutrition, but the focus on women and care-givers suggests that education is especially important for women.

Education may also benefit nutrition by delaying the age at which girls become mothers. Some evidence suggests that keeping girls in school delays age at first pregnancy (UNICEF 2014a; Ali and Gurmu 2016; Ferre 2009). Because adolescent pregnancy is more dangerous for both mother and baby—with increased risk of maternal complications and adverse outcomes such as neonatal death and preterm birth—delaying pregnancy is relevant to health and nutrition (see Chapter 4 for more) (Bhutta et al. 2013).

**School-based nutrition programs**

There is minimal evidence from developing countries on the impact of school-based education and promotion programs on undernutrition (Ruel et al. 2013). In high-income countries, education interventions—most commonly including classroom activities, parental involvement and school nutrition policies—have successfully reduced overweight and obesity, as well as increasing fruit and vegetable consumption (Silveira et al. 2011). Likewise, school programs involving increased physical activity sessions have been shown to reduce overweight and improve dietary and physical activity behavior in LMICs (Verstraeten et al. 2012). The success of these interventions highlights the need for studies examining whether similar strategies could work for undernutrition in LMICs.12

**Conclusion**

In addition to the interventions discussed above, general principles for making programs more nutrition-sensitive can be applied to ECD and education (Ruel et al. 2013). To increase impact on nutrition, education interventions and programs can be targeted at the nutritionally vulnerable (by age or by physiological status) and to areas with higher poverty levels or food insecurity. Including specific nutrition objectives, empowering women and girls, and using schools and other existing education platforms to deliver nutrition-specific interventions should also be considered.

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12 While mentioned as a potential intervention for nutrition, school garden-based food and nutrition education has been minimally studied (UN Network for SUN/REACH Secretariat 2016). A single study from Australia and no studies from LMICs were identified in this review (Jaenke et al. 2012).
Chapter 9: Nutrition interventions in emergency contexts

Emergencies, whether due to natural disasters, conflicts or multiple factors, result in immediate and far-reaching needs. The need for food and adequate nutrition—alongside needs for health care, clean water, and shelter—is often one of the first to arise in an emergency. This chapter reviews evidence on interventions that are often implemented in response to nutrition emergencies and notes knowledge gaps.

Defining a nutrition emergency

Attending to the nutrition needs of communities is a critical priority in emergencies, though by no means the only one. In some cases it is readily apparent when an emergency arises, such as a widespread drought, an earthquake or a crisis arising from armed conflict, but defining when a nutrition emergency exists is not always easy. Nutrition emergencies can arise not only from catastrophic conditions but also from mismanagement of food resources, disruption of food distribution systems and extreme poverty (Pierre-Louis 2008). These latter conditions can arise from fragile political and economic situations that destabilize food security, leaving individuals vulnerable to malnutrition.

A nutrition emergency has been described as a situation where there is “the risk of or an actual rise in mortality due to acute malnutrition” (Pierre-Louis 2008). However, researchers have noted that the threshold between emergency and nonemergency situations is not always well defined, in part because the indicators of nutrition and threat to life can arise and manifest in many different contexts (Webb et al. 2014; Hall, Blankson and Shoham 2011). The WHO classifies the severity of malnutrition in a community using prevalence of wasting and mean weight-for-height Z-scores (a measure of global acute malnutrition). It considers malnutrition “critical” when wasting affects at least 15 percent of children under 5 or when the mean weight-for-height Z-score of the population is less than or equal to -1.00. The Integrated Food Security Phase Classification (IPC) spearheaded by the UN Food and Agriculture Organization (FAO) defines five phases of food security, where phase 4 represents an emergency and phase 5 represents a famine (Table 9.1).

The hallmarks of nutrition emergencies are high-to-severe food consumption gaps. The often serious macronutrient and micronutrient deficiencies that follow food shortages multiply the burden of disease and mortality, increasingly threaten already vulnerable populations, delay or halt recovery, and strain existing resources and system capacity.

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13 Access to clean water, adequate sanitation, and hygiene, for instance, are key needs following an emergency. A lack of water—as in the case of a drought—can cause nutrition emergencies, and can exacerbate morbidity and loss of life if unaddressed. Interventions to improve issues of water, sanitation, and hygiene (WASH), however, are often not well-integrated within nutrition emergency responses, which tend to focus on meeting food and micronutrient needs. This can leave vulnerable populations exposed to unsafe water and poor hygiene, which can contribute to the spread of diarrheal diseases and death from dehydration.
### Table 9.1: Five phases of the Integrated Food Security Phase Classification

<table>
<thead>
<tr>
<th>Phase</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Minimal</td>
<td>More than four in five households are able to meet essential food and nonfood needs without engaging in atypical, unsustainable strategies to access food and income, including any reliance on humanitarian assistance.</td>
</tr>
<tr>
<td>2 Stressed</td>
<td>Even with any humanitarian assistance, at least one in five households in the area have the following or worse: minimally adequate food consumption but inability to afford some essential nonfood expenditures without engaging in irreversible coping strategies.</td>
</tr>
<tr>
<td>3 Crisis</td>
<td>Even with any humanitarian assistance, at least one in five households in the area have the following or worse: food consumption gaps with high or above usual acute malnutrition or marginal ability to meet minimum food needs only with accelerated depletion of livelihood assets that will lead to food consumption gaps.</td>
</tr>
<tr>
<td>4 Emergency</td>
<td>Even with any humanitarian assistance, at least one in five households in the area have the following or worse: large food consumption gaps resulting in very high acute malnutrition and excess mortality or extreme loss of livelihood assets that will lead to food consumption gaps in the short term.</td>
</tr>
<tr>
<td>5 Famine</td>
<td>Even with any humanitarian assistance, at least one in five households in the area have an extreme lack of food and other basic needs; starvation, death and destitution are evident. (Evidence for all three criteria of food consumption, wasting and crude death rate is required for classification as famine.)</td>
</tr>
</tbody>
</table>


To curtail the impact of food shortages and critical nutrition emergencies, emergency nutrition activities are a substantial component of an emergency response. The primary goals of these activities—as described in Webb et al. (2014)—are to:

- Reduce levels of wasting to below conventionally defined emergency rates or thresholds (such as the WHO threshold of 15 percent)
- Reduce and or prevent micronutrient deficiencies, which increase the risk of mortality
- Reduce the specific vulnerability of infants and young children
- Prevent the life-threatening deterioration of nutritional status by ensuring access to adequate, safe and nutritious foods (Webb et al. 2014)

**Evidence for nutrition-specific interventions in emergency settings and fragile situations**

Broadly speaking, many of the interventions that have been used in emergency settings mirror or are identical to interventions used in nonemergency settings (Box 9.1).

In emergencies, the priorities may be different than for non-emergency settings. Rapid escalation of coverage may require different and accelerated protocols, for example.

It is important to note that although a standard set of interventions has emerged to address nutrition emergencies, the evidence base is not as robust as for nutrition interventions in non-emergencies. The knowledge gaps are often due to the nature of emergency response. In an
emergency, collecting data to inform a rigorous analysis and evaluation of an intervention’s impact can be difficult, expensive, dangerous and even unethical. As one review of the knowledge base on nutrition in emergencies noted, “It is not possible deliberately to withhold an intervention in order to achieve a comparison or control group [in an emergency setting]” (Hall, Blankson and Shoham 2011). Furthermore, since emergency and disaster response often involves a wide array of interventions implemented simultaneously, it is often impossible to isolate the impact of any one intervention on any one outcome (Webb et al. 2014).

This chapter therefore does not synthesize data on effectiveness of emergency interventions, but presents some examples and basic information on interventions that have not been discussed in previous chapters but are broadly seen as critical in responding to emergencies. General food distribution, supplementary food and nutrition assistance (including assistance targeted at vulnerable populations), IYCF, and psychosocial support with nutrition responses are discussed in this chapter.14

**General food distribution**

In an emergency, gaps in food consumption may be so critical that the entire affected population needs food assistance. General food distribution provides food rations to individuals and households, with the aim of covering basic nutritional needs. The World Food Programme (WFP) has recently implemented general food distribution in eastern Aleppo, Syria, distributing hot meals, ready-to-use canned foods and staple foods to displaced Syrians returning to the city after fleeing conflict from the Syrian Civil War (WFP 2017).

Fortified blended foods—such as Corn Soya Blend and Super Cereal—are an important component of the general food ration in emergencies, particularly for vulnerable populations. Food fortification, which has been discussed in previous chapters of this report, can reduce micronutrient deficiencies in emergencies by providing rations fortified in vitamins, calcium, iron, iodine, and zinc (among other micronutrients). The UN recommends the inclusion of fortified foods—such as Fortura—are an important component of the general food ration in emergencies, particularly for vulnerable populations. Food fortification, which has been discussed in previous chapters of this report, can reduce micronutrient deficiencies in emergencies by providing rations fortified in vitamins, calcium, iron, iodine, and zinc (among other micronutrients). The UN recommends the inclusion of fortified food aid.

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14 The following emergency response interventions are discussed in other chapters: Management of severe acute malnutrition (SAM); management of moderate acute malnutrition (MAM); delivery of micronutrients; treatment of diarrhea with oral rehydration therapy/zinc; prevention and treatment of vitamin A deficiency.

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**Box 9.1: Nutrition-specific interventions commonly implemented in emergency situations**

- General food distribution
- Supplementary food and nutrition assistance (including assistance targeted at vulnerable populations)
- Infant and young child feeding (IYCF)
- Psychosocial support with nutrition responses
- **Management of severe acute malnutrition (SAM)**
- **Management of moderate acute malnutrition (MAM)**
- **Delivery of micronutrients**
- **Treatment of diarrhea with oral rehydration therapy/zinc**
- **Prevention and treatment of vitamin A deficiency**

Note: Italicized interventions are primarily covered in other chapters (Webb et al. 2014)
blended food as part of general food distributions in emergency settings (World Health Organization et al. 2004).

Supplementary food and nutrition assistance

In many emergencies, it may be necessary to provide additional, or supplemental, feeding support to particularly vulnerable populations. There are two types of supplementary feeding programs (SFPs): targeted supplementary feeding programs and blanket supplementary feeding programs.

Targeted SFPs are directed at at-risk individuals and aim to rehabilitate malnourished persons and prevent and reduce morbidity and mortality. They most often target malnourished children under 5 years of age, as well as malnourished adolescents, pregnant and breastfeeding women, adults and elderly persons. Medical referrals—such as patients living with HIV and/or tuberculosis—may be included in SFPs.

By comparison, blanket SFPs are meant to provide food and micronutrient supplementation for all members of groups at high risk of becoming malnourished. The UN High Commissioner for Refugees (UNHCR) and the WFP recommend that blanket SFPs be initiated in the presence of widespread malnutrition and aggravating factors (Figure 9.1).

Supplementary feeding programs have been implemented in many settings. Ethiopia implemented a national SFP, targeted at acutely malnourished children and pregnant/nursing women, with the support of the WFP. In one year, it reached more than 500,000 beneficiaries (WFP 2012).

Supplementary feeding programs have also been implemented in conjunction with cash transfer programs. (Cash transfers programs are discussed in greater detail in Chapter 7.) In Niger, the distribution of supplementary food combined with a cash transfer had a greater preventative effect on moderate and severe acute malnutrition than strategies using cash transfers or supplementary feeding in isolation (Langendorf et al. 2014).

Infant and young child feeding in emergencies

The protection and promotion of IYCF is essential in all settings; in emergencies, it becomes vital for preventing morbidity and mortality among at-risk individuals in the affected population. Caring for the nutritional needs of pregnant and lactating women, ensuring safe and appropriate complementary feeding and supporting the early initiation of exclusive breastfeeding in emergencies are vital components of addressing infant and young child feeding in emergencies and should be prioritized in response implementation.

Guidelines for IYCF in emergencies developed by the UNHCR prioritize support for breastfeeding by mothers and support for relactation, or the resumption of breastfeeding after a period of non-breastfeeding (UNHCR 2015). As a secondary measure, wet nursing for infants—or the feeding of an infant by a lactating woman who is not the infant’s mother—is an acceptable backup action, with the provision of breastmilk substitutes (BMS) as an option of last resort. The UN and other agencies discourage the use of BMS outside of limited settings, and have issued guidance on
ways to prevent and limits the risks of inappropriate BMS use. One of these recommendations is the active discouragement of donations of BMS, which can lead to early and unnecessary cessation of breastfeeding (UNHCR 2015).

In an emergency, pregnant and lactating women may have limited access to secure and supportive places to render care to infants and young children; emergency responses can address this need by creating infant- and mother-friendly spaces that also provide needed resources and support. For instance, in 2005, a major earthquake in Kashmir left many women in Pakistan without access to private spaces to breastfeed. In response, Pakistan’s Ministry of Health and UNICEF established “mothers’ corners”—tents where women could meet to breastfeed, support one another and receive information from health workers (Richardson and Walters 2014).

Psychosocial support within nutrition responses
Nutrition deficiencies and psychosocial deprivation—as a result of poor health and/or insufficient care and stimulation—are thought to lead to development delays and stunted cognitive
development. WHO advises that psychosocial support should be integrated within nutrition responses in emergencies to ensure the physical and intellectual development of infants as well as the mental wellness of their care-takers. In Darfur and in West Africa, psychosocial support has been integrated into nutrition programs in response to food crises, through training in psychosocial support activities and the creation of infant- and mother-friendly spaces to foster both nutritional and psychosocial support (McGrath 2012).

**Governance and support for nutrition in fragile situations**

Planning and governance are critical to the implementation of any nutrition policy. In fragile and conflict-affected areas, mechanisms to effectively address malnutrition through coordinated action and service delivery may be severely lacking.

Countries experiencing fragility have some of the highest rates of stunting and wasting worldwide (Taylor et al. 2015) and are less likely to have the dedicated political will, prioritization and resources for nutrition to join the SUN Movement (for more on SUN, see Chapter 12). Chronic nutrition emergencies in fragile situations may result in emergency response interventions becoming a long-term approach rather than a short-term and temporary response.

There is very limited data on how to strengthen engagement with fragile and conflict-affected states on malnutrition and accelerating investment in nutrition. Taylor et al. (2015) recently argued that enhancing governance in fragile states may increase the likelihood of engagement with global movements to support nutrition (like the SUN Movement) and with nutrition more broadly, but it is worth noting that joining the SUN Movement is not a perfect measure of a country’s commitment to tackling malnutrition. Indeed, an earlier analysis by Taylor (2013) found that fragile and conflict-afflicted states within and outside the SUN Movement had broadly similar rates of stunting.

The special needs of fragile situations may require that interim nutrition strategies be adopted in place of a national plan and program. Though creating a sustainable national program for nutrition ought to remain a priority and benchmark, nutrition planning in fragile states may require a more immediate set of actions around basic nutrition interventions (as well as emergency nutrition programs) (SUN 2010). Nutrition planning should also consider the role of civil society, particularly in fragile states, in mobilizing resources and support for the scale up of nutrition programs and for maintaining accountability to affected populations (IFPRI 2016); in fragile situations where the state is unable to lead or coordinate nutrition action, nutrition improvements led by civil society and/or private sector development (e.g., in food systems) may be particularly important.

**Conclusion**

Responding to emergencies saves lives and safeguards public health, making the swift implementation of effective interventions of paramount concern. To this end, the nutrition community increasingly recommends that all countries include as part of their national nutrition plan an analysis of risks and mitigation strategies for addressing emergency needs. These and other recommendations on how countries can implement national nutrition plans through multisectoral involvement and coordination are discussed in the final chapter of this report.
Chapter 10: Gender and nutrition across sectors

Gender discrimination is associated with both chronic and acute malnutrition, with gender inequality as both a cause and an effect of malnutrition (SUN 2016). This relationship stems in part from women’s and girls’ roles in families. Across cultures, women oversee household nutrition, child care and health (FAO 2015b). In addition, women are responsible for 60 to 80 percent of food production in developing countries. Improvements in gender equality and women’s empowerment thus lead to improved nutrition outcomes for women, their families and their communities (SUN 2016).

Although the role of girls/women and women’s empowerment has been discussed in each of the preceding chapters, this chapter explicitly focuses on women in recognition of their centrality to nutrition. Research has identified women’s decision-making power and education as key elements of empowerment that contribute to better nutrition (Taukobong et al. 2016). Women with more decision-making power and higher literacy levels are more likely to have well-nourished children and less likely to have stunted children. Women’s mobility and control over income, assets and resources also contribute to nutrition (but probably not as strongly as decision-making power and education) (Taukobong et al. 2016). This may be explained by the finding that when women’s income increases, they invest more in health, nutrition and education (SUN 2016). These investments in human capital contribute to long-term economic growth.

The state of women’s and girls’ nutrition

There is increasing recognition globally that nutrition is critical to women’s empowerment, but more progress on women’s nutrition is needed. Although differences between the genders in child nutrition outcomes such as stunting and wasting are not significant, disparities arise in adolescence and persist into adulthood (UNICEF 2013b). For instance, the anemia rate in women of reproductive age remains high, at 29 percent globally in 2011. Moreover, it is decreasing slowly: from 1995 to 2011, it fell only 4 percentage points (IFPRI 2016). In addition, short stature and thinness in women and girls remain public health problems in too many countries (IFPRI 2014). Overweight is also an increasingly common nutritional condition in women (IFPRI 2016).

Investing in women and girls

Improving nutrition for children and families requires investing in women and girls in multiple ways. Investing directly in women’s nutrition benefits not only women but also their future children. Investing in women’s empowerment through dedicated women’s empowerment initiatives or targeted nutrition-sensitive programs also benefits nutrition.

Investing in women’s nutrition directly

Nutrition-specific interventions that target women of reproductive age and pregnant women improve nutrition outcomes for both women and children. Proven interventions such as family planning, micronutrient supplementation and intermittent preventive treatment of malaria for

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15 Studies evaluating these relationships have not been designed to establish causality, but the associations are strong.
pregnant women should be scaled up rapidly.\textsuperscript{16} Achieving national coverage of these interventions would bring the world closer to achieving the WHA targets for nutrition (IFPRI 2016).

\textit{Empowering women}

Investing in women’s empowerment, directly or through targeted programs, can also potentially improve nutrition. At the macro level, this means changing negative cultural norms and improving policy environments that hinder women’s empowerment (Box 10.1).

\textbf{Box 10.1: National and community leaders promote gender equality in Malawi}

In Malawi, more than half of girls are married before the age of 18. Political leaders, religious leaders and parents have recently come together to promote gender equality and eliminate child marriage. At the highest levels, President Peter Mutharika is championing women’s empowerment through the UN Women HeForShe campaign. At the community level, religious leaders are learning about the risks and consequences of early marriage, and a national campaign has been launched to keep girls in school (SUN 2016).

At the program level, nutrition-sensitive initiatives across sectors should also be gender-sensitive (Box 10.2). Specifically, they should seek active involvement of women, men, girls and boys throughout the project cycle. Simultaneously, interventions focusing on women’s empowerment should seek opportunities to increase women’s access to resources, income-generating opportunities, credit, and labor- and time-saving technologies. For example, \textit{agriculture} projects could empower women by promoting horticultural crops traditionally grown by women in many places (FAO 2015b; African Development Bank 2015). Research has shown that \textit{social protection} programs that direct benefits to women have greater impact on nutrition than those that do not (H. H. Alderman 2016; Duflo 2003). \textit{WASH} interventions may especially benefit women because women are most affected by water and sanitation issues (UN Water 2006). For instance, improved water supply can free women from the need to collect water from sources miles away. Likewise, because using latrines in the early morning or at night endangers women, improved sanitation facilities increase women’s safety; they also reduce limitations associated with menstruation. In \textit{education}, keeping girls in school is critical for nutrition, as discussed earlier with regards to women’s literacy. Schooling is also closely tied to \textit{health} efforts to prevent adolescent pregnancy (SUN 2016).

During the design phase of all types of programs, a participatory gender analysis can help inform efforts to make the program gender-sensitive. For instance, there is often a trade-off between income-generating activities and child care, as well as between women’s employment and breastfeeding (FAO 2015b; Rollins et al. 2016). To maximize benefits and minimize harms, the views of women, men, girls and boys can be considered in shaping the interventions.

\begin{footnotesize}
\textsuperscript{16} Evidence on the impact of these nutrition-specific interventions is reviewed in the health chapter.
\end{footnotesize}
Furthermore, specific indicators can be included in the monitoring strategy to track the impact pathways identified as relevant to women, men, girls and boys.

**Box 10.2: Tajikistan promotes women’s empowerment through agriculture**

In Tajikistan, three out of four jobs are in agriculture. Although women carry out 80 percent of farm work, they often lack decision-making power and control over resources. In 2013, the government of Tajikistan partnered with the U.S. government’s Feed the Future initiative to gather evidence on women’s empowerment in the poor agricultural province of Khatlon using the Women’s Empowerment in Agriculture Index (WEAI). Data from the survey is being used to address gender issues in support of inclusive agricultural growth. Efforts have included strengthening value chains for fruits and vegetables predominately grown by women, training women to act as local organizers and targeting nutrition behavior change interventions at women (SUN 2016). The WEAI has also been employed in Uganda, Ghana, and Niger, among numerous other countries, to promote women’s empowerment in agriculture (IFPRI 2017).

**Conclusion**

Gender equality and nutrition are closely related. Empowered women and girls are more likely to have well-nourished children and be well-nourished themselves. Improving women and children’s nutrition requires not only investing in nutrition-specific interventions focused on women but also empowering women through direct initiatives and targeting women in nutrition-sensitive programs.
Chapter 11: Evidence for interventions targeting overnutrition in low- and middle-income countries

Overnutrition—the overconsumption of nutrients to the point of negatively affecting health—has risen sharply in Africa in recent years (Adeboye, Bermano, and Rolland 2012). Since 1990, the absolute number of obese children in Africa has doubled (IFPRI 2016). More than 10 million children under age 5 in Africa are overweight or obese, accounting for a quarter of the world’s overweight or obese children. In some African states, particularly those in North Africa, more than one in 10 children is overweight (Figure 11.1).

Poverty and food insecurity are both positively associated with higher rates of stunting. So, too, is obesity: children who are stunted are at a higher risk of obesity in the future (Popkin, Richards and Montiero 1996). In fact, undernutrition in early childhood followed by rapid weight gain is associated with an increasing probability of chronic disease and obesity. For children who are overweight, the outcomes are similar. Overweight in early years is a strong predictor for overweight in adulthood.

Figure 11.1: From left to right, percent of children under age 5 who are overweight in Africa, and percent of adults who are obese


For a variety of reasons, low- and middle-income countries in Africa are now increasingly facing a “double burden” of malnutrition: the co-occurrence of undernutrition and overnutrition (Wojcicki 2014; Kimani-Murage 2013; Količić 2012). According to the World Health Organization, this double

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17 Overweight and obesity are closely related, but refer to different measurements of abnormal or excessive fat accumulation. The WHO defines overweight in adults as a body mass index (BMI), an index of weight-for-height, greater than or equal to 25, and obesity as a BMI greater than order equal to 30. In children under 5, overweight and obesity is defined as weight-for-height greater than 2 and 3 standard deviations, respectively, above WHO Child Growth Standards median (WHO 2017b).
burden “can exist at the individual level—for example obesity with deficiency of one or various vitamins and minerals, or overweight in an adult who was stunted during childhood—at the household level—when a mother may be overweight or anemic and a child or grandparent is underweight—and at the population level—where there is a prevalence of both undernutrition and overweight in the same community, nation or region” (WHO 2017a).

It has generally been observed that stunting rates are lower among countries with progressively higher economic development, while rates of adult obesity correlate positively with gross domestic product (GDP) per capita (Egger, Swinburn, and Amirul Islam 2012; WHO 2017a) (Figure 11.2).18 As countries develop economically, increased rates of overweight and obesity may be due to changes related to diet—including changing food consumption patterns, reflecting an increased intake of energy-dense foods that are high in fat—and physical activity, including more sedentary lifestyles and decreased physical activity (WHO 2017b). These changes, however, can occur and overlap with patterns of undernutrition, across populations and even within households, resulting in a double burden of malnutrition.

Figure 11.2: Adult obesity and childhood stunting by GDP per capita

Source: IFPRI 2016 The double burden of malnutrition has been observed in West Africa, Egypt and rural South Africa (Wojcicki 2014; Kolčić 2012) and could affect a growing number of African states as they develop economically. Children in these settings are vulnerable to inadequate

18 Because of this trend, obesity is often described as a nutritional burden that mostly affects the affluent and residents of highly-developed urban areas. Within countries, however, rates of obesity have been rising even among poor households and in rural settings (Roemling and Qaim 2012). Evidence suggests that this is due in part to healthy foods being typically less accessible and more expensive than less healthy alternatives: a healthy meal may be beyond the reach of a low-income family in a middle-income country, thereby restricting dietary choices.
nutrition as infants; they are also exposed to high-fat, high-sugar, energy-dense and micronutrient-poor foods, which tend to be inexpensive per calorie but also have poorer nutrient quality overall. This causes increased rates of childhood obesity while undernutrition remains unaddressed.

At present, obesity rates are increasing in every country in Africa (IFPRI 2016), and no country is currently meeting the WHA target of halting the rise in prevalence of adult overweight and adult obesity (IFPRI 2016).

The sharp rise in obesity and overweight in Africa is troubling for many reasons. From a health perspective, obesity and overweight are associated with premature death and disability. Elevated body mass index (BMI) and overweight are leading risk factors for non-communicable diseases among adults, and children who are obese have an elevated risk of premature death and disability in adulthood (WHO 2017a).

The economic impact of obesity is severe in terms of both direct and indirect costs. Obesity entails health care costs for the management of associated non-communicable diseases. These costs are high, but they are often surpassed by the indirect effects of obesity and obesity-related dietary and physical activity patterns. These costs—including lost productivity and workforce participation—can be high. A case study found that the indirect costs of obesity in China ranged from 3.58 percent to 8.73 percent of the country’s gross national product (GNP) in 2000 and 2025, respectively (Popkin et al. 2006).

**Evidence for interventions to reduce overnutrition**

Globally, overnutrition arises from the interaction between people’s food preferences, their expression of healthy preferences (through diet and exercise) and their social environments (Hawkes et al. 2015). Strategies to combat overnutrition should include comprehensive policies that create enabling food, information and social environments (Hawkes et al. 2015). These environments should empower families to learn about healthy choices and should promote more equitable access to high-quality, nutritious food.

Though there is evidence supporting interventions that have been shown to be effective in changing dietary practices, reducing BMI and curbing rates of overweight and obesity (Mozaffarian et al. 2012), these interventions have almost exclusively been implemented and evaluated in high-income countries.

Few interventions to address overnutrition in Africa have been implemented, and even fewer have been evaluated. This is in part because nutrition programming in Africa is largely focused on the pressing challenges of undernutrition. However, as countries in Africa develop economically, and as rapid urbanization and access to highly processed high-caloric foods increases, the issue of overnutrition will become more important.

Though there is a paucity of evidence for interventions to reduce overnutrition in low- and middle-income countries, there are a number of interventions that have been piloted, discussed, or incorporated into national overnutrition response plans in Africa. Many of these interventions are similar to those implemented in high-income settings, such as fiscal incentives to influence healthy diets.
While these interventions may not have been brought to scale or evaluated for impact on nutrition indicators, they are indicative of possible strategies that states may utilize to address overnutrition. Both public sector and private sector actors may be able to contribute to control efforts (Box 11.1).

**Fiscal incentives and disincentives to promote healthy nutrition**

One of the most prominent strategies to promote the consumption of healthy foods in high-income settings has been the use of **subsidies to lower the prices of more healthful foods and beverages** (Mozaffarian et al. 2012; Darmon et al. 2014; Thow et al. 2010). Lower fruit and vegetable prices have been found to be associated with lower body weight among low-income children and adults (Powell et al. 2012). However, nutritious diets may, in some settings, be unaffordable for many. A study in South Africa found that “healthier food choices are, in general, considerably more expensive than commonly consumed foods. As a result, a healthy diet is unaffordable for the large majority of the population” (Temple et al. 2011).

**Box 11.1: Overnutrition and the private sector: Brazil’s engagement with the food industry**

In Brazil, the availability of ultra-processed foods has been positively associated with higher prevalence of obesity in both adults and children (Canella et al. 2014). In 2007, the government entered into a technical cooperation agreement with the Brazilian Food Industry Association. One of the main components and directives of this agreement addresses food reformulation, with emphasis on reducing the sodium, sugar and fat content of processed foods (Nilson 2015).

The government and the private sector jointly set a goal for nutritional standards, starting with transfatty acids. In 2010, nutrient monitoring showed that more than 90 percent of food products in Brazil had achieved the targets. The adoption of these nutritional standards represented a reduction of 230 tons of trans fats from foods sold in Brazil each year (Nilson 2015).

Overnutrition response plans can reduce the cost of healthy foods such as fruits and vegetables by providing subsidies to farmers or by decreasing the value-added tax charged at the point of sale. Prices can also be reduced through food and agricultural policies that work throughout the supply chain—including the manufacturing, processing and distribution of food—to provide consumers access to cheaper, more healthful foods. Costs may also be reduced by providing cash-back rebates on purchases of healthy foods by consumers.

Fiscal incentives at the point-of-sale have been implemented in South Africa by the health insurer Discovery, which implemented a cash-back rebate program for healthy food purchases (HealthyFood) as part of its health promotion program. The program made rebates available for purchases made in over 400 designated supermarkets for foods that were classified as healthy by a panel of nutritionists, physicians, and behavioral scientists based on international dietary guidelines. A study of the program indicated that rebates of 10% and 25% for healthy foods were associated with increased food expenditure on health foods, purchase of fruit and vegetables relative to total food expenditure, and a decrease in the purchase...
of less desirable foods (such as those high in saturated fats, added sugar, or refined starch) (Sturm et al. 2013).

A similar strategy to fiscal incentives involves **increasing the price of less healthful foods and beverages**—such as high-sugar drinks and foods that are high in saturated fats—through the use of taxes. Fiscal policies related to sugar-sweetened beverages have been included as part of South Africa’s plan to combat obesity, where taxes on unhealthy foods and subsidies on healthy foods were found to be very cost-effective (Box 11.2) (Department of Health, Republic of South Africa 2015).

Studies indicate that taxes and subsidies for selected foods typically have the potential to influence patterns of food consumption, particularly when they are combined with multicomponent interventions (Afshin et al. 2017). However, several studies in high-income settings suggest that taxes to change diets should be used cautiously and in concert with other fiscal strategies (Mozaffarian et al. 2012; Darmon et al. 2014; Thow et al. 2010). Although taxes have been shown to influence consumption of particular foods, there is scant evidence on whether taxes have an effect on body weight and BMI, raising concerns that the long-term impact on food and nutrition behaviors is unclear. Furthermore, taxes tend to have a disproportionate impact depending on the purchasing power of individuals and households. Some nutrition experts warn that taxes may inadvertently increase nutrition inequality through a disproportionate effect across socioeconomic groups. The complementary use of subsidies for more healthy foods may mitigate this effect.

**Legislation to curb overnutrition**

Governments can also use legislation as a tool to combat overnutrition. An effective strategy in high-income settings is **restricting TV advertisements for less healthy foods and beverages**
targeted at children (Mozaffarian et al. 2012). Food marketers are interested in children and young adults as product consumers because of their spending power and household purchasing influence, but also because they represent an investment: children who are influenced today are likely to have greater purchasing power as adults.

Legislation of this kind has not been implemented widely in Africa, and there is little evidence documenting whether it would be—or has been—effective in reducing overnutrition in the African context. The intervention may be appropriate, however, in certain settings. Mchiza and Maunder (2013) argue that the factors that drive obesity in South Africa “include television advertisements in the country which promote less healthy food products and widespread misleading health claims.” “Only a handful of advertisements on television,” the authors write “pertain to foods with a high nutrient content, such as vegetables, fruit, and low-fat milk and milk products.” The authors argue that government intervention is needed “to reduce the advertising of unhealthy food related products, to encourage more advertising that pertains to healthy foods, and to promote physical activity.” (Box 11.3 further discusses promotion of physical activity.)

Additional regulatory policies can target less healthful foods directly by promoting guidelines for nutritional content. Regulations have effectively reduced or restricted sugar, salt and certain fats in processed foods; these regulations have occasionally been drafted and implemented in collaboration with food businesses. In Mauritius, in the late 1980s and early 1990s, a population-wide intervention program was implemented to promote healthy lifestyles concurrent with legislative regulation of the composition of cooking oil available to the public (by limiting the content of palm oil) (Dowse et al. 1995; Uusitalo et al. 1996). The interventions were noted to decrease serum cholesterol concentration across the population (Uusitalo et al. 1996) and the prevalence of hypertension. Moderate leisure physical activity was also observed to increase. However, the prevalence of overweight and obesity did not change (Dowse et al. 1995); some sources suggest that it even increased during the same time period (Institute of Medicine, Board on Global Health, and Committee on Preventing the Global Epidemic of Cardiovascular Disease: Meeting the Challenges in Developing Countries 2010). More recently, South Africa is implementing mandatory salt reduction targets for food manufacturers. The regulations target the amount of salt in breads, soup mixes and spreads (e.g., margarine and butter) and are scheduled to be fully implemented by June 2019 (Mushoriwa et al. 2016).

**Box 11.3: Promotion of physical activity to reduce overweight**

An additional intervention that has been implemented to reduce overweight and combat overnutrition is the promotion of physical activity through infrastructural investments, public messaging campaigns, and policies (Mozaffarian et al. 2012). Interventions to promote physical activity can include environmental and policy approaches, such as the creation and improvement of public spaces for recreation, changes to urban design and land use, and policies that promote active transport, sport, and recreation (Heath et al. 2012). Policies to promote physical activity have been implemented in Brazil, Colombia, and Mexico, with studies finding increases in physical activity (Malta and da Silva 2012), decreases in cases of hypertension (Fioravanti 2012), and a high ratio of health benefits to cost (Montes et al. 2012).
**Opportunities and challenges**

Strategies to address malnutrition must address the growing burden of overnutrition. As countries in Africa develop economically—with increasing rates of urbanization and market access to high-energy, low-cost processed foods—obesity is likely to become an even greater problem.

Further research is needed to solidify the evidence of effectiveness of various approaches to improving diet and reducing overweight and obesity. Much of the available research on interventions to address overnutrition comes from high-income countries in Europe and the Americas; the extent to which these interventions may be adapted to and implemented in African LMICs warrants additional research.

Nevertheless, there are a number of interventions for which the evidence on impact in Europe and the Americas is promising, and for which the theory of change appears directly applicable to Africa. More action is needed to implement evidence-based approaches that have proven effective to address the rise of obesity rates in Africa.
Chapter 12: Implementing a multisectoral nutrition strategy

Addressing the burden of malnutrition—and realizing the potential contribution of better nutrition on human health and development—requires the involvement of multiple sectors. As outlined in the conceptual framework presented in Chapter 2, nutrition-specific interventions are necessary to address the immediate cause of malnutrition. However, these interventions must be joined by nutrition-sensitive interventions across other development sectors to tackle the underlying causes (Reinhardt and Fanzo 2014). Both nutrition-specific and nutrition-sensitive interventions have been described throughout this report. This chapter addresses how to engage and coordinate multiple sectors to effectively combat malnutrition.

Challenges to implementing multisectoral nutrition plans

Despite the global recognition that nutrition is multisectoral—and requires a multisectoral approach to address—countries often face challenges in implementing the governance strategies needed for multisectoral nutrition (MSN) planning. A recent analysis conducted of the African Nutrition Security Partnership identified a broad range of governance challenges encountered by countries (Appendix Table 12.1) (Pelletier et al. 2015). The analysis traced these challenges to a discrete set of root causes, including human resource constraints for overall MSN

Box 12.1: Multisectoral drivers of malnutrition

In the 2016 GNR, researchers at the International Food Policy Research Institute highlighted six underlying drivers of malnutrition (see table below). They assigned each driver a threshold corresponding to a predicted stunting rate of less than 15 percent. The report examined 98 countries to determine how many were meeting each threshold. It identified only six countries (Argentina, Armenia, Belarus, Brazil, Turkey and Venezuela) that met all six thresholds; the vast majority of countries failed to meet three or more thresholds.

<table>
<thead>
<tr>
<th>Underlying Driver of Stunting</th>
<th>Threshold Corresponding to a Predicted Stunting Prevalence of &lt;15%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total per capita calories in food supply</td>
<td>2,850</td>
</tr>
<tr>
<td>Percent of calories from non-staple foods</td>
<td>51</td>
</tr>
<tr>
<td>Percent of populace with access to improved water</td>
<td>69</td>
</tr>
<tr>
<td>Percent of populace with access to improved sanitation</td>
<td>76</td>
</tr>
<tr>
<td>Female secondary school enrollment rate</td>
<td>81</td>
</tr>
<tr>
<td>Ratio of female to male life expectancy (as a proxy for the empowerment of women)</td>
<td>1.072</td>
</tr>
</tbody>
</table>

Source: GNR 2016
implementation and coordination, lack of dedicated implementation staff for subnational efforts, and failure to engage high-level decision-makers at critical bottlenecks.

The findings echo the experiences of countries worldwide. In 2008, the Lancet Series on Maternal and Child Undernutrition highlighted several key challenges to MSN governance, including building and maintaining priority for nutrition, choosing and scaling up locally tailored interventions, reaching populations with the greatest need, making data-based decisions, and building capacity (Bryce et al. 2008). Despite the broad progress that has been made in MSN, countries continue to face challenges in building political support for nutrition and in generating and facilitating cooperation across sectors, institutions and actors.

Until recently, most of the evidence on the implementation of MSN policy and plans had been available solely at the global level (Marasini and Mugenyi 2016); however, a growing body of evidence drawing from country experiences indicates a number of dimensions and activities of MSN that countries can address in order to improve nutrition planning and implementation.

Global efforts to strengthen nutrition governance and multisectoral planning

The past decade has seen a diverse range of global efforts to support countries in developing and strengthening multisectoral approaches to addressing malnutrition. One of the earliest initiatives was the Mainstreaming Nutrition Initiative (MNI), a 2006-2009 project that sought to build a base of experience in Bolivia, Guatemala, Peru and Vietnam to make nutrition a higher priority at national level. The initiative found that deficiencies within the policy sector— particularly those related to weak strategic capacity—were a critical impediment to MSN programming (Pelletier et al. 2012).

In 2008, the same year as the first Lancet series on undernutrition, the United Nations established a joint agency initiative called Renewed Efforts Against Child Hunger (REACH). REACH emerged as a shared approach undertaken by the FAO, the WHO, UNICEF, the WFP and later the International Fund for Agricultural Development (IFAD). The initiative seeks to coordinate U.N. support across different sectors and facilitate improved governance and management for MSN activities at the country level (SUN UN Network 2016a). A 2015 joint evaluation of the REACH approach confirmed that support provided through REACH was effective in building capacity for MSN at the country level, while noting that gains and impact could be difficult to sustain due to capacity and resource constraints (Visser et al. 2015). REACH currently acts as the leader and secretariat of the SUN Movement (SUN UN Network 2016a).

The SUN Movement began with a Framework for Action for nutrition in 2010; the framework was rapidly endorsed by numerous countries and partners, and the SUN Movement’s institutions became more formalized (SUN 2010). Today, nearly 60 countries have joined the SUN Movement and are engaged in its efforts to scale up concerted and coordinated action to ending malnutrition in all its forms. More than half of the countries in the SUN Movement are in Africa, reflecting a growing commitment across the continent to end malnutrition. The SUN Movement’s goal is that by 2020 all countries will have multi-stakeholder partnerships for coordination, an aligned policy in support of nutrition, and measurable contributions from all stakeholders to scale up nutrition.
Critical components for implementing multisectoral nutrition

The growing body of evidence from studies of nutrition governance and guidance issued by the global actors mentioned earlier indicates that a number of factors influence the enabling environments surrounding effective MSN policy and programming (Figure 12.1). The key components that countries need in order to develop an MSN policy include politics and governance, resources and capacity, and technical knowledge and evidence (Gillespie et al. 2013).

Figure 12.1: The core components of multisectoral nutrition plan support concerted action for nutrition


Politics and governance

Political support for MSN is necessary for any strategy to advance. Within this domain, a number of activities and factors can be influential in securing political attention for nutrition. In the four MNI countries, researchers studied the experience of generating political will and mapped the influence of different factors (Shiffman 2007; Shiffman and Smith 2007). The researchers noted that, in all four countries, the existence of credible indicators was found to be critically important. Other factors were found to be critical in at least three countries. These factors included internal and external frame of nutrition, political transitions or other policy changes, and, to some extent, norm promotion.

Nutrition governance—the processes by which public authorities formulate, implement and enforce policies and actions for nutrition—is also critical. Haddad and Acosta (2012) suggest that three of the key components of effective nutrition governance are capability, accountability and responsiveness.
Capability broadly encompasses the adequacy of resources to address malnutrition across multiple sectors, and is described in greater detail in the following section. Accountability is particularly important in the context of malnutrition, which can be invisible to policymakers until it becomes a critical and highly acute issue; civil society and organized citizens, therefore, may have a vital role to play in raising awareness of nutrition and holding officials to account (Haddad and Acosta 2012). Finally, good nutrition governance requires that responses be implemented in a timely fashion to prevent as much irreversible damage from malnutrition as possible. For many, severe acute malnutrition poses a threat to life. A swift response can be the difference between life and death for individuals most vulnerable to malnutrition.

**Resources and capacity**

Establishing an effective and sustainable multisectoral approach to nutrition requires a nutrition workforce that can engage across multiple sectors, levels of government and political interests. A lack of human resource capacity for nutrition, however, is frequently cited as a key weakness in national multisectoral approaches (Lamstein et al. 2016). The human capacity needs are diverse and include a wide array of skills. Jerling et al. identified specific skills needed for the three main types of workers supporting an MSN plan: program staff, frontline workers, and researchers and evaluators (2016).

- **Program staff** should have a strong understanding of the linkages between food and health systems and the capacity to appropriately design nutrition interventions that are sensitive to the interconnectivity of systems. Program staff should also be able to invest in, and provide for the effective collection, analysis and presentation of nutrition data, and they must be able to engage in a multi-stakeholder environment.

- **Frontline workers** should have strong coordination and negotiation skills to work within broader communities on larger multisectoral teams. This includes interpersonal skills, communication skills and empathetic engagement with communities.

- **Researchers and evaluators** can provide critically needed evidence, surveillance and evaluations for nutrition programming. Because of the multisectoral nature of nutrition, experts will be needed across different subject areas and disciplines.

An MSN plan must also have adequate financial and physical resources and would benefit from strong leadership from high-level officials who act as champions for nutrition within fraught political landscapes. These issues are discussed in greater detail below.

**Technical knowledge and evidence**

Closely related to the need for resources and capacity is the need for technical knowledge and evidence of best practices and standards of care. The UN Network for SUN and the Reach Secretariat recently launched a major resource to help advocates, policy-makers and program managers identify evidence-based nutrition-specific and nutrition-sensitive actions: the Compendium of Actions for Nutrition (UN Network for SUN/REACH Secretariat 2016; SUN UN Network 2016b). The Compendium describes the available evidence for various interventions across multiple sectors, providing an authoritative resource guide to generate and foster MSN planning.
One of the SUN Movement’s aims is to facilitate and promote sharing of knowledge and expertise across the various SUN countries and networks. Knowledge sharing is encouraged within countries through in-country partner alliances as well as across countries through regional workshops.

**National multisectoral nutrition plans: a checklist**

The development of a national nutrition plan is seen as a critical step in comprehensively tackling malnutrition. In 2016, the SUN Movement released a checklist for developing and assessing quality national nutrition plans. Developed through a consultative process by a working group of policy and budget management experts convened by the SUN Secretariat and the UN Network for SUN, the SUN Checklist was intended to be generic rather than prescriptive, and therefore suitable for many contexts (SUN UN Network 2016b). The document will be shared with countries and revised to incorporate feedback from reviewers. A final version of the checklist is expected to be released in mid-2017.

The SUN Checklist joins recommendations from the Institute of Development Studies (Haddad and Acosta 2012), the Strengthening Partnerships, Results and Innovations in Nutrition Globally Project (SPRING) (Pomeroy-Stevens 2017), and the Regional Strategic Analysis and Knowledge Support System (Jerling et al. 2016) on best practices for developing national MSN plans. The recommendations are synthesized below.19

**Informed planning**

Many of the recommendations for creating a strong strategy for MSN emphasize the importance of informed planning through situational analyses, goal setting, risk analysis and development of key guidance documents. Resources further emphasize the importance of taking a long-term view of scale-up, with the need to set long-term goals to sustain commitment in planning and implementation. SUN and other resources recommend these elements of informed planning:

- Conducting a situational analysis of the nutrition context, including prevalence of malnutrition, drivers of undernutrition and overnutrition, and contextual factors
- Establishing SMART (specific, measurable, achievable, relevant and time-bound) nutrition goals that are consistent with national and internationally adopted recommendations (e.g., WHA targets, SDG 2) that promote inclusiveness and equity of impact
- Defining clear and feasible programmatic and policy actions that are informed by evidence and guided by technical expertise

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19 The recommendations span five areas that closely parallel the five areas of the SUN Checklist. They have been modified here to incorporate and expand on recommendations from other sources.
• Conducting an analysis of risks and mitigation strategies, including measures to address needs that arise in emergency settings (this is particularly important for fragile states or drought-prone countries). This analysis may include plans to ensure adequate transition of national nutrition plans between governments during periods of political change.
• Defining policies and mechanisms to ensure governance, accountability, management and coordination
• Developing an operational framework that describes the implementation responsibilities of different government and nongovernment actors

**Intersectoral cooperation**

Establishing structures and policies to manage coordination across sectors is crucial to implementing a national MSN plan, and has been identified as a critical challenge in MSN at the country level (Kennedy et al. 2016). This includes:

• Establishing a nutrition coordinating body that facilitates cooperation across ministries and sectors. National nutrition coordinating bodies, often led by ministry of health officials with direct authority from the head of state, have been the hallmark of many African nutrition strategies
• Creating a shared vision of nutrition as part of the national development agenda, possibly including the creation of a shared narrative across sectors about the importance of nutrition
• Establishing linkages between the national plan and sectoral plans, including the broader development framework and strategy of the country
• Implementing a transparent and consultative process to ensure engagement with stakeholders at the local and national levels
• Developing clear policies for managing conflicts of interests during the development of plans

**Vertical coordination**

Vertical coordination of national and subnational levels is seen as critical to a successful national nutrition plan. It is closely linked to intersectoral cooperation and requires high-level political commitment. Activities that promote vertical coordination may include:

• Fostering and sustaining political commitment from the highest executive levels, with the direct involvement of the executive branch of government in developing and implementing malnutrition reduction policies
• Coordinating policies and actions across subnational levels through clearly defined mechanisms
• Building and strengthening local governance and capacity in support of nutrition and service delivery
• Encouraging local ownership of nutrition programming.
Sustainable financing
Nutrition planning and programming requires sustained financing to maintain gains, expand coverage, improve quality and reduce malnutrition over the long term. Sustainable financing must be predictable, so that policymakers can reliably plan budgets and anticipate funding, as well as flexible, so that it can adapt to changing needs.

SUN and other groups recognize that national nutrition plans require a clear operational framework with costed components in order to establish implementation arrangements and meaningfully articulate resource needs for the budget management cycle. The budgeting and financial framework should identify how funds and resources will be deployed across sectors and actors in order to support program planning.²⁰

Monitoring, evaluation and advocacy
To ensure transparency, responsiveness and accountability, a national nutrition plan should include monitoring and evaluation mechanisms and engagement with civil society and advocacy networks. Key activities include:

- Creating a clear monitoring and evaluation framework. An example is the MNI assessment framework, which includes three assessment domains: epidemiologic, operational and sociopolitical. Each domain includes well-defined key issues, assessment methods and data sources for evaluation
- Collecting nutrition data at regular intervals (particularly in emergency settings) at the national and subnational levels
- Budget tracking and collecting expenditure data
- Joint periodic performance reviews across sectors and stakeholders
- Documentation and dissemination of good practices and lessons learned
- Development of social accountability mechanisms by working with civil society organizations to promote advocacy and accountability in the implementation of the plan

Strong multisectoral nutrition planning to implement and coordinate nutrition-specific and nutrition-sensitive interventions is needed to effectively tackle malnutrition. Though there are challenges to implementing multisectoral nutrition, countries worldwide are meeting these challenges with the components and tools mentioned above to foster supportive enabling environments and stronger governance for nutrition.

Three case studies of country experiences operationalizing multisectoral nutrition are presented below. Broadly, they highlight the value of generating a multisectoral strategy, establishing clear vertical coordination, and adopting common results frameworks to drive multisectoral nutrition. Though malnutrition remains high in these countries, countries are rising to meet the challenge through concerted action across sectors and levels of government.

²⁰There is less consensus surrounding whether the national plans should explicitly identify sources of financing for nutrition, and whether these funding sources should be centralized (for example, through the creation of earmarked funds or special financing arrangements such as trusts funds or lotteries). However, as countries develop economically, donor funding for nutrition is expected to phase out, requiring countries to take greater responsibility for funding nutrition programs. This will require careful planning and the selection of financing mechanisms that are sustainable, predictable, additive, cost-effective and equitable.
Case studies

Nepal

Nepal has had a rich history of developing and implementing multisectoral plans for nutrition (Pomeroy-Stevens et al. 2016). Nepal’s most recent five-year Multisectoral Nutrition Plan (MSNP) emerged from a growing tide of political will and interest in nutrition by the Government of Nepal, highlighted in the completion of a 2009 Nutrition Assessment and Gap Analysis and the government’s commitment to join the SUN Movement. The MSNP is the result a coordinated effort involving five government sectors: agriculture, education, federal affairs and local development, health and population, and urban development (Government of Nepal, National Planning Commission 2012). The development of the plan received high-level support from the Prime Minister of Nepal and was led by the country’s National Planning Commission (NPC) in consultation with several external development partners.

The plan is ambitious, with a goal of achieving a one-third reduction in maternal, infant and child undernutrition. It is being implemented through a phased district-by-district scale-up, focusing on 28 priority districts (SUN 2017a). The MSNP calls for the creation of steering committees on nutrition and food security at the national, subnational and local levels—a vertical oversight structure that starts with parliament and the NPC and ends at the village level (Devkota, Adhikari and Upreti 2016). The NPC is also responsible for coordinating government and donor funds for this plan.

The process of developing the MSNP in Nepal has been documented in a report commissioned by UNICEF in Nepal; the report found that key strengths of the process included “participatory and inclusive plan development, an enabling environment for multi-sector collaboration, high level champions of nutrition, shared practices and/or strategies and development of coherent policy frameworks,” while it identified limited national nutrition capacity as a key weakness in bringing the plan to scale (Shrimpton et al. 2014). The plan echoes many of the characteristics and elements of the SUN Movement’s recommended components of national nutrition plans, including setting SMART nutrition impact targets, linking sectoral strategies, involving multiple sectors and stakeholders and securing high-level political commitment.

Since the implementation of the MSNP, researchers have noted a marked increase in activities and financing for nutrition in Nepal, with allocations steadily increasing each year (Pomeroy-Stevens et al. 2016). A study of Nepal’s nutrition governance capacity found improvement across all levels of administration in cross-sector engagement, nutrition awareness, and capability (Webb et al. 2016). In 2014, the Central Bureau of Statistics and UNICEF reported that the prevalence of stunting in Nepal had dropped from 41 percent to 37.4 percent, although this reduction is in line with Nepal’s previous rate of progress in reducing stunting (Devkota, Adhikari and Upreti 2016). Nonetheless, the MSNP offers a strong case study in effective national nutrition planning and multisectoral implementation.

Senegal

Senegal has made remarkable progress in reducing malnutrition, with an average annual rate of reduction in stunting prevalence of 2.6 percent (European Commission 2017). One of the key factors behind this progress has been strong governance and support for nutrition, highlighted by
the establishment of the Fight Against Malnutrition Unit (CLM) in the President’s Office (SUN 2017b). This unit acts as a convening body that advises the government and brings various sectors together. This high-level coordinating body is particularly critical in the context of Senegal’s decentralized government.

Senegal has developed a costed Multi-Sectoral Strategic Plan (2013–2018), which is currently being revised to include a common results framework with a participatory approach involving all relevant sectors (SUN 2017b; USAID 2017). Through the CLM, five key programs are being implemented to support nutrition through multisectoral action: community nutrition, social transfers, poverty and hunger reduction, micronutrient fortification and salt iodization (USAID 2017). The lessons from the plan’s implementation and the CLM’s nutrition programming can help inform nutrition planning globally; Senegal has been engaged in a joint learning effort to share its experiences with other countries in West Africa (Pizzini 2014).

From a historic high of nearly 35 percent prevalence in 1992, Senegal was able to reduce stunting to a historic low of approximately 15.5 percent in 2012 (European Commission 2017; World Bank 2017b). However, recent projections indicate that stunting rates have stagnated and perhaps deteriorated in recent years. Iron-deficiency anemia, wasting and food insecurity also remain high. This is due, in part, to a continuing food security deficit following a continuation of poor rainfall in the Sahel (UNICEF 2013a). The response to malnutrition has been hindered by barriers including limited staff capacity and limited access to quality health services (UNICEF 2014b).

Senegal seeks to address the recent increase in malnutrition by strengthening institutional governance for nutrition and reiterating its commitment to nutrition interventions across sectors. The adoption of a common results framework will help provide alignment on the implementation and management of multisectoral actions.

Ethiopia
Undernutrition remains a serious problem in Ethiopia: 40 percent of children under age 5 are stunted and 9 percent are wasted. However, Ethiopia has been a leader in implementing a multisectoral approach to nutrition, with dramatic progress. Between 1992 and 2014, the under-5 stunting rate fell from 67 percent to 40 percent—equal to a 40 percent decrease (IFPRI 2016).

In 2015, Ethiopia committed to ending undernutrition by 2030 with the Seqota Declaration. The declaration supports the implementation of the 2016–2020 National Nutrition Programme II (NNP II), a multisectoral strategy with a life-cycle approach to improving nutrition. The NNP II updates the first NNP, which was developed in 2009 based on the 2008 National Nutrition Strategy (L. Taylor 2012). The NNP II is organized around five strategic objectives: improving nutrition for children, adolescent girls, and women; improving nutrition services; strengthening nutrition-sensitive programs; and improving multisectoral coordination. Each objective is accompanied by explicit targets for related indicators, which will be incorporated into sector-specific subnational plans. The NNP II includes signatories from a wide range of sectors, including the Ministry of Health; Ministry of Agriculture and Natural Resources; Ministry of Education; Ministry of Industry; Ministry of Water, Irrigation, and Electricity; Ministry of Trade; and Ministry of Labor and Social Affairs, among others (Government of Ethiopia, n.d.).
The National Nutrition Coordination Body, chaired by the minister of health and co-chaired by the ministers of agriculture and education, is charged with implementing the strategy. The body convenes nine ministries and representatives from academia and the donor community. Monitoring and evaluation efforts will be guided by the accountability and results framework included in the NNP II and supported by integrated data systems, review meetings at all levels, operational research and regular dissemination of reports (Government of Ethiopia, n.d.).
Appendices

Appendix 1: List of consulted experts
Harold Alderman, Senior Research Fellow, IFPRI
Anna Herforth, Independent Consultant, global food security and nutrition, and Adjunct Associate Research Scientist, Columbia University
Sue Horton, Professor and CIGI Chair in Global Health Economics, University of Waterloo
Mduduzi Mbuya, Cornell University
Caroline Wilkinson, Senior Nutrition Officer, UNHCR
## Appendix 2: Supplementary tables by chapter

### Chapter 4

#### Appendix Figure 4.1: Evidence for impact of interventions targeting women of reproductive age and pregnant women on key outcomes

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Height-for-age</th>
<th>Weight-for-height</th>
<th>SGA/ Low birthweight</th>
<th>Anemia or Hb</th>
<th>Vit A or zinc deficiency</th>
<th>Diarrhea incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplementation with balanced energy protein (pregnant women)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IPTp and ITN for malaria (pregnant women)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron and iron-folate supplementation (WRA and pregnant women)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiple micronutrient supplementation for pregnant women</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcium supplementation (pregnant women)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Folic acid supplementation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal deworming</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal vitamin D supplementation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal zinc supplementation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Omega-3 fatty acid supplementation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antenatal psychosocial assessment and mental health support</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control of household air pollution</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Legend

- **Dark Green**: Synthesized evidence demonstrating effectiveness
- **Light Green**: Several primary studies demonstrating effectiveness
- **Yellow**: Multiple primary studies not demonstrating effectiveness
- **Orange**: Synthesized evidence not demonstrating effectiveness
- **Gray**: Minimal evidence
Appendix Figure 4.2: Evidence for impact of interventions targeting newborns on key outcomes

<table>
<thead>
<tr>
<th>Interventions</th>
<th>Nutrition outcomes</th>
<th>Int. outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Height-for-age</td>
<td>Weight-for-height</td>
</tr>
<tr>
<td>Delayed cord clamping</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neonatal vitamin K administration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin A supplementation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Massage for promoting growth in preterm infants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zinc supplementation for treatment of newborn infections</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin E supplementation in preterm infants</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Legend**

- Green: Synthesized evidence demonstrating effectiveness
- Yellow: Several primary studies demonstrating effectiveness
- Orange: Multiple primary studies not demonstrating effectiveness
- Gray: Synthesized evidence not demonstrating effectiveness
- Black: Minimal evidence
### Appendix Figure 4.3: Evidence for impact of health interventions targeting infants and children on key outcomes

<table>
<thead>
<tr>
<th>Interventions</th>
<th>Nutrition outcomes</th>
<th>Int. outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Height-for-age</td>
<td>Weight-for-height</td>
</tr>
<tr>
<td>Exclusive breastfeeding*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preventive vitamin A supplementation in children 6 months to 5 years of age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zinc supplementation in children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management of SAM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management of MAM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complementary feeding promotion in children 6-24 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron supplementation in children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiple micronutrient supplementation including iron in children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lipid-based nutrient supplementation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malaria prophylaxis and treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deworming in children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feeding practices in diarrhea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zinc therapy for diarrhea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin D supplementation in children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zinc supplementation for treatment of childhood pneumonia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control of household air pollution</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Exclusive breastfeeding (EBF) is considered a nutrition outcome, and interventions promoting EBF are effective at increasing EBF.*

### Legend

<table>
<thead>
<tr>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Synthesized evidence demonstrating effectiveness</td>
</tr>
<tr>
<td>Yellow</td>
<td>Several primary studies demonstrating effectiveness</td>
</tr>
<tr>
<td>Gray</td>
<td>Multiple primary studies not demonstrating effectiveness</td>
</tr>
<tr>
<td>Brown</td>
<td>Synthesized evidence not demonstrating effectiveness</td>
</tr>
<tr>
<td>Black</td>
<td>Minimal evidence</td>
</tr>
</tbody>
</table>
### Appendix Table 5.1: Descriptions of reviewed agriculture interventions

(UN Network for SUN/REACH Secretariat 2016)

<table>
<thead>
<tr>
<th>Production (interventions aiming to increase quantity or quality of food produced)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biofortification</td>
<td>Promotion of biofortified crop varieties (varieties which have been bred to be micronutrient-rich), such as orange-flesh sweet potato, quality protein maize, and others</td>
</tr>
<tr>
<td>Home gardening</td>
<td>Promotion of home gardens; primarily to produce fruits and vegetables</td>
</tr>
<tr>
<td>Cash cropping</td>
<td>Production of crops primarily for sale with the goal of income generation</td>
</tr>
<tr>
<td>Animal rearing (homestead and extensive)</td>
<td>Production of livestock such as poultry, sheep, goats, and cows, either on homesteads or in extensive systems in which animals range freely for all or part of the production cycle</td>
</tr>
<tr>
<td>Aquaculture and capture fisheries</td>
<td>Promotion of fish, either through fish farming or through capturing wild fish</td>
</tr>
<tr>
<td>Insect farming</td>
<td>Promotion of farming of insects, such as crickets, mealworms, grasshoppers, and others, for consumption</td>
</tr>
<tr>
<td>Food safety and aflatoxin prevention</td>
<td>Promotion of food safety practices, especially with regards to aflatoxin prevention (note: also listed in processing and storage)</td>
</tr>
<tr>
<td>Biodiversity (wild foods and local varieties)</td>
<td>Promotion of local and traditional foods and production of stable forest products such as wild foods, fruits and berries, roots and tubers, seeds, nuts, and mushrooms</td>
</tr>
<tr>
<td>Improved access to inputs and financing</td>
<td>Measures to increase access to inputs, such as seeds and fertilizer, and to financing tools, such as credit/microcredit and microfinance</td>
</tr>
<tr>
<td>Education of farmers and extension workers</td>
<td>Education interventions on topics including agricultural techniques and food safety</td>
</tr>
<tr>
<td>Rotation and intercropping</td>
<td>Staple crop intensification via crop rotation (successive cultivation of different crops in a certain order on the same field) and intercropping (growing two or more crops in the same field at once)</td>
</tr>
<tr>
<td>Irrigation</td>
<td>Introduction or upgrade of irrigation systems</td>
</tr>
<tr>
<td>Production of lipid-based nutrient supplements</td>
<td>Production of crops used to produce lipid-based nutrient supplements</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Processing and storage (interventions aiming to increase or preserve the nutritional value of food)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fortification - community</td>
<td>Addition of micronutrients to food at the community level through small or medium scale mills</td>
</tr>
<tr>
<td>Fortification - mass</td>
<td>Addition of micronutrients to foods commonly consumed by the public, such as cereals and condiments, on a large scale</td>
</tr>
<tr>
<td>Food safety and aflatoxin prevention</td>
<td>Promotion of food safety practices, especially with regards to aflatoxin prevention (note: also listed in production)</td>
</tr>
<tr>
<td>Promotion of processing for income generation</td>
<td>Promotion of processing in addition to production to add value and generate income</td>
</tr>
<tr>
<td>Enhancing digestibility and nutritional value of foods</td>
<td>Introduction of processing techniques that enhance digestibility, such as reducing the polyphenol and phytate concentration in beans to increase iron absorption, or increase nutritional value of foods, such as producing protein-rich flours from legumes rather than other foods</td>
</tr>
<tr>
<td>Food storage support</td>
<td>Large-scale food storage support, including the construction and maintenance of large-scale food storage facilities such as community or commercial sheds, storage silos, or national grain reserves</td>
</tr>
<tr>
<td>Malting, drying, pickling, and curing</td>
<td>Promotion of techniques such as malting, drying, pickling, and curing at the household level</td>
</tr>
</tbody>
</table>

| Retail and labeling (interventions aiming to influence the presentation and sale of food)       | Description                                                                                           |
| Marketing regulations                                                                          | Regulation addressing how foods must and must not be marketed to consumers                           |
| Labeling regulations                                                                            | Regulation addressing how foods must and must not be labeled for sale to consumers                   |

| Purchase and consumption (interventions aiming to influence consumer behavior)                 | Description                                                                                           |
| Price policies (taxes and subsidies)                                                           | Legislation affecting food prices, such as taxes and subsidies                                         |
| Consumer BCC and education                                                                     | BBC and education interventions aimed at consumers, for purposes such as increasing demand for a product or increasing knowledge of nutritional needs |
| Household food storage                                                                          | Promotion of good household food storage methods, including promotion of solar-powered refrigeration and appropriate preservation and storage methods |
Appendix Figure 5.1: Evidence for impact of agriculture interventions on nutrition outcomes

<table>
<thead>
<tr>
<th>Interventions</th>
<th>Nutrition outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Height-for-age</td>
</tr>
<tr>
<td>Biofortification</td>
<td></td>
</tr>
<tr>
<td>Home gardening</td>
<td></td>
</tr>
<tr>
<td>Cash cropping</td>
<td></td>
</tr>
<tr>
<td>Animal rearing (homestead and extensive)</td>
<td></td>
</tr>
<tr>
<td>Aquaculture and capture fisheries</td>
<td></td>
</tr>
<tr>
<td>Insect farming</td>
<td></td>
</tr>
<tr>
<td>Biodiversity</td>
<td></td>
</tr>
<tr>
<td>Improved access to inputs and financing</td>
<td></td>
</tr>
<tr>
<td>Education of farmers and extension workers</td>
<td></td>
</tr>
<tr>
<td>Rotation and intercropping</td>
<td></td>
</tr>
<tr>
<td>Irrigation</td>
<td></td>
</tr>
<tr>
<td>Production of lipid-based nutrient supplements</td>
<td></td>
</tr>
<tr>
<td>Fortification - community</td>
<td></td>
</tr>
<tr>
<td>Fortification - mass</td>
<td></td>
</tr>
<tr>
<td>Food safety and aflatoxin prevention</td>
<td></td>
</tr>
<tr>
<td>Promotion of processing for income generation</td>
<td></td>
</tr>
<tr>
<td>Enhancing digestibility and nutritional value of foods</td>
<td></td>
</tr>
<tr>
<td>Food storage support</td>
<td></td>
</tr>
<tr>
<td>Malting, drying, pickling, and curing</td>
<td></td>
</tr>
<tr>
<td>Marketing regulations</td>
<td></td>
</tr>
<tr>
<td>Labeling regulations</td>
<td></td>
</tr>
<tr>
<td>Price policies (taxes and subsidies)</td>
<td></td>
</tr>
<tr>
<td>Consumer BCC and education</td>
<td></td>
</tr>
<tr>
<td>Household food storage</td>
<td></td>
</tr>
</tbody>
</table>

*This outcomes is marked as positive if there is consistent evidence for impact on specific item within them (i.e. any micronutrient)

**Legend**

- Green: Synthesized evidence demonstrating effectiveness
- Orange: Several primary studies demonstrating effectiveness
- Yellow: Multiple primary studies not demonstrating effectiveness
- White: Synthesized evidence not demonstrating effectiveness
- Gray: Minimal evidence
Appendix Figure 5.2: Evidence for impact of agriculture interventions on intermediate outcomes

<table>
<thead>
<tr>
<th>Interventions</th>
<th>Intermediate outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Household income</td>
</tr>
<tr>
<td>Biofortification</td>
<td></td>
</tr>
<tr>
<td>Home gardening</td>
<td></td>
</tr>
<tr>
<td>Cash cropping</td>
<td></td>
</tr>
<tr>
<td>Animal rearing (homestead and extensive)</td>
<td></td>
</tr>
<tr>
<td>Aquaculture and capture fisheries</td>
<td></td>
</tr>
<tr>
<td>Insect farming</td>
<td></td>
</tr>
<tr>
<td>Biodiversity</td>
<td></td>
</tr>
<tr>
<td>Improved access to inputs and financing</td>
<td></td>
</tr>
<tr>
<td>Education of farmers and extension workers</td>
<td></td>
</tr>
<tr>
<td>Rotation and intercropping</td>
<td></td>
</tr>
<tr>
<td>Irrigation</td>
<td></td>
</tr>
<tr>
<td>Production of lipid-based nutrient supplements</td>
<td></td>
</tr>
<tr>
<td>Fortification - community</td>
<td></td>
</tr>
<tr>
<td>Fortification - mass</td>
<td></td>
</tr>
<tr>
<td>Food safety and aflatoxin prevention</td>
<td><strong>Synthesized evidence of impact on aflatoxin levels in food</strong></td>
</tr>
<tr>
<td>Promotion of processing for income generation</td>
<td></td>
</tr>
<tr>
<td>Enhancing digestibility &amp; nut. value of foods</td>
<td></td>
</tr>
<tr>
<td>Food storage support</td>
<td></td>
</tr>
<tr>
<td>Malting, drying, pickling, and curing</td>
<td></td>
</tr>
<tr>
<td>Marketing regulations</td>
<td></td>
</tr>
<tr>
<td>Labeling regulations</td>
<td></td>
</tr>
<tr>
<td>Price policies (taxes and subsidies)</td>
<td></td>
</tr>
<tr>
<td>Consumer BCC and education</td>
<td></td>
</tr>
<tr>
<td>Household food storage</td>
<td></td>
</tr>
</tbody>
</table>

*These outcomes are marked as positive if there is consistent evidence for impact on specific item within them (i.e. any nutrient or specific nutrient-rich food)

**Legend**

- **Synthesized evidence demonstrating effectiveness**
- **Several primary studies demonstrating effectiveness**
- **Multiple primary studies not demonstrating effectiveness**
- **Synthesized evidence not demonstrating effectiveness**
- **Minimal evidence**
## Appendix Table 6.1: Descriptions of reviewed WASH interventions

<table>
<thead>
<tr>
<th>Hygiene</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Handwashing and supplies</td>
<td>Handwashing behavior change practices including the provision of handwashing supplies</td>
</tr>
<tr>
<td>Food Hygiene Promotion</td>
<td>Handwashing before preparing food and safe food hygiene practices</td>
</tr>
<tr>
<td>Environmental hygiene promotion</td>
<td>Protection from fecal exposure in the environment from humans and animals</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sanitation</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to improved sanitation</td>
<td>Access to sanitation on the premises including the availability of latrines and/or their use</td>
</tr>
<tr>
<td>Excreta disposal management</td>
<td>Excreta disposal management especially focused on sewage systems</td>
</tr>
<tr>
<td>Community-based sanitation interventions</td>
<td>Community-based approaches that combine behavior change interventions and latrine installation</td>
</tr>
<tr>
<td>Sanitation support for infants and toddlers</td>
<td>Considerations to latrine construction with regard to safety and ease of access for the elderly and disabled</td>
</tr>
<tr>
<td>Sanitation support for elderly and disabled</td>
<td>Considerations to latrine construction with regard to safety and ease of access for infants and toddlers</td>
</tr>
<tr>
<td>Sanitation Marketing</td>
<td>Marketing of household sanitation options</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Water</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to improved water</td>
<td>Access to water from a piped source on the premises</td>
</tr>
<tr>
<td>Source water quality improvements and household water treatment and safe storage</td>
<td>Improvements to water quality at the source and household water treatment mechanisms like chlorination, flocculation, etc. and safe storage</td>
</tr>
<tr>
<td>Provision of safe water under special circumstances (humanitarian emergencies)</td>
<td>Provision of safe water in emergency settings like complex humanitarian emergencies</td>
</tr>
<tr>
<td>Household Water Treatment and Safe Storage</td>
<td>Household water treatment mechanisms like chlorination, flocculation, etc. and safe storage</td>
</tr>
<tr>
<td>Improved source water quality</td>
<td>Improvements to water quality at the source</td>
</tr>
</tbody>
</table>

Note: While most of these interventions have been drawn from the UN Network for SUN/REACH Secretariat 2016, a few additional categories have also been included to capture the evidence base on interventions that have been defined differently in studies.
## Appendix Figure 6.1: Evidence for impact of WASH interventions on nutrition outcomes

<table>
<thead>
<tr>
<th>Interventions</th>
<th>Nutrition outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handwashing education, promotion and supplies</td>
<td></td>
</tr>
<tr>
<td>Food hygiene promotion</td>
<td></td>
</tr>
<tr>
<td>Environmental hygiene promotion</td>
<td></td>
</tr>
<tr>
<td>Access to improved water</td>
<td></td>
</tr>
<tr>
<td>Source water quality improvements and household water treatment and safe</td>
<td></td>
</tr>
<tr>
<td>storage</td>
<td></td>
</tr>
<tr>
<td>Provision of safe water under special circumstances (humanitarian emergencies)</td>
<td></td>
</tr>
<tr>
<td>Household Water Treatment and Safe Storage</td>
<td></td>
</tr>
<tr>
<td>Improved source water quality</td>
<td></td>
</tr>
<tr>
<td>Access to improved sanitation</td>
<td></td>
</tr>
<tr>
<td>Excreta disposal management</td>
<td></td>
</tr>
<tr>
<td>Community-based sanitation interventions</td>
<td></td>
</tr>
<tr>
<td>Sanitation support for the elderly and disabled</td>
<td></td>
</tr>
<tr>
<td>Sanitation support for infants and toddlers</td>
<td></td>
</tr>
<tr>
<td>Sanitation marketing</td>
<td></td>
</tr>
<tr>
<td>Household water treatment, handwashing</td>
<td></td>
</tr>
</tbody>
</table>

### Legend

- **Dark green**: Synthesized evidence demonstrating effectiveness
- **Light green**: Several primary studies demonstrating effectiveness
- **Light gray**: Multiple primary studies not demonstrating effectiveness
- **Dark yellow**: Synthesized evidence not demonstrating effectiveness
- **Dark gray**: Minimal evidence
## Appendix Figure 6.2: Evidence for impact of WASH interventions on intermediate outcomes

<table>
<thead>
<tr>
<th>Interventions</th>
<th>Intermediate outcomes</th>
<th>Soil Transmitted Helminth infections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handwashing education, promotion and supplies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food hygiene promotion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental hygiene promotion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access to improved water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source water quality improvements and household water treatment and safe storage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provision of safe water under special circumstances (humanitarian emergencies)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household Water Treatment and Safe Storage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improved source water quality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access to improved sanitation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excreta disposal management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community-based sanitation interventions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sanitation support for the elderly and disabled</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sanitation support for infants and toddlers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sanitation marketing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household water treatment, handwashing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Legend**

- Green: Synthesized evidence demonstrating effectiveness
- Light green: Several primary studies demonstrating effectiveness
- Beige: Multiple primary studies not demonstrating effectiveness
- Yellow: Synthesized evidence not demonstrating effectiveness
- Gray: Minimal evidence
## Chapter 7

### Appendix Table 7.1: Descriptions of reviewed social protection interventions (UN Network for SUN/REACH Secretariat 2016)

<table>
<thead>
<tr>
<th>Social assistance</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Conditional cash transfers (CCTs)</strong></td>
<td>Distribution of cash to households, conditional upon meeting certain requirement (e.g., school enrollment, attending maternal and child health services, attending maternal nutrition education sessions, etc.)</td>
</tr>
<tr>
<td><strong>In-kind transfers</strong></td>
<td>Distribution of foods to safeguard nutrition, particularly of mothers, infants, and young children.</td>
</tr>
<tr>
<td><strong>Money vouchers for food</strong></td>
<td>Quasi in-kind transfers of vouchers for foods (with restricted choices), most often targeting economically vulnerable populations (rather than nutritionally vulnerable)</td>
</tr>
<tr>
<td><strong>Public works programs</strong></td>
<td>Distribution of food or cash for participation in public works programs, or civil projects in infrastructure undertaken for the benefit of the community at large</td>
</tr>
<tr>
<td><strong>School feeding</strong></td>
<td>Distribution of meals to school children (primarily used as a social safety net and education incentive)</td>
</tr>
<tr>
<td><strong>Social transfers (Child support grants &amp; noncontributory pensions)</strong></td>
<td>Benefit in the form of noncontributory grants or pensions provided to individuals to safeguard nutrition</td>
</tr>
<tr>
<td><strong>Take-home food rations</strong></td>
<td>Distribution of food rations through children enrolled and attending school (primarily used as a social safety net and an education incentive)</td>
</tr>
<tr>
<td><strong>Unconditional cash transfers (UCTs)</strong></td>
<td>Distribution of cash to economically vulnerable households, without conditions (in other words, without requirements that the household must meet in order to receive the transfer)</td>
</tr>
<tr>
<td><strong>User fee removal</strong></td>
<td>Elimination of required out-of-pocket payments for health service utilization</td>
</tr>
<tr>
<td><strong>Vouchers for child daycare for children to support IYCF</strong></td>
<td>Quasi in-kind transfers of vouchers for child daycare in order to support early initiation of breastfeeding, exclusive breastfeeding for the first six month of life, adequate complementary feeding, and sustained breastfeeding until 2 years or beyond</td>
</tr>
<tr>
<td><strong>Vouchers for maternal health services</strong></td>
<td>Quasi in-kind transfers of vouchers for maternal health services through which nutritional services are provided</td>
</tr>
<tr>
<td><strong>Social insurance</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Health insurance</strong></td>
<td>Contributory health insurance purchased to improve uptake of nutrition-specific health services</td>
</tr>
<tr>
<td><strong>Social security insurance (including maternity protection and unemployment insurance)</strong></td>
<td>Maternity protection and unemployment insurance to safeguard nutrition</td>
</tr>
<tr>
<td><strong>Weather-based insurance for crops/livestock</strong></td>
<td>Weather risk insurance for farmers and index-linked livestock insurance, targeting smallholder farmers and poor livestock keepers</td>
</tr>
<tr>
<td><strong>Labor market programs</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Asset transfers with skill training</strong></td>
<td>Transfer of assets (livestock, seed, fertilizer, infrastructure) combined with training to boost food production, income, and entrepreneurship</td>
</tr>
</tbody>
</table>

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21 General food distribution, a type of in-kind transfer, is a social protection strategy often implemented in emergencies where a large percent of the general population requires food assistance. As such, this intervention is discussed at greater length in a later chapter.
### Appendix Figure 7.1: Evidence for impact of social protection interventions on nutrition outcomes

<table>
<thead>
<tr>
<th>Interventions</th>
<th>Nutrition outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Height-for-age</td>
</tr>
<tr>
<td>Asset transfers with skill training</td>
<td></td>
</tr>
<tr>
<td>Conditional cash transfers (CCTs)</td>
<td></td>
</tr>
<tr>
<td>Health insurance</td>
<td></td>
</tr>
<tr>
<td>In-kind transfers</td>
<td></td>
</tr>
<tr>
<td>Money vouchers for food</td>
<td></td>
</tr>
<tr>
<td>Public works programs</td>
<td></td>
</tr>
<tr>
<td>School feeding</td>
<td></td>
</tr>
<tr>
<td>Social security insurance</td>
<td></td>
</tr>
<tr>
<td>Social transfers</td>
<td></td>
</tr>
<tr>
<td>Take-home food rations</td>
<td></td>
</tr>
<tr>
<td>Unconditional cash transfers (UCTs)</td>
<td></td>
</tr>
<tr>
<td>User fee removal (health services)</td>
<td></td>
</tr>
<tr>
<td>Vouchers for child daycare for children to support IYCF</td>
<td></td>
</tr>
<tr>
<td>Vouchers for maternal health services</td>
<td></td>
</tr>
<tr>
<td>Weather-based insurance for crops/livestock</td>
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## Appendix Figure 7.2: Evidence for impact of social protection interventions on intermediate outcomes

<table>
<thead>
<tr>
<th>Interventions</th>
<th>Intermediate outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Diet diversity</td>
</tr>
<tr>
<td>Asset transfers with skill training</td>
<td></td>
</tr>
<tr>
<td>Conditional cash transfers (CCTs)</td>
<td></td>
</tr>
<tr>
<td>Health insurance</td>
<td></td>
</tr>
<tr>
<td>In-kind transfers</td>
<td></td>
</tr>
<tr>
<td>Money vouchers for food</td>
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</tr>
<tr>
<td>School feeding</td>
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<tr>
<td>Social security insurance</td>
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<tr>
<td>Social transfers</td>
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</tr>
<tr>
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<td></td>
</tr>
</tbody>
</table>

* This outcome is marked as positive if there is consistent evidence for impact on intake of any macronutrient or micronutrient.

### Legend

<table>
<thead>
<tr>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
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</tr>
<tr>
<td>Yellow</td>
<td>Several primary studies demonstrating effectiveness</td>
</tr>
<tr>
<td>Light yellow</td>
<td>Multiple primary studies not demonstrating effectiveness</td>
</tr>
<tr>
<td>Grey</td>
<td>Synthesized evidence not demonstrating effectiveness</td>
</tr>
<tr>
<td>Minimal</td>
<td>Minimal evidence</td>
</tr>
</tbody>
</table>
Chapter 12
Appendix Table 12.1: Challenges to multisectoral nutrition governance

In their review of the multisector nutrition experiences of SUN countries supported by the African Nutrition Security Partnership—Burkina Faso, Ethiopia, Mali, and Uganda—Pelletier et al. identified several challenges which have been listed below

<table>
<thead>
<tr>
<th>Level of Operation</th>
<th>Challenge</th>
</tr>
</thead>
</table>
| **Personnel**      | • Weak understanding of nutrition and MSN  
|                    | • Weak staff in key positions of influence  
|                    | • Gatekeepers who impede progress for personal, professional or political reasons  
|                    | • Risk aversion and rule-boundedness  
|                    | • Fear of losing control over nutrition agenda  
|                    | • Resistance  
|                    | • Micro-politics and power struggles  |
| **Organization**   | • Lack of alignment between sectoral objectives and MSN objectives  
|                    | • Lack of awareness among sectors of their contribution to nutrition  
|                    | • Sectoral focal points that are low level and/or lack influence within their ministries  
|                    | • Overreliance on sectoral focal points to promote nutrition prioritization  
|                    | • Nutrition not included in job descriptions, or with poor specificity  
|                    | • High staff turnover in key positions  
|                    | • Unpredictable and unstable funding  
|                    | • Misalignment of partner mandates and domestic priorities  
|                    | • Bureaucratic inefficiency related to funding and routine tasks (e.g., meeting organization)  |
| **System**         | • Weak or nonexistent coordination structures  
|                    | • Poor attendance, facilitation and follow-up at platform meetings  
|                    | • Structures still maturing  
|                    | • Lack of clear roles and responsibilities for staff and structures  
|                    | • Disagreements over anchorage (e.g., where nutrition will be housed within the system)  
|                    | • Weak convening power and authority for MSN within the ministry of health  
|                    | • Lack of detailed implementation guidelines  
|                    | • Lack of harmonized orientation guidelines for sectors and districts  
|                    | • Weak reporting mechanisms for MSN from districts to the national level  
|                    | • Disagreements within the nutrition policy community  
|                    | • Scheduling conflicts (e.g., too many meetings; too few staff members)  
|                    | • Weak partner alignments  
|                    | • Lack of shared long-term vision for MSN  
|                    | • Lack of real commitment to country-owned, country-led agenda  |

Source: Pelletier et al. 2015
References

Chapter 1


Chapter 2


Chapter 5


Chapter 6


Ejemot-Nwadiaro, Regina I, John E Ehiri, Dachi Arikpo, Martin M Meremikwu, and Julia A Critchley. “Hand Washing Promotion for Preventing Diarrhoea.” In Cochrane Database of


Chapter 7


Chapter 8


Chapter 9


Chapter 10


Chapter 11


Chapter 12


