



**Expert Group Meeting on Nutrition and the SDGs under  
Review in Preparation for the High-Level Political Forum**

**BACKGROUND DOCUMENT**

**19-20 June 2018**

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## Background and Purpose of the Expert Group Meeting on Nutrition

The world faces multiple burdens of malnutrition. Around 815 million people go hungry, a little less than 2 billion are overweight or obese and approximately 2 billion suffer from micronutrient deficiencies. Trends indicate that the world is not on track to achieve the global nutrition targets as set by the World Health Assembly, let alone eradicate all forms of malnutrition by 2030 as indicated by the 2030 Agenda. The universal nutrition crisis has an impact on health – the global burden of disease is now primarily diet-related, characterized by diabetes, heart disease and other non-communicable diseases (NCDs).

In September 2015, the United Nations General Assembly adopted Agenda 2030 for Sustainable Development (herein Agenda 2030). Its Preamble noted determination “...to take the bold and transformative steps which are urgently needed to shift the world onto a sustainable and resilient path”.<sup>1</sup> As an agenda for “people, planet, prosperity, peace and partnership”, Agenda 2030 provides a vision for people and planet-centered, human rights-based, and gender-sensitive sustainable development. It promises “more peaceful, just and inclusive societies which are free from fear and violence” and the commitment that no one is left behind.

The High Level Political Forum (HLPF) reviews a set of Sustainable Development Goals (SDGs) on a yearly basis. In 2017, HLPF reviewed SDG1 (poverty), 2 (food security and nutrition), 3 (health), 5 (gender), 9 (infrastructure and industrialization) and 14 (oceans). SDG17 (means of implementation) is under review every year. An Expert Group Meeting (EGM) in 2017, looked specifically at progress in SDG2 (zero hunger) that includes the elimination of all forms of malnutrition (target 2.2). The review of SDG2 and to a lesser extent SDG3 (health), ensured that food security and nutrition were debated intensively during the 2017 HLPF, as well as during several of its side events.

The theme of the HLPF in 2018 is “*Transformation towards sustainable and resilient societies.*” While not explicitly under review in 2018, good nutrition is integral to human well-being and to humanity’s ability to achieve the SDGs. Nutrition permeates almost all the SDGs, both as an outcome as well as an important input into their achievement. The determinants of good nutrition cut across sectors; good nutrition results from a healthy diet and proper hygiene and health care. Access to a healthy diet depends on decent employment, education, and transport and connections to a thriving, resilient, sustainable food system. Proper hygiene and health care likewise rely on income, education, and transport, along with provision of quality health services, safe water and adequate sanitation.

The EGM on Nutrition is comprised of experts from various disciplines all with an interest in nutrition. It serves as a follow up to the EGM on SDG2 that took place in 2017. The EGM on SDG2 added value to the HLPF deliberations and the UN Decade of Action on Nutrition because it helped shape policy discussions and contributed to policy coherence amongst UN bodies and processes dealing with nutrition. We anticipate this EGM will contribute in the same way.

The EGM on Nutrition also will add value to the policy process of the Committee on World Food Security (CFS). The CFS has started work leading to policy convergence for food systems and

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<sup>1</sup> <https://sustainabledevelopment.un.org/post2015/transformingourworld>.

nutrition. Both the CFS and the 2030 Agenda promote system-wide transformation for sustainable development.

Most of the SDGs and their targets both benefit from, and require, good nutrition. Through sharing experience and knowledge, experts will develop key messages to be conveyed to the HLPF regarding nutrition. Questions will be answered, such as: Are there commitments or recommendations for action that the EGM would like Member States and the HLPF to undertake? What experiences can be built on? What knowledge gaps need to be filled? Are there leveraging points that will facilitate the transformation envisioned both by Agenda 2030 and the CFS? As outlined in the agenda for the EGM on Nutrition, the meeting will discuss each SDG under review individually but with specific attention to the interlinkages between them.

The HLPF will review the following SDGs in July 2018:

- Goal 6. Ensure availability and sustainable management of **water** and sanitation for all
- Goal 7. Ensure access to affordable, reliable, sustainable and modern **energy** for all
- Goal 11. Make **cities** and human settlements inclusive, safe, resilient and sustainable
- Goal 12. Ensure sustainable **consumption and production** patterns
- Goal 15. Protect, restore and promote sustainable use of **terrestrial ecosystems**, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
- Goal 17. Strengthen the **means of implementation** and revitalize the Global Partnership for Sustainable Development (considered every year and will not be considered explicitly in this EGM, although elements will surface)

The goals for sustainability of water, energy, human settlements, consumption and production, life on land and partnerships offer crucial entry points to address some key challenges related to malnutrition. This document looks at some of those entry points and suggests questions that may guide the EGM discussion. In addition, separate, more in-depth background notes for each SDG are attached as annexes to this document.

This document also raises several common issues that arise when looking at the SDGs and nutrition that need to be examined and addressed in a holistic manner. Some of these common ideas also emerge from leading nutrition reports, including the Global Nutrition Report (GNR), the reports of the High Level Panel of Experts on Food Security and Nutrition (HLPE) of the CFS and the Global Panel on Agriculture and Food Systems for Nutrition. For example, they note:

- Complexity of the links between nutrition and other issues and the need to integrate nutrition concerns into all relevant policies and for integrated, multi-sectoral policies;
- Significance of a holistic and food system approach to nutrition;
- The necessity of strong, accountable governance.

They also reflect that nutrition continues to be an important development issue at the global level yet it remains a challenge to translating commitment into action and accelerating progress towards eradicating malnutrition in all its forms.

Before turning to each SDG, and then crosscutting issues that emerge, this document briefly discusses the UN Decade of Action on Nutrition (2016-2025), which provides the context in which the EGM on Nutrition is being held. It also briefly refers to the CFS, which will provide another platform for the outcomes of this meeting.

### ***The Decade of Action on Nutrition 2016-2025***

The United Nations General Assembly endorsed the outcomes of the Second International Conference on Nutrition (ICN2) and proclaimed 2016 - 2025 the UN Decade of Action on Nutrition to accelerate implementation of the ICN2 commitments, achieve the Global Nutrition and diet-related NCD targets by 2025 and contribute to the realisation of the SDGs by 2030. The Nutrition Decade aims to provide an umbrella for a wide group of actors to work together to make progress toward SDG2 to end hunger and malnutrition in all its forms. The Nutrition Decade has several benefits that are relevant to the deliberations during the HLPF. They include;

- Highlighting the urgency to act now in order to be able to eliminate all forms of malnutrition;
- Establishing a period of focus on nutrition for countries to establish and implement commitments for action involving a diverse range of actors within and beyond the nutrition community and for the national and global community to monitor and evaluate impact and outcomes;
- Providing global connectivity among all constituencies working on food and nutrition-related programs and initiatives to create mutual learning and foster synergies for action to achieve common goals;
- Highlighting the integrative force of nutrition in realizing Agenda 2030.

The Nutrition Decade has identified six action areas that include sustainable food systems for healthy diets; aligned health systems; social protection and nutrition education; investments and trade; supportive environments and improved governance and accountability. Even though all action areas are equally important, the action area on sustainable food systems is most closely related to the deliberations during this EGM.

### ***The Committee on World Food Security***

The High-Level Panel of Experts on Food Security and Nutrition (HLPE) of the CFS has produced several reports on nutrition<sup>2</sup>, including:

- #8 - Food losses and waste in the context of sustainable food systems (2014)
- #9 - Water for food security and nutrition (2015)

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<sup>2</sup> All HLPE reports are available at [www.fao.org/cfs/cfs-hlpe](http://www.fao.org/cfs/cfs-hlpe)

- #10 - Sustainable agricultural development for food security and nutrition: what roles for livestock? (2016)
- #11 - Sustainable forestry for food security and nutrition (2017)
- #12 - Nutrition and food systems

The most recent HLPE report (#12) deals explicitly with nutrition and food systems (2017). Based on the recommendations of this report, voluntary guidelines will be developed to be adopted by the CFS plenary in October 2020.

## **Linking Nutrition with the SDGs under Review**

The following pages provide a brief background of the SDGs under review and their linkages with nutrition. They are meant as inputs for discussion and do not represent an exhaustive overview of the topics. The Annex to this document however provides more detailed information on the selected SDGs and has been prepared specifically for use during this EGM. Notes included within the Annex do not necessarily represent the views of the UNSCN or its members.

The goal of the sessions is to discuss key messages that the HLPF should note as well as the policy interventions or commitments this group would recommend to the HLPF, including noting the possible challenges to change.

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### **Nutrition and SDG6: Ensure availability and sustainable management of water and sanitation for all**

#### ***Background and Potential Guiding Questions***

Water is an irreplaceable resource for food security, nutrition, and health. Water of sufficient quantity and quality is an essential input in daily activities, such as hygiene and sanitation practices in households and health care facilities, food production, animal rearing, and fisheries, as well as for the production of fibers and plants for medicinal purposes.

The Background Note attached as Annex 1 to this paper, remarks on the complexity of the linkages between SDG6 and the other SDGs, and warns that focusing on a single water-nutrition linkage may result in misleading policy recommendations. The paper calls for planning using a cautionary approach that exploits synergies and reduces trade-offs among potential linkages.

Agricultural systems are tightly linked to water and energy systems. Increasing interest in the nexus between food (SDG2), water (SDG6) energy (SDG7) systems is driven by the growing recognition that focus on gains in one specific area can inadvertently lead to losses in others, as well concerns about climate change (SDG13) and the negative impact of the industrial food and agricultural system on human and planetary health generally.

Industrial agriculture is very water intensive. It accounts for 70% of water withdrawals worldwide. Global trade in agricultural products—and the freshwater it takes to produce these commodities and food products—can exert even more pressure on watersheds.

Annex 1 notes irrigation has the potential to improve nutrition outcomes. Yet it also highlights the fact that agricultural water use, and particularly irrigation, is a key and often the largest contributor to both surface and groundwater depletion and degradation, as well as water pollution. Therefore, the model is not sustainable nor appropriate for expansion (Rosegrant et al. 2009).

The occurrence and manifestation of climate change may intensify water-nutrition linkages. As noted by the Intergovernmental Panel on Climate Change in its reports of 2007 and 2012, malnutrition is perceived as one of the five most substantial health impacts of climate change.

Agroecological approaches have been shown to support important ecosystems services including water cycling and purification. These approaches can confer resilience, robustness, and stability to our food and water systems across the world. According to Pierre-François Pret of *Terre & Humanisme*, agroecological approaches require “3 to 4 times less water than the established requirement for a specific crop, as determined by the agricultural chamber” when using renewable energies.<sup>3</sup>

Children living in poor water supply, sanitation and hygiene (WASH) environments are more likely to be infected by disease-causing pathogens, including bacteria, viruses, and other microorganisms.

Given the substantial time investment women face collecting water for both domestic and productive purposes and caring for sick children, improvements in the proximity and cleanliness of water sources and technologies for water extraction could support women’s empowerment through time savings. This in turn should increase investment in food and health purchases (Yoong et al., 2012).

***Potential questions to guide discussion include:***

- Is there a statement, commitments or policy recommendations required about how to best address the nexus between water and the SDGs and, in particular, between food and nutrition, water, energy, climate and biological diversity? What potential trade-offs should be considered so that addressing one issue does not exacerbate another?
- Are there policy recommendations or commitments that would help support agroecological approaches and diversified farming systems given the growing evidence that these approaches contribute to the robustness, resilience and stability of our food and water systems?
- If irrigation can improve nutrition outcomes but water scarcity is only likely to increase, what recommendations would help move towards improving water efficiency while still supporting healthy nutrition and diversified production while protecting against human and other damage from pollution?

Are there recommendations in terms of addressing the following knowledge gaps?

- The linkages between WASH and obesity, more specifically the relationship between contaminated water and unsafe sanitary environment and the consumption of fried foods and sugary drinks as alternatives to fresh foods and water.

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<sup>3</sup> [http://www.mdpi.com/journal/sustainability/special\\_issues/agroecology\\_and\\_water](http://www.mdpi.com/journal/sustainability/special_issues/agroecology_and_water)

- The sources and pathways of fecal contamination that most strongly affect child nutrition in different contexts, across rural, urban and high-density areas, and the interventions that are most effective to interrupt these pathways.

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**Nutrition and SDG7: Ensuring access to affordable, reliable, sustainable and modern energy for all**

***Background and Potential Guiding Questions***

Energy is essential to produce food. All steps along the food systems value chain, specifically in food production, postharvest operations, transportation and distribution, processing, storage and food preparation need energy whether direct or indirect.

Before the emergence of industrial agriculture, however, the primary energy input for agriculture was the sun. Photosynthesis enabled plants to grow, serving as food for livestock, which in turn provided manure as fertilizer and draught power for farming.

The reliance on fossil fuels and other forms of non-renewable energy, especially in industrialized food systems, makes this system of agriculture one of the largest contributors to greenhouse gas emissions. The effects equal more than our transport systems and more than our cities. Climate instability and unpredictability put all food production systems at risk, but particularly vulnerable are the 1.5 billion small-scale farmers from low and middle income countries who are at the frontlines of climate change. These farmers currently produce in upwards of 70% of the food consumed globally. In this system, production tends to be measured by yield per hectare not by energy-efficiency or nutrient density.

The rapidity with which planting and harvesting is done in an energy supported production system allows for the utilization of land year-round where crop rotations could be effectively practiced to increase diversification. The overall result can increase the supply of diversified foods for diverse diets. Unfortunately, both between and within countries there is a differential effect depending on socioeconomic strata. Those already advantaged are more likely to see an increase in the availability of diversified diets while those less advantaged will continue to struggle with limited access and availability. In parallel, there is an increased supply of highly processed foods, with high levels of fats, sugar and salt, contributing the rising levels of overweight and diet related NCDs.

Harnessing renewable sources of energy is necessary for healthy and diverse diets from production to processing to distribution. For example, limited access to energy has been the main bottleneck in attempts by many developing countries to establish food processing industries. Food loss can also result from lack of access to energy. A deficit in food quality can be a component of food loss and is sometimes accompanied by the presence of pathogens that can lead to food-borne health hazards with direct, sometimes catastrophic, effects on human health and nutrition status.

Sustainable, available, affordable energy is important for better nutrition all along the food chain. It is particularly important that investments to extend access to affordable, sustainable energy benefit rural populations, who are often at a particular disadvantage.

***Potential questions that might guide the discussion include:***

- Fossil fuels and other non-renewable throughout the food system are causing adverse environmental and health impacts – how can a shift towards renewable energy resources to protect the resilience of food production systems and the production, processing, storage and consumption of healthy, diverse foods be encouraged? And how to best ensure that the access to such energy is extended across the rural-urban continuum at affordable rates?
- What policies need to be in place to ensure that access to affordable, sustainable energy supports diversified, healthy diets for all, not just those in a position of economic advantage?
- SDG7 does not explicitly mention agricultural production, yet it is clearly energy intensive. Are there messages or recommendations for action to convey that reflect that the implementation of the SDG must also consider agricultural production?
- Are the right metrics in place to judge agricultural productivity? Have other metrics including energy-efficiency and nutrient density been developed and tested and if so, how can more holistic metrics that look at energy, full cost accounting and nutrition outcomes be increased?

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**Nutrition and SDG11: Make cities and human settlements inclusive, safe, resilient and sustainable**

***Background and Potential Guiding Questions***

Although what is “rural” and what is “urban” exist along a continuum, and not a clear divide, the nature and characteristics of nutrition do differ between “more urban” and “more rural” environments.

***Malnutrition in urban areas***

On average nutritional status is almost uniformly better in urban than in rural areas of developing countries. But the term “average” conceals important insights about the nature of urban nutrition. For instance, studies show that malnutrition is presenting new challenges in urban areas, such as increases in overweight and obesity, due to the nature of urban life even as the prevalence of undernutrition declines.

Studies concur that the factors driving malnutrition in urban and rural areas are the same, but differences arise because the specific conditions and the levels of these determinants vary (e.g., maternal education, household income, water and sanitation, access to health services). Consequently, great disparities in levels of malnutrition can exist within urban areas, and

children in cities can live in highly precarious situations, just as rural children do. Levels of malnutrition among poor household in slums, for example, can rival those found in rural areas.

Mass media and marketing are also more present in urban areas, which can increase demand for certain foods.

### ***Trends away from traditional diets and differential impact on food choice***

In the face of economic development, urbanization, and tighter global connections, food systems and dietary patterns are changing. The density of urban areas facilitates tighter distribution, transportation, and information networks. Wholesalers and retailers have larger markets, and can reach a higher number of consumers at a lower per unit cost. This allows for both specialization and provision of a wider range of food and delivery options for urban consumers, including supermarkets, smaller and convenience stores, restaurants, and street foods.

The availability of a wider range of food choices has encouraged a shift from traditional diets. Urban diets generally include increased consumption of meat and dairy products as well as fruits and vegetables in comparison to rural areas. Although likely to be more adequate than a rural one in terms of energy and protein, these dietary trends are also more likely to be unbalanced with excess levels of energy and salt and low levels of fiber and micronutrients.

This wide range of food choices in a city is not available to everyone, however. Some neighborhoods exist as “food deserts” with no easily accessible supermarkets. Other families may feel they do not have the time to shop and cook. In both cases, families may then rely on street foods, fast-food restaurants, or other highly processed and prepared foods as significant components of their diets.

### ***Rural-Urban Linkages***

Food systems cut across rural and urban settlements, encompassing the interactions of people, natural resources, the climate, inputs, technology, institutions and infrastructure to shape outcomes in terms of food production and consumption, employment, social institutions and gender and the environment. Rural-urban linkages—including physical, economic, social, and political connections—are crucial for ending hunger and malnutrition sustainably in both rural and urban areas.

Urban growth increases food demand and spurs dietary changes in urban areas—new demand can create opportunities for rural producers to improve their livelihoods. Broken value chains and poor coordination weaken rural-urban links and hold back progress on food security and nutrition. Investment in rural infrastructure and intermediate towns—quality rural and feeder roads, electricity, storage facilities, communications and information—can build connections and create hubs of economic activity benefiting smallholders and cities.<sup>4</sup>

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<sup>4</sup> Taken from Graziano da Silva, José; and Fan, Shenggen. 2017. Smallholders and urbanization: Strengthening rural-urban linkages to end hunger and malnutrition. In 2017 Global Food Policy Report. Chapter 2. Pp 14-23. Washington, DC: International Food Policy Research Institute (IFPRI). [https://doi.org/10.2499/9780896292529\\_02](https://doi.org/10.2499/9780896292529_02)

Where integrated territorial planning creates linkages between rural and urban stakeholders<sup>5</sup> value chains are integrated across the rural-urban continuum and local diets are based around nutritious, diverse and locally produced food – supplemented by food imports according to local needs – the potential to promote local employment, holistic approaches to the sustainable management and use of water, energy and biodiversity and food security and nutrition is enhanced.<sup>6</sup> But this can only be achieved if the interests of rural people, including smallholder farmers, are integrated into discussions of the SDGs, including SDG11.

***Potential questions that may guide the discussion include:***

- If addressing the key targets of SDG11 is essential to improving nutrition in urban areas, what can be learned and built on from the integrated approach to improve life in the cities found in SDG reflected in New Urban Agenda and the Milan Urban Food Policy Pact?
- What policies and investments are needed to support integrated territorial planning across the rural-urban continuum and improved nutrition for all?
- What experience is there with policies that make food systems more coherent in terms of promotion of good nutrition? What are some of the key components that would need to be in place? While this session focuses on urban areas, please feel free to discuss policies needed to make food systems more coherent in terms of promotion of good nutrition generally (this may be a cross-cutting message to discuss again on Day Two as well). For example:
  - Are there effective means of prohibiting the use of unhealthy additives such as trans fats in prepared or processed foods?
  - Are there tax incentives or disincentives both on the consumption and production side? What role do informal and informal safety nets in urban areas for food and nutrition play and what factors encourage or inhibit their effectiveness?
  - How have public procurement programmes supported both healthy diverse diets and rural livelihoods – the rural urban connections and what are the challenges experience?
  - What challenges have positive examples of local food systems in cities faced in trying to scale up to a national or regional level?
  - Are there examples of policies and programmes that have effectively promoted nutritional awareness as well as availability and access to the diversity of foods needed for a healthy diet that this group and can lessons be learned both from success and challenges to these policies and programmes?

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<sup>5</sup> SDG 11A: “Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning.”

<sup>6</sup> From IFAD, Policy Brief, *How inclusive rural transformation can promote sustainable and resilient societies*. March 2018, pg 5.

- What can be learned from earlier discussions on SDG6 and 7 about what is needed in terms of infrastructure, sanitation?
- How can food retailers and food services make a greater contribution toward creating an enabling environment for good nutrition?
- What positive experiences with policies to address the nutrition transition can point policy makers in a promising direction?

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## **Nutrition and SDG12: Ensuring sustainable consumption and production patterns**

### ***Background and Potential Guiding Questions***

SDG12 is instrumental for reconciling economic, social and environmental objectives. While it represents a self-standing goal, responsible consumption and production is closely associated with a wide range of SDGs and their targets. For example, the system of agriculture that emerged after World War II is untethered from planetary boundaries, to become a major contributor to climate change, the largest user of fresh water resources, the biggest driver of biodiversity loss and a polluter causing dead zones in our oceans. In the long run, the environmental, social and economic impact of these agricultural methods produces a greater cost than can possibly be sustained over time. Yet SDG12 only mentions food waste and no other elements of the food system from production to consumption to disposal.

As it relates to nutrition, the current food system has increasingly homogenized the food supply where at the global level, three cereal crops now provide close to 50% of all calories consumed. Dietary diversity is one way to help support an adequate supply of essential micronutrients. Without dietary diversity, people may have enough to eat and yet still suffer from hidden hunger (micronutrient deficiency). Diversity of diet, founded on diverse farming systems, delivers better nutrition and greater health, with additional benefits for human productivity and livelihoods, and it has the added value of being essential to cope with the predicted impacts of climate change.

#### ***Potential questions that may guide the discussion include:***

- SDG12 only explicitly deals with the food waste part of the food system, what policy or other guidance or commitments should be encouraged to make to ensure that the targets do not limit implementation that deals with sustainable consumption and production (SCP) along the entire food system from production to disposal? Given the focus on nutrition, the group may wish to consider recommendations to links with SDG 2.4: “By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality” and to SDG 15.3 “By 2030, combat desertification, restore degraded land and soil...” and 15.9 “By 2020, integrate ecosystem and biodiversity values into national

and local planning, development processes, poverty reduction strategies and accounts.”

- What policies are needed or need to be changed to reverse the expansion of unsustainable agricultural production system and to support production systems that promote climate solutions, enhance biological diversity including agricultural biological diversity of crops and in soils, and enhances dietary diversity and nutritious diets in particular for the poor in urban and rural areas and in developed and developing countries?
- Is there experience in eliminating food waste in wealthier countries and food loss in developing countries that could guide policy, recommendations or action in implementation of SDG12?
- Should the relationship of the SDG12 targets to food systems and gaps, including for example sustainable consumption when it comes to food and its impact on nutrition, be made more explicit and if so, how would this best be done and conveyed?

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**Nutrition and SDG15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss**

***Background and Potential Guiding Questions***

Agricultural biodiversity is vital for human health and nutrition, wellbeing, livelihoods and “life on land.” Yet SDG15 makes no mention of agricultural biological diversity and no connection to SDG2 in general, nor to its references to genetic resources. The importance of agricultural biodiversity and its custodians has been ignored in both conservation and agricultural development. Indeed, “wild” biological diversity is often seen to be in tension with agricultural biological diversity.

Agricultural biodiversity includes the variety and variability of animals, plants and micro-organisms at the genetic, species and ecosystem levels, which sustain the functions, structure and processes of production systems. It also includes crop varieties, fodder and tree species, animal breeds, aquatic and marine species, soil biota, pollinators and the great diversity of non-domesticated (wild) species used by people. Agricultural biodiversity is created and managed by farmers, pastoralists, forest dwellers and fishers, and remains essential to the lives of indigenous peoples and other small-scale food providers who produce and gather most of the world’s food.

Food-based solutions, which diversify what we grow and what we eat, provide meaningful and enduring benefits to local communities and the environment. Bringing back diversity is critical for attaining healthy and sustainable food systems.

Terrestrial food biodiversity – the diversity of plants, animal and other organisms used for food both cultivated and wild – is a critical element in response to global malnutrition and underpins

healthy, nutritious and sustainable diets, as well as supporting sustainable agriculture and sustainable food systems and contributing to general ecosystem functioning and service.

The nutrient content between different food species, or different varieties or breeds of the same species. Available studies clearly indicate the potential of traditional crops in nutritional terms when compared with staple crops, providing important complementary micro-nutrients and healthy compounds. This information can be used to maximize the nutritional adequacy of diets and underpins the food-based approaches that are needed to help combat malnutrition and promote health.

Much of this food biodiversity is under threat worldwide, as current production and consumption revolves around only 12 major crops, with 3 providing close to 50% of all calories consumed. Homogenous diets, limited food access and poorly developed markets for underutilized, nutrient-rich species guarantee the continued proliferation of malnutrition and poverty. Improved availability, accessibility, affordability and acceptability of food biodiversity are key factors for achieving better, more sustainable diets.

Enhanced terrestrial food biodiversity conservation can be achieved through more strategic and innovative use of locally adapted, nutrient-rich crops such as through providing better incentives to produce more nutritious and healthy foods using agroecological and other environmentally-friendly farming approaches. Attention should also be given to sustainable and healthy sourcing of food including the integration of more biodiversity into public and private food procurement such as school feeding programmes and should support the development of short supply chains, to name but a few.

***Potential questions that may guide discussion include:***

- How should the biological diversity linkages between SDG2, 12 and 15 be reflected in terms of awareness, policy, action and/or recommendations?
- What advice can be provided regarding raising awareness that agricultural biological diversity is essential to the resilience of agricultural production and therefore essential for the sustainability of or food supply (including in times of climate change)?
- What research and messaging is needed to raise awareness and understanding of the importance of agricultural biological diversity to healthy diets?
- How do we better build agricultural biological diversity into the Rural-Urban Agenda?

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## Crosscutting Issues Emerging from the Background Notes Provided as an Input for this EGM

### *Overview of Crosscutting Themes and Potential Guiding Questions*

The key crosscutting issues that emerged – in addition to others identified at the EGM – all relate back to the three points highlighted on page 7 (complexity, systemic approaches and governance and accountability), as well as the key message that were identified during the EGM on SDG2 in 2017: Diversity and diversification (key message 4<sup>7</sup>), governance, investments and regulations, the centrality of small holder producers and the need for inclusive agriculture transformation.

Issues related to (international) trade and investments and its impact on the several SDGs, including nutrition also emerged as a cross cutting issue: The Work Programme of the Nutrition Decade states the following about trade: Rules governing trade and investment have become increasingly important to food systems. Trade and investment agreements affect how the food system functions at global, regional, national and local levels, influencing food prices, availability, access and consumption as well as nutrition outcomes, food safety and dietary options. UNGA Resolution 68/177, paragraph 25 states: Coherence between trade and nutrition policies is vital. Trade policies and agreements should support implementation of nutrition policies and programmes and should not negatively impact the right to adequate food in other countries.

Trade policies have the potential to benefit nutrition in countries with unreliable food supplies by leading to greater and more stable availability of nutritious foods. They can also lead to reduced access of locally produced nutritious foods consumed by nutritionally-vulnerable sub-populations. Another potential advantage is that trade policies increase the diversity of foods available to populations; but evidence points to benefiting those already advantaged both between and within countries<sup>8</sup>. SDG 2.B calls for the prevention trade restrictions, market distortions and export subsidies.<sup>9</sup> Trade and investment goals now need to also support sustainable agriculture and food systems, healthy diets, and the broader implementation of the

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<sup>7</sup> Key message 4: **Diversity and diversification are key for achieving SDG2.** We must maintain and sustainably use genetic diversity, and ensure the fair and equitable sharing of benefits. We know that diversification of production practices, for example through agroecology, agroforestry or organic farming will be key for building resilience to climate change, land and water degradation and pests and disease risks. Maintaining and using genetic diversity also needs to be incorporated in policy and program design. Farmers should be placed at the center of decision making related to use of genetic diversity. Farmers' rights to genetic resources must be recognized and their traditional knowledge needs to be valorized. The productive capacity of the poorest need to be enhanced through integrated approaches such as combining social protection programmes with support for agricultural production; exploring options such as public procurement, farmers markets, and different ways to link local production to school meals and other public procurement systems; integrating small-scale producers and family farmers into value chains; and strengthening producer organizations and cooperatives.

Efforts must keep in mind the need to provide market and food access for vulnerable populations in urban and rural areas to ensure the quality, safety, diversity and stability of their diets.

<sup>8</sup> See, Corrina Hawkes, "Enhancing coherence between trade policy and nutrition Action" can be found on the UNSCN website: [www.unscn.org](http://www.unscn.org)

<sup>9</sup> <https://www.globalgoals.org/2-zero-hunger>

SDGs.<sup>10</sup> Trade and investment need to be tools to achieve healthy diets for all. A complicating factor is the dominating role of large multinational players in global trade and the overall food system. They have emerged at each stage of the global food system: from seed and fertilizer and chemical giants at the production stage, over commodity traders and brand-manufacturers in the middle stages of the value chain, to supermarket and fast food restaurant chains at the downstream end. It is therefore the trade in each of these products (inputs, raw agricultural produce and processed food products) that affects the food system's structure, conduct and performance, including in terms of nutrition. The interest of large corporations has a powerful influence on national and international policy-making. Governments and international agencies are under pressure to promote market-friendly policies and, with reduced resources, may be unable to provide goods and services in the public interest or at least to provide a strong counter-balance<sup>11</sup>.

Balanced and inclusive societies will only be brought about intentionally, with the political will to adopt policy, investment and governance frameworks through people-centered, holistic and multi-stakeholder approaches in which all voices are heard. It is not enough for the voices to just be heard, to eradicate malnutrition in all its forms, systemic inequalities and power imbalances must be recognized and addressed all along the food system. This requires strong, accountable governance from the local to the global levels. The President's summary at HLPF 2017 called for "inclusive policy processes and partnerships ... involvement of all stakeholders [and] policy coherence."

In addition, research identified the following preconditions for an enabling environment for nutrition:

- 1) Knowledge, data, evidence, and their effective framing and communication;
- 2) Political commitment, effective governance, and sound policy; and
- 3) Leadership, capacity, and financing.<sup>12</sup>

***Possible questions to guide discussion of crosscutting issues emerging from all the SDGs under review include:***

- If the global community is to leave no one behind, what entry points are available or needed to deal with these challenges in an integrated and systematic way? (E.g. the promotion of healthy and sustainable diets and/or the promotion of agro-ecology, sustaining agricultural biological diversity).
- What does it mean to create enabling policy environments for improved nutrition, particularly in creating coherence with policies that were not necessarily designed with nutrition objectives in mind such as trade, investment and other rules? Are there

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<sup>10</sup> SDG 2.B Correct and prevent trade restrictions and distortions in world agricultural markets, including through the parallel elimination of all forms of agricultural export subsidies and all export measures with equivalent effect, in accordance with the mandate of the Doha Development Round.

<sup>11</sup> <http://www.etcgroup.org/content/corporate-concentration>

<sup>12</sup> S. Gillespie, L. Haddad, V. Mannar, P. Menon, N. Nisbett, and the Maternal and Child Nutrition Study Group, "The Politics of Reducing Malnutrition: Building Commitment and Accelerating Impact," *Lancet* 382, no. 9891 (2013): 552–569.

positive experiences with integrated governance that protects the public interest in healthy, nutritious diets?

- What governance mechanisms are needed to deal with competing policies, interests and actors coming from numerous sectors, with different degrees of political or economic power?
- How can political commitment be generated for the types of actions needed?

# ANNEXES: BACKGROUND NOTES FOR DISCUSSION SESSIONS

**Annex 1: Linking Nutrition with Clean Water and Sanitation**

**SDG 6: Ensure availability and sustainable management of water and sanitation for all**

***What does water have to do with nutrition?***

Water is an irreplaceable resource for food security, nutrition, and health. Pathways from water to nutrition include the provision of safe water for drinking and other domestic uses, water for many industrial processes, as well as water of acceptable quality for irrigation, fisheries and crop rearing, as well as for agricultural processing. Water is also essential for energy production, including hydro-electricity, coal extraction, biofuel production and, to a lesser extent, for all other forms of energy. Access to clean energy is positively associated with human health, food security and nutrition (see Figure 1 for an illustration of water-nutrition linkages).

More than 70 percent of all freshwater resources are currently withdrawn for agriculture and about 85 percent of withdrawn resources are consumed in irrigated agricultural production. With these resources irrigated crop areas generate 40 percent of global food production on less than a third of global harvested area (Ringler 2017). At the same time, most crops continue to be grown with rainwater, and most irrigated crops also benefit from precipitation. Total consumptive water use is expected to increase by around 50 percent globally between 2000 and 2050 (Rosegrant et al. 2013). Among these, domestic and industrial demands for water, while accounting for smaller shares of total demand are growing much faster and are putting increasing pressures on water use in agriculture.

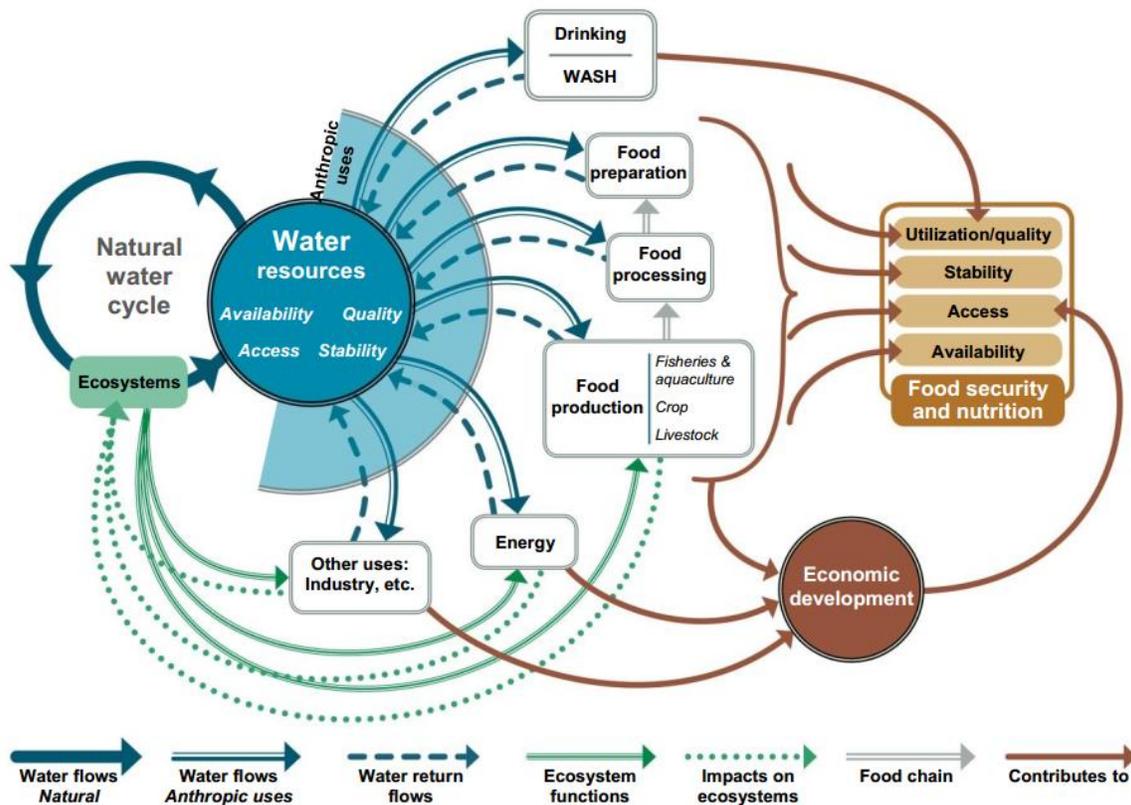


Figure 1: Linkage from water to food security and nutrition. (Source: HLPE 2015)

### ***SDG 6 Target Linkages to Nutrition***

A quick glance at Tables 1 and 2 suggests a variety of interdependencies between SDG6 and nutrition as expressed in SDG 2. Ending hunger and malnutrition requires access to safe drinking water (SDG6.1) as well as equitable sanitation and hygiene (SDG6.2). The underlying productivity (SDG2.3) and sustainability (SDG2.4) of agricultural systems is dependent on adequate water availability of good quality; more specifically, in much of the world irrigation is a key contributor to increased productivity and lack of access to water is a key determinant of low yield growth in Sub-Saharan Africa, for example. Moreover, water and related agro-ecosystems (e.g. wetlands), which are embedded in sustainable landscapes are an important contributor to sustainable agriculture (SDG2.4).

The three implementing mechanisms of SDG2 can all be strengthened through a focus on water. Implementing mechanism SDG2.A on investment and technology development for increased agricultural productivity could be supported through irrigation and complementary infrastructure, as well as precision tools, such as moisture sensors or advanced irrigation scheduling tools. Mechanism SDG2.B calls for open trading systems. Such systems can improve both water and food security and nutrition in water-scarce countries through the import of water embedded in traded food. This is of particular importance in countries located in the Middle East and North Africa region that would otherwise draw down fragile, often non-renewable groundwater resources.

Implementation mechanism SDG.C relates to ways to limit extreme food price volatility. Much of this volatility is triggered by climate extreme events and water variability, which can reduce food production in parts of the globe; resulting in real or perceived shortages in global food markets, which can, in turn, trigger panic on food markets, and spiraling food prices, with adverse impacts on nutrition. The 2007/08 food price crisis is an example of this linkage. Interventions in the water sector that reduce climate variability and change can thus support the reduction in price volatility target.

The following sections describe the various contributions of SDG6 to nutrition in greater detail by target

**Table 1: SDG 2 targets**

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2.1 by 2030 end hunger and ensure access by all people, in particular the poor and people in vulnerable situations including infants, to safe, nutritious and sufficient food all year round
2.2 by 2030 end all forms of malnutrition, including achieving by 2025 the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women, and older persons
2.3 by 2030 double the agricultural productivity and the incomes of small-scale food producers, particularly women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment
2.4 by 2030 ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters, and that progressively improve land and soil quality
2.5 by 2020 maintain genetic diversity of seeds, cultivated plants, farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at national, regional and international levels, and ensure access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge as internationally agreed
2.A Increase investment, including through enhanced international cooperation, in rural infrastructure, agricultural research and extension services, technology development and plant and livestock gene banks in order to enhance agricultural productive capacity in developing countries, in particular least developed countries
2.B Correct and prevent trade restrictions and distortions in world agricultural markets, including through the parallel elimination of all forms of agricultural export subsidies and all export measures with equivalent effect, in accordance with the mandate of the Doha Development Round
2.C Adopt measures to ensure the proper functioning of food commodity markets and their derivatives and facilitate timely access to market information, including on food reserves, in order to help limit extreme food price volatility

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**Table 2: SDG 6 targets**

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<b>SDG 6 Target</b>
6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all
6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations
6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally
6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity
6.5 By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate
6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes
6.a By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies
6.b Support and strengthen the participation of local communities in improving water and sanitation management

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**a) Target 6.1: Universal and equitable access to safe and affordable drinking water for all**

- ***Universal and equitable access to safe and affordable drinking water is essential for nutrition and health and there is some evidence on the linkage between water supply and nutrition. While in SDG6, water supply and sanitation are separated, for nutrition and health, these two water interventions are typically combined with hygiene under a WASH package (Water supply,***

***Sanitation and Hygiene). All WASH projects should include guidelines that consider nutrition objectives, and ways to enhance impact***

Access to safe water is associated with reduced incidence of enteric infection and reduced incidence of disease in pregnant women and is important for reducing maternal and neonatal mortality rates. This in turn can reduce stunting and improve nutrition outcomes during the first 1000 days (Cumming et al. 2016). However, recent, published and unpublished studies of combined water supply (and 6.2 sanitation) interventions find mixed evidence for nutrition benefits. Thus, while such investments are important inputs to achieving nutrition objectives, they are not necessarily sufficient, and might be overshadowed by other factors adversely affecting nutrition outcomes (see also Box 1).

WASH is also critical for survival in the first phase of many emergencies and for resilience in succeeding phases. People affected by humanitarian crises, such as natural disasters or displaced by conflict, are generally at a much higher risk of illness and death from disease. Inadequate access to WASH infrastructure and poor and crowded living conditions will exacerbate this risk increasing susceptibility to diarrhoeal and infectious diseases transmitted by the faecal oral route, as well as by vectors associated with poor sanitation, waste management and drainage (<http://ehg.lshtm.ac.uk/wash-emergencies/>). However, providing sufficient water and sanitation facilities alone will not guarantee proper use nor impact on public health. It is critical that communities have the necessary knowledge and understanding to prevent WASH related diseases and are included in the process of designing and maintaining those facilities. Moreover, improved understanding of previous humanitarian and development projects and social influences could also improve WASH interventions during emergencies (Yates et al., 2017).

**b) Target 6.2: By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations**

- ***Similar to access to safe water, there is evidence on linkages between nutrition and access to adequate sanitation. But the body of research needs expansion and not all WASH projects include guidelines related to nutrition.***

Access to improved sanitation is associated with better health and nutrition outcomes (Freeman et al., 2017). Smith and Haddad (2015) calculated that roughly 14% of the total decline in stunting between 1970 and 2010 resulted from improved sanitation. Reducing the practice of open defecation in particular may have the greatest impact on child health (Wolf et al., 2018).

In 2015, 892 million people worldwide still practiced open defecation and 2.3 billion people lacked adequate sanitation facilities with the highest rates in Central and South Asia (30%) and Sub-Saharan Africa (23%) (WHO/UNICEF, 2017).

A better understanding of access and usage barriers is needed to be able to deliver equitable access to services to make progress on Target 6.2. Disparities in access to sanitation and hygiene are driven by a range of interrelated and complex factors, such as socio-economic status, gender, age and location. Children who lack access to sanitation are more likely to be malnourished, and these deprivations interact to magnify the effects of undernutrition (World Bank Group, 2017). Moreover, it is crucial to understand and consider the vulnerabilities of different groups and the associated health consequences of poor

quality of services or lack of services overall, including women and young girls with regards to menstrual hygiene (House et al., 2012), and those with disabilities (White et al., 2016). These considerations should inform the design of WASH infrastructure, policies and programs.

**Box 1: WASH-Nutrition Linkages—what do we know?**

Access to safe water supply and improved sanitation and hygiene practices can decrease the incidence of diarrhea in young children. A systematic review and meta-analysis of health impacts of water and sanitation interventions show reductions in diarrhea morbidity, with evidence supporting greater reductions in diarrhea for households with piped water connections and higher community coverage of improved sanitation (Wolf et al., 2014). Some evidence suggests that reductions in the number of episodes of diarrhea in children under two years of age can reduce the probability of stunting, and thus reductions in the exposure to contaminants could bring benefits for child health and nutrition (Checkley et al., 2008).

While poor sanitation is implicated as the second leading risk factor for child stunting worldwide (Danaei et al., 2016), the causal links between improvements in WASH environments and nutrition are still under investigation. Reviews have reported modest effects of water quality, sanitation and handwashing interventions on height-for-age of children under age five years, independent of the effects on diarrhea (Dangour et al., 2013; Freeman et al., 2017). Moreover, environmental enteric dysfunction may be a major causal pathway between poor WASH and child stunting (Humphrey, 2009). Although recent studies have found that combined WASH interventions are not consistently more effective in the prevention of diarrhea and improving child growth than are single interventions (including nutrition-specific interventions) (Luby et al., 2018; Null et al., 2018), the importance of WASH for these outcomes should not be dismissed (Arnold et al., 2018; Coffey and Spears, 2018; Cumming and Curtis, 2018; Menon and Frongillo, 2018). Access to adequate quantities of safe water enables hygiene behaviors that beneficially influence child health and nutrition, such as handwashing, washing utensils and containers, and cleaning objects and surfaces used by children (Howard et al., 2003). Lack of access to a continuous source of safe water can have negative health consequences if households revert to using unimproved sources of water for even short periods of time (Hunter et al., 2009). Reductions in exposure to harmful pathogens have the potential to improve morbidity not just for one household, but also for the surrounding community through the positive externality of a reduced contaminant load (Eisenberg and Fuller, 2016; Harris et al., 2017; Miguel and Kremer, 2004).

c) **Target 6.3: By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally**

- ***Addressing water pollution and treating wastewater is essential to addressing stunting and other nutrition related issues but no provision linking to nutrition is currently included in Target 6.3.***

More than 330 km<sup>3</sup> of pathogen laden municipal wastewater (equivalent to 4 times the Nile River) are being discharged globally to our rivers, lakes and seas every year, most of it untreated (Mateo-Sagasta et al., 2017). Microbiological pollution is aggravated by the booming livestock and aquaculture sectors and the associated wastes (Mateo-Sagasta et al., 2017). Currently, severe pathogen pollution affects around

one-third of all river stretches in Latin America, Africa and Asia, putting the health of millions of people at risk (UNEP, 2016).

Water pollution adversely affects human health and nutrition. Water pollution in the form of biological, chemical and industrial pollutants can contribute to diarrhea in addition to other diseases, including cancer. While microbiological water pollution is the biggest health concern, water bodies receive increasing amounts of chemical contaminants from cities, industries and agriculture aggravating impacts on public health through different pathways.

Geogenic pollution of irrigation and drinking waters with arsenic, or industrial toxic agents, agrochemicals or emerging pollutants (such as endocrine disruptors or antibiotics), are just examples of health problems of growing significance. As a result of widespread water pollution, the global area of cropland irrigated with polluted water is growing and has reached about 36Mha in peri-urban areas, the size of Germany (Thebo et al., 2017).

Domestic and agricultural pollution of water sources can contribute to blue baby syndrome (in which high levels of nitrates in water can cause methaemoglobinemia—a potentially fatal illness- in infants) and many other maladies determined by the nature of the pollutant. Polluted water also is commonly used for food processing and preparation in low income countries and informal markets, where affordable drinking water is not available (Drechsel and Evans, 2010). Many foodborne illnesses can be related back to poor water quality used in food production and/or post-harvest processing and/or food preparation (HLPE 2015). The global burden of foodborne disease was 33 million DALYs in 2010 and 40% of the foodborne disease burden is among children under five years of age. Foodborne diarrheal disease agents caused 230,000 deaths per year, particularly non-typhoidal salmonella enterica which causes diarrheal and invasive disease (WHO 2015).

Use of wastewater or polluted water for the irrigation of crops, and particularly nutrient-dense vegetables is likely to result in millions of disease incidences ever year, largely unreported, as well as in thousands of deaths (Thebo et al., 2017). Similarly, the use of polluted water in local markets, in food preparation at home, as well as in agro-food processing can harm nutrition and health outcomes. Some of this pollution is directly caused by agricultural management practices, while other pollution derives from lack of treating industrial and municipal wastewater, as well as from the mining industry.

Agricultural water pollution is considered a diffuse water source, i.e. pollutants are input to water bodies from diffuse source of entry points. Fertilizer use on cropland and livestock animal excreta are key sources of agricultural water pollution. Excessive Nitrogen (N) and Phosphorous (P) in water bodies results in eutrophication, i.e. when algae grow faster than normal, killing other aquatic life by depleting oxygen. The presence of nitrogen-based compounds in drinking water can also be directly harmful to human health. Agriculture-caused water pollution is rapidly increasing, particularly in the group of developing countries (Mateo-Sagasta et al., 2017; Xie and Ringler, 2017), threatening progress for nutrition and health.

**d) Target 6.4: By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity**

- ***Reducing water scarcity and more sustainable water withdrawals can support nutrition and health outcomes but a focus on increasing water use efficiency in irrigated agriculture might reduce progress in these two areas. A call for progress on sustainable agricultural water use, the largest stakeholder in SDG6 in terms of volumes withdrawn and depleted is not explicit in SDG6. Linkages between agricultural water use and nutrition and health are not addressed. This puts in peril progress on nutrition and health.***

Water insecurity compounds the risks the poor face in accessing water resources for household and agricultural use. For example, water scarcity increases time spent on collecting water, the burden of which falls mainly on women, reducing their time available for caregiving. Seasonal water shortages may also result in households using unsafe water sources, contributing to higher incidence of water-related disease. Conflict induced water insecurity can place populations at severe risk of disease and malnutrition.

Water scarcity also reduces the capacity of water bodies to dilute pollution, and can put food production at risk both in the lean season, and with severe and long-term drought throughout the year. As such improving water productivity, i.e., using less water per unit or value of nutritious food produced and directing water to more nutritious crops is beneficial for food security and nutrition.

However, we need to be careful on the measurement used for water use efficiency. High-tech irrigation interventions often lead to an increase in water consumption (in part because farmers tend to extend the area under irrigation) and subsequent reduction in downstream water availability. Thus, increased water use efficiency without reducing overall water allocation to an irrigation scheme or farmer will generally not result in overall water savings that can be used by downstream users or ecosystems (Perry et al., 2017). As such there are risks to achieving nutrition and food security targets from a mis-guided interpretation of target (and indicator) 6.4.

**e) Target 6.5: By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate**

- ***Integrated water resources management that considers the nutritional impacts of decisions on affected populations can help to safeguard the quality and quantity of water resources for household and productive uses, contributing to nutrition outcomes. To obtain positive outcomes in this area nutrition would need to be explicitly added.***

Integrated water resources management (IWRM) has been defined by the Global Water Partnership (GWP 2000) as "a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems".

Transboundary cooperation helps reduce tension and conflicts in transboundary basins, and as such contributes to water and food and nutrition security. For instance, farming operations within transboundary waters may overuse or pollute the waters of a neighboring country downstream thus hindering food security and sustainable agriculture or posing challenges to the ecosystem of the downstream neighbor. Essentially, by providing scrutiny of policy and its implementation, the indicator facilitates the proper implementation of policy around water, including its use for irrigation and food production. However, without special attention to nutrition, it is unlikely to achieve strong benefits for improved nutrition and health.

The concept has received much criticism in terms of workability--as various water users compete with each other and there are relatively few inducements and regulations for IWRM implementation (see, f.ex. Biswas 2000). Today, the IWRM concept is often replaced by the Water-Energy-Food nexus concept in both research and practice.

f) **Target 6.6: By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes**

- ***While intuitively, the protection of water-related ecosystems contributes to nutrition and health outcomes it can be challenging to generate evidence on these linkages; this area of study is neglected and needs to be developed. Studies will be needed to develop guidelines that help ensure that interventions for Target 6.6 also support nutrition and health outcomes. The target indicator does not relate to many interventions in water bodies that affect ecosystems and could affect nutrition, such as water-related infrastructure.***

Water-and related ecosystems underlie all agricultural production and healthy ecosystems are essential for healthy people (WLE 2014). Healthy water-related ecosystems provide a series of provisioning, regulating, supporting and cultural ecosystem services, many of which, in turn, support nutrition and health outcomes. It is estimated that globally freshwater ecosystems contribute at least 59.5 million tonnes of fish annually (inland fisheries 11.5 million tonnes; freshwater aquaculture 48 million tonnes). Due to difficulties in monitoring, this is most likely an underestimate but equates to 50% of all food fish.

Protection and conservation of watersheds can have protective effects on child health and nutrition, by reducing seasonal water shortages, reducing sediment loads, and reducing the incidence of waterborne and insect vector-transmitted diseases. Environmental degradation has been associated with food insecurity, and malnutrition and certain ecosystem types are associated with greater infant mortality (Fanzo et al., 2017), but little evidence has been generated on these linkages.

Infrastructure development, such as dam construction, can have both positive and negative impacts on water-related ecosystems and nutrition. Dams can either be a support to irrigation if the stored water is used for that purpose, or it can adversely affect irrigation development (Zeng et al. 2017) if water is being diverted elsewhere. Reduced downstream flows below dams can have substantial negative impacts on ecosystem services including availability of water for riparian irrigation and (by blocking fish migration routes and altering flow regimes) yields of fisheries and other aquatic species, that are often essential sources of protein and micro-nutrients for the poorest and most marginal groups of society. The controversies surrounding dam developments and downstream fisheries in the Mekong highlight a major point of contention in one of the largest fisheries in the world (Geheb and Pukinskis, 2012) where the fisheries and associated livelihoods are at risk due to substantial upstream hydropower dam development.

In terms of this target and nutrition, the data produced by the 6.6.1 indicator provides the spatial extent of water-related ecosystems (thus indicating the change in extent which may mean a loss of food production potential) of aquatic food resources as well as crops grown in aquatic environments such as floating rice, many vegetables, edible algae, etc. as well as the quantity of water in rivers and in groundwater, a change of which could adversely affect irrigated food production, fisheries and livestock production.

### ***The Impact of Diet on Water in the Environment***

Agricultural systems have expanded and intensified in response to the growing demand for food and changing diets (Mateo-Sagasta et al., 2017). Since agriculture is the major anthropogenic use of water, changing consumption trends, including transitions to more dairy and red meat, as well as energy-dense and processed foods—regardless of contribution to nutrition and health or to overweight, obesity and malnutrition—are increasingly adversely affecting water quality and availability for people and the planet and thus achievements for all SDG targets and indicators.

Worldwide, about 1.9 billion people are overweight, and of these, more than 600 million are obese, with 62% living in low and middle-income countries. Dietary preferences are changing and unhealthy diets, with excess fats and meat, tend to have higher water footprints (Mateo-Sagasta et al., 2017). A recent study suggests that, in India, even modest changes in diets could help address projected reductions in the availability of freshwater and improve diet-related health outcomes (Milner et al., 2017). These issues have been described by the [Water Footprint Network](#) which visualized a model that tells us how much water is used in our daily activities, including food production, domestic water use, and indicates the pressure we exert on our freshwater resources.

### ***Key Gaps in SDG 6 - Nutrition Linkages***

In addition to the key messages listed as part of the SDG 6-nutrition linkages, the following are key areas that require more analysis to ensure that progress in SDG 6 supports nutrition outcomes and that a nutrition focus does not adversely affect important SDG 6 targets. Key gaps include:

- a) Lack of understanding and action on linkages between agricultural water use—the key human water use—and nutrition
- b) Lack of understanding of and investments in measures that ensure nutrition under more variable water supplies, i.e. droughts and floods, under climate change
- c) Accounting for the nutritional impact of increasing competition for water resources – between different users and across geographic boundaries
- d) Strengthening the understanding of women’s and men’s roles for achieving water and nutrition objectives

#### **I. Key Gap 1: Lack of understanding and action on linkages between agricultural water use—the key human water use- and nutrition**

As already mentioned SDG6 does not directly relate in targets nor indicators to the key human water use of irrigation. However, without a focus on sustainable agricultural water management, neither SDG6 targets nor SDG2 goals and targets can be achieved.

Water for agriculture has the potential to improve nutrition and health through several pathways. The 5 key pathways from agricultural water use to nutrition include 1) the income pathway; 2) the agricultural diversification and production pathway, 3) the women's empowerment pathway, and the 4) WASH pathway (Domènech, 2015; Ringler and Domenech, 2013). These pathways are summarized below.

1. The income pathway: Irrigation-induced increases in agricultural production and commercialization of production, as well as water for local aquaculture, leading to increased incomes, lower food prices for consumers and thus increased food access
2. The agricultural diversification pathway: increases in agricultural diversification can increase dietary diversity of subsistence farmers, especially of micronutrient-rich foods such as fruits, vegetables, animal-sourced foods, and dry season crops
3. The women's empowerment pathway: Improvements in women's empowerment through increased asset ownership, control over resources and reduced time spent on water collection - Given the substantial time burden women face collecting water for both domestic and productive purposes and caring for children, improvements in the proximity and cleanliness of water sources and technologies for water extraction could support women's empowerment through time savings.
4. The WASH pathway: In many countries, water provided for irrigation is also used for water supply and sanitation purposes which can improve the overall WASH environment in and around the household, reducing exposure to fecal contamination and the risk of infectious diseases

On the other hand, if irrigation or any form of water management in agriculture, is not properly handled, agricultural productivity might decline, and nutrition, health, and women's empowerment could be reduced. Increasing the availability of water around the household or farmland can introduce vectors for malaria, dengue, schistosomiasis, as well as bacteria responsible for cholera, dysentery, and other diseases if preventive measures are not taken. For example, excess standing water may provide habitat for vectors, and wastes may become recycled back into the drinking water. Research on the question of whether irrigation increases malaria prevalence has proven the issue complex. Irrigation schemes and dams are built to contribute to economic development and poverty alleviation that tend to improve peoples' health and nutritional status. However, some studies indicate that under certain circumstances higher rates of malaria transmission are found in communities living in the vicinity of dams and irrigation schemes (Kibret et al., 2016). This is especially the case in areas of unstable transmission, where people have little or no immunity to malaria parasites, such as the African highlands and desert fringes. Similarly, poor irrigation practices with runoff of Nitrogen and Phosphorous or soil salinization and water logging can adversely affect health and nutrition of both soils and humans.

II. **Key Gap 2: Lack of understanding of and investments in measures that ensure nutrition under more variable water supplies, i.e. droughts and floods, under climate change**

The occurrence and manifestation of climate change may intensify, both positively and negatively, the water-nutrition linkages. Malnutrition is perceived as one of the five most substantial health impacts of climate change (IPCC, 2012, 2007). Decreased water quality and availability in some areas could result in increased sanitation problems and water-borne diseases such as diarrheal disease (Met Office and WFP, 2012), while, *ceteris paribus*, the transmission of vector-borne diseases is projected to increase with climate change (Akresh et al., 2011). Changes in rainfall (level, pattern, or variability) can result in increased aridity of agricultural land leading to reduced food production but can also lead to increased

flooding, both of which can affect nutritional status, particularly stunting outcomes (Akresh et al., 2011; Phalkey et al., 2015), potentially due to a loss in livelihood and decreased access to food.

Droughts have also been linked to an increase in mosquito-borne illnesses such as West Nile virus, malaria, and dengue which are known risk factors for anemia and undernutrition. On the other end of the weather spectrum is increased incidence of severe flooding, which can damage agricultural land and increase incidence of water-borne diseases that lead to poor nutrition outcomes. Drought has the potential to lead to food shortages as well as loss of income, resulting in slowed growth in children younger than two (Hoddinott and Kinsey, 2001). Flooding has short- and long-term effects on child height through changes in food consumption and infectious disease burden (Danysh et al., 2014; del Ninno and Lundberg, 2005; Rodriguez-Llanes et al., 2011).

Additionally, changes in climate may result in a lack of water for hygiene, flood damage to water and sanitation infrastructure, and contamination of water sources through overflow, the latter especially true of human and animal waste entering waterways (McMichael et al., 2006). Resulting health impacts include increased risks of food- and waterborne diseases (Fanzo et al., 2017).

Changes in runoff patterns and evaporation, increased salinity, unreliable rainfall patterns, and increased incidence and intensity of drought are some of the ways in which climate change is already affecting and will continue to affect the availability of freshwater. Changes in rainfall, temperature and sea-levels are expected to increase the frequency and intensity of disasters such as droughts, hurricanes, cyclones, and severe floods. Some of the expected increase will be in regions that historically have not been impacted by natural disaster, but much of the increased incidence will be in regions that are traditionally vulnerable. i.e. drier regions will get drier and wetter regions will get wetter (IPCC, 2014).

### III. **Key Gap 3: Accounting for the nutritional impact of increased competition for water resources**

Increasing urbanization, industrialization, and population growth and the consequent increased water demand necessarily competes with agricultural water demand. Thus, water policy that is harmonized across different water users can help to mitigate the potential adverse impacts on nutrition.

Lack of cooperation on the use of transboundary water resources can potentially impact food security and nutrition, when the quality and quantity of water resources available in one location are inadequate as a result of poor distribution and inequitable use of water resources in transboundary water settings. However, it is currently not common practice to consider the nutritional consequences of transboundary water decisions and agreements. More experience and policy guidance is needed in this area.

### IV. **Key Gap 4: Understanding women's and men's roles in achieving water and food security**

Needs and agency of women around water is not addressed in SDG6 beyond the sanitation target. However, it is clear that women have more varied roles and needs around water for both productive and reproductive uses and that, similarly, women have special roles and needs around nutrition. A joint assessment of water-nutrition-gender linkages is lacking in SDG targets and indicators and, while linkages are intuitive, there is currently limited evidence on this topic.

In addition to these four key gaps, other areas in the water-nutrition field that require further study include but are not limited to:

- Understanding the linkages between WASH and obesity: the relationship between contaminated water and unsafe sanitary environment and consumption of fried foods and sugary drinks as alternatives to fresh foods and water ([French et al](#), [Onufrak et al](#)).
- Better understanding of the sources and pathways of fecal contamination that most strongly affect child nutrition in different contexts, across rural, urban and high-density areas, and the interventions that are most effective to interrupt these pathways; and
- Impacts of the use of marginal quality water on the nutritional value of food and nutrition outcomes; and
- Impacts of dietary change on all aspects of SDG6.
- Health and nutrition benefits related to the protection and conservation of water-related ecosystems, including through reduced pathogen transmission, increased livelihood opportunities and food and nutrition security.

### ***Key Messages and Policy Actions***

As the document has shown the linkages between water and nutrition are broad and strong. The nutrition target in SDG 2 cannot be achieved unless progress is made in achieving key targets under SDG 6. At the same time, achieving all SDG 2 targets and adequate nutrition for all could well pose substantial pressure on achieving some of the SDG 6 targets. Thus, better linkages between these two SDGs and their target will be needed to achieve both goals. The following lays out a few entry points where more progress is needed.

- a) Billions of people still do not have access to safe drinking water and lack adequate hygiene and sanitation services, putting them at risk of avoidable infections and disease that negatively impact nutritional status and health.

**Policy actions:** Improve current financing and planning mechanisms to allow for installation and updating of existing infrastructure that deliver both quality and sufficient quantity of water, and to address barriers in accessing water. These developments in financial and grey infrastructure should be accompanied by context-specific and culturally-sensitive behavior change communication campaigns that improve knowledge and understanding of the importance of proper WASH practices for nutrition and health. Additional research is needed to better understand WASH-nutrition linkages, which would then inform these policies.

- b) Irrigation, being the single most important recipient of freshwater withdrawals with potential to influence nutritional outcomes in several direct and indirect pathways, has not been given enough attention for its role in improving nutritional outcomes. Almost no data collection, analysis and monitoring processes exist that support the understanding of how irrigation can strengthen nutrition. Currently ongoing research under the USAID supported Feed the Future Innovation Lab on [Small Scale Irrigation](#) suggests that irrigation can strongly affect households' economic access to food and nutritional outcomes of women and children, particularly when irrigation is defined beyond the use of buckets and watering cans in agriculture.

**Policy actions:** Support research on rigorous analysis on irrigation-nutrition linkages that provides the evidence base on whether irrigation needs to be promoted on its merit to improve nutrition, in addition to its potential for higher yield. This includes the identification of irrigation typologies that are particularly adept for improving nutritional outcomes; that allow the irrigation of a diverse set of cash crops and that sustainably increase the amount of land under irrigation. The impact of combined irrigation-WASH-nutrition interventions as opposed to standalone interventions in improving nutritional outcomes also needs to be explored.

- c) Water pollution (biological, chemical and industrial) reduction and treating wastewater is essential for decreasing preventable diarrhea, foodborne illness, and, in turn, undernutrition.

**Policy actions:** Support research on the current status of water quality and the spatial and temporal distribution patterns of pollutants in water environments to better understand levels and risks for both aquatic ecosystems but also nutrition and health. Develop a combination of approaches to address water pollution, including regulations, economic incentives, and information dissemination. Enforce feasible regulations to protect water quality that prioritize major polluters and water bodies with highest pollution and largest potential adverse impact on nutrition and health. To ensure widespread uptake of solutions in the pollution space requires accessible advisory services and training for farmers to adopt good practices.

- d) Water insecurity is on the rise and compounds the risks the poor face in accessing water resources for household and agricultural use. Water scarcity also reduces the capacity of water bodies to dilute pollution, and can put food production at risk. Therefore, addressing water variability, scarcity and competing uses is beneficial for food security and nutrition.

**Policy actions:** A large body of measures in the policy, institutions and technology space exist to address water scarcity, variability and competing uses. However, these need to be tailored to local conditions, ensure that the poorest women and men receive special consideration and that linkages to nutrition are understood, highlighted and addressed.

- e) Water-and related ecosystems underlie all agricultural production and healthy ecosystems are essential for healthy people. Healthy water-related ecosystems provide a series of provisioning, regulating, supporting and cultural ecosystem services, many of which in turn support nutrition and health outcomes. However, these linkages are poorly understood. Many research initiatives, such as the CGIAR Research Program on [Water, Land and Ecosystem](#) have developed basic understandings on these linkages, but further linkages with the nutrition community are needed to enhance the positive linkages from ecosystems to positive nutrition outcomes.

**Policy actions:** More evidence needs to be generated on linkages between water-related ecosystems and health/nutrition. This will be challenging, but places to start include assessing

the effects of protection and conservation of watersheds on child health and nutrition, further exploring how environmental degradation affects food insecurity and malnutrition.

- f) Including target communities in decision-making is crucial to creating appropriate policies that are successful. Using smart technologies that are culturally sensitive (gender, social norms) could improve all aspects of water resources and water, sanitation and hygiene management.

**Policy actions:** More evidence needs to be generated on linkages between water-related ecosystems and health/nutrition. This will be challenging, but places to start include assessing the effects of protection and conservation of watersheds on child health and nutrition, further exploring how environmental degradation affects food insecurity and malnutrition.

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## SESSION 3

### Annex 2: Linking Nutrition with Affordable and Clean Energy

#### **SDG 7: Ensure access to affordable, reliable, sustainable and modern energy for all**

Energy has always been necessary for the production and processing of foods. Both renewal and non-renewal sources, from the sun's solar energy in photosynthesis for the growth of plants and drying of agriculture produce; through to fuel powered agriculture machinery; and electrical energy supporting storage and processing facilities, play a significant role in our global food system.

Globally, the agrifood chain consumes 30 percent of the world's available energy with more than 70 percent consumed beyond the farm gate.<sup>13</sup> The reliance on fossil fuels, makes the food system from farm to fork, one of the largest contributors to greenhouse gas emissions, more than our systems of transport, more than our cities and leaves much to be desired.

Presently there are nearly 800 million people chronically undernourished. Some two billion are micronutrient deficient and another two billion overweight or obese people on this planet.<sup>14</sup>

This paper seeks to illustrate the vital role "*Access to affordable, reliable, sustainable and modern energy*" as outlined in SDG7, plays, in food security and nutrition.

#### ***How energy is used along the food system***

All steps along the food systems value chain, specifically in food production, postharvest operations, transportation and distribution, processing, storage and food preparation need energy whether direct or indirect. Direct energy includes electricity, mechanical power, solid, liquid and gaseous fuels used directly in the production and distribution of food. Indirect energy, on the other hand, refers to energy required to manufacture inputs such as machinery, farm equipment, fertilizers and pesticides. According to United Nations Industrial development organization, the lack of reliable and low cost electrical power severely constrains the development of cold chains that are critical for maintaining quality of high value perishable products such as fruits, vegetables and dairy productions<sup>15</sup>

Food production operations at the farm level can include ploughing, irrigation, chemical spraying, tilling, planting, fertilizer and pesticide applications and harvesting. It is increasingly accepted that an agroecological approach is needed for sustainable food and nutrition security globally. The agroecological approach and its relational frame seeks to empower farmers and meet the food needs of all, enriching soil, maintaining and developing agricultural biodiversity, conserving water, and contributing to climate solutions.<sup>16</sup>

The production focus of modern agricultural systems has led to an intensification that is heavily reliant on industrial methods and is characterized by innovations such as tractors, modern irrigation systems etc. and implements designed to be more precise and less wasteful in the use of fuel, water, seed, or fertilizer. Most of the innovations are energy dependent.

Over the years since the industrial revolution, power for agricultural machinery has been supplied by oxen or other domesticated animals, steam power and internal combustion engines operating on petrol and diesel. As an example, intensive production operation such as irrigation, relies on machinery such as

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<sup>13</sup> <http://www.fao.org/docrep/015/an913e/an913e01.pdf>

<sup>14</sup> <http://www.who.int/nutrition/topics/UN-decade-action-NY-ju2016/en/>

<sup>15</sup> Agribusiness for Africa's Prosperity. UNIDO. Pg 72

<sup>16</sup> <http://www.fao.org/3/I9037EN/i9037en.pdf>

engines, pumps and other specialized gear to provide water quickly and in high volumes to large areas of land. Similar types of equipment are used to deliver fertilizers and pesticides.

Instead of planting seeds with a hoe, in intensive production, energy dependent seeders are introduced, instead of harvesting grain by hand with a sharp blade, wheeled machines cut a continuous swath. Instead of threshing the grain by beating it with sticks, threshing machines separate the seeds from the heads and stalks.

### ***The differential impact of energy-supported production***

The rapidity with which planting and harvesting is done in an energy supported production system allows for the utilization of land the year around where crop rotation could be effectively practiced, leading to food production diversification. The overall result can increase in the supply of diversified foods and diversified diets. Unfortunately, both between and within countries there is a differential effect depending on socioeconomic strata with those already advantaged more likely to see an increase in diversified diets and those less advantaged not having the same access or availability.

### ***Specific energy issues: food loss, food processing, time spent on acquiring energy***

As noted above, solving the persistent hunger problem is not simply a matter of expanding agricultural production area to increase food volume, but also a matter of what farmers are supported to produce, and in the availability of and access to safe, high quality diverse foods, from the farmers' harvest. According to the United Nations and others, hunger that exists today is due to constraints in infrastructure, distribution, storage, economic and political issues as opposed to limited production. In fact, according to WFP we produce enough to feed the global population of 7 billion people. Other communications suggest there is enough to feed up to 10 billion people by proper utilization of existing agricultural produce.

It is now increasingly realized that reducing food loss (PHL) along food chains can, in certain cases, provide a more cost-effective and environmentally sustainable means of promoting food and nutrition security than investments focusing on increasing production.<sup>17</sup> PHL can be measured in quantity and quality terms. Quantity losses occur when the actual amount of food is lost and can be measured in kilograms or calorie. This has been the focus on PHL magnitude estimation and reduction strategies, to date. Quality losses occur via the loss of important nutrients or through contamination of food. These loss types can be more obscure, more difficult to detect, but potentially more important given that micronutrient deficiencies are far more prevalent around the world than is undernourishment due to insufficient dietary energy intake (Barrett and Bevis, 2015). Food quality loss that is sometimes accompanied by the presence of pathogens can lead to food-borne health hazards with direct, sometimes catastrophic, effects on human health and nutrition status. Poor quality may also lead to quantity losses and economic losses when consumers pay a reduced price for inferior quality product. Diminishing prices for low quality food translates to less income for producers that in turn reduce their ability to purchase diversified food and access to a balanced and healthy diet.

PHL have been estimated at 23% for grains<sup>18</sup> produced in Sub Saharan Africa while PHL losses in fruits and vegetable have been estimated at 25-40% in most developing economies<sup>19</sup>. However, although the volume and impact of PHL are well-known, up to now, little success has been achieved in reducing them a consequence of lack of access to energy. Energy in postharvest operations is required in commodity handling, activities such as loading, sorting and grading, washing, drying storage both long term and short

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<sup>17</sup> <http://www.fao.org/3/a-au092e.pdf>

<sup>18</sup> <sup>18</sup> <http://publications.jrc.ec.europa.eu/repository/bitstream/111111111/15877/1/lbna24712enc.pdf>

<sup>19</sup> <http://www.fft.c.agnet.org/library.php?func=view&id=20110630151214>

term, chemical application, packing and unloading. For example in the case of potatoes, the biggest consumer of energy is the cooling process during storage - whether using ambient or refrigerated air.<sup>20</sup>

Reducing food loss (PHL) increases the quantity of food available and reduces unnecessary resource waste thereby increasing profits (disposable incomes to producers) and resulting in overall increased quality food supply and a reduction in food prices for consumers. With proper policy support, this can help to increase access to food and allow a safer, more diversified and more nutritious diet.

Beyond postharvest loss management is food processing and value addition to food commodities. Limited access to energy has been the main bottleneck in attempts by many developing countries to establish food-processing industries<sup>21</sup>. The need for access to reliable energy to drive pumps, and motors, to generate heat and to drive the mechanical processing and packaging equipment is obvious, yet on a global scale, we must find sustainable ways to harness energy.

Food processing is undertaken primarily to increase convenience, improve taste and improve safety. Food processing in some cases allows for food fortification and thus improved nutrition. Some forms of processing helps lock in nutrients than would otherwise be lost if fresh product is exposed to the atmosphere for long periods of time. Many processed foods are also shelf stable and are easy to distribute which can be helpful during hunger periods and other crises. Processed foods are also often less costly than fresh products as usually the cost of processing is lower than the cost of fresh storage. Furthermore, value addition along food value chains has a strong potential to create jobs and income opportunities, and thus counteract poverty and hunger in rural areas.

At the household level, provision of energy allows small-scale producers to reduce amounts of time spent on search for fuel for cooking and for manual food processing such as pounding and milling. The producers can thus allocate more time for productive capacities that result in increased incomes and expansion and diversification of food production. Furthermore, there is decreased food wastage as refrigeration and cool storage becomes available. This ultimately leads to diversification of diets and good nutrition. There is further value added when the energy used is derived from renewable energy such as with biodigesters based on agriculture residue and animal waste, in that, it reduces the need to cut trees for fuel and the effluent from the conversion of feedstock into biogas can be used as soil improver on farms.

### ***Increasing access to affordable, reliable, sustainable and modern energy for all***

Ensuring food and nutrition security cannot be achieved without energy. Increased access to energy, particularly non-renewable energy however, could have significant adverse effects to the sustainability of food supply systems and puts our planet at risk. In the first place, if increased access to energy, is through fossil fuel and other non-renewable forms of energy (including in the production of pesticides and fertilizers), in an attempt to modernize the agricultural system with a focus on large scale production of commodities for export, livestock production or to produce biofuels, puts our food production system at risk because of the correlation between this energy use and pollution, climate change and toxic exposure. In addition increased access to energy adds to the trend towards processed, cheap calorie dense diets, rich in sugar, animal products and fats that contribute to poor nutrition, global obesity and related diseases. According to the Cancer Journal for Clinicians,<sup>22</sup> the availability of cheaper food has been cited as the main reason behind the rising rates of obesity in the U.S.

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<sup>20</sup>[https://potatoes.ahdb.org.uk/sites/default/files/publication\\_upload/Energy%20use%20in%20post-harvest%20handling%20and%20storage.pdf](https://potatoes.ahdb.org.uk/sites/default/files/publication_upload/Energy%20use%20in%20post-harvest%20handling%20and%20storage.pdf)

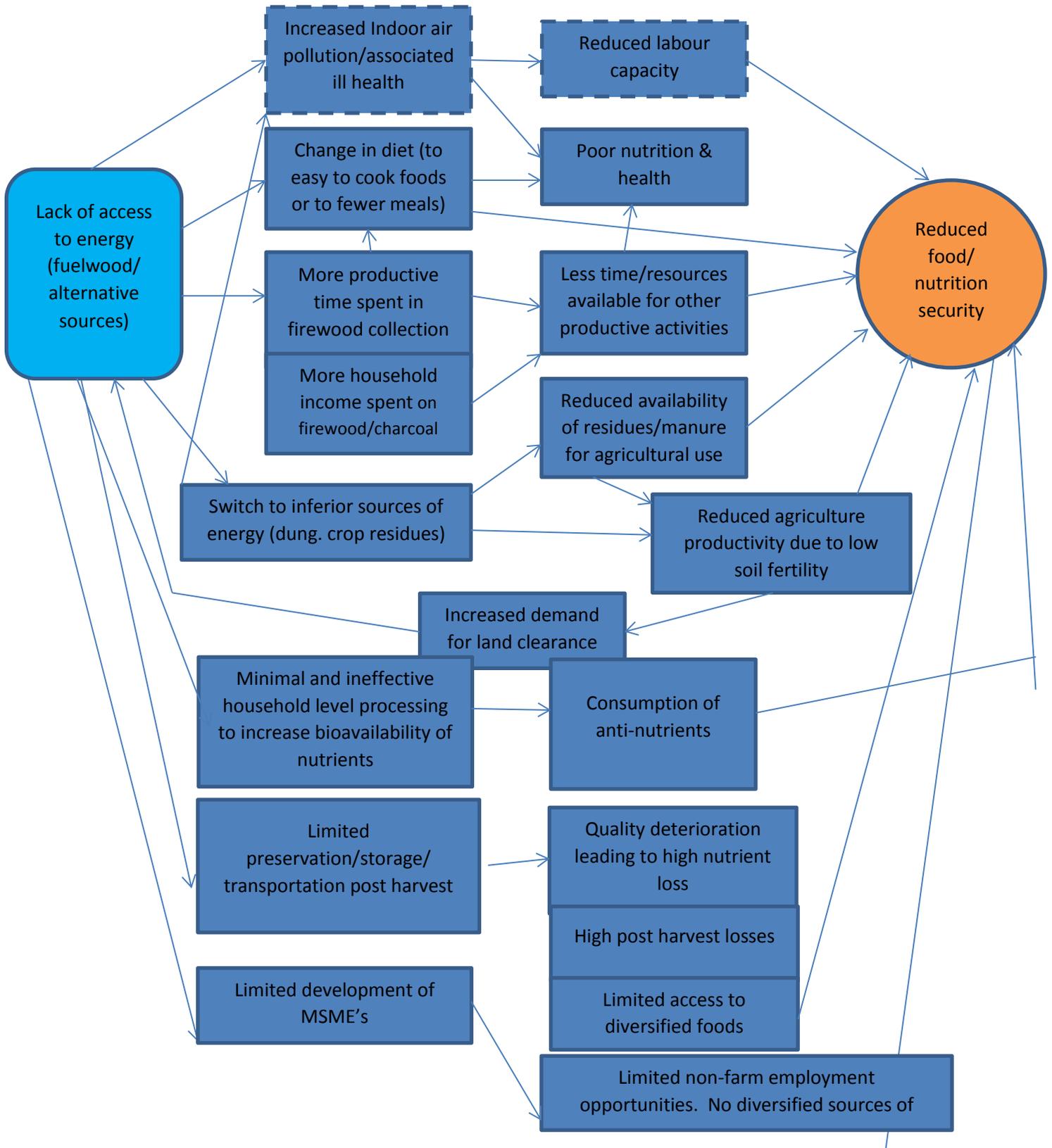
<sup>21</sup> Agribusiness for Africa's prosperity. UNIDO. Pg254

<sup>22</sup><https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4159423/>

The adverse environmental and health impacts of using fossil fuels throughout the food system no doubt requires a dramatic shift in the relationship that has grown between this non-renewable energy source and food systems. Emphasis should be placed on the application of energy-efficient production processes and technologies, along with the enhanced utilization of renewable energy sources, to allow for low-carbon and low-emissions at all levels of the food production system from farm to fork.

Renewable energy in the form of solar, wind, hydro, bioenergy, hydrogen, geothermal, wave and tidal plays a fundamental role to satisfy the growing energy demand for electricity, transport, heating and cooling as well as boosting access to off-grid energy services to a reduction in post-harvest losses through primary processing and storage.

**Schematic representation of how energy is linked to undernutrition**



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## SESSION 5

### Annex 3: Linking Nutrition with Sustainable Cities and Communities

#### **SDG 11: Make cities and human settlements inclusive, safe, resilient and sustainable**

Good nutrition is integral to human well-being and to humanity's ability to achieve the Sustainable Development Goals (SDGs). Nutrition permeates almost all the SDGs, both as an outcome as well as an important input into their achievement, especially in terms of strengthening human capital. This paper focuses on the specific relationship of nutrition with SDG11, "Make cities and human settlements inclusive, safe, resilient and sustainable."

Although what is "rural" and what is "urban" exist along a continuum – there is not a clear divide – the nature and characteristics of nutrition do differ between "more urban" and "more rural" environments. Emphasizing the perspective largely of low- and middle-income countries, this paper highlights:

- The nutrition situation and key issues around nutrition in urban areas
- Links with SDG 11 and related policy and program actions
- Knowledge needs

#### ***Panorama of Urban Nutritional Status***<sup>23</sup>

The dynamics of urbanization and of urban life itself create complex problems of nutrition even as the urban landscape offers significant opportunities to put an end to malnutrition in all its forms for people of all ages. The shifting of populations from rural to urban areas often, but not always, brings with it improvements in some of the underlying causes of malnutrition (health services, water and sanitation), along with a wider variety of food options. Consequently, across the lifecycle, the main drivers of nutrition in urban areas also shift somewhat, with a close connection to diets, and therefore food systems, especially for older children and adults.

The fact is that all forms of malnutrition – undernutrition, obesity and overweight, and micronutrient deficiencies – continue to exist in urban areas, even at times in the same household, an unfortunate but tangible demonstration of the juxtaposition and intertwining of the factors that cause malnutrition. Even if on average nutritional status is almost uniformly better in urban than in rural areas of developing countries, "average" covers up the alarming conditions and levels of undernutrition that can exist in pockets throughout a city; and the static term "average" fails to capture the dynamics involved in the nutrition transition, with its rising levels of overweight and obesity and related noncommunicable diseases (NCDs).

Overall, in terms of nutritional status indicators:

- The number of chronically undernourished urban children is stuck at 50 million. Over the past 30 years, although the share of urban children who are stunted has declined, the rate of decline has not kept pace with urban growth. On the other hand, the number of stunted children in rural areas has declined markedly, from around 190 million in 1985 to about 110 million today (Paciorek et al 2013).

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<sup>23</sup> The sections in this paper describing urban nutritional status and the related urban environment draw significantly on Ruel, Garrett, Yosef, and Olivier (2017).

- Progress varies markedly across regions. Although in East and Southeast Asia the number of stunted children in urban areas has fallen substantially in this period, the number of stunted children in urban areas of Sub-Saharan Africa has doubled and now rivals that of South Asia, where numbers have changed little over time (Paciorek et al 2013).
- Even as undernutrition continues to be a problem, the number of overweight and obese children in low- and middle-income countries is rising, from about 25 million in 1990 to about 31 million in 2010 (Black et al 2013). Prevalence of overweight children in urban areas is now over 10 percent in some countries, particularly among countries in Central Asia and Northern Africa and the Middle East. Perhaps surprisingly, differences in prevalence of overweight children between the richest and poorest quintiles and between rural and urban areas are actually fairly small in most countries (Data source: International Center for Equity in Health).
- Prevalence of overweight and obesity in women is also rising, and levels in urban areas tend to be higher than in rural ones (Neuman et al 2013). This increase, however, is happening generally and not only in the cities. One study showed that in about half the countries the rate of increase was actually greater in rural areas (Jaacks, Slining and Popkin 2015).
- The preponderance of obesity shifts from higher to lower socioeconomic levels as countries develop (Garrett and Ruel 2005; Monteiro et al 2004). This may be because at higher levels of income, individuals may be more aware of overweight and obesity as an issue and also have the means to deal with factors contributing to it that lower socioeconomic groups do not.
- Urban residents, not just rural ones, also suffer from food insecurity. Available data urgently need updating, but studies from the 2000s show that even with higher incomes and a wider range of food choices, household energy availability can often be lower than that of rural areas – in 7 of 12 African countries in one study (Smith et al 2006) and 12 of 18 African, Asian, and Latin American countries in another (Ahmed et al 2007). In the first study, in all but one of those countries at least 40 percent of the urban population was energy deficient (Smith et al 2006).

These overall indicators indicate the complexity and heterogeneity of the nutrition situation in urban areas. National and city data that would allow a more informative disaggregation of levels and trends of these indicators in and across urban areas and among specific groups (by size of urban area, location within the city (e.g., slums), income) and across the lifecycle (sex and age) are generally lacking. Data for men and for micronutrient status are particularly absent. Even when such data exist, easily accessible comparative analyses are few.

### ***Determinants of Nutrition and SDG11***

How do these factors relate to the targets specified in SDG 11? First, we know that determinants of good nutrition cut across sectors; good nutrition results from a healthy diet, good water and sanitation, and good health care. Access to a healthy diet depends on decent employment, education, and transport and connections to a thriving, resilient, sustainable food system. Access to safe water, adequate sanitation, and quality health services likewise relies on these same factors, along with the equitable, generally public, provision of these services. The targets of SDG 11 align with these elements and, if a people-centered, nutrition lens is applied, actions to achieve those targets will contribute to improving urban nutrition as well.

Studies concur that the factors driving malnutrition in urban and rural areas are the same, but differences arise because the specific conditions and the levels of these determinants vary (Srinivasan, Zanello, and Shankar 2013, Garrett and Ruel 1999). The inequities suffered by urban dwellers in terms of income and decent employment; education, especially for women; and access to adequate health care, safe water, and sanitation drive the disparities in levels of malnutrition that can exist within urban areas. Levels of malnutrition among children in slums, for example, can rival those found in rural areas. For older children and adults, both men and women, having a healthy diet, which depends on the many factors affecting food choices, is even more important. The nature of the food system that each urban household deals with will thus have a large impact on their nutrition and overall well-being and productivity throughout the lifecycle.

How do some of these determinants play out in urban areas?

### ***The Urban Environment and Nutrition***

#### *Food systems and urban diets*

In the face of economic development, urbanization, and tighter global connections, food systems and dietary patterns are changing. In more populous urban areas, wholesalers and retailers have larger markets, and with greater density they can reach a higher number of consumers at a lower per unit cost. Firms can both specialize and supply a wider range of food and delivery options for urban consumers, including supermarkets, smaller groceries, restaurants, and street foods.

This diversity of choice exists across countries and income levels. The rise of supermarkets in Africa and Asia has been particularly noteworthy in recent years. Yet the expansion of supermarkets has not been as all-encroaching as sometimes seems. As of the mid-2000s, for instance, supermarkets in sub-Saharan Africa still accounted for less than 5 percent of urban food expenditures (Traill 2006). In Nigeria, a middle-income country almost 50 percent urban, supermarkets have only 2 percent of retail food sales; convenience stores and street shops take 33 percent and traditional markets 65 percent (USDA 2014).

Many consumers, particularly low-income ones, still purchase the majority of their food in smaller, neighborhood groceries or fresh markets. Higher-income consumers may shop more often at supermarkets, but they also frequent neighborhood groceries, convenience stores, and fresh markets. A sort of dual system seems to be developing, with supermarkets taking a larger share of expenditures on non-staples and processed goods, and meats and fruits and vegetables being bought in the traditional, smaller groceries and fresh markets (FAO 2013). Even with strong supermarket presence, then, households appear to draw on a multitude of options, rather than choosing only one. And traditional groceries and fresh markets remain key food sources for urban dwellers, especially the poor (Peyton, Moseley, and Battersby-Leonard 2015).

In any case, the type of food purchased does not correlate exactly with the type of store. Processed foods or, alternatively, fruits and vegetables are available in supermarkets and also neighborhood shops and fresh markets. Mass media and marketing are also more present and persistent in urban areas, and these aim to increase demand for certain, often processed, products, without regard to type of store.

The impact of specific food sources on nutrition is not well known, though some studies have found that shopping in supermarkets is associated with higher consumption of processed foods and lower consumption of unprocessed foods, including fruits and vegetables (Demmler, Ecker, and Qaim 2018). But we do know that the availability and promotion of a wider range of food choices combined with other factors, such as convenience in the face of time constraints, have encouraged a shift from traditional diets, not always in positive ways. In general urban residents consume more meat, dairy products, and fruits and vegetables in comparison to rural dwellers. Although likely to be more adequate than a rural diet in terms of energy and protein, this diet is also more likely to be unbalanced, with higher levels of energy and salt, lower levels of fiber, and still inadequate levels of micronutrients (Ruel et al 2017).

This wide range of food choices in a city is not available to everyone, however. Some neighborhoods may exist as “food deserts,” with no easily accessible or affordable markets, or “food swamps,” areas that are flooded with outlets for highly processed, low-nutrient foods (HLPE 2017). Other families may simply feel they do not have the time to shop and cook. In both cases, families may then rely on street foods, fast-food restaurants, or other highly processed and prepared foods as significant components of their diets. The prices of these foods may be even less than if they were locally purchased and freshly prepared (HLPE 2017).

The nature of urban work and the response of business influence these changes. As employed women in urban areas tend to work away from home, to ease time burdens, households demand convenient and often prepared foods that are easy to purchase. Employed women and men and students will tend to eat more meals outside the home, at restaurants or, especially, fast-food outlets, or street food stalls. As noted above, such foods may not always contribute to a healthy diet. The physical environment both responds to and encourages this, with the rise of fast-food outlets and availability of prepared and processed foods.

In addition, although common urban jobs such as construction work or rickshaw driving, require heavy labor, urban employment is nevertheless frequently more sedentary work. And with motorized transportation, lifestyles in urban areas are generally characterized by lower levels of physical activity than those in rural areas. Thus, on average, just as these more energy-dense food options become more available, the energy requirements, as compared to rural areas, decline.

### *Urban agriculture*

Agricultural production in urban and peri-urban areas exists in various forms, from household to community gardens to commercial producers. Urban agriculture production is often concentrated among the poor. By providing direct access to nutritious foods (especially fruits and vegetables, meat from small animals and dairy), it can provide a coping strategy to guard against shocks in terms of income or seasonality. Data in one study covering over 15 low- and middle-income countries showed wide variation in participation, from 11 percent of households in Indonesia to nearly 70 percent in Vietnam and Nicaragua. Urban and peri-urban agriculture contributed 5 to 15 percent of production in most countries and was mostly geared to own-consumption rather than the market. In four countries, however, more than one-third of the production was marketed. Across countries, the contribution to income tended to be small and, in line with production, was highly variable: The contribution to overall household income was only above 10 percent in five countries – but was significant among those households that practiced urban agriculture (above 20 percent in 7 countries) (Zezza and Tasciotti 2010). A recent systematic review confirmed the general nature of these findings (Poulsen et al 2015).

New technologies may also change the face of urban agriculture, as commercial greenhouses or vertical, hydroponic, or rooftop production is now taking place even in city centers. More holistic considerations may also allow for a greater integration of production with the urban environment, developing a more contained, likely organic, production system that provides ecosystem services, such as safe use or re-use of waste waters (Liu and Grundy 2017, Goldstein et al 2016).

The city environment, however, may not favor urban agriculture. City regulations may declare agricultural production, including livestock, illegal. Land availability may be scarce, and tenure issues may arise if producers take over lots extralegally. Agricultural production also encounters challenges of how to safely access and use needed inputs, such as water and agrochemicals, and dispose of animal or crop waste. Urban planners usually make little provision for inclusion of agriculture in the urban landscape despite its potential benefits (Redwood 2009), but this may be changing as some countries show the way (Gore 2018).

### *Street foods*

Street foods can be a low-cost, easily accessible source of food for urban dwellers. They can also make up a significant proportion of the urban diet and provide a source of employment, particularly for women. Nigerian adolescents, for example, obtain between 20 and 30 percent of their energy from street foods (Bhat and Waghray 2000). Studies from the late 1990s found that street vendors in larger cities composed up to 20 percent of the labor force and created millions of dollars of revenue for the local economy (Tinker 1997). City governments, however, sometimes fail to recognize the contributions street foods can make to employment, economy, and food security, and implement overly burdensome regulations or prohibitions and fail to provide needed supporting infrastructure, such as water and sanitation. This then undermines the positive impact street foods can have and heightens the precarious situation of those employed in the sector. City experiences show, however, that policies and programs can ensure that street vendors are not a nuisance or threat to health but make a positive contribution to the urban street and food scene as well to a healthy diet (von Holy and Makhoane 2006, FAO 2007).

### *Food safety*

Food safety can be a concern as well. Here, the urban food system is clearly tied to what goes on in rural areas, as unhygienic or unsafe conditions and practices can occur throughout the food chain. Contaminated water or unsafe use of agrochemicals – in production, processing, or preparation outside or inside the home – can lead to unsafe food and disease. Heavy metals or other pathogens from urban waste water used for irrigation can contaminate production areas in urban and peri-urban areas (Amoah et al 2007). Despite beliefs that “modern” food systems are safer, studies indicate they may not be any more safe than traditional systems. For example, in East Africa informal retailers and supermarkets had a similar proportion of substandard milk samples (Randolph et al 2007).

Street foods are consistently cited as a concern in terms of food safety (Trafialek, J. et al 2018, Alimi 2017, FAO 2007), although studies have shown that street foods are generally safe if consumed shortly after cooking (Tinker 1997). Adoption of known, effective approaches to safety that cover the supply chain from production to consumption can also, and more reliably, reduce risk. Making stakeholders, including producers, vendors, and consumers, aware of food safety issues and involving them in solutions would help to support sustainable, and still profitable, actions (Alimi 2017, von Holy and Makhoane 2006). Overall, studies have shown that consumers are willing to pay a premium for safe foods (Wang, Mao, and

Gale 2008), but policies must make sure that actions do not price the poor out of consumption of the safer food, once more putting them at risk.

### *Urban employment, income, and demand*

Many of the urban poor work at insecure jobs with low and variable pay, such as petty trade, construction, and manufacturing. Although informal sector employment is significant, jobs in the formal sector are also important (Garrett 2004, Charmes 2012). These jobs, which are often also subject to seasonality, expose the urban poor to further income shocks.

Uncertain housing tenure, especially in slums or unplanned areas, exacerbates the fragility of employment among the urban poor. Price volatility that accompanies commodity price shocks or conflict can also significantly increase vulnerability. Cities may also serve as a haven for refugees or internally displaced peoples (IDP) during times of conflict and crises, creating further challenges to city services, food systems, and the overall economy (UNSCN 2012).

Compared to rural consumers who often produce a considerable proportion of the food they consume, urban consumers depend largely on food purchases. Thus, urban food consumption is highly dependent on employment (income) and food costs (including opportunity costs in terms of time). The amount allocated to food can be a significant part of the household budget. In one study of very poor urban households in 20 low- and middle-income countries, in all but two food expenditures were more than 50 percent of the household budget. Food consumption of the urban poor is therefore at risk not only because of low incomes but also because incomes depend on uncertain employment that can also be seasonally affected. Since food is a large part of the budget, it may be the expenditure share that gets squeezed in hard times.

Little research has yet been done on the influence of prices and costs generally (in a broad sense including ease of access and cost of time for acquiring, preparing, and eating food) in determining overall eating patterns. Yet we know that dependence on cash food purchases means that the urban poor are particularly vulnerable to food price shocks. We also know that price wedges and media messages can be used to influence consumer preferences, although the nutritional impact of “soda” or similar taxes is debated, and likely depends on the size of the tax and the ease of availability of substitutions. Policies can also be used to make food systems more coherent in terms of promotion of good nutrition, for example, by prohibiting the use of unhealthy additives such as trans fats in prepared or processed foods (FAO 2013, Hawkes et al 2013).

### *Health and other social services and social networks*

Health services may be available in urban areas, but lack of access and lack of time can be constraints on their use by the poor. The cost and quality of services available to the poor may pose additional barriers to getting the care needed for good health and nutrition, especially maternal and child care. For instance, in urban India, 83 percent of pregnant women in the top three wealth quintiles attended at least three prenatal healthcare visits, as opposed to only 54 percent in the poorest quintile (Agarwal 2011).

A 2014 survey showed that about one-fifth of urban dwellers have access to formal safety nets (Gentilini, Honorati, and Yemtsov 2014). Some aspects of urban areas may make it easier for implementation of social programs; others may make it more difficult. Information networks and transportation can connect urban residents to program offices, helping to raise awareness or deliver and deal with benefits issues.

Alternative service providers, including NGOs and CBOs, may be able to meet a wider range of specific needs.

While community identification may be weaker, easier mobility across an urban area may facilitate access to a wider range of social support from, say, kinship, ethnic, business, or political ties. At the same time, the transient nature of many urban poor (as migrants or simply moving due to changes in circumstances, including uncertain tenure) can be a challenge to reaching and keeping in touch with intended program beneficiaries.

The urban environment can also facilitate convergence of program activities from multiple sectors, such as health, education, nutrition, and agriculture. Such programmatic convergence leads to synergistic effects and has been shown to be essential to effectively reducing malnutrition (Newman 2013).

### *Water and sanitation and energy*

Many urban dwellers live in crowded, unplanned, environments with poor quality water sources, drainage, and waste disposal. This affects hygiene and sanitation at both community and household level. Food and water for consumption can be contaminated, compounding food- and water-borne diseases such as diarrhea with their negative impacts on illness and malnutrition. Urban communities can become havens for propagation of insect vectors of disease, including malaria. High population densities exacerbate these problems.

While the issue of water and sanitation hygiene is essential for improving urban nutrition, conditions have improved significantly since 1990. In 2012, in lower-income countries 84 percent of urban populations were using improved water sources, up from 79 percent in 1990. Access to adequate sanitation in urban areas has also improved in the same period, rising to 48 from 38 percent (WHO/UNICEF 2014).

Nevertheless, as with other urban characteristics, there is large variation across the urban landscape. In urban India, for instance, 62 percent of households from the upper three wealth quintiles had access to piped water at home, while only 18.5 percent of the poorest quintile did (Agarwal 2011). In Mombasa, Kenya, even though more than 60 percent of inhabitants of formal settlements had access to improved water sources, less than 20 percent of those in informal settlements did (WHO/UNICEF 2012). Urban dwellers may have also to pay for delivery of water when piped water is not available. A study in the urban slums of Indonesia found that purchase of drinking water was associated with greater risk of child morbidity, undernutrition, and mortality (Semba et al 2009). Again, an average hides what is a more distressing reality for many.

Greater availability of electricity in cities also means that refrigeration is more available for homes and businesses. This improves food safety and allows for purchase of a wider variety of products, especially perishables and other items that need cold storage, such as dairy and meat. By allowing households to store foods, they may purchase more, and more diverse, foods, saving time on shopping and on costs (Reardon et al 2003). As above, however, the reality of the poor may be different, since for them electricity may be available only sporadically or not at all.

### *Women's employment and children's well-being*

Women who work in urban areas are likely to work away from home. And urban women tend to breastfeed two to three months less than rural women (UNSCN 2012). Whether this puts the child at a

disadvantage depends on the nature and level of income associated with the job and the type and quality of childcare available. Data from the 1990s suggest that urban mothers are less likely to take children with them to work than rural mothers, perhaps because they work in the streets or in more formal settings, rather than agriculture where it might be easier to take a child along. Hired help and institutional care was higher in urban areas, although practically nonexistent in Asia and uncommon in Africa (Ruel et al 1999). Studies in Ghana and Guatemala suggest that, at least in the informal sector, urban women also do take their child to work with them (Quisumbing, Hallman, and Ruel 2003; Armar-Klemesu et al 2000). This at a minimum is likely to facilitate breastfeeding.

Although there would seem to be tensions and trade-offs between maternal employment, childcare, and child nutrition, the evidence on the impact of women's employment on child care and nutrition is mixed. Some data suggest urban households tend to have better complementary feeding practices (Smith et al 2005), while others find that, in fact, maternal employment is associated with childhood obesity and less time spent on caregiving and food-related behaviors (Cawley and Liu 2012).

Although the evidence is scarce, it is possible that violence or other urban conditions can contribute to stress and mental health issues, perhaps negatively affecting child or family care and work productivity. A range of social policies and programs, therefore, may be needed, including mental health support and legal protection mechanisms (UNSCN 2012).

#### *Some additional considerations*

While urban indicators of health, education, services, and even nutritional status are on average better than in rural areas, there is a problem: substantial numbers of urban residents are left out or left behind. Attention to urban nutrition will require a focus on people, not just infrastructure. It will require investment and planning with equity as an objective and inclusion of vulnerable or disempowered groups, including women, youth, ethnic minorities, indigenous peoples, and the poor, as an action. Only in this way can the large variation that exists behind the averages be addressed.

Dealing with urban nutrition also requires understanding and shaping the connections between urban areas and the countryside. There is a mutual interdependency and interaction between the two. Cities demand food and other resources from rural areas, including water and energy and, frequently, areas for waste disposal. In turn, cities provide much to rural areas. In addition to providing the demand for food, cities are the major source of agricultural inputs (such as seeds and agrochemicals), finance, and other services. Urban food demand can result in positive and negative environmental impacts on the countryside: production systems of certain crops may cause environmental damage (excess use of agrochemicals and run-off, for example) while others may lead to environmentally cleaner, more sustainable production. Shorter value chains may have cultural and economic as well as nutritional benefits for a region (UNSCN 2012).

The private sector must also take a leading role in addressing the challenges of urban nutrition and particularly in shaping a sustainable food system for healthy diets. From input suppliers to producers, aggregators, traders, processors, distributors, and marketers, both large and small, individual and corporate, and from the rural areas of production to the most urban stores and consumers, the private sector dominates food production and distribution. Business opportunities exist across food systems, and some analysts see high potential for local farmers and small and medium-size enterprises (SMEs) to provide nutritious food to the cities (RUAF 2018). Policymakers and planners must therefore promote inclusive, equitable, sustainable solutions to shape a food system that will encourage healthy diets. Given

the importance of the private sector, decisionmakers must also consider innovative solutions that make business sense and provide these actors with a profitable operating environment, even as they also direct their attention to meeting the needs of the poorest and most vulnerable with essential public goods and services.

### ***Towards Improved Urban Nutrition: Nutrition and SDG 11***

Clearly, working to achieve the key targets of SDG 11 will also address essential aspects of improving urban nutrition. The integrated approach to improving life in the cities found in SDG 11 (see Table 1), the New Urban Agenda (UN 2017), and the Milan Urban Food Policy Pact (Milan UFPP 2015) mirrors that needed to improve urban nutrition, especially through creating a more diverse, affordable food system; improving water and sanitation and health services; providing quality education for all ages, including that that improves household diets and child feeding and care practices; securing infrastructure for transport and energy; and ensuring decent employment for all.

With regard to specific SDG 11 targets, services and infrastructure for water and sanitation, health, and physical activity will have direct effects on the good health needed for good nutrition (Targets 11.1, 11.6). Improved education will have positive effects in the longer run, in terms of human capital for employment and higher incomes, and in the shorter run, in terms of better food choices, health choices, and child caring practices in the home. Improved transportation as well as innovative technologies for information, for food transformation, and for reducing loss and waste, and better planning within the city and for connecting with local and regional rural areas of production, will strengthen the food system itself so that it is more sustainable and provides affordable access to a range of nutritious foods (Targets 11.2, 11.3). Attention to generating the proper environment for urban agriculture can provide green space for diversion and livelihoods, contributing to dietary diversity and providing a potential coping strategy for the poor (11.7).

Planning and effectively executing national and regional policies can catalyze and help to dynamically integrate local and regional economies. City and regional planning can more productively and efficiently link urban, peri-urban, and surrounding rural areas, not only improving infrastructure and services but also helping to mitigate and adapt to climate change (Targets 11.3, 11.A, 11.B) With the proper lens, actions to strengthen urban-rural linkages, including more direct connections between consumers and producers, can be part of the development of a diverse, regionally-focused food system that is sustainable and provides fresh, affordable foods to urban residents. As part of this, actions can focus on protecting and valuing a region's cultural and natural heritage and local traditions and customs, thus promoting sustainability, agrobiodiversity and the use of neglected and underutilized species (Target 11.4). Addressing issues of women's equality and empowerment is also essential to improving nutrition for children and families. One key challenge is to help lower-income and less-urbanized developing countries avoid the negative side of the nutrition transition, and not "overshoot" to increasing levels of overweight and obesity as they address the problems of undernutrition.

### ***Policy and program actions***

SDG 11 really does bring together the different elements of infrastructure, services, and planning needed to make a difference to nutrition in the cities. However, SDG 11 must put people and their needs at the center of action and apply a nutrition lens to development of a coherent urban strategy and related actions in order to be effective. Actions should not only provide things and make plans but ensure

investments and policies genuinely work together to create resilient, sustainable food systems for affordable healthy diets for people of all ages, all year-round; and to ensure that the needed infrastructure and services (not only health and water and sanitation, but also energy, education, and transport) reach everyone.

Multisectoral programmatic convergence and policy coherence are critical for success. The sad lesson of many past attempts to address malnutrition is that effective interventions, even when they existed, were scattered across a geography or time. Insufficient efforts were made to ensure that all the needed interventions (which cut across sectors) reached the same beneficiaries at the same place at the same time. And effective policies at one level of governance might be undone by contradictory policies at another. Planning and actions to effectively address malnutrition in the growing cities of the world must not make the same mistakes.

Within the framework of SDG 11, and primarily drawing on elements of The New Urban Agenda (UN 2017) and the Milan Urban Food Policy Pact (Milan UFPP 2015), key actions to take include:

- Support city and regional planning and investments for services and food systems (RUAF 2018, UN 2017)

Planning should start from and be clear about the objectives: to improve nutrition for all people at all times; to create opportunities for healthy diets; and to ensure access to safe and adequate water and sanitation and health services, most especially the Essential Nutrition Actions. This should be complemented by education and nutrition-food awareness, promotion of women's equity and empowerment, and attention to energy and transport. Relevant experiences with planning and stakeholder processes, such as urban-rural food policy networks and roundtables, should be reviewed and used if appropriate.

- Encourage interdepartmental and cross-sectoral coordination at municipal and community levels, working to integrate nutrition, health, and food policy considerations into social, economic, and environment policies.
- Seek coherence among the efforts in the different sectors and among the different relevant subnational, national, regional, and international policies and processes (Milan UFPP 2015).
- As part of inclusive planning, engage communities and actors involved each of these areas.

For food systems planning, for example, this would include urban consumers, the public sector and public institutions, civil society, the private sector, and those from rural areas (producers, traders, etc). Innovations may be needed in terms of regulations or incentives for food system actors, including processors, marketers, and consumers, to promote acquisition and consumption of a healthy diet. This can include actions in terms of food labelling, nutrition awareness campaigns, including integration within the schools, and certain kinds of taxes and subsidies. Changes in policies and regulations and investment in public spaces may be needed to promote positive contributions of urban and peri-urban agriculture and encourage healthy street foods. Civil society and the private sector have major roles to play in terms of undertaking these new innovations or informational and advocacy campaigns (Milan UFPP 2015).

Government can consider prioritizing local suppliers for institutional procurement and facilitate linkages between them and urban demand. Local farmers and SMEs may need to be supported with public

investment and facilitation to promote shared use of infrastructure, pooling of resources, or connections to urban consumer demand or supply chains. Integrated policies and incentives can work to reduce food loss and waste across the supply chain (RUAF 2018). Policies can include investment support; provision of information, technical assistance and education; and creation of favorable business and production environments, all undertaken with attention to environmental sustainability. Planning can help integrate these actors with and across sectors, and can promote adoption of innovations in food production, marketing, and waste disposal. Legal and regulatory instruments, including procurement standards and food certification systems; zoning and land protection; public or public-private investment in infrastructure and services; targeted taxes and subsidies; and support for vendors (e.g., farmers' markets, business support services) are all instruments that city and regional authorities can use to help develop a safe, diverse, affordable and dynamic food system.

- Ensure services such as health, water and sanitation, energy, transport, and education reach all residents.

City planning must ensure that the needs of the underserved and excluded are met. Health systems must be shaped to address the causes of all types of malnutrition, reflective of the nature of the problem in the area. Inclusive health systems should focus on provision of Essential Nutrition Actions and prevention of NCDs. Efforts to raise nutritional awareness and knowledge are essential, through nutrition information campaigns, nutrition education, and behavior change communications activities. Public-private partnerships may be successful in providing some of these services.

### ***Knowledge Needs***

Cities cannot wait to tackle the nutrition problems in their midst even as decision makers, analysts, and planners still struggle with getting a complete picture of the urban nutrition environment and determining which actions will be most effective. Up-to-date information about prevalence and the characterization of malnutrition (especially micronutrient deficiencies) in urban areas is scarce. Studies of food consumption patterns and food sourcing are few, especially in low- and middle-income countries. National-, regional-, or city-level data are sometimes available, but are not sufficient to synthesize in global overviews or trend or comparative analyses across city type or urban-rural areas. Little of this information can be reliably disaggregated by season, location (including across city sizes or within the city), or by population or income groups.

Some city-specific studies of the urban food landscape are available (see especially those of the African Food Security Urban Network), but a general, reliable picture of the urban nutrition landscape across a country or region has yet to emerge. Such a picture would include information on the nature of food system change in urban areas and its impacts on urban livelihoods and nutritional status. Very seldom is the link to nutritional status actually made, but as a beginning we greatly need to understand better what influences consumption of a healthy (or a not-so-healthy) diet, including the effects of mass media, prices, and the built environment. Similarly, we need to know more about the nature of physical activity for labor and leisure of urban dwellers, and the environment that promotes or inhibits it, especially in low- and middle-income country cities. Some information on urban water and sanitation and electricity is available, but it, too, is not easily accessible in disaggregated form (by urban location, income group, etc.). Scant literature also exists on the how women in cities balance their roles as income-earners, mothers, and family caretakers, and how their decisions affect their child's nutrition, their own nutrition, and their ability to lead a fulfilling life.

Clearly a whole range of questions around design, implementation, and impact of policies and programs to address urban malnutrition exists, as highlighted above. This includes issues around how to link urban, rural, and regional markets while ensuring sustainable production, especially by smallholders; how to help consumers navigate the urban food landscape to improve food choices and household diets; how to encourage vendors to provide a diversity of nutritious foods and link back to sustainable, often local, producers; how to ensure food safety along the supply chain in formal and informal contexts; how to incorporate agriculture into the cityscape, livelihoods, and diets; how to encourage adequate physical activity; how to ease trade-offs for mothers between work and child care; and how to ensure the urban poor and slum dwellers have access to adequate health care, water and sanitation, electricity, and transport.

Some city examples are emerging and being shared, and the study of urban nutrition, food, and health issues has grown significantly in recent years, encouraged by initiatives such as the Food for the Cities Global Network and the Food Smart Cities for Development project. Yet systematic, comparative analyses of city experiences and rigorous evaluations of interventions that would underpin guidance on what to do and what works to address urban nutrition issues are still limited. Analyses of interventions should focus on providing insights in terms of whom to target, and how to target actions, the cost and benefits of specific interventions, and how to work holistically and effectively across sectors and across a food or health system. A key issue is how to deal with the “wicked problem” of the nutrition transition, where actions must deal with all forms of malnutrition simultaneously while not exacerbating any of them.

The questions may seem daunting, but a basic understanding of the situation and what is needed already does exist (e.g., New Urban Agenda). The key next step would seem to be to get these ideas into the planning, policies, programs, and other investments of cities around the globe and to develop a systematic plan of learning and sharing from research and experience, perhaps as part of existing platforms, so that together we can take advantage of the dynamics and opportunities in cities and human settlements to put an end to malnutrition in all its forms for people of all ages.

**Table 1. SDG 11 Targets**

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11.1 By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums	11.2 By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons
11.3 By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries	11.4 By 2030, strengthen efforts to protect and safeguard the world's cultural and natural heritage
11.5 By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations	11.6 By 2020, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management
11.7 By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities	11.A Support positive economic, social and environmental links between urban, per-urban and rural areas by strengthening national and regional development planning
11.B By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels	11.C Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilizing local materials

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**Annex 4: Linking Nutrition with Responsible Consumption and Production****SDG 12: Ensure sustainable consumption and production patterns**

The Sustainable Food Systems Programme (SFS Programme) is part of the *UN 10-Year Framework of Programmes on Sustainable Consumption and Production (10YFP)*. It is a global multi-stakeholder partnership that addresses sustainable diets as one of its principal focus themes, promoting the production and dissemination of scientific and practice-based knowledge and policy discussions with the aim to advance holistic food system policies. Sustainable diets, incorporate the three dimensions of sustainability – environment, economy and socio-cultural values – and also cover health, wellness and nutrition.<sup>24</sup>

***SDG12 and sustainable diets***

The world is currently producing enough food to feed the entire population. However, some 88% of countries face a serious burden of either two or three forms of malnutrition<sup>25</sup> (hunger/undernutrition; micronutrient deficiency (hidden hunger); and overweight/obesity) and trends predict that 1 in 3 people currently malnourished will grow to 1 in 2 people soon.<sup>26</sup> The discrepancy between food production and consumption continues to be a major global challenge and a tremendous opportunity for progress and improvement.

Many contemporary diets are characterized by high intakes of meat, fat, salt, sugar and highly processed food which pose a major risk to health, social systems and environmental life-support systems.<sup>27</sup> Globally, it is estimated that transitioning to more plant-based diets, in line with WHO recommendations on healthy eating (WHO 2015) and guidelines on human energy requirements (WHO 2004) as well as recommendations by the World Cancer Research Fund (WCRF/AICR, 2007), could reduce global mortality by 6-10% and food-related greenhouse gas emissions by 29-70% compared with a reference scenario for 2050<sup>28</sup>.

A move towards more sustainable diets and food systems could help provide the global population with sufficient, safe, and nutritious food that meets their dietary needs for a healthy life. This progression is underscored by the linkage between sustainable food systems and sustainable diets, which is clarified in the following definitions:

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<sup>24</sup>; Dernini S et al. Med Diet 4.0: the Mediterranean diet with four sustainable benefits. *Public Health Nutr.* doi:10.1017/S1368980016003177. 2016

<sup>25</sup> Peng W & Berry EM. Global Nutrition 1990-2015: a shrinking hungry, and expanding fat world. *PLoS ONE* 13(3): e0194821. <https://doi.org/10.1371/journal.pone.0194821>

<sup>26</sup> See annual SOFI reports from FAO. The 2017 report is available here: <http://www.fao.org/state-of-food-security-nutrition/en/>

<sup>27</sup> EU Standing Committee on Agriculture Research (SCAR). 2011. Sustainable food consumption and production in a resource-constrained world.). 3rd SCAR Foresight Exercise. European Commission Directorate-General for Research and Innovation; Lim SS, Vos T, Flaxman AD, Danaei G, Shibuya K, Adair-Rohani H, et al. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet.* 2012; 380 (9859):2224–60; Aleksandrowicz L, Green R, Joy EJM, Smith P, Haines A (2016) The Impacts of Dietary Change on Greenhouse Gas Emissions, Land Use, Water Use, and Health: A Systematic Review. *PLoS ONE* 11(11): e0165797.

<sup>28</sup> Springmann, M., Godfray, H. C. J., Rayner, M., Scarborough, P., 2016b, Analysis and valuation of the health and climate change cobenefits of dietary change, *Proceedings of the National Academy of Sciences of the United States (PNAS)*, Vol 113 (15), pp. 4146–4151.

- “A *food system* gathers all the elements (environment, people, inputs, processes, infrastructures, institutions, etc.) and activities that relate to the production, processing, distribution, preparation and consumption of food, and the outputs of these activities, including socio-economic and environmental outcomes” (HLPE, 2014). This includes namely nutrition and health status, socio-economic growth and equity as well as environmental sustainability.
- “A *sustainable food system* “is a food system that ensures FSN for all in such a way that the economic, social and environmental bases to generate FSN for future generations are not compromised” (HLPE, 2014).
- “*Sustainable diets*” are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources”.<sup>29</sup>

Thus, SCP is embedded in all the above definitions and plays a central role in contributing to better long-term nutritional outcomes.

### ***Nutrition and sustainable diets in the targets and indicators of SDG 12***

Although nutrition is not explicitly referred to in SDG 12, it directly relates to most of its sub-targets. Below is a list of the most relevant targets and how they may contribute to improve global FSN:

**Target 12.1** “Implement the 10-year framework of programmes on sustainable consumption and production [...]” and indicator 12.1.1 “Number of countries with sustainable consumption and production national action plans or SCP mainstreamed as a priority or a target into national policies”. The 10YFP explicitly addresses nutrition through the SFS Programme’s focus theme on sustainable diets. Furthermore, all forms of malnutrition (under and over) can be addressed through national action plans and policies on SCP that cover sustainable food systems and sustainable diets.

**Target 12.2** “Achieve the sustainable management and efficient use of natural resources”. Malnutrition can be reduced by protecting the natural resources involved in the provision of sustainable and healthy nutrition, and reducing negative environmental impacts of food production. It is estimated that more plant-based, balanced and healthier diets could reduce emissions from food production significantly below those of current diets, with potential per capita reductions of up to 55% by 2050<sup>30</sup>. These studies underline the urgent need to move towards more sustainable and healthy food- consumption patterns in the coming decades.

**Target 12.3** “[...] Halve per capita global food waste [...]”. Approximately one-third of food produced is lost or wasted. Preventing this would reduce strain on natural resources and enhance long-term food production, therefore increasing nutrition availability. In addition, safe, good quality food that is unsold may be given to organizations helping feed people in need today. Education in schools and for the general public is crucial to encourage good practices and reduce waste. (see also 12.8. *infra*)

**Target 12.4** “Achieve the environmentally sound management of chemicals [...], and significantly reduce their release to air, water and soil [...]”. This target can support sustainable and healthy diets by ensuring that food products are safe and free of toxins.

<sup>29</sup> Sustainable diets and Biodiversity, FAO, 2012; available at: <http://www.fao.org/docrep/016/i3004e/i3004e.pdf>

<sup>30</sup> Tilman D, Clark M. (2014). Global diets link environmental sustainability and human health. *Nature*. 2014 Nov 27; 515(7528):518-22. doi: 10.1038/nature13959.

Both targets 12.3 and 12.4 can also have a positive impact on nutrition since they help protect the natural resources that are necessary to provide sustainable and healthy nutrition (in line with target 12.2). This could increase availability and reduce costs. There is also a strong reciprocal relationship between food production and these targets since food production has a large impact on the environment, including where chemicals are excessively used which is neither sustainable for ecosystems nor animal (including human) life. It should be noted that food production is responsible for a major part of greenhouse gas emissions and decline in biodiversity.

**Target 12.6** “Encourage companies [...] to adopt sustainable practices and to integrate sustainability information into their reporting cycle”. This target can address malnutrition by increasing the availability and user-friendliness of information regarding product sustainability, including knowledge on nutrition.

**Target 12.8** “Ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles [...]” and indicator 12.8.1 “Extent to which [...] education for sustainable development [...] are mainstreamed in (a) national education policies; (b) curricula; [...]”. Public (and school) education and raising awareness about sustainable diets are essential for healthy, sustainable food, nutrition and lifestyle choices. These are necessary to prevent and combat non-communicable diseases such as obesity, diabetes, heart disease and some cancers.

### ***Recommendations for sustainable diets and sustainable consumption and production***

Current and expected patterns of food consumption and production, with growing populations and increasing demand for animal-based proteins, will increase pressure on the world’s limited resource base. A shift towards more sustainable diets and nutrition can be an effective tool to reduce the impact of food production on the environment.

The paradigm of ‘growth’ should broaden its boundaries beyond primary agricultural production, and include efficiencies along the whole food chain to decrease stresses on the environment. The promotion of sustainable practices and diets should stimulate demand for food with lower water requirements, lower environmental/ecological impacts, increased resource efficiency and reduced losses and waste along the value chain. Governments, businesses, organizations and consumers must all cooperate to improve the sustainability of diets and food systems.

To accelerate the shift towards SCP and sustainable diets, direction can come from the following recommendations of the 1<sup>st</sup> Global Conference of the 10YFP SFS Programme “Sustainable Food Systems for All – Catalyzing Change through Multistakeholder Action”, which took place in Pretoria (South Africa) on June 21<sup>st</sup>-23<sup>rd</sup> , 2017. Each recommendation is relevant to positioning FSN as a central issue in achieving SDG 12.

- The priority entry point in the transformation of the current food system is action to address the heavy burden of malnutrition.
- The adoption of more sustainable diets can accelerate the transformation of food systems.
- Investment is required in formal and informal food value chains that truly reflect the standards and needs of producers, local communities and consumers.
- There is an immediate opportunity for reducing food losses and waste within a country-specific and food systems context.
- It is necessary to move beyond talk, and invest in consolidated multistakeholder actions to promote and implement a holistic systemic approach to sustainable food systems.

## ***Conclusions***

Food systems and dietary patterns are key determinants of the nutrition, health and productivity of countries and their populations. At the same time, they play a significant role with regard to environmental degradation and climate change.

Nutrition and sustainable diets are core elements of SCP, of relevance to all targets of SDG 12 and beyond. Thus, achievement of SDG12 is intimately connected with improvements in sustainable diets and sustainable food systems.

The attainment of long-term, sustainable FSN, must be tackled through holistic (i.e. cross-sectoral) national policies and supra-national strategies that align healthy nutrition and food consumption with the sustainable production of food, involving all the elements and activities of the entire food system.

Multi-stakeholder roundtables and partnerships, such as those championed by the 10YFP Sustainable Food Systems Programme, are effective means to promote such integrated policies. It is essential to strengthen such multi-stakeholder engagement to achieve SDG 12, through stronger political commitment and appropriate policy environments.

**Annex 5: Linking Nutrition with Life on Land****SDG 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss'**

Agricultural biodiversity is vital for human health and nutrition, wellbeing, livelihoods and 'life on land.' Agricultural biodiversity includes the variety and variability of animals, plants and micro-organisms at the genetic, species and ecosystem levels, which sustain the functions, structure and processes of production systems. It also includes crop varieties, fodder and tree species, animal breeds, aquatic and marine species, soil biota, pollinators and the great diversity of non-domesticated (wild) species used by people.

Agricultural biodiversity is created and managed by farmers, pastoralists, forest dwellers and fishers, and remains essential to the lives of indigenous peoples and other small-scale food providers who produce and gather most of the world's food. Despite its importance to the health of both people and the planet, this broad understanding both of what agricultural biological diversity is, it gets no explicit mention in the Sustainable Development Goals. In fact, as will be noted more fully below, it is often ignored both by those concerned with nature conservation and with agricultural development. The transformation called for in Agenda 2030 will require a shift in our understanding and action to support the conservation and sustainable use of agricultural biological diversity as required by the Convention on Biological Diversity and the International Treaty on Plant Genetic Resources for Food and Agriculture.

The benefits of a more diverse diet are widely recognized. A diverse and balanced diet can ensure exposure to a broader set of nutrients and non-nutrients which have antioxidant, anti-cancer and other beneficial properties.<sup>31</sup>

Unfortunately, much of this food biodiversity is under threat worldwide, as current production and consumption revolves around only 12 major crops, with 3 crops providing close to 50% of all calories consumed. Food-based solutions, which diversify what we grow and what we eat, provide meaningful and enduring benefits to local communities and the environment. Bringing back diversity is critical for attaining healthy and sustainable food systems. Improved availability, accessibility, affordability and acceptability of food biodiversity are therefore key factors for achieving better, more sustainable diets.<sup>32</sup>

Industrial agriculture in combination with trade and investment rules and other features of globalization (viability of long-term transportation, cheap energy etc.) have a major impact on food systems around the world. These forces affect availability and access to food through changes to food production, procurement and distribution and bring about a gradual shift in food culture, with consequent changes in dietary consumption patterns and nutritional status that vary with the socio-economic strata within and between countries.

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<sup>31</sup> The micronutrient superiority of some lesser-known cultivars and wild varieties over other, more extensively utilized cultivars, has been confirmed by recent research. For example, recent analyses have shown that beta-carotene content can differ by a factor of 60 between sweet potato cultivars and the pro-vitamin A carotenoid of banana cultivars can range between 1 µg and 8,500 µg/100 grams (Burlingame et al., 2009; Litaladio et al., 2010), while the protein content of rice varieties can range from 5 to 13 per cent (Kennedy and Burlingame, 2003). As they observe, 'Intake of one variety rather than another can be the difference between micronutrient deficiency and micronutrient adequacy'. Unfortunately, we lack detailed information about such diversity within most crops at the cultivar level and the role it plays in nutrition because of the general neglect by professionals (Burlingame et al., 2009)

<sup>32</sup> IPES-Food. 2016. From uniformity to diversity: a paradigm shift from industrial agriculture to diversified agroecological systems. International Panel of Experts on Sustainable Food systems.

The recognition of the differential effect depending on socioeconomic strata goes to the heart of discussions around the forces of globalization and its nutritional impacts. It reveals without regulation, trade and investment will disproportionately benefit people who are already advantaged both within and between countries. So, for example, trade rules and subsidies may provide access to cheaper, less nutritious food to poorer people, displacing traditional systems and diets, while providing expensive off-season fruits and vegetables and more diverse diets for those with the resources to access and purchase them. The increasing global reach of obesity and other diet-related disease, as well as the pressures on farmers in traditional production systems, are therefore both rooted in the processes of globalization.

Furthermore, the focus of research and policy programmes on improving the productivity of industrial agriculture i.e. focusing on a limited number of input-responsive staple crop varieties and livestock breeds, has been to the detriment of a wider variety of traditional foods.

The rise of industrial agriculture has also had impacts on the nutrient content of foods. Several studies have shown a considerable decrease in the nutrient quality of common fruit and vegetable crops<sup>33</sup> Crop improvement has historically favoured the selection of traits such as high yield, shelf life, and appearance while neglecting favourable traits such as vitamin and mineral content and overall nutritional quality. As a result, the content of important macro and micronutrients are found to be significantly higher in traditional vegetables as compared to global vegetables.<sup>34</sup> Indeed, agricultural policies that promote specialization in energy-rich staple cereals have resulted in a decline in consumption of pulses and other minor crops with high nutritional value.

Both wild and domesticated species in agricultural landscapes support production and provide essential ecosystem functions. Important wild species include soil microorganisms, pollinators, aquatic organisms, and plant and animal pest predators. Pollination of crops by animals is estimated to contribute to approximately 35% of global food production. The quality of many provisioning, regulating and supporting ecosystem services depends on the diversity of wild species.

Homogenous diets, limited food access and poorly developed markets for underutilized, nutrient-rich species guarantee the continued proliferation of malnutrition and poverty. If terrestrial food biodiversity is a critical element in response to global malnutrition and underpins healthy, nutritious and sustainable diets, as well as supporting sustainable agriculture and sustainable food systems, from a nutritional perspective, the question is how this dietary diversity is achieved?

First, there needs to be a better understanding of the linkages between agricultural biological diversity, the other SDGs and nutrition. This is particularly true with SDG 15 which seems to reflect a historical, but artificial, tension between agricultural biological diversity and nature conservation.

Nearly all the targets of SDG 15 'Life on Land' require agroecological pathways to agricultural production the foundation of which is the agricultural biological diversity as defined in the first paragraph of this Background Paper. Nevertheless, agricultural biological diversity is not explicitly mentioned by SDG 15, not in SDG 15. 1 on conserving and restoring terrestrial and fresh water ecosystem services, or SDG 15.2

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<sup>33</sup> Mayer, A.M. Historical changes in the mineral content of fruits and vegetables, *British Food Journal* **1997**, *99*, 207-211; doi: <https://doi.org/10.1108/00070709710181540>; Davis, D.R.; Epp, M.D.; Riordan, H.D. Changes in USDA food composition data for 43 garden crops, 1950 to 1999, *Journal of the American College of Nutrition* **2004**, *23*, 669-682; doi: <https://doi.org/10.1080/07315724.2004.10719409>

<sup>34</sup> Davis, D.R. Declining fruit and vegetable nutrient composition: What is the evidence? *HortScience* **2009**, *44*, 15-19; Available online: <http://hortsci.ashspublications.org/content/44/1/15.full> (Accessed on 18 May 2018); Keatinge, J.D.H.; Yang, R.Y.; Hughes, J.D.A.; Easdown, W.J.; Holmer, R. The importance of vegetables in ensuring both food and nutritional security in attainment of the Millennium Development Goals, *Food Security*, **2011**, *3*, 491-501; doi: <https://doi.org/10.1007/s12571-011-0150-3>; Nyadanu, D.; Lowor, S. T. Promoting competitiveness of neglected and underutilized crop species: Comparative analysis of nutritional composition of indigenous and exotic leafy and fruit vegetables in Ghana, *Genetic Resources and Crop Evolution* **2015**, *62*, 131-140; doi: <https://doi.org/10.1007/s10722-014-0162-x>

on implementing the sustainable management of forests, or SDG 15.3 on restoring degraded land and soil, or SDG 15.4 on restoring mountain ecosystems including the capacity to provide benefits that are essential for sustainable development, or SDG 15.5 on reducing the degradation of natural habitats and halting the loss of biological diversity. The only reference is in SDG 15.6 'Promote fair and equitable sharing of the benefits arising from the utilization of genetic resources and promote appropriate access to such resources, as internationally agreed', an important, yet a subset of agricultural biological diversity.

There needs to be greater recognition of the interlinkages between SDG 2 and SDG 15 that goes beyond genetic diversity and seeds and recognizing the important role of agricultural biological diversity as broadly defined in health and nutrition, in providing important ecosystem services and in nature conservation. In a paper, entitled 'Agrobiodiversity considerations in land-use decisions: Reconciling agriculture and nature conservation will require greater consideration of agrobiodiversity' authors Mijatovic and Hodgkin detail the contribution of agricultural biological diversity to ecosystem services, and resilience and adaptability<sup>35</sup>. They go on to state that the importance of agricultural biodiversity and its custodians has been ignored in both conservation and agricultural development. Indeed, an artificial tension seems to underlie the disconnection amongst nature conservation, biological diversity and agricultural biological diversity. The authors suggest:

*"One way to maintain agrobiodiversity is to maintain and increase landscape complexity, to protect natural habitats and develop ecological corridors for wild species such as trees, crop wild relatives and pollinators. The maintenance of traditional land-use systems and increasing diversity in production systems in ways that are part of agroecological approaches are also important in addressing conservation concerns and supporting sustainable improvements in food production."*

Second, we need to recognize dietary diversity and a food system based approach to health diets and nutrition is not going to be served by industrial agriculture that favors mono-cropping and the focus on a few crops.

Third, in instances when trade and investment may be helpful in supporting dietary diversity and healthy diets, as currently regulated these benefits are accruing only to those who are already at an advantage with the rules pushing poorer populations in rural and urban areas towards more unhealthy and less diverse diets.

Fourth, enhanced terrestrial food biodiversity conservation can be achieved through more strategic and innovative use of locally adapted, nutrient-rich crops such as through providing better incentives to produce more nutritious and healthy foods using agroecological and other environmentally-friendly farming approaches; attention to sustainable and healthy sourcing of food including the integration of more biodiversity into public and private food procurement including school feeding programmes; the support and development of short supply chains to name but a few.

The EGM may wish to consider:

- How should the biological diversity linkages between SDG 2, 12 and 15 be reflected in terms of awareness, policy, action and/or recommendations?
- To help support synergies and interlinkages, should the EGM provide a short message that the HLPF could send to the Convention on Biological Diversity at its Fourteenth Conference of the Parties taking place in Egypt from 17-29 November 2018 that it believes in the value of embedding

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<sup>35</sup> <http://agrobiodiversityplatform.org/agrobiodiversity-considerations-in-land-use-decisions/>

the SDG 15-agricultural biological diversity-nutrition link in the new CBD Strategic Plan for 2021-2030?

- The International Treaty on Plant Genetic Resources for Food and Agriculture is developing a joint work programme on the sustainable use of plant genetic resources, are there nutrition-related components that the EGM would want to recommend to the International Treaty or its online consultation that begins in July/August 2018?
- What advice can we provide regarding raising awareness that agricultural biological diversity is essential to the resilience of agricultural production and therefore essential for the sustainability of our food supply (including in times of climate change).
- What research and messaging is needed to raise awareness and understanding of the importance of agricultural biological diversity to healthy diets?
- How do we better build agricultural biological diversity into the Rural-Urban Agenda?