HLPE REPORT 15

FOOD SECURITY AND NUTRITION BUILDING A GLOBAL NARRATIVE TOWARDS 2030

CFS COMMITTEE ON WORLD FOOD SECURITY

HLPE High Level Panel of Experts

This report by the High Level Panel of Experts on Food Security and Nutrition (HLPE) has been approved by the HLPE Steering Committee.

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FOREWORD

The High Level Panel of Experts on Food Security and Nutrition (HLPE) is the science-policy interface of the Committee on World Food Security (CFS), which is, at the global level, the foremost inclusive and evidence-based international and intergovernmental platform for food security and nutrition (FSN).

Lessons derived from the food crisis of 2007/2008 and the economic crisis of 2009 led to the reform of the CFS and the formation of the HLPE, so that decisions and the work of the CFS are based on the hard evidence of state of the art knowledge. The HLPE was created in October 2009 as an essential element of the CFS reform. The HLPE aims to facilitate policy debates and policy making by providing independent, comprehensive and evidence-based analysis and advice, at the request of the CFS. Monkombu Swaminathan, who was its inaugural Chair in 2010, suggested that the formation of the HLPE was a major step that can **"foster the emergence of a coalition of the concerned with reference to elimination of hunger**."

The HLPE reports serve as a common, evidence-based starting point for the multi-stakeholder processes of policy convergence in the CFS. The HLPE strives to provide in its reports a comprehensive overview of the topics selected by the CFS, based on the best available scientific evidence and considering different forms of knowledge. It strives to clarify contradictory information and knowledge, to elicit the backgrounds and rationales of controversies and to identify emerging issues. The HLPE reports are the result of an inclusive and continuous dialogue between the HLPE experts (Steering Committee, Project teams, external peer reviewers) and a wide range of knowledge-holders across the world, building bridges across regions and countries, across scientific disciplines and professional experiences.

In October 2018, the HLPE was asked by the CFS to prepare a report that takes stock of its contributions, in order to inform future CFS actions on FSN for all in the context of the 2030 Agenda and the Sustainable Development Goals (SDG). Following the emergence of the COVID-19 pandemic, the HLPE was asked to urgently prepare an issues paper on the potential impact of the pandemic on global food security and nutrition for an extraordinary meeting of the CFS on 19 March 2020. The key findings and recommendations from this issues paper have been updated and included in this report, and it is anticipated that the issues paper on COVID-19 will also continue to be updated by the HLPE, as needed. The current COVID-19 crisis is unprecedented in its global scale and the situation is changing rapidly, with many unknowns. It serves as a reminder of the fragility of the global food system and the importance of global coordination. On behalf of the HLPE, our thoughts go out to those affected by the COVID-19 pandemic.

Beyond immediate health concerns from the COVID-19 crisis, short-, medium- and long-term impacts are expected on food systems and on food security and nutrition. Although there are many unknowns, it is already apparent that the most affected will be the poorest and

most vulnerable segments of the population. The initial impacts of the pandemic have been in countries that have a well-developed food supply chain and modern health service. One of the major concerns is how the spread of COVID-19 will impact less developed countries, especially those that are already experiencing current food and health crises. As the virus has spread around the world, the short-term impacts to the food supply have been an increase in demand due to panic buying and hoarding of food, leading to shortages of some products. The measures put in place to "flatten the curve" of COVID-19 cases have been successful in terms of controlling the spread of the disease, but have also had significant economic impact with massive job losses, pushing people into poverty and affecting their ability to purchase food. School closures have meant, for millions of children, the loss of school meals, which help to reduce child malnutrition in many parts of the world. Restricting the movement of people has also meant the loss of access to fresh food, especially in countries that rely on local markets for fruit and vegetables. In the medium term, disruptions to the movement of farm labour and the supplies needed to grow food are starting to affect the supply side of the food chain and, if countries impose export restrictions, this could disrupt global supply chains and cause an increase in food prices. In the medium to long term, it is difficult to predict the extent and duration of the global recession. The major concern here is that the global recession could push millions of people into extreme poverty and food insecurity. Without strong social protection measures, economic stimulus and global collaboration and trade, the public health impact of food insecurity may, in the end, be far greater than the actual disease itself.

Even before the outbreak of COVID-19, the state of global food security and nutrition was already alarming, with an estimated average of 821 million people undernourished and poor nutrition causing nearly 45 percent of the deaths of children under five. The timing of this report is therefore crucial. FSN indicators showed a lack of progress on meeting SDG 2 targets when work on this report began, and the COVID-19 pandemic, which emerged while preparing this report, has only made the situation more urgent.

Drawing on the findings of previous HLPE reports over the past decade, as well as the broader scientific literature, this report's key messages are:

i. There is an urgent need for strengthening and consolidating conceptual thinking around FSN to prioritize the right to food, to widen our understanding of food security and to adopt a food systems analytical and policy framework.

ii. FSN outcomes in recent years show the extent to which the global community is falling short on Agenda 2030 targets, especially SDG 2, and that food systems face a range of challenges – and some opportunities – linked to major trends in the drivers of food system change.

iii. Policy approaches and actions for FSN, in light of the diverse challenges facing food systems, will require critical policy shifts and support for enabling conditions that uphold the six dimensions of food security.

It is always difficult to argue the counterfactual, but if one of the key objectives of the CFS reform and the formation of the HLPE was to improve our understanding of food security, it has been successful. Without doubt, we have made significant progress since the food crisis of 2007/2008 in our understanding of the complex interrelated aspects of the global food system and the policies and actions that will be needed to uphold the right to food. On the current trajectory, however, without a radical transformation, we are not currently on track to deliver against SDG 2 by 2030. If the last decade has predominantly been about improving our understanding, then the next decade must focus on accelerating the implementation of policies and innovative solutions, if we are to ensure global food and nutritional security for future generations.

The right to food is a fundamental human right that is inseparable from social justice. Feeding people is one of the primary objectives of any government, and is a part of national sovereignty. The complex and interconnected nature of food and nutritional security issues and their impacts on public and planetary health know no borders and, therefore, reinforce the importance of international coordination, not only to ensure the future health of the global food system but also for national governments to fulfil their own sovereign responsibility to feed their people.

Ten years on from the formation of the HLPE, it is appropriate to acknowledge the amazing contribution that previous HLPE Steering Committee members have made over the last decade to improve our understanding of food security and nutrition and to provide evidenced-based advice to the CFS and other actors in the global food security community. I would especially like to acknowledge the most recent outgoing chairperson, Patrick Caron, for his leadership and for encouraging that the CFS consider the work required for this report.

I would like to acknowledge the engagement and commitment of all the HLPE experts who worked on this report, and especially the HLPE Project Team Leader, Jennifer Clapp and the Project Team Members: Barbara Burlingame, William Moseley and Paola Termine.

I would like to commend and thank the HLPE Secretariat for its precious support for the work of the HLPE. The COVID-19 pandemic meant that all the Steering Group meetings and deliberations had to be virtual, which presented additional challenges and work for the Secretariat to ensure that progress on the report was maintained. This report also benefited greatly from the suggestions of external peer reviewers and from the comments provided by an even larger than usual number of experts and institutions, both on the scope and on the first draft of the report.

Last but not least, I would like to thank those partners who provide effective and continuous financial support to the work of the HLPE in a totally selfless fashion and thus contribute to the impartiality, objectivity and widely recognized quality of its proceedings and reports.

The COVID-19 pandemic serves as a timely reminder of the fragility of our global food system and the importance and urgency of the work that we do to foster the international coordination of a global strategic framework for food security and nutrition to end hunger.

Martin Cole
Chairperson, Steering Committee
of the HLPE, June 2020

ACKNOWLEDGEMENTS

This report takes stock of the amazing contribution that previous HLPE Steering Committee members have made over the last decade to improve our understanding of food security and nutrition and to provide evidence-based advice to the CFS and other actors in the global food security community. Particularly, the most recent outgoing chairperson, Patrick Caron, must be commended for encouraging the CFS to consider the work required for this report.

The HLPE warmly thanks all the participants who offered their valuable inputs and comments to the two open consultations, first on the scope of the report, and second on an advanced draft (V0). These contributions were channelled through the Food and Agriculture Organization of the United Nations (FAO) Global Forum on Food Security and Nutrition (FSN Forum). All contributions are available at www.fao.org/cfs/cfs-hlpe.

The HLPE thanks all the peer reviewers for their review of a pre-final draft (V1) of the report. The list of all HLPE peer reviewers is available at http://www.fao.org/cfs/cfs-hlpe/acknowledgements.

The following individuals are thanked warmly for their contributions, suggestions and inputs to the work of the panel: Taarini Chopra, Lucy Hinton, Reetika Khera, Nadia Lambek, Rachel Mc Quail, Tracey Wagner-Rizvi.

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ACRONYMS

CBD	[United Nations] Convention on Biological Diversity
CFS	Committee on World Food Security
CFS-FFA	Framework For Action for Food Security and Nutrition in Protracted Crises
CGIAR	Consultative Group on International Agricultural Research
CLiP	Burundi's Crop Livestock integration Project
COVID-19	Coronavirus Disease 2019
CRISPR-Cas9	Clustered regularly interspaced short palindromic repeats sequences and associated enzymes)
CSA	Climate-Smart Agriculture
CSA	Community-Supported Agriculture (subscription farming)
CSM	Civil Society Mechanism of the Committee on World Food Security (CFS)
DNA	DeoxiriboNucleic Acid
ECOSOC	[United Nations] Committee on Economic, Social and Cultural Rights
FAO	Food and Agriculture Organization of the United Nations
FERG	[World Health Organization] Foodborne Disease Burden Epidemiology Reference Group
FIES	Food Insecurity Experience Scale
FSN	Food Security and Nutrition
GIAHS	Globally Important Agricultural Heritage System
GM	Genetically Modified
GMO	Genetically Modified Organism
GHG	Greenhouse gas
H5N1	Avian Influenza
HIV/AIDS	Human Immunodeficiency Virus / Acquired Immune Deficiency Syndrome
HLPE-FSN	High Level Panel of Experts on Food Security and Nutrition
HLPF	United Nations High-level Political Forum on Sustainable Development
IARC	International Agency for Research on Cancer
IFAD	International Fund for Agriculture Development
IITA	International Institute for Tropical Agriculture
ILO	International Labour Organization
IPBES	International Platform on Biodiversity and Ecosystem Services

IPCC	Intergovernmental Panel on Climate Change
IPES-Food	International Panel of Experts on Sustainable Food Systems
ISAAA	International Service for the Acquisition of Agri-biotech Applications
MSP	Multi-Stakeholder Partnership
MYPoW	Multi-Year Programme of Work
NFSA	India's National Food Security Act
OECD	Organization of Economic Cooperation and Development
PAHO	Pan American Health Organization
PoU	Prevalence of Undernourishment
PPP	Public-Private Partnership(s)
R&D	Research and Development
RAI	Responsible Investment in Agriculture and Food Systems
SARS-CoV-2	Severe Acute Respiratory Syndrome Coronavirus 2
SDG	Sustainable Development Goal(s)
SFS	Sustainable Food System(s)
SI	Sustainable Intensification
SSB	Sugar-Sweetened Beverage
TAAS	Trust for Advancement of Agricultural Sciences
TEEB	The Economic of Ecosystems and Biodiversity
UN	United Nations
UNCBD	United Nations Convention on Biological Diversity
UNCCD	United Nations Convention to Combat Desertification
UN-CESCR	United Nations Committee on Economic, Social and Cultural Rights
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNGA	United Nations General Assembly
UNICEF	United Nations Children's Fund
UNSCN	United Nations System Standing Committee on Nutrition
UNSG	United Nations Secretary General
UN-Water	United Nations Water
USDA	United States of America Department of Agriculture
VGFSyN	Voluntary Guidelines on Food Systems for Nutrition

VGGT	Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security
WASH	Water Sanitation and Hygiene
WB	World Bank
WBG	World Bank Group
WEAI	Women's Empowerment in Agriculture Index
WFP	World Food Programme
WHO	World Health Organization
WTO	World Trade Organization

SUMMARY

In October 2018, at its 45th session, the United Nations (UN) Committee on World Food Security (CFS) requested the High Level Panel of Expert on Food Security and Nutrition (HLPE) to prepare a report that takes stock of its contributions in order to inform future CFS actions on food security and nutrition (FSN) for all in the context of the 2030 Agenda and the Sustainable Development Goals (SDG). The HLPE was specifically asked to outline a forward looking, global narrative on FSN that draws on previous HLPE publications and considers recent developments in order to provide strategic guidance towards the achievement of the SDGs, especially SDG 2. In responding to this request, this report articulates a global narrative that builds on what we know about the current situation with respect to FSN concepts, outcomes, drivers and critical policy directions that are vital for meeting SDG 2 targets and the entire 2030 Agenda.

Drawing on the findings of previous HLPE reports over the past decade, as well as the broader scientific literature, the key messages of this report are:

1 There is an urgent need for strengthening and consolidating conceptual thinking around FSN to prioritize the right to food, to widen our understanding of food security and to adopt a food systems analytical and policy framework.

2 FSN outcomes in recent years show the extent to which the global community is falling short on Agenda 2030 targets, especially SDG 2, while food systems face a range of challenges – and some opportunities – linked to major trends in the drivers of food system change.

3 Policy approaches and actions for FSN, in light of the diverse challenges facing food systems, will require critical policy shifts and support for enabling conditions that uphold all dimensions of food security.

These points are illustrated with brief case studies that draw on a wide range of experiences and contexts.

The timing of this report is crucial. FSN indicators showed a lack of progress on meeting SDG 2 targets when work on this report began. The COVID-19 pandemic that emerged while preparing this report has only made the situation more critical. The impact of this crisis has been profound, revealing many aspects of food systems that require urgent rethinking and reform if we are to assure food security and the right to food for all.

UPDATING CONCEPTUAL AND POLICY FRAMEWORKS

1. Articulating a global narrative on FSN requires a prioritization of the right to food (in other words: "the right to adequate food") as a legal framework that is essential for ensuring food security and sustainable food systems. In recent years, a growing number of states have adopted legislation to enshrine the right to food, and progress has been made in many cases, but there remains much work to be done to achieve the full realization of this fundamental human right.

2. The concept of food security has evolved to recognize the centrality of agency and sustainability, along with the four other dimensions of availability, access, utilization and stability. These six dimensions of food security are reinforced in conceptual and legal understandings of the right to food.

3. Agency refers to the capacity of individuals or groups to make their own decisions about what foods they eat, what foods they produce, how that food is produced, processed and distributed within food systems, and their ability to engage in processes that shape food system policies and governance. Sustainability refers to the long-term ability of food systems to provide food security and nutrition in a way that does not compromise the economic, social and environmental bases that generate food security and nutrition for future generations.

4. Food security and nutrition policy is best approached within a sustainable food system framework (FIGURE 2) underpinned by the right to food. Food systems encompass the various elements and activities that relate to the production, processing, distribution, preparation and consumption of food, as well as the output of these activities including socioeconomic and environmental outcomes. A food systems framework captures the complexity of the interrelationships of drivers of change at a broader scale with the functioning of food systems.

5. Sustainable food systems embody qualities that support the six dimensions of food security. Sustainable food systems are: productive and prosperous (to ensure the availability of sufficient food); equitable and inclusive (to ensure access for all people to food and to livelihoods within that system); empowering and respectful (to ensure agency for all people and groups, including those who are most vulnerable and marginalized to make choices and exercise voice in shaping that system); resilient (to ensure stability in the face of shocks and crises); regenerative (to ensure sustainability in all its dimensions); and healthy and nutritious (to ensure nutrient uptake and utilization).

6. There have been important shifts in policy approaches to food security and nutrition that are informed by the evolving understandings of food security and food systems thinking, as outlined in past HLPE reports. Policies that embrace these shifts: i) support radical transformations of food systems; ii) appreciate food system complexity and interactions with other sectors and systems; iii) focus on a broader understanding of hunger and malnutrition; and iv) develop diverse policy solutions to address context-specific problems.

7. The report articulates a theory of change (FIGURE 4) that the four critical policy shifts together, along with a stronger enabling environment, work to bring about more sustainable food systems that support the six dimensions of food security and ultimately support the realization of the right to food and the achievement of the SDGs, especially SDG 2.

CURRENT TRENDS, CHALLENGES AND POTENTIAL OPPORTUNITIES IN FOOD SYSTEMS

8. Progress on SDG 2 has been uneven. The number of people suffering from hunger in recent years has increased and the COVID-19 crisis has exacerbated the situation. Different forms of malnutrition—including overweight, obesity and micronutrient deficiencies—are also expanding at alarming rates. Food environments in different contexts are deteriorating and food safety is an ongoing concern. Food system livelihoods also continue to be precarious for many of the world's most vulnerable and marginalized people. There are also enormous external costs to the way food systems currently operate.

9. Formulating more effective FSN policy requires a deeper understanding of the underlying forces that drive food system change. It is necessary to unpack the main trends, challenges and opportunities to formulate better FSN policies. There are many important trends in various types of food system drivers.

10. Biophysical, environmental and disease trends. Climate change is having profound effects on food systems, while food systems contribute to a changing climate. Food systems are also responsible for the accelerated pace of natural resource degradation at the same time that they are affected by it. Food safety risks, hazards, pests and emerging diseases—including COVID-19—have wide ranging impacts on food security.

11. Technology, innovation and infrastructure trends. Recent years have seen growing support for innovation for sustainable agricultural production methods—such as agroecology, sustainable intensification and climate-smart agriculture—although there are some controversies over which of these approaches should be applied in which contexts. Digital technologies create opportunities for efficiencies, while raising questions about data privacy. New plant breeding technologies, such as genome editing, are seen by some as an advancement over traditional agricultural biotechnology, while others are concerned about their environmental and social implications. Ongoing weaknesses and postharvest handling and storage infrastructure present serious challenges, including high levels of food loss and waste.

12. Economic and market trends. There has been both expansion and disruption in food and agriculture markets in recent decades and ongoing debates over the implications of international food trade for food security. Progressive concentration in recent decades has also reshaped agrifood supply chains in ways that enhance the power and influence of large corporations within food systems. Financial actors have also become increasingly engaged at various points in food systems, sparking debates about whether their activities are beneficial or destabilizing. Economic weaknesses have been exacerbated by the economic fallout from the COVID-19 pandemic, with negative consequences for food security. The shift in recent decades of a significant proportion of agricultural production and land use away from human food-related activities and towards animal feed, timber and biofuels has presented trade-offs between food security and energy needs. Limited access to land, resources and markets for small-scale producers has affected rural livelihoods.

13. Political and institutional trends. Weak and fragmented FSN governance has resulted in policy inertia at different scales that threaten progress. Public sector investment in food and agriculture has declined, raising questions about the appropriate balance between the roles of the public and private sector in supporting food systems. Civil strife and conflict affect the food security of millions of people around the world.

14. Socio-cultural trends. Inequalities persist at all levels, with a negative impact on poverty reduction and food security, especially for the world's most vulnerable and marginalized people—including small-scale producers, women, youth, indigenous peoples and vulnerable food system workers. There has been slow progress on women's empowerment, which affects food security in important ways due to the multiple roles that women play in food systems.

15. Demographic trends. Population change will result in growing demand for food, although by how much will depend on consumer food choices and the ability to reduce food losses and waste. Urbanization patterns also influence food systems, particularly rural to urban migration and growing urban demand for easy-to-prepare and processed foods. Declining youth interest in agriculture presents enormous challenges for the future of food production and food system livelihoods.

POTENTIAL POLICY DIRECTIONS

16. The most promising policy directions are those that embrace the four critical policy shifts outlined in this report. Policies that follow these shifts are more likely to support the six dimensions of food security and strengthen food systems. At the same time, these policies enable food systems to mitigate threats and identify the opportunities that emerge from the trends in food system drivers.

17. Policies that promote a radical transformation of food systems need to be empowering, equitable, regenerative, productive, prosperous and must boldly reshape the underlying principles from production to consumption. These include stronger measures to promote equity among food system participants by promoting agency and the right to food, especially for vulnerable and marginalized people. Measures to ensure more sustainable practices, such as agroecology, also address climate change and ecosystem degradation. And measures to reshape food production and distribution networks, such as territorial markets, help to overcome economic and sociocultural challenges such as uneven trade, concentrated markets and persistent inequalities by supporting diverse and equitable markets that are more resilient.

18. Policies that appreciate the interconnectedness of different systems and sectors are required to ensure more regenerative, productive and resilient food systems. Improved coordination is needed across sectors and systems, such as approaches that ensure economic systems work in ways that support food systems. They also include policies that specifically address challenges at the intersection of food systems and ecosystems, which are foundational to food production. Initiatives and policies that build on lessons about inter-system connections from past crises, such as what is being learned about the COVID-19 pandemic, are also important to help make food systems more resilient in future crises.

19. Policies that address hunger and malnutrition in all its forms require food systems that are equitable, empowering, sustainable, healthy and nutritious. Policies in this area support nutrition-driven agricultural production, food environments to encourage healthy diets and the availability of diverse, fresh, local fruits and vegetables. Fundamental to all nutrition improvements are policies on infant and child nutrition, including improving rates of exclusive breastfeeding up to six months of age. Measures that address specific forms of malnutrition are also important, especially for the most marginalized populations.

20. Policies that develop context-specific solutions, taking local conditions and knowledge into account, are necessary for more resilient, productive and empowering food systems. Measures must tackle the distinct challenges that arise in diverse types of rural and urban contexts, including support for small-scale

farming systems as well as support for access to healthy foods in urban areas that link up with small-scale producers in rural areas. Unique challenges posed by conflicts are a key cause of hunger, requiring measures to support integrated food production in situations of unrest and in post-conflict areas.

21. Effective governance is necessary to support the critical policy shifts and to better enable FSN policies and initiatives to meet the SDGs, especially SDG 2. Effective governance includes a renewed commitment to multilateral cooperation and coordination, upholding established international obligations, enhanced coordination across sectors at different scales of government, as well as effective multi-stakeholder partnerships that support participation and representation, including the voices of marginalized and vulnerable groups.

22. It is important for states to encourage and support a wide range of FSN research, in particular on key critical and emerging issues as well as contentious areas. It is essential that these issues, including in the case of unforeseen crises such as the COVID-19 pandemic, receive full research consideration with respect to their impact on FSN policies and outcomes, especially their effects on the most marginalized and vulnerable groups.

CONCLUSION

23. It is vital that the global community seize this moment to adopt new FSN frameworks that widen our understanding of food security, that appreciate the complexity of food systems drivers and outcomes and embrace critical policy shifts that support all dimensions of food security, all of which are essential to upholding the right to adequate food. These conceptual frameworks and policy shifts have been consistently emphasized by the HLPE but have been unevenly applied in practice. Given the weak performance with respect to SDG 2 and all SDGs as they relate to FSN to date, the time is past due for adopting these frameworks and policy approaches in a consistent and coherent way across food systems and all food system actors.

24. The urgent and worsening FSN situation due to the COVID-19 crisis makes these findings even more timely and relevant. The crisis has been a wake-up call to address the multiple complex challenges facing food systems, and it demands measures to improve food systems to make them not only more resilient to crises, but also more equitable and inclusive, empowering and respectful, regenerative, healthy and nutritious, as well as productive and prosperous for all.

INTRODUCTION

Food systems must be transformed if the global community is to achieve the Sustainable Development Goals (SDG) by 2030, especially SDG 2 to end hunger and malnutrition in all its forms and promote sustainable agriculture by 2030. The particular call to action of the SDGs that is central to the 2030 Agenda is to "leave no one behind." This call emphasizes equity, at the same time that it underlines the importance of sustainability.

One-third of humanity is now experiencing one or more forms of hunger or malnutrition. Following years of steady decline, the number of hungry people began to rise again in 2015, reaching 821 million by 2017 (FAO *et al.*, 2019). Chronic hunger, alongside all forms of malnutrition—including overweight, obesity and micronutrient deficiencies, which affect a large and growing proportion of humanity—presents a vexing, multi-pronged challenge. At the same time, food systems face numerous other challenges, including the degradation of natural resources, climate change, conflict, population change and inequities in access to food and agricultural resources, among others. There is an urgent need for a more effective policy framework to facilitate a fundamental transformation of food systems to better address these highly complex situations.

New challenges are layered on top of this troubling picture, which further complicate the task ahead. The number of people experiencing hunger is expected to increase considerably by the end of 2020 due to the COVID-19 crisis, which has had very serious negative impacts on the global economy, food supply chains and global food security. The High Level Panel of Experts (HLPE) on Food Security and Nutrition (FSN) issued a brief report on the impact of the COVID-19 crisis on food security and nutrition (HLPE, 2020) and the analysis presented here includes additional reflections on the impact of the pandemic as it relates to the mandate of this report.

Prior to this most recent crisis, in October 2018, the United Nations (UN) Committee on World Food Security (CFS) at its 45th session asked the HLPE to prepare a report that takes stock of its contributions "with a view toward informing future CFS actions on FSN for all in the context of the 2030 Agenda," with analysis that takes into account the perspective of those most affected by food insecurity and malnutrition (CFS, 2018a). The overall aim of this report, as articulated in the CFS multi-year programme of work, is to: "elaborate in a forward-looking perspective a global narrative on FSN, enlightened by previous HLPE publications and considering recent developments in the FSN sector" in order to provide strategic guidance towards the achievement of SDG 2 and the 2030 Agenda for Sustainable Development.

In particular, the CFS requested that the objectives of the report include:

- Reflection on "the current state of knowledge, highlighting the main areas of consensus or controversy, as well as the major challenges, gaps or uncertainties."

- "Highlighting, using concrete examples, the pathways through which the CFS policy recommendations built on those [HLPE] reports have contributed or could contribute to the advancement of the 2030 Agenda, of its goals and targets, at different scales."
- "Informing the preparation of future CFS contributions to the High-Level Political Forum."
- "Identifying the main factors affecting FSN that have not been considered so far and that deserve more attention to inform future discussions towards the preparation of future CFSMulti-year Programmes of Work (MYPoW)" (CFS, 2019).

THIS REPORT RESPONDS TO THIS REQUEST FROM THE CFS

and is framed around three urgent questions:

(1) In what ways has thinking on FSN shifted in recent years as articulated in past HLPE reports, and how can these insights feed into a global narrative on how best to meet SDG 2 targets?

(2) What are the key trends and challenges affecting FSN outcomes today that might help explain stalled progress on meeting SDG 2 targets or give insight into potential opportunities to better meet those targets in future?

(3) What are some of the most promising policy directions to move beyond the challenges and achieve FSN targets toward 2030?

This report seeks to provide answers to these questions. First, it outlines key conceptual and policy understandings of FSN as articulated in past HLPE reports as well as the broader scholarly literature that are foundational to a global narrative on how to effectively meet food security and nutrition targets outlined in SDG 2. Second, it provides an overview of the dominant trends that matter for FSN outcomes around the world today, highlighting challenges, barriers and potential opportunities. Finally, it presents examples of critical policy directions that are vital to addressing the pressing problem of stalled progress on meeting SDG 2 targets.

The overall narrative[1] articulated in this report builds on what we know about the situation, including scientific advances, the vast array of small and big innovations on the ground, and civil society and peasant mobilizations for equitable access to resources and social justice. It also highlights areas where we currently lack knowledge, issues that are controversial and where further research is needed. This report proposes a strengthening and consolidation of thinking, policy approaches and actions, drawing on multiple stakeholders and forms of knowledge to achieve the required results. The main elements of this narrative are the following:

1. With respect to conceptual thinking that informs policy, the report highlights the importance of agency and sustainability as key dimensions of food security alongside the four other widely referenced dimensions: availability, access, utilization and stability. It also emphasizes the need for food policy to embrace a sustainable food systems framework, underpinned by this wider conceptualization of food security with the right to food as a guiding principle. Policies that support sustainable food systems embrace four critical policy shifts: (i) they propose radical transformation of food systems as a whole to achieve Agenda 2030 goals; (ii) they recognize the complexity and interconnectedness of the food system with a range of other systems and sectors; (iii) they

1 The term "narrative" implies that the authors are telling a cohesive story or rendition of a situation, rather than sharing a set of disarticulated facts. Narratives also reflect the collective or prevailing wisdom on a topic. As such, narratives may evolve or change over time as new information emerges. Sometimes dominant narratives may persist in the face of contrary evidence, but they eventually change as counter narratives emerge (Leach and Mearns, 1996).

address hunger and all forms of malnutrition; and (iv) they appreciate context-specific situations that require diverse solutions. These critical policy shifts can be supported with key enabling conditions, including more effective governance at multiple scales and a robust research agenda, to continually build knowledge on what types of initiatives and policy approaches work best. While an approach to FSN policy that incorporates these interconnected ideas has been emphasized in previous HLPE reports, it has not been evenly adopted in policy actions in practice.

2. Regarding the key trends and challenges, the report highlights a series of emerging and ongoing developments that have complex implications for all six dimensions of food security and for food systems more broadly. These include trends in FSN outcomes, as well as trends that are occurring in other domains that are drivers of food system change, including: biophysical and environmental; technology, innovation and infrastructure; economic and market; political and institutional; socio-cultural; and demographic. These trends have profound effects on food systems and intersect with FSN outcomes in important ways. These influences are complex, often presenting challenges and, in some cases, opportunities for food security and nutrition. While experts are in wide agreement with respect to the implications of some of these trends for food security and nutrition, others are subject to considerable debate or are just emerging and we lack full information regarding their implications for FSN. The report notes the areas of agreement and controversy, and where more research is necessary to gain a fuller understanding of the potential impact and implications for policy.

3. Drawing on HLPE reports as well as analysis in the wider literature, the report outlines suggestions for policy directions to effectively address these challenges in ways that build more resilient food systems that can better enable actors and stakeholders at all levels to contribute to meeting all SDGs, but especially SDG 2. The suggested policy directions embrace the critical shifts in approach identified in Chapter 1, which are essential to supporting the six dimensions of food security and addressing the challenges and opportunities for FSN and food systems identified in Chapter 2. These policy directions recognize the complex interaction of the different dimensions of food security and the need for policies to support sustainable food systems that build on the right to food.

The timing of this report is critical. The year 2020 marks the 10th anniversary of the establishment of the HLPE, while 2030, the deadline to reach the SDGs, is only 10 years away. It is also just one year after the declaration of the UN Decade on Family Farming (2019 to 2028) and one year before the start of the UN Decade on Ecosystem Restoration (2021 to 2030). Furthermore, it marks the mid-way point of the UN Decade of Action on Nutrition (2016 to 2025). The report will also inform the Convention on Biological Diversity's upcoming 15th Conference of the Parties (COP 15), which will be adopting a global biodiversity framework, COP 26 of the UN Framework Convention on Climate Change that is scheduled for 2021, as well as the 2021 UN Food Systems Summit.

While some progress has been made over the past decade on some of the key challenges to food security and nutrition that are the focus of this report, in responding to the SDG call to "leave no one behind," this report stresses an immediate need for creative solutions at multiple levels to meet the Agenda 2030 goals. This challenge is especially pressing at this time when the COVID-19 pandemic is presenting new and serious threats to food security and nutrition, and revealing clearly which aspects of food systems are not functioning well. We must urgently seize the current moment to fundamentally transform food systems in ways that improve their resilience in order to fully meet the SDGs, especially SDG 2, and to re-balance priorities in food systems to improve their ability to ensure all people are food secure at all times.

Chapter 1

UPDATING CONCEPTUAL AND POLICY FRAMEWORKS

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A first step in mapping out a coherent global narrative around FSN and sustainable development is to take stock of the evolution in thinking regarding our understanding of FSN and the most promising FSN policy approaches over recent decades. This chapter provides a brief review of the key conceptual and policy elements central to such a narrative, outlining the main approaches and findings articulated in past HLPE reports and in the wider literature. These include: the prioritization of the right to food as a legal framework that is essential for meeting FSN goals; advances in our understanding of the concept of food security to encompass six dimensions (availability, access, utilization, stability, agency and sustainability); the importance of adopting a sustainable food systems framework for analysing FSN drivers and outcomes that are essential for informing policy developments; and the critical policy shifts needed to support sustainable food systems. The chapter ends with a brief look at how advances in thinking on these issues come together in a theory of change that links consistent application of the critical policy shifts to more sustainable food systems that support the six dimensions of food security, which are necessary to realize the right to food and for meeting all Agenda 2030 goals, especially SDG 2.

PRIORITIZING THE RIGHT TO FOOD

HLPE reports have consistently stressed the right to adequate food as a key guiding principle in support of food security and nutrition. The right to adequate food is recognized as a fundamental human right to be upheld by states as duty bearers in the 1948 Universal Declaration of Human Rights, which also underscores the indivisibility and interdependency of all human rights (UNGA, 1948). States have the duty, obligation and responsibility to respect, protect and fulfil human rights, including the right to food, under international law, as outlined in Article 11 of the 1966 International Covenant on Economic, Social and Cultural Rights (UN, 1966). Governments reaffirmed "the right of everyone to have access to safe and nutritious food, consistent with the **right to adequate food** and the fundamental right of everyone to be free from hunger" in the Rome Declaration on World Food Security adopted at the World Food Summit in 1996 (UN, 1996).

The UN Committee on Economic, Social and Cultural Rights, General Comment No.12 The Right to Adequate Food (1999) detailed the content and obligations contained in the right, summarized by former UN Special

Rapporteur on the right to food, Olivier de Schutter as follows: "The right to food is the right of every individual, alone or in community with others, to have physical and economic access at all times to sufficient, adequate and culturally acceptable food that is produced and consumed sustainably, preserving access to food for future generations" (de Schutter, 2014). The General Comment affirmed that "the right to adequate food is indivisibly linked to the inherent dignity of the human person," and that it is "inseparable from social justice, requiring the adoption of appropriate economic, environmental and social policies, at both the national and international levels, oriented to the eradication of poverty and the fulfilment of human rights for all" (UN-CESCR, 1999, p.2). The General Comment also specified the "respect, protect and fulfil" obligations of states, which includes their responsibility: to refrain from measures that may remove existing access to adequate food; to ensure that enterprises or individuals do not take actions that deprive people from access to adequate food; and to facilitate access to food by proactively engaging in "activities intended to strengthen people's access to and utilization of resources and means to ensure their livelihood, including food security" (UN-CESCR, 1999, p. 5).

Although governments have endorsed the principle of the right to food and have enshrined it in legal frameworks at the international level, implementation of that right has been uneven in practice. Member governments of the Food and Agriculture Organization of the United Nations (FAO) Council reaffirmed the right to food at the 2002 World Food Summit and requested that guidelines be developed on the right to food to support their realization (FAO, 2002). In 2004, the Voluntary Guidelines to Support the Progressive Realization of the Right to Adequate Food in the Context of National Food Security (also referred to as the Right to Food Guidelines) were adopted unanimously by the 127th Session of the FAO Council (FAO, 2005) to encourage more states to realize this right in practice. In recent years, a growing number of states adopted legislation to enshrine the right to food, and progress has been made in many cases, but there remains much work to be done to achieve the full realization of this fundamental human right (CFS, 2018b; FAO, 2019a).

AN EVOLVING UNDERSTANDING OF FOOD SECURITY

Understandings of the concept of food security have changed and evolved in important ways over the past 50 years (e.g. Maxwell, 1996; Shaw, 2007; Berry *et al.,* 2015), and these updated insights have been consistently reflected in HLPE reports. The term "food security" was first defined at the World Food Conference in 1974, amid a time of soaring food prices and widespread concern about the impact of market turmoil on world hunger. In that context, food security was defined as "[the] availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices" (FAO, 1974). This definition reflected the dominant thinking at that time that hunger was predominantly the product of lack of availability of sufficient food supplies at the global level and of international price instability.

Within a decade, however, valuable research that sought to explain why famines arose historically in certain contexts, despite widespread food availability, led to important breakthroughs in our understanding of food insecurity (Sen, 1981). This work showed that availability is only one component of the broader picture of why hunger persists, and that a person's ability to access food is extremely important. It also showed that there are a number of factors, such as market conditions, employment and livelihood viability, and ownership of assets that help to explain why some of the world's most vulnerable people have been unable to access food even in situations of abundant food supply. This insight was reflected in FAO's 1983 definition of food security as "Ensuring that all people at all times have

both physical and economic access to the basic food that they need" (FAO, 1983), and the World Bank's definition of food security as "access of all people at all times to enough food for an active, healthy life" (World Bank, 1986, p.1).

In 1996, the definition of food security was further updated, to incorporate nutritional and cultural dimensions (FAO, 1996), and with the addition of the word "social" in FAO's 2001 *State of Food Insecurity* report, this remains the most authoritative and widely used definition of the concept today:

> *Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life.*

This definition features four important dimensions that have been seen as central to the concept over the previous decades—including not just availability and access, as outlined above, but also utilization (referring to nutritional uptake) and stability (referring to the constancy of the other three dimensions). These four dimensions have also been highlighted consistently in the academic literature on food security and nutrition (Webb *et al.,* 2006; Barrett, 2010). In 2006, FAO published a policy brief to capture and reinforce these four key dimensions of food security as important for identifying policy pathways to improve food security (FAO, 2006).

These four dimensions of food security are also recognized—either explicitly or implicitly—within legal interpretations of the right to food. The 1999 General Comment specifically mentions food availability and accessibility, including both economic and physical access. It also references dietary needs, which equates to utilization, as well as the need for states to ensure vulnerable population groups and individuals to receive adequate food even in times of severe resource constraints, which equates to stability (UN-CESCR, 1999). The connection between the right to food and these four dimensions of food security is reinforced in the 2004 Right to Food Guidelines where these dimensions are explicitly stated (FAO, 2005).

RECOGNIZING AGENCY AND SUSTAINABILITY AS KEY ASPECTS OF FOOD SECURITY

Although the above four dimensions of food security remain central to the concept, they still miss some elements that have come to be seen as essential for transforming food systems in the direction needed to meet the SDGs. Specifically, as emphasized in previous HLPE reports, "agency" and "sustainability" are vital dimensions of food security that flow directly from the principle of the right to food, that, while not new, deserve to be further elevated within conceptual and policy frameworks. The addition of these dimensions to common understandings of food security reflects findings and analyses in the scholarly literature over the past decade, as outlined below.

AGENCY

Agency is widely accepted as a key aspect of the development process (Kabeer, 1999; World Bank, 2005; Ibrahim and Alkire, 2007). Agency is defined by Sen (1985, p.203) as "what a person is free to do and achieve in pursuit of whatever goals or values he or she regards as important." Agency goes beyond access to material resources in that it includes empowerment—the ability of people to take actions that help improve their own wellbeing, as well as their ability to engage in society in ways that influence

the broader context, including their exercise of voice in shaping policies (Alsop and Heinsohn, 2005). Governments have an important role to play in providing the institutional context and in developing public policies that enable the exercise of agency, by supporting democratic, inclusive and participatory processes and institutions. Most agency is situated, meaning that it is constrained by local power dynamics, wealth disparities, gender norms, and governance structures (Peter, 2003). Societal inequalities often reflect differences in agency among different individuals, groups and government institutions, which in turn affect development opportunities and outcomes (World Bank, 2005). Having the ability to exercise agency in ways that allow one to be spared of deprivation is a basic human right and, as stressed by the World Bank (2012), leads to better development outcomes.

Just as agency matters for development more widely, it is also vital for ensuring food security (Burchi and de Muro, 2016; Chappell, 2018; Rocha, 2007). In this context, agency implies the capacity of individuals or groups to make their own decisions about what foods they eat, what foods they produce, how that food is produced, processed and distributed within food systems, and their ability to engage in processes that shape food system policies and governance. Historically disadvantaged individuals and communities (including women, small-scale agricultural producers, indigenous peoples, pastoralists, fisherfolk, vulnerable food system workers, marginalized communities, and poor people in urban areas, for example) often lack agency with respect to food security and food systems, and often experience disproportionate levels of food insecurity. At the same time, other actors (such as donors and large corporations) may have disproportionate agency or power in shaping the way we think about food insecurity–– including defining the solutions and influencing the contours of food environments (HLPE 12, 2017; Schurman, 2017). It is widely recognized that governments have an important role to play in strengthening both the individual and collective capacity of disempowered people to have a greater role in shaping their food systems, including creating political spaces for debate where power differentials are minimized and enhancing their food security outcomes by improving their nutritional capabilities (Burchi and de Muro, 2016; HLPE 12, 2017; HLPE 14, 2019).

The concept of agency in food systems is deeply connected to human rights, including the right to food. The right to food recognizes agency, as human rights are intrinsically about individual and community capabilities and freedoms. The Voluntary Guidelines on the Progressive Realization of the Right to Adequate Food (Right to Food Guidelines), adopted unanimously by all FAO member states in 2004, reinforces the importance of agency to realizing the right to food by calling upon states to "promote and safeguard a free, democratic and just society in order to provide a peaceful, stable and enabling economic, social, political and cultural environment in which individuals can feed themselves and their families in freedom and dignity" (FAO, 2005, Guideline 1). The Right to Food Guidelines also explicitly call on states to ensure that right to food strategies and policies are developed, implemented and monitored through inclusive processes that ensure the participation of women and other vulnerable groups, and that they facilitate consumer choices (FAO, 2005, e.g. Guidelines 3, 8, 9 and 11). At the same time, exercising agency requires recognizing and upholding rights. This point is emphasized in HLPE 14, which stresses that, "Achieving agency implies the need for access to accurate information, the right to such information and to other aspects of food security, as well as the ability to secure such rights, including access and control over the resources required for production, harvesting and preparation of foods" (HLPE 14, 2019, p.66).

SUSTAINABILITY

Sustainability is widely recognized in the broader literature as being integral to the concept of food security (e.g. Lang and Barling, 2012; Garnett, 2013; Berry *et al.,* 2015; Béné *et al*., 2019; Béné *et al*., 2020), and is a central idea in policy initiatives such as the SDGs (UN 2019a). Sustainability

refers to the long-term ability of food systems to provide food security and nutrition today in such a way that does not compromise the environmental, economic, and social bases that generate food security and nutrition for future generations (adapted from HLPE 8). Sustainability as a dimension of food security implies food system practices that respect and protect ecosystems—the very basis of the food system—over the long term, in their complex interaction with economic and social systems required for providing food security and nutrition (El Bilali *et al.*, 2018; Meybeck and Gitz, 2017; Carlsson *et al.,* 2017).

It is vital to incorporate sustainability into the concept of food security and nutrition because growing trends such as climate change and degradation of natural resources, as well as growing social and economic inequality, undermine the capacity of ecological systems to interface with social and economic systems to support diverse and healthy food production and food system livelihoods into the future. Thus, it is imperative to ensure that ecological, social and economic systems work together in ways that are regenerative and provide FSN into the long future. This longer-term outlook is not readily captured by the stability dimension of food security, which was originally added to take into account shorter-term disruptions, such as conflict, natural disasters and market turmoil, which can rapidly undermine food security (FAO, 2006). This longer-term outlook considers the capacity of the linkages between the natural resource base, livelihoods and society to continually maintain systems that support food security, and ensures that the needs of future generations are taken into account.

Sustainability is recognized as an important aspect of ensuring the right to food. The Right to Food Guidelines explicitly refer to the importance of sustainability in meeting states' obligations to uphold and protect the right to food. The Guidelines specifically call on states to "consider specific national policies, legal instruments and supporting mechanisms to protect ecological sustainability and the carrying capacity of ecosystems to ensure the possibility for increased, sustainable food production for present and future generations" (FAO, 2005, Guideline 8). Further, sustainability is a key feature of nearly all HLPE reports, including most recently HLPE 14 and HLPE 12. For food systems, the concept and metric of the ecological footprint provides a useful representation of the sustainability dimension in that it takes into account not only **what** people consume but also **how** it is produced, processed, transported and used. The use of this metric encourages practices that maintain or enhance natural capital and discourages those that deplete it (HLPE 14, 2019). As the 2017 review of the HLPE contributions to CFS in support of the SDGs notes: "When looking at FSN, sustainable development in its different dimensions has actually been central in the narrative of most of the HLPE reports" (HLPE, 2017d).

The inclusion of agency and sustainability is already implicitly considered in the widely accepted definition of food security, as depicted in FIGURE 1. The mention of "at all times" implies not only short-term instabilities in food systems, but also the long-term dimension that the sustainability dimension captures. The mention of "all people" as well as "food preferences" in that definition signals the importance of some key aspects of agency, as it is important that all people have the capacity not only to access sufficient and nutritious foods that meet their dietary needs, but also their free choice as to the foods they eat and produce. Agency also underpins all other dimensions of food security by stressing the capacity of individuals and groups to engage in policy processes and decision-making that shapes the other dimensions of food security (Rocha, 2007; Chappell, 2018).

The six dimensions of food security, summarized in BOX 1, are all interconnected through a complex web of relationships. For

FIGURE 1
IDENTIFYING SIX DIMENSIONS OF FOOD SECURITY IN ITS CURRENT DEFINITION

BOX 1
THE SIX DIMENSIONS OF FOOD SECURITY

Availability	Having a quantity and quality of food sufficient to satisfy the dietary needs of individuals, free from adverse substances and acceptable within a given culture, supplied through domestic production or imports.
Access (economic, social and physical)	Having personal or household financial means to acquire food for an adequate diet at a level to ensure that satisfaction of other basic needs are not threatened or compromised; and that adequate food is accessible to everyone, including vulnerable individuals and groups.
Utilization	Having an adequate diet, clean water, sanitation and health care to reach a state of nutritional well-being where all physiological needs are met.
Stability	Having the ability to ensure food security in the event of sudden shocks (e.g. an economic, health, conflict or climatic crisis) or cyclical events (e.g. seasonal food insecurity).
Agency	Individuals or groups having the capacity to act independently to make choices about what they eat, the foods they produce, how that food is produced, processed, and distributed, and to engage in policy processes that shape food systems. The protection of agency requires socio-political systems that uphold governance structures that enable the achievement of FSN for all.
Sustainability	Food system practices that contribute to long-term regeneration of natural, social and economic systems, ensuring the food needs of the present generations are met without compromising the food needs of future generations.

example, food must be available if it is to be accessible, but it is not accessible to all unless individuals and groups have the ability to exercise the agency that enables them to acquire the foods they need and shape food systems to meet their preferences. Likewise, if food is not produced using sustainable practices, its stability and utilization are put at risk, which in turn, threatens availability and access over the longer term. While these aspects of food security are sometimes referred to as "pillars" in the literature, the term "dimensions" is a better fit. Pillars might imply separate elements of equal weight in all situations, while dimensions allow for an appreciation of more complex interactions between them and also different emphasis in importance in different situations (Berry *et al.,* 2015).

SUSTAINABLE FOOD SYSTEM FRAMEWORK

There is growing recognition of the need to approach food security and nutrition policy within a food systems framework underpinned by the right to food as a guiding principle (HLPE 12, 2017; Salcedo Fidalgo and Morales, 2019). This approach recognizes the interrelatedness of food systems with other systems, and in turn appreciates the complex interaction of all the SDGs (Waage *et al.,* 2015). Progress on SDG 2, on hunger and malnutrition, for example, has a direct bearing on progress on SDG3, on health, and vice versa. SDG 6, on access to clean water and sanitation, is necessary for food production as well as good nutrition. SDG 12, on responsible production and consumption, is necessary to achieve food security and nutrition in a sustainable manner. SDG 14, on fisheries, and SDG 15, on terrestrial biodiversity, also have direct relevance for SDG 2 as both aquatic and terrestrial ecosystems support food production.

The HLPE 8 (2014, p.29) defined food systems as follows:

> *"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 output of these activities, including socio-economic and environmental outcomes."*

A food systems framework, as outlined in HLPE 12, recognizes the complexity of relationships among the systems that support food production, food supply chains, food environments, the behaviours of individual consumers, diets, and nutritional and wider outcomes that feed back into the system (see also Fanzo *et al*,. 2020; Maestre, Poole, and Henson, 2017; Béné *et al.,* 2019). The systems that support food production include ecosystems, human systems, energy systems, economic systems and health systems, which provide essential inputs into the food system.

Food supply chains (also often referred to as food production and distribution networks), are an important component of food systems, and include all the stages and actors, including private sector businesses, from production to trade, processing, retail marketing, consumption and waste disposal (HLPE 12, 2017). Food supply chains are increasingly complex, characterized by specialization of production and distribution systems. As food typically moves from production

to consumption, flows of payments for food commodities typically move in the opposite direction, while investment funds flow into each stage of supply chains in complex ways. Food supply chains draw on supporting ecological, human, energy and economic systems to produce and distribute food, while also providing livelihoods for those who work at various points in the production-to-distribution continuum.

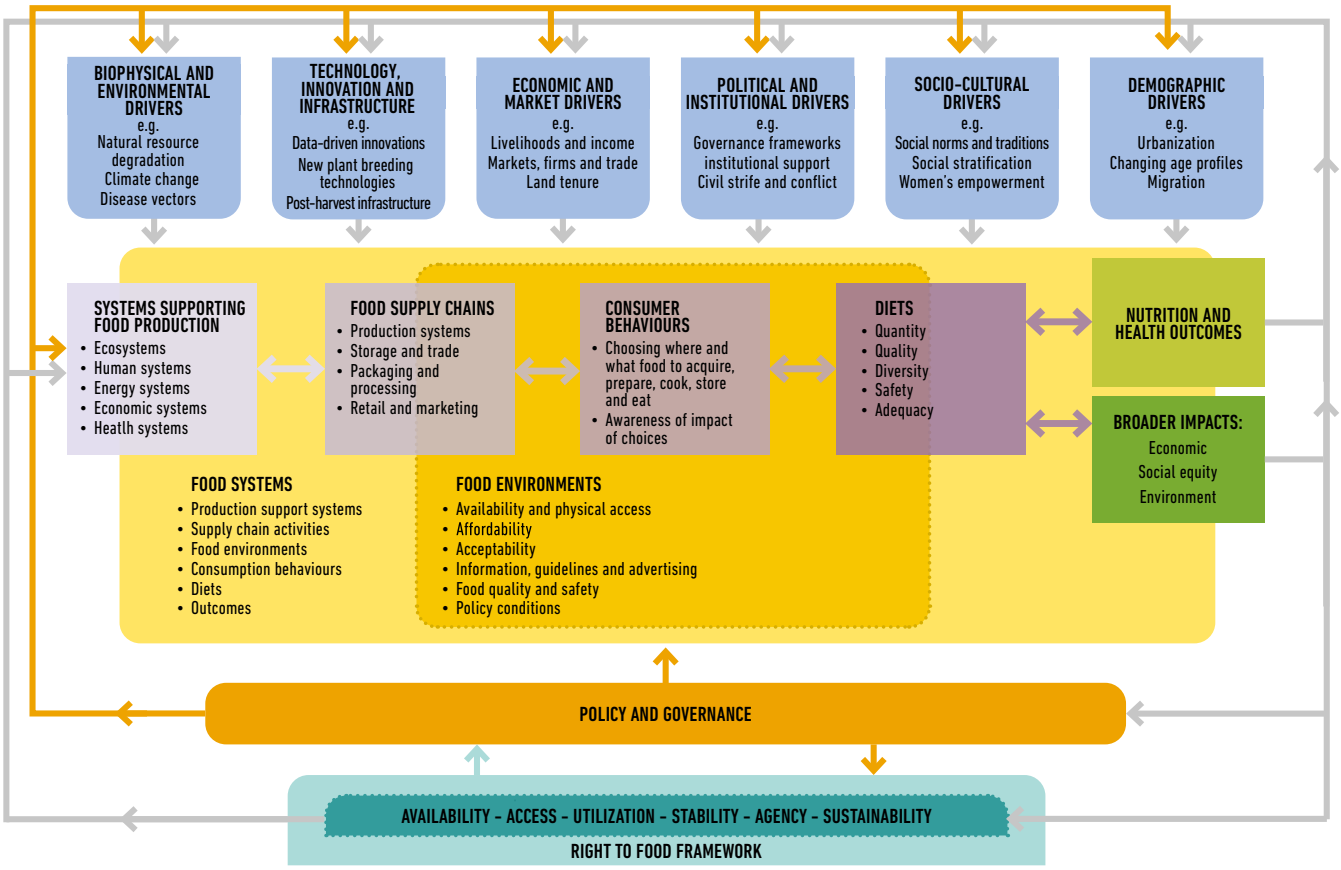
Food environments refers to the physical, economic, socio-cultural and policy conditions that shape access, affordability, safety and food preferences (Kraak *et al*., 2014; HLPE 12, 2017; UNSCN, 2016). Food environments typically overlap with food supply chains, consumer behaviours and diets. Consumer behaviours respond to food environments and are comprised of individual awareness and decisions on where and what foods to acquire, prepare and eat. These individual decisions ultimately shape diets in terms of quantity, quality, diversity, safety and adequacy of food (Downs *et al*., 2020). Diets in turn shape outcomes that affect other systems, such as nutritional impacts within populations that affect health systems, as well as the climate impact of diets that affect ecosystems, for example. These linkages create feedback loops that shape the drivers of food system change and the policies that address it (Burlingame, 2019). Well-nourished individuals and communities are key throughout food systems for ensuring positive outcomes (Lawrence *et al*., 2019) and those outcomes feed back into food systems by influencing people's ability to work and to exercise agency within the system. Ultimately, these outcomes are shaped by, and further shape, the drivers that influence food systems, as well as policies that respond to those outcomes.

A food systems framework captures the ways in which complex drivers of change at a broader scale affect the functioning of food systems, often with uncertainty and unforeseen consequences that feed back into the system (Béné *et al.,* 2019). Private companies, industry and legal frameworks, for example, often shape food environments, which can be major drivers of poor health and environmental degradation (by promoting diets high in calories, added sugars, saturated fats and ultraprocessed foods) (Swinburn *et al*., 2019). In turn, environmental degradation (resulting from unsustainable diets) can exacerbate negative impacts on health, for example, from climate change and agricultural pollution associated with land clearing and highly industrialized modes of agriculture (IPES-Food, 2016). Here we group the main drivers of food system changes into six broad categories: biophysical and environmental; technology and innovation; economic and market; political and institutional; socio-cultural; and demographic (adapted from Ingram, 2011, in HLPE 12, 2017). These food system drivers are discussed in more detail in Chapter 2.

Policy and governance systems interact with food systems in complex and iterative ways (Candel, 2014; McKeon, 2015; Pérez Escamilla *et al*., 2017). Food governance encompasses both formal and informal rules, norms and processes that shape policies and decisions that affect food systems. The key actors engaged in food governance include public actors, such as governments and intergovernmental organizations, civil society, such as non-governmental agencies and social movements, and private sector actors, such as businesses. Food policy and governance seeks to shape food system outcomes, and in doing so seeks to shape the ways in which drivers of food system change affect food systems, consumer behaviours, and the rules by which supply chain actors must operate, all of which ultimately flows through to outcomes. Food system policy and governance that are guided by the principle of the right to food are most likely to support the six dimensions of food security. These relationships are depicted in FIGURE 2 below.

According to FAO(2018a), food systems are sustainable when they "deliver food security and nutrition for all in such a way that the economic, social and environmental bases to generate food security and nutrition for future generations are not compromised." Sustainable food systems embody qualities that support the six dimensions of food security. These qualities

FIGURE 2
SUSTAINABLE FOOD SYSTEM FRAMEWORK



SOURCE: ADAPTED FROM HLPE 12, 2017

are: **productive and prosperous** (to ensure the availability of sufficient food); **equitable and inclusive** (to ensure access for all people to food and to livelihoods within that system); **respectful and empowering** (to ensure agency for all people and groups to make choices and exercise voice in shaping that system); **resilient** (to ensure stability in the face of shocks and crises); **regenerative** (to ensure sustainability in all its dimensions), and **healthy and nutritious** (to ensure nutrient uptake and utilization). In practice, just as the six dimensions of food security are interrelated, so too are these qualities of sustainable food systems deeply interconnected. When food systems embody these qualities in an integrated, holistic way, they are more likely to support the realization of the right to food and to meet the goals of the 2030 Agenda, especially SDG 2.

AN EVOLVING POLICY AGENDA

Until recently, global food security policy approaches largely focused on increasing food production, to address availability concerns, and indeed some policy initiatives still prioritize food production over other goals for the food system. While huge strides have been made in increasing global food production, there is widespread agreement that this is not only insufficient to address all dimensions of food insecurity, but such an approach may actually be counterproductive (Garnett *et al.*, 2013;

Burlingame, 2014). Global food and nutrition insecurity is a highly differentiated problem, especially at its edges where those who are hard to reach are situated. Although increasing food production addresses part of the variegated food and nutrition challenge, it has become clear that we need a more nuanced set of approaches to address other dimensions of food security beyond availability. This more nuanced approach, building on the sustainable food system framework, will more effectively reach the one in nine people in the world who are chronically hungry today and will also address all forms of malnutrition, such as overweight, obesity and micronutrient deficiencies.

A food security and nutrition policy approach that is grounded in a sustainable food systems framework embodies critical policy shifts that have been occurring in recent decades and which have been consistently advocated by the HLPE across all of its reports (HLPE, 2017d):

i. SUPPORT FOR A RADICAL TRANSFORMATION OF FOOD SYSTEMS AS A WHOLE TO IMPROVE FSN AND ACHIEVE AGENDA 2030

HLPE reports complement a growing literature that stresses the need to move beyond food policies that focus exclusively on agricultural supply and demographic change to instead implement policies that support fundamental changes to food systems as a whole in order to meet SDG 2 and support all the SDGs in an integrated way (e.g. IPES-Food, 2016; Willet *et al*., 2019). Food system transformation thus requires a shift from an exclusive focus on quantity, to addressing multiple dimensions of **quality.** In this context, quality refers to, for example, the ability of citizens to exercise agency to shape food systems in ways that meet their needs and preferences, the sustainability of production systems (HLPE 14, 2019), the resilience of food production and distribution networks, and consideration of the health and nutritional dimensions of food at all stages from production to consumption (HLPE 12, 2017; Fan, Yosef and Pandya-Lorch, 2019; Burlingame, 2020), among other important characteristics of food systems.

ii. RECOGNITION OF THE COMPLEX INTERLINKAGES BETWEEN FOOD SYSTEMS AND MULTIPLE SECTORS AND SYSTEMS THAT DRIVE CHANGE IN FOOD SYSTEMS

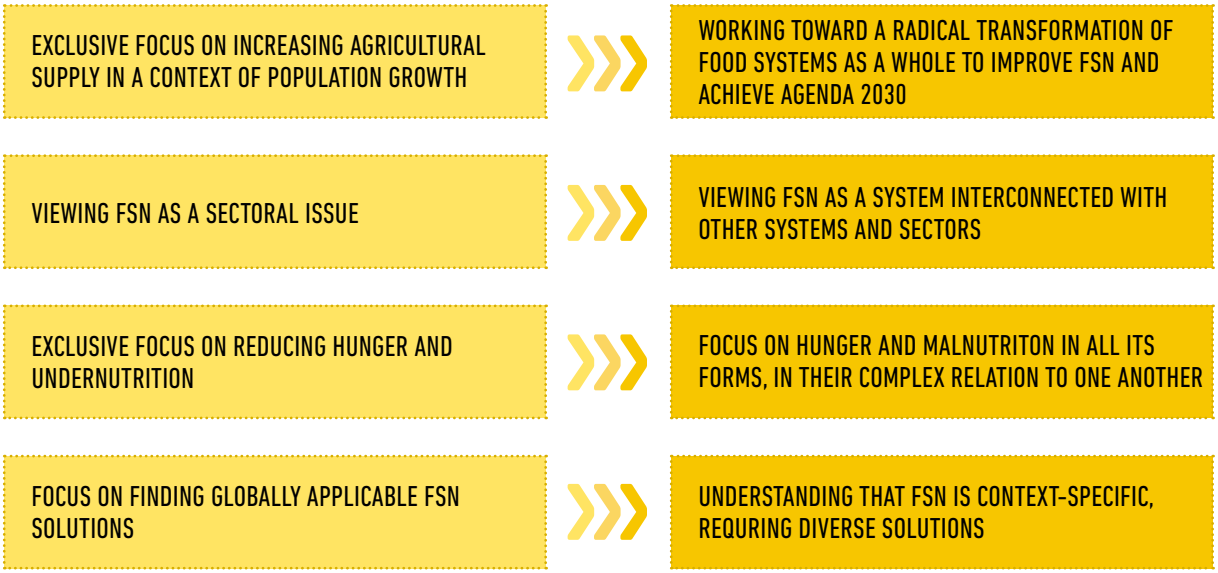
HLPE reports, as well as a number of other international assessments, have consistently highlighted linkages among different systems and sectors as well as among all the SDGs with each other and in their relation to food systems (e.g. IPES-Food, 2016; Willett, 2019; Swinburn *et al*., 2019). These findings illustrate a shift from seeing FSN policy as a sectoral issue to viewing food systems as connected in complex ways with other sectors (health, agriculture,[1] environment, culture) and systems (such as ecosystems, economic systems, social-cultural systems, energy systems and health systems).

iii. FOCUS ON HUNGER AND ALL FORMS OF MALNUTRITION

HLPE reports, along with a growing body of scholarly and policy literature, have consistently shown the need for a shift from a focus exclusively on hunger and undernutrition as the main FSN problem—albeit one that remains a huge challenge and should not be underestimated—to one that includes all forms of malnutrition, including not just chronic undernourishment but also overweight and obesity, micronutrient deficiencies, and diet-related non-communicable diseases (HLPE 12, 2017; HLPE 14, 2019; WHO, 2013; Swinburn *et al*., 2019). These diverse forms of malnutrition can coexist in the same country, community, household and even in the same individual at different phases of the life cycle. As such, it is important to focus on inequalities and at-risk populations in all countries, from low- to high-income. Among the structural aspects of food insecurity and right to food violations that stand out are deep inequalities in terms of power, income, gender and access to natural resources and services.

1 In this report, the term "agriculture" is used in its broad connotation which includes farming, animal production, forestry, fisheries and aquaculture, and related activities.

FIGURE 3
CRITICAL SHIFTS IN POLICY APPROACHES ADVOCATED BY THE HLPE



SOURCE: ADAPTED FROM HLPE, 2017d

iv. TAKE THE DIVERSITY OF SITUATIONS INTO ACCOUNT AND PROPOSE VARIABLE AND CONTEXT-SPECIFIC SOLUTIONS

Each context is specific and calls for policies that are designed and adapted for each situation. The consistency of this finding illustrates a shift from focusing solely on overarching global solutions to appreciating diverse situations that require diverse solutions. In previous reports (HLPE 10, HLPE 11, HLPE 12, among others), the HLPE highlighted the diversity of food systems across and within countries. These food systems are situated in different environmental, socio-cultural and economic contexts and face diverse challenges. Hence, policy actors need to design context-specific transition pathways to sustainable food systems. Such pathways combine technical interventions, investments and enabling policies and instruments, and incorporate different types of knowledge, including local and indigenous knowledge. They also involve a variety of actors at different scales. Yet, both incremental transitions at local scales, and more structural changes to institutions and norms at larger scales, are required in a coordinated and integrated way to achieve the transformation of food systems towards FSN and sustainable development.

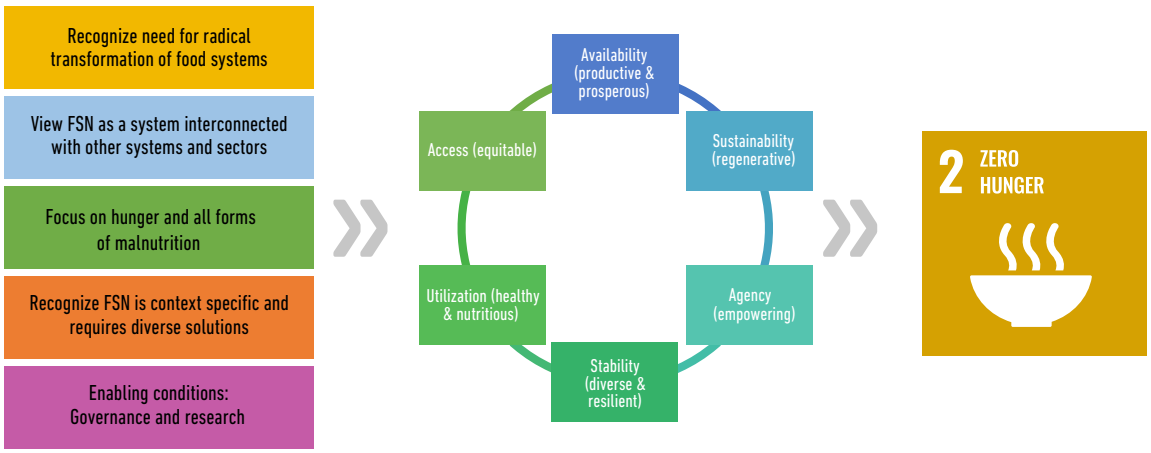
These four policy shifts are complementary to one another, and together reinforce a shift toward a new policy framework that supports more sustainable food systems. The adoption of a policy approach that incorporates these shifts brings HLPE insights, which are grounded in the scholarly and policy literatures (e.g. Caron *et al.*, 2018; IPES-Food, 2016; Swinburn *et al.*, 2019), more fully into policymaking in a consolidated and coherent way. As summarized in the review of HLPE contributions to CFS for SDG 2 by the High-Level Political Forum on Sustainable Development (HLPF), it is necessary to take the full complexity and interplay of these FSN policy elements into account when developing food security policy and programmes (see HLPE, 2017d). These policy shifts are summarized in FIGURE 3 and will be discussed in greater detail in Chapter 3.

TOWARDS A GLOBAL NARRATIVE: ARTICULATING A THEORY OF CHANGE

Transforming food systems to improve their resilience and ability to meet Agenda 2030, especially SDG 2, requires a policy approach that consistently embraces the four policy shifts noted above. These shifts together work to bring about more sustainable food systems that support the six dimensions of food security and ultimately support the realization of the right to food. By making food systems more resilient, these policy shifts improve the ability of food systems to overcome the many challenges they face. The connection between these concepts is illustrated in FIGURE 4, which depicts this report's theory of change. For example, the shift toward a radical transformation of food systems, because it focuses on improving the quality of food systems as a whole, encourages food systems that are more empowering, equitable, regenerative, productive and prosperous. The shift toward policies that appreciate the interconnectedness of different systems, because it focuses on ensuring that systems work synergistically in positive ways rather than working at cross purposes, encourages more regenerative, productive and resilient food systems. The shift in policies to address hunger and all forms of malnutrition, because it focuses on ensuring nutritious foods are available for all people, encourages food systems that are equitable, empowering, and healthy and nutritious. And the shift toward more context-specific policies, because it takes local conditions and knowledge into account, encourages more resilient, productive and empowering food systems.

By supporting more sustainable food systems, these four policy shifts, when embraced together, enable food systems to overcome many of the challenges they face, and they open up opportunities for initiatives to thrive that better support the achievement of the 2030 Agenda, and especially SDG 2. These policy directions and

FIGURE 4
THEORY OF CHANGE



SOURCE: AUTHORS

initiatives, and the ways in which they address food system challenges, will be examined in more depth in Chapter 3.

These four policy shifts are more likely to be sustained in a coherent and consistent way when supported by key enabling conditions. Most importantly, effective governance mechanisms that encourage and sustain coordination at different scales, from the global through to the local level and across sectors, is vital. The principles of representation and participation are central to effective governance mechanisms, and for FSN this means incorporating the voices of vulnerable and marginalized groups that are key participants in food systems. Support for research is also important for enabling the four policy shifts to be consistently upheld in FSN policies. A robust research agenda across all dimensions of food systems helps to build understanding and knowledge of the kinds of policy initiatives that are most likely to result in meaningful progress in meeting Agenda 2030, especially SDG 2.

TO SUM UP THIS CHAPTER, it is important for various actors—including governments, civil society, individual citizens, the private sector and institutions—to come together more consistently around a new consolidated approach to FSN which:

(1) is guided by the principles and legal framework of the right to food;
(2) expands conceptualizations of food security to six dimensions, to more consistently incorporate agency and sustainability alongside availability, access, utilization and stability, as supported by the literature and states' obligations with respect to the right to food;
(3) is grounded in a sustainable food systems analytical framework; and
(4) encourages policies that -
    i) support radical transformations of food systems emphasizing multiple dimensions of quality
    ii) appreciate food system complexity and interaction with other sectors and systems
    iii) focus on a broader understanding of hunger and malnutrition
    iv) develop context-specific policy solutions to address diverse problems.

Chapter 2

CURRENT TRENDS, CHALLENGES AND POTENTIAL OPPORTUNITIES IN FOOD SYSTEMS

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SDG 2 calls for an end to hunger and all forms of malnutrition, and for the promotion of sustainable agricultural systems that improve the productivity and income of small-scale food producers, especially, women, indigenous peoples, family farmers, pastoralists, and fisherfolk (UNGA, 2015). Food system outcomes to date, however, have been highly uneven, and progress on SDG 2 has been lacklustre at best, even as world food production in terms of dietary energy currently exceeds the needs of the population (Willett *et al.*, 2019). Understanding these uneven food system outcomes, and the lack of progress on SDG 2, requires a deeper understanding of the underlying forces that drive food system change. Unpacking the main trends to see the state of the situation, and where the main challenges and opportunities lie, is a vital step in formulating better FSN policies. This chapter first provides a brief snapshot of key trends with respect to food system outcomes that point to the need to better understand the root causes of these dynamics. It then examines in more depth a number of trends in the drivers of food system change. The food system approach is helpful for analysing these trends, as the situation is highly complex, and it is difficult sometimes to disentangle the drivers and outcomes that feed back into one another.

FOOD SYSTEM OUTCOMES: KEY TRENDS IN BRIEF

INCREASING HUNGER

After a period of steady progress, the number of people who suffer from hunger has increased for the third year in a row. As a result, more than 820 million people in the world were chronically undernourished, as measured by the SDG 2 indicator 2.1, prevalence of undernourishment (PoU), in 2018 (FAO *et al.,* 2019). Among the regions with the highest PoU in 2018 were sub-Saharan Africa (22.8 percent), the Caribbean (18.4 percent and South Asia (14.7 percent (FAO *et al.*, 2019). Measured by the SDG 2 indicator 2.1.2, prevalence of moderate or severe food insecurity based on the Food Insecurity Experience Scale (FIES), just over 700 million people experienced severe food insecurity in 2018, while another 1.3 billion people experienced moderate food insecurity, for a total of 2 billion people, roughly one quarter of the world's population, facing food insecurity (FAO *et al.,* 2019). The COVID-19 crisis and global economic recession will likely increase these numbers significantly in the coming year (WFP, 2020a). The World Food Programme (WFP) estimates that an additional 130 million people will experience acute hunger as a result of the pandemic, with particular concern for countries across sub-Saharan Africa and the Near East (Khorsandi, 2020).

DIFFERENT FORMS OF MALNUTRITION ARE EXPANDING

Different forms of malnutrition are also expanding. In 2016, some 1.9 billion adults, around 40 percent of people over 18 years old worldwide, were overweight, and about one-third of those people —650 million—were obese (WHO, 2020a). Rates of overweight and obesity among children and adolescents is also high and rising. Overweight and obesity contribute to around 4 million deaths worldwide every year (FAO *et al.,* 2019). At the same time, approximately 1.5 billion people suffer from one or more forms of micronutrient deficiency, that is, a low-quality diet lacking in crucial vitamins and minerals—for example, vitamin A and iron—which are necessary for good health. Micronutrient malnutrition can affect undernourished and overweight people alike (FAO *et al.,* 2018). All told, nearly one in three people face at least one form of malnutrition.

UNEVEN QUALITY OF FOOD ENVIRONMENTS

Food environments are uneven in quality across different locations, even within the same country, and in many contexts are becoming increasingly unhealthy. Lack of nutrition education, loss of traditional knowledge and food practices, limited access to affordable fresh and nutritious foods and targeted advertising of ultraprocessed foods all contribute to poor-quality food environments. With economic growth, urbanization and globalization, countries often go through a "nutrition transition" whereby consumption of highly processed foods increase (HLPE 12, 2017; Popkin, Adair and Ng, 2012). Consumption of high-energy beverages and snacks, as well as other processed and ultraprocessed foods have been on the rise in lower middle-income countries, especially in urban areas (Baker and Friel, 2016). In higher-income countries, the trend has been less stark in recent years, with a plateau or slight decline from a relatively high level of ultraprocessed food consumption (Baker, 2016).

ONGOING FOOD SAFETY CONCERNS

Unsafe food is responsible for a large number of illnesses and deaths worldwide, which has an important effect on socio-economic development. These illnesses can be acute or chronic, and can be caused by agents such as bacteria, viruses, parasites, mycotoxins, chemical contaminants, heavy metals and natural toxins. As noted by the WHO Foodborne Disease Burden Epidemiology Reference Group (FERG), 31 food-borne hazards were responsible for around 600 million food-borne illnesses and 420 000 deaths in 2010. These figures likely underestimate the extent of the problem, particularly because many people do not consult a physician to address diarrhea, a common symptom of food-borne disease. The estimated burden of food-borne disease is comparable to other major infectious diseases such as HIV/AIDS, malaria and tuberculosis. Even as food safety has improved in recent decades, new risks have emerged as food systems and environments change and become more complex (Nayak and Waterson, 2019).

PRECARIOUS FOOD SYSTEM LIVELIHOODS

Agriculture provides livelihoods for over a billion people, and there are approximately 500 million family farms worldwide, many of which operate at a small scale (ILO, 2020; Graeub *et al*., 2016). While the share of agriculture in total worldwide employment declined from around 40 percent to 26.8 percent in the past two decades, the percentage of the population engaged in agriculture in many developing countries remains high, reaching as high as 60 percent in many low-income countries (ILO, 2020). With agricultural transformation, some jobs lost in agriculture may be created in other stages of the food system, such as food processing and retail, but being accounted under manufacturing or services underestimates the importance of food systems for employment (World Bank, 2017). In Africa and Asia, agriculture and food systems are an important provider of employment and livelihoods. There are wide differentials in agricultural productivity across

different regions, what some refer to as "yield gaps" (e.g. van Ittersum *et al.*, 2013), however, as well as differences in income generation from agriculture in different parts of the world (Ricciardi *et al.*, 2018). The livelihoods of many food producers and workers across all parts of food systems, many of whom are vulnerable, are highly precarious due to uneven power relationships in food systems (IPES-Food, 2016). The COVID-19 crisis has made this clear, with many migrant farmworkers and food processing sector workers being most vulnerable to the disease.

EXTENSIVE EXTERNAL COSTS OF FOOD SYSTEMS

While there is growing political support for the idea of sustainable food production, including agroecological farming methods, as discussed in more detail below, there are still enormous ecological impacts and stressors associated with much of the world's food production that impose costs that are often externalized (TEEB, 2018). Food systems have an enormous impact on climate, freshwater resources, soil fertility, biodiversity and marine environments, as discussed in more depth below. A number of analyses indicate that food systems have crossed several of the proposed "planetary boundaries" that establish a safe operating space within which humanity must stay to ensure long-term sustainability (Rockström, *et al.*, 2009; Springmann *et al.*, 2018; Willett *et al.*, 2019).

FOOD SYSTEM DRIVERS: KEY TRENDS

There are numerous trends in the drivers of food system change that influence food system outcomes as they relate to Agenda 2030. These trends are organized here according to the type of food system driver that they represent: biophysical and environmental; technology, innovation and infrastructure; economic and market; political and institutional; sociocultural; and demographic. These trends, discussed only briefly here due to space constraints, are deeply interconnected and interact with one another in complex ways, even across these categories of drivers. They also play out in differentiated ways in different parts of the world. Some of these drivers are more direct, and others more indirect in terms of their impact on FSN and food system outcomes, although the direct and indirect aspects of these trends often intersect in ways that are not always easy to disentangle.

Some of these trends clearly present barriers to meeting the SDG targets by affecting outcomes in negative ways, while others may present opportunities, or have more ambiguous or debated effects, that require further research to fully understand. FIGURE 5 illustrates the challenges and vulnerabilities affecting each of the six dimensions of food security that emerge from an analysis of these trends. There are likely to be other important trends and challenges that emerge in the future, and as such this list is not meant to be static or exhaustive, but rather illustrative of the ways in which food system outcomes are influenced by major trends occurring not just within food systems themselves, but also trends in the wider political, economic and environmental spheres that have a bearing on food systems.

BIOPHYSICAL, ENVIRONMENTAL AND DISEASE TRENDS

CLIMATE CHANGE

It is widely recognized that agriculture is one of the sectors most vulnerable to the impacts of climate change due to its dependence on natural resources and weather conditions. Climate change is already having an impact on food security due to temperature rises, changes in precipitation patterns and an increase in the occurrence of extreme weather events (IPCC, 2019; Mbow *et al.*, 2019). Climate change can affect agricultural production, including through decreases in yields, changes in abundance and distribution of aquatic species, droughts and water scarcity, extreme temperature stresses, changes in forest productivity, growth in the presence of weeds and emergence of new pests, viruses and food-borne diseases, with resulting

FIGURE 5

CHALLENGES AFFECTING THE SIX DIMENSIONS OF FOOD SECURITY

AVAILABILITY

- Yield gaps
- Declining public sector investment in agriculture
- Lack of research/training in support of low external input agriculture
- Lack of resource rights and support for women farmers
- Inefficiencies in production, post-harvest handling and transport
- Weak incentives at producer level
- Degradation of environment, natural resources and biodiversity
- Climate change affecting productivity
- Food losses and waste
- Labour constraints in farming systems
- Weak storage infrastructure

ACCESS

- Lack of affordability of healthy food
- Food import dependence
- Poverty and precarious livelihoods
- Income inequality
- Uneven quality of food environments
- Gender, class, age and intra-household differences in access
- Weak infrastructure for distribution and access to markets for small-scale producers
- Concentration in retail markets and increased distance between production and consumption

UTILIZATION

- Hidden hunger/micronutrient deficiencies
- Rising levels of obesity
- Poor dietary diversity
- Food safety challenges
- Unhealthy and unsustainable diets
- Changing dietary patterns with increased incomes and urbanization
- Lack of safe drinking water and sanitation
- Diseases that hinder nutrient absorption
- Unequal gender divisions of labour and limited time working women can devote to cooking and feeding
- Lack of access to reliable information on nutrition
- Uneven quality of food environments

STABILITY

- Conflict, migration and geopolitical tensions
- Seasonality of food availability
- Climate emergencies, natural and human-made disasters
- Economic crises, trade disruptions, volatile food prices
- Biotic stresses (diseases, insect pests, parasitic weeds)
- Food safety crises
- Changing food/feed/fuel/timber demand
- Income variability throughout the year
- Heightened vulnerability of production systems to shocks

SUSTAINABILITY

- Climate change affecting future production
- Biodiversity loss damaging genetic diversity
- Degradation of natural resources
- Resource inefficiencies and pollution from overuse of agrochemicals
- Ecological and economic costs of unsustainable agriculture
- Unsustainable diets
- Precarious food systems livelihoods
- Declining youth interest in agriculture
- Population change and urbanization

AGENCY

- Disparities in wealth and income affecting choices
- Gender inequities constraining choices
- Uneven local and global power dynamics affecting individual and community decisions on food systems
- Corporate power shaping food supply chain dynamics
- Uneven trade rules that may disadvantage some farmers and consumers
- Uneven agency and knowledge in making informed decisions on own diets and food choices
- Weak and fragmented food systems governance
- Weak political institutions
- Failure of states to uphold the right to food
- Uneven land and resource distribution
- Uneven access to information and technology

increases in food prices and negative impacts on health, food safety and nutrition (HLPE 3, 2012; IPCC, 2019). Increasing weather variability and natural disasters associated with climate change are also affecting agricultural productivity, which has ripple effects that impact food trade and consumption (FAO *et al.,* 2019).

The impact of a changing climate will also have important effects on food systems more broadly (IPCC, 2019; Mbow *et al*., 2019), which vary by region, with the bulk of the negative impact being concentrated in tropical developing regions and temperate dry areas, where there are already high rates of hunger and poverty (FAO, 2016a). In sub-Saharan Africa and the Near East, for example, drought is one of the major factors contributing to an increase in undernourishment. In addition, impacts on agricultural yields and livelihoods are predicted to worsen with time (FAO, 2016a). In addition to dryland areas, mountain regions and small island developing states are also particularly vulnerable to climate change (IPCC 2019). The effect of climate change on various forms of malnutrition is a further challenge (Fanzo *et al*., 2018; Swinburn *et al*., 2019). Obesity, undernutrition and climate change have important synergistic adverse effects on each other (Dietz, 2020). There is also some evidence that climate change is reducing the nutritional content of food crops (Smith and Myers, 2018).

While food systems are impacted by climate change, agriculture is also the second largest economic sector contributing to greenhouse gas (GHG) emissions after energy (IPCC, 2019). FAO estimates that agriculture, forestry and land-use change generate one-fifth of GHG emissions. The contribution of food systems to global GHG emissions is even greater due to the impact of agrochemicals production, transport and storage, and agro-processing and retailing (FAO, 2016a).

ACCELERATED PACE OF NATURAL RESOURCE DEGRADATION

Food systems increasingly face other environmental stresses that interact with climate change and affect food security and nutrition outcomes in complex ways (Herrero Acosta *et al.,* 2019). These stresses include biodiversity loss, water scarcity, deforestation, land degradation, soil fertility loss and pollution that arise from land-use changes, a great proportion of which are related to the expansion of agriculture and food production activities (HLPE 11, 2017; HLPE 14, 2019). More than one-third of the terrestrial land surface is now under agricultural cultivation or used for animal husbandry. Although this expansion of land under cultivation for agriculture is associated with increases in food production, there is wide agreement that the degradation of the natural resource base associated with these activities threatens the resilience of the sector and, ultimately, the food security, in the longer term (IPBES, 2019). Resource degradation undermines ecosystem services such as water filtration, carbon absorption and pollinator diversity, all of which are essential to healthy agricultural systems (HLPE 14, 2019). More than three-quarters of global food and agriculture crops, for example, rely on insect and/or animal pollination that is increasingly under threat from land and resource degradation (IPBES, 2019). Nearly one-third of global fish stocks are overexploited, a problem exacerbated by degradation and loss of fish habitats (Brown *et al.,* 2019).

Agriculture uses significant amounts of water, and is responsible for an average 70 percent of total freshwater withdrawals, reaching as high as 95 percent in some developing countries (Campbell *et al.,* 2017). Agricultural nutrients, pesticides and other contaminants are also major causes of water pollution, which if not carefully managed imposes substantial social, economic and environmental costs. Water use grew at nearly twice the rate of population growth over the last century. About 4 billion people live under conditions of severe physical water scarcity for at least one month per year, and around 1.6 billion people, nearly one-quarter of the world's population, lack the necessary infrastructure to access water. In the face of competing demands for manufacturing, domestic use and thermal power generation,

there will be little scope for increasing the amount of water used for irrigation. Water scarcity affects economic growth prospects, including agriculture and food production (UNESCO, UN-Water, 2020).

The threat to agrobiodiversity has been ongoing for decades but has reached crisis levels in recent years. FAO estimates that some 75 percent of the world's crop diversity was lost between 1900 and 2000 with the most rapid decline occurring after 1950 (FAO, 2010). This decline in diversity occurred alongside the growing practice of monoculture cultivation. Three cereals account for more than 40 percent of the world's food calorie supply (FAO, 2016a) and underpin global diets that are becoming increasingly homogenous (Khoury *et al*., 2014). There is a decline in the variety of plants being cultivated and a dwindling number of species of animals being reared around the world. There is a growing incidence of extinctions of food and agriculture related domestic breeds of mammals while at least 2 000 livestock breeds used for food and agriculture are at risk of extinction (FAO, 2019b; IPBES, 2019). There are few conservation efforts for crop wild relatives, which are essential for ensuring food security. As the diversity of cultivated crops, crop wild relatives, and domestic animal breeds declines, agroecosystems become less resilient to stresses such as climate change, pathogens and other pests (IPBES, 2019).

FOOD HAZARDS AND EMERGING DISEASES

A range of diseases and hazards affect food systems in complex ways. Food-borne illnesses are most commonly caused by diarrheal disease agents, such as bacterial, viral and parasitic organisms that can spread in both water and food, especially in cases of unsanitary handling and preparation of food. Children under 5 years old account for approximately 40 percent of the food-borne disease burden. The highest burden of food-borne disease is among people who live in regions with low-incomes, including countries in Africa, Southeast Asia and the Eastern Mediterranean (Havelaar *et al.*, 2015). Diarrhea is a major cause of malnutrition and is the second highest cause of death in children under age 5. Other food-borne hazards include mycotoxins such as aflatoxin, heavy metals such as arsenic, and agricultural chemicals including many herbicides and insecticides, which are known and probable carcinogens found in food supplies (IARC, 2020).

New diseases have also emerged on the global scene which have important implications for food systems and food security. Most recently, COVID-19, a respiratory disease caused by a novel coronavirus, surfaced in China in late 2019 and quickly spread to nearly every country in the world, with the World Health Organization (WHO) declaring a global pandemic in early March 2020. The COVID-19 crisis has had important implications for food security and nutrition (HLPE, 2020). As the prevalence of the disease accelerated, there were disruptions to food supply chains as people engaged in panic buying of food. There were outbreaks among workers on farms and in meat packing plants, and measures to contain the disease disrupted the movement of both food and farm labour. Food access was compromised in this situation, as a broader economic slowdown that accompanied policies to contain the pandemic led to losses of jobs and incomes, especially for the poorest and most vulnerable segments of the population. The supply, demand and access effects of COVID-19 are interconnected with one another and affect food systems in complex ways, and ultimately affect FSN outcomes in both the short and the long term (see Box 6 in Chapter 3). Other serious zoonotic diseases with linkages to food systems prior to the COVID-19 outbreak include Ebola and H5N1 avian influenza.

Other infectious diseases that are not transmissible to humans also affect animals in food systems. The deadly African swine fever, a viral disease that originated in wild boars and that now also affects farmed pigs, has been around for nearly a quarter of a century, but saw a major resurgence across Asia and Europe in 2018/2019. The disease led to the death of nearly one-quarter of the world's pigs by 2019 (Dixon,

Sun and Roberts, 2019), including around half of the pigs in China, and disrupted global meat supply chains.

Another crucial component in the fight against infectious diseases is the challenge of antimicrobial resistance. On one hand, antimicrobial drugs are important for treating diseases and their use protects both human and animal health. On the other hand, antimicrobials are often overused for treating and preventing diseases in livestock, aquaculture and crop production. Antimicrobial drugs have also been used to promote animal growth, which increases the risk of antimicrobial resistant micro-organisms that can spread (Hughes and Heritage, 2004). Some studies show that exposure to antimicrobial-resistant bacteria can be spread through food (FAO, 2020).

SURGING PESTS

Recent years have seen a resurgence of a variety of pests that threaten agricultural productivity in rich and poor countries alike. While some of these pest problems are cyclical in nature, there is growing concern that the expansion of this problem is linked to environmental change as well as certain farming methods. Climate change will, for example, most likely increase agricultural crop losses due to insects (Deutsch *et al.*, 2018). The fall armyworm, for example—a transboundary pest originating in the Americas and feeding on maize and other crops—has spread to sub-Saharan Africa, the majority of Asian countries and Australia since 2016, and could lead to immense crop losses annually, affecting especially small-holders (FAO, 2018b). Another pressing example is the current locust swarm that has been affecting the Horn of Africa and parts of the Near East and South Asia since late 2019. The locust swarms in East Africa in 2020 have been the worst the region has experienced in 70 years (Roussi, 2020). Food availability is directly threatened by these locust surges. Regions currently experiencing both insect pests and the arrival of COVID-19 simultaneously are facing an enormously complex situation that has direct consequences for food security.

Weed pests are also increasingly threatening agricultural productivity. It is widely understood that the increasing use of herbicides to control weeds, for example, in conjunction with crops engineered to withstand the spraying of those chemicals and in herbicide-reliant, no-till farming models, has contributed to the growing problem of difficult to control weeds that are resistant to the application of herbicides (Bonny, 2016; Beckie *et al.*, 2019). Weed problems can undermine agricultural productivity as they compete with crops for vital nutrients. This tendency has led to growing use of more toxic herbicides, which contribute to the pollution of soils and waterways, which can threaten soil biodiversity (European Environment Agency, 2020), aquatic life, (HLPE 7, 2014) and affect human health.

TECHNOLOGY, INNOVATION AND INFRASTRUCTURE TRENDS

GROWING SUPPORT FOR INNOVATION IN SUSTAINABLE AGRICULTURAL PRODUCTION METHODS

Increased awareness of the relationship between farming and ecological systems has led to growing support for innovation for sustainable modes of agricultural production. Although there is widespread agreement on the need for more sustainable farming practices, there is disagreement on the most promising innovations to achieve it. Several types of innovation for sustainable agriculture have been promoted in the literature.

Agroecology, which has a long history, has gained significant ground over the past decade, with a growing number of movements, governments and institutions, such as FAO, engaging in research on this type of farming (e.g. Rosset and Altieri, 2017; FAO, 2018c; FAO, 2018d; Bezner Kerr *et al.*, 2018). As outlined in HLPE 14, there are multiple understandings of agroecology, including: (1) the scientific application of ecological principles to food systems, (2) practices aimed at improving agroecosystems, and (3) social movements that support regenerative, locally grounded, and socially just small-scale diverse farming

systems. Agroecological farming methods incorporate a range of key principles designed to improve resource efficiency (such as recycling and input reduction), strengthen resilience of ecosystems (such as building soil and animal health, enhancing biodiversity, fostering positive synergies and economic diversification) and build social equity (such as co-creation of knowledge, incorporating social values into food systems and strengthening participation and governance) (HLPE 14, 2019).

Other approaches to sustainable production methods that are gaining traction include sustainable intensification and climate smart agriculture (Garnett *et al.,* 2013; Rockström *et al.,* 2017). Sustainable intensification aims to produce more food using fewer resources on the same amount of land. The idea is to intensify production without needing to clear more land, thereby reducing pressure on biodiversity from deforestation due to land clearing for agriculture. The idea of climate smart agriculture is to reduce greenhouse gases and incorporate more adaptive practices to enable high levels of agricultural productivity even in hostile climatic conditions (World Bank, 2011). Sustainable intensification (SI) often promotes farming methods that are part of a climate smart agriculture (CSA) model. While SI and CSA are complementary approaches, the main difference is CSA's focus on outcomes related to climate change adaptation and mitigation (Campbell *et al*., 2014). SI and CSA often rely on the use of new digital technologies, discussed in further detail below.

These different models of innovation for sustainable agriculture have both supporters and detractors, and while there is some space for merging insights from both models, they are not always seen as compatible and controversies remain (e.g. Taylor, 2017; Godfray, 2015). More research is needed in this area.

DATA-DRIVEN TECHNOLOGIES IN FOOD AND AGRICULTURE

The revolution in data-driven and digital technologies is affecting all sectors, and the food and agriculture sector is no exception. There has been a burst of innovation and what is known as "digital farming," which includes the use of digital technologies to assist in farm decision-making and delivery of inputs. Building on the concept of precision farming, which has been around for decades, the most recent digital technologies applied in the sector include global positioning systems and satellite connected digital sensors on farm equipment, such as tractors and drones (Rose and Chilvers, 2018). A growing number of farmers, particularly in industrialized countries, are increasingly using these technologies to improve the efficiency of farm inputs such as energy and agrochemicals (Weersink *et al.,* 2018; Balafoutis *et al.,* 2017). In other cases, farmers are using these technologies to address labour shortages, such as robotic milkers, a trend that could deepen with COVID-19. Farmers in less industrialized countries, including small-scale farmers, are also beginning to adopt digital technologies, although there is a knowledge gap in this area and more research is needed to gain a full picture of usage trends.

Digital technologies are also affecting food systems through the growing use of blockchain technology in the organization of global food supply chains (Bumblauskas *et al.,* 2019). Blockchain technology, which cannot easily be tampered with and can assist with traceability and improved transparency in supply chains, is increasingly being used to assist with detecting and monitoring potentially harmful substances in supply chains to improve food safety (Creydt and Fischer, 2019).

These data-focused and digital technologies have important implications for food security and nutrition, although there are ongoing debates about whether those impacts are likely to be overall positive or negative (HLPE 14, 2019; Rotz *et al*., 2019). Proponents make the case that digital technologies enable farmers to make more fine-grained decisions by utilizing computer assisted analysis of big data that can help determine the most appropriate levels of fertilizer and pesticide use in their fields (Wolfert *et al.,* 2017). Critics, however, stress that

technology alone cannot address food insecurity, and warn that growing amounts of farm specific data are increasingly being transferred to the large private corporations that provide these technologies and the services associated with them, raising important concerns about questions of data privacy and farmer agency (Bronson and Knezevic, 2016). Others worry that these technologies are largely inaccessible to the poorest and most food insecure farmers and may further exacerbate rural inequalities (Moseley, 2017a).

NEW PLANT BREEDING TECHNOLOGIES

Since the 1990s, a number of genetically modified (GM) crops have been introduced using agricultural biotechnology techniques that insert DNA from other organisms into plants to give them new traits such as resistance to herbicides or pests. The planting of GM crops increased significantly between 1996 and 2018, from 1.7 million hectares to 191.7 million hectares (ISAAA, 2018). Four crops account for the vast majority of GM crops: soy, maize, cotton and canola. Although initially GM crops were most prevalent in industrialized countries, by 2018 over half of all biotech hectares were planted in developing countries. The increase in GM crops is still highly concentrated, however, with 91 percent of the hectares planted with GM crops being located in just five countries: the United States of America, Canada, Argentina, Brazil and India (ISAAA, 2018). Since their introduction, GM crops have remained highly controversial (Herring and Paarlberg, 2016). Proponents stress that GM crops hold great potential to improve crop traits that will benefit farmers in rich and poor countries alike, including improving food security (Juma, 2011; Anthony and Ferroni, 2012; Qaim, Krattiger and von Braun, 2013). Critics raise a number of concerns, including potential environmental effects, social inequality and food insecurity related to their adoption (Glover, 2010; Moseley, 2017a).

Increased computational capacity and big data generation in recent decades has given rise to more precise methods of plant breeding, including genome editing and other data-informed plant breeding technologies that many predict will replace more traditional forms of agricultural biotechnology (Weersink *et al*., 2018; HLPE 14, 2019). Methods such as clustered regularly interspaced short palindromic repeats sequences and associated enzymes (CRISPR-Cas9) and transcription activator-like effector nucleases (TALEN) allow for much more precise edits to a plant's genome than previous generations of agricultural biotechnology and can be utilized without the addition of genes from other species. Research is underway to apply these techniques to edit plants for traits such as extending a crop's shelf life, improving its nutritional profile, or to give plants resistance to pests and extreme weather. A considerable amount of research also focuses on making crops resistant to herbicides, which mirrors the focus of much of agricultural biotechnology over the previous 25 years (Zhang *et al*., 2018).

Although gene edited crops are still in early stages of research and development, there is considerable controversy with respect to the safety, environmental impact and control of these technologies (Helliwell, Hartley and Pearce, 2019; Bartkowski *et al.,* 2018). While proponents see these technologies as safer than agricultural biotechnology because they edit existing genetic material in plants and do not insert foreign DNA, critics have raised concern about the potential for unforeseen impacts and the potential to negatively affect agricultural biodiversity. Given these uncertainties and debates, more research is needed on the impact of these novel plant breeding technologies.

WEAKNESSES IN POST-HARVEST HANDLING AND STORAGE INFRASTRUCTURE

The availability of post-harvest handling and storage infrastructure is highly uneven, with developing countries generally facing weak infrastructural capacity that limits their ability to translate harvests into food items that can be stored, especially for fruits and vegetables. The result of this weak post-harvest storage and processing infrastructure, as well as limited transport infrastructure, is high levels

of food losses. Food losses and waste affect food availability in important ways (HLPE 8, 2014; Alexander *et al.*, 2017). FAO estimated that 13.8 percent of food produced in 2016 was lost in the food chain from the level of the farm to just prior to the retail stage, with marked regional variations (FAO, 2019c; FAO, 2019d). This figure excludes the substantial food waste at the consumer level, which is especially high in industrialized countries and urban contexts. While recent global estimates of food waste are not available, earlier estimates indicate that roughly one third of all food produced is lost or wasted in all production and consumption stages, corresponding to about 1.3 billion tonnes per year (FAO, 2019d).

ECONOMIC AND MARKET TRENDS

EXPANSION AND DISRUPTION IN FOOD AND AGRICULTURE MARKETS

Food systems have changed rapidly in recent decades, with food supply chains generally becoming longer and increasing the distance between producers and consumers as food systems and agricultural supply chains become more globalized (Clapp, 2014). Around 20-25 percent of world food production is traded on international markets (D'Odorico *et al.*, 2014). The value of global food trade has increased from approximately USD 315 billion in 1990/91 to approximately USD 1.5 trillion in 2017 (WTO, 2018). Low- and middle-income countries account for about one-third of this global food trade (FAO, 2018e). The growth in international food trade indicates a growing number of people are relying on global markets for their food security.

While global food trade has expanded enormously in recent decades, the impact on food security is not always straightforward and is a subject of considerable debate (FAO, 2015; Clapp, 2015). While some see trade as enhancing opportunities for income generation (such as through the sale of cash crops) and thus increasing access to food (Lamy, 2013), others critique the process of liberalization which they see as being less advantageous for smallholders in developing countries (de Schutter, 2009).

Many countries in sub-Saharan Africa have become net food importers in recent decades, raising concerns about vulnerability arising from reliance on global markets for foodstuffs (Rakotoarisoa, Lafrate and Paschali, 2011). There are also debates about the impacts of trade on ecological load, with some arguing that it better distributes the ecological impacts of food production (especially for ecologically stressed food importing countries) and others expressing concern that it over-stresses ecosystems in some exporting areas (Lamy, 2013: Clapp, 2017a; Fulton and Shilling, 2019; Balogh and Jámbor, 2020). Complicating the picture is an uneven landscape of state agricultural policies, such as subsidies, tariffs and quotas that can distort trade. Some states, for example, can afford to subsidize domestic food production, while others are less able to pursue such policies. These issues have been debated in the negotiations over revisions to the Agreement on Agriculture at the WTO, but those talks have been fraught (Margulis, 2018; Scott, 2017).

As global food trade has expanded, coupled with shifting food demands related to increasing urbanization, the availability of energy dense foods (that is, foods high in sugar and fat) in both rich and poor countries has grown (An, *et al.*, 2019; Friel *et al.*, 2013). A number of studies have linked these types of foods to increasing levels of overweight and obesity, as well as an increase in the incidence of non-communicable diseases, such as heart disease, type 2 diabetes and certain cancers (Willet *et al.*, 2019; Swinburn *et al.*, 2019). International trade and industrialization of food supply chains have increased the importance of a very limited number of commodities, such as maize, soy and palm oil, which are used not only as processed food ingredients, but also in animal feed and as biofuel stock (HLPE 12, 2017).

These patterns of growing globalization of the agri-food markets and supply chains have been disrupted in recent years owing in large part to growing trade tensions between the world's two largest economies: China and the United States of America. Global supply chains for soy,

for example, have been reconfigured in the past few years as China, a major importer of soy, has sought to shift its purchases of that crop from the United States of America to suppliers in South America, such as Argentina and Brazil. Some studies have linked the expansion of soy production in South America with heightened levels of deforestation, climate change, soil exhaustion and the heavy use of agricultural chemicals (Fuchs *et al.,* 2019; Ali *et al.,* 2017). The COVID-19 pandemic has also disrupted global food trade patterns. Some countries restricted exports of key food commodities in the early phase of the crisis, which can drive up food prices on world markets, with negative effects for countries that rely on imported food, including many countries in sub-Saharan Africa (Glauber *et al*., 2020). Other countries lost their agricultural export markets during the crisis due to a drop in demand as a result of lockdowns, which harmed their foreign exchange earnings and contributed to rising poverty and hunger. These dynamics may encourage countries that rely on food imports to strengthen their domestic food production capacity.

GROWING CONCENTRATION IN AGRI-FOOD SUPPLY CHAINS

Progressive concentration in recent decades has reshaped agri-food supply chains in ways that enhance the power and influence of large corporations in food systems (Howard, 2016). Corporate concentration in the agricultural input sector intensified following recently announced mergers among the largest agricultural seed and chemical producers that have concentrated the bulk of that market in just four companies (Clapp, 2018). In the agricultural commodity trading sector, just a handful of firms dominate the bulk of the global grain trade (Oliveira and Schneider, 2016; Hall, 2019). In the food processing sector, a series of mergers and acquisitions in the last several years has resulted in some giant firms commanding a huge proportion of the market in their respective sectors (IPES-Food, 2017). Although retail markets tend to be organized along domestic and regional lines, concentration, often in the form of supermarketization, has also been increasing in this sector in recent decades in both rich and poor countries. Just a few companies typically dominate in domestic food retail markets, displacing small local shops and selling less fresh and locally sourced produce (Peyton, Moseley and Battersby, 2015; IPES-Food, 2017; Battersby, 2019).

The high degree of corporate concentration in agri-food supply chains has implications for food security and nutrition, and the pros and cons of this trend are debated in the literature. Concentration in the input and commodity trading sectors, for example, can lead to higher prices and limit farmer choices and agency both in terms of the inputs they use as well as the markets into which they can sell their crops (HLPE 14, 2019; Bonny, 2017). In the food processing and retail sectors, corporate concentration can influence food environments by influencing prices and increasing the proportion of highly processed foods on offer, thus limiting food choices and agency for individual consumers (HLPE 12, 2017; Baker and Friel, 2016). Concentration in the food system can also affect food safety outcomes by centralizing supply chains. While larger corporations often have the resources to ensure safe food production, storage and processing practices, concentrated markets can also mean that any problems that do arise can quickly spread through those supply chains. Disruption in the highly concentrated meatpacking sector in several countries during the COVID-19 pandemic, where high rates of infection among workers caused plant closures, illustrated the ways in which problems can reverberate quickly and widely through food systems. More research is needed in this area.

FINANCIALIZATION IN THE FOOD SYSTEM

Financial actors have become increasingly engaged all along agri-food supply chains, investing food and agriculture firms through complex financial instruments as well as engaging in commodity futures trading and investment in farmland financial instruments, including in developing countries (Schmidt, 2015; Clapp and Isakson, 2018).

These trends towards greater involvement of financial actors in food systems have the potential to affect food security, although there is a robust debate over the extent of these impacts. For example, while many civil society organizations and some researchers pointed to speculative financial investment in agricultural commodities as a key factor driving food price volatility during the 2008 food price crisis (e.g. Ghosh, 2010), other researchers defend financial actors as important to maintain liquidity in commodity markets (e.g. Irwin and Sanders, 2011) and point out that other factors, such as export restrictions, were the primary cause of the 2008 food price spikes (Headey, 2011). But even in the wake of this debate, there is growing acknowledgement that financial investment has the potential to exacerbate food price volatility, which can negatively affect the poorest members of society who may face higher food prices as a result (Tadesse *et al.,* 2014; UNCTAD, 2011).

Similarly, there are different viewpoints regarding the impact of financial investment on encouraging large-scale land acquisitions in developing countries over the past decade. Some view financial investors as key drivers of this trend and raise concerns that their main goals are profit, rather than improved FSN outcomes (e.g. Fairbairn, 2014; Ouma, 2014). Others see potential for financial investment in land to provide critical capital needed for development in the sector (e.g. Deininger and Byerlee, 2011). Additional empirical research is needed to evaluate the food security and nutrition impacts of this type of financial investment.

FRAGILE AND UNCERTAIN GLOBAL ECONOMIC SITUATION

Since the 2007/2008 global financial crisis, the condition of the global economy has been fragile at best. The COVID-19 pandemic and associated global economic downturn have only exacerbated the economic situation. The state of the economy in any society has important implications for food security and nutrition. This impact plays out in several ways. At a most basic level, economic trends affect people's income, employment and livelihood prospects, which has direct implications for their ability to access food (FAO *et al.,* 2019). Economic growth also has substantial effects on diet change, as increasing income is directly correlated with increased demand for animal proteins and processed food (FAO, 2017a; HLPE 12, 2017).

Even before the COVID-19 outbreak, economic growth had stalled in many countries, including emerging and developing economies. According to FAO and others, hunger increased in those countries experiencing economic slowdown or contraction since the 2008 financial crisis. These effects are much more pronounced in situations where economic inequalities are severe, and economic shocks have exacerbated the severity of food crises linked to other causes such as climate change and conflict (FAO *et al.,* 2019). Many of the countries most affected by these dynamics are reliant on commodity exports, which saw price decreases over the 2011 to 2017 period.

The global economic downturn associated with the COVID-19 pandemic exacerbated these effects, with negative consequences for food security. As global growth slowed, the poorest and most vulnerable segments of the population were hardest hit, as they generally lacked resources to cope with the loss of employment and income, and with higher food prices that at times accompanied disrupted supply chains due to the COVID-19 crisis. Multiple dimensions of food security have been threatened by this crisis (HLPE, 2020) (see Box 6 in Chapter 3).

CHANGING DEMAND BALANCE BETWEEN FOOD/FEED/FUEL

Recent decades have seen the shift of a significant proportion of agricultural production and land use away from human food-related activities and towards animal feed, timber and biofuels. These shifts, which have taken place as a result of economic incentives in these different sectors, have important implications for food security, deforestation and land use, and the environment. In 2018, the global production of biofuels continued to increase, but less markedly

than in previous years,[3] as their real prices are projected to continue decreasing (OECD and FAO, 2019), although recent volatility in oil prices may affect these dynamics, including a sharp price decrease related to the COVID-19 economic slow-down.

HLPE explored in detail the trade-offs between biofuel and food production, which can be direct (biofuel vs food) and indirect (biofuel vs animal feed) (HLPE 5, 2013). Future developments in biofuel production are likely to focus on more advanced technologies based on crop residues, wood and waste, causing less competition with food and creating fewer emissions. Further research is needed, however, to bring this production to scale (OECD and FAO, 2019). International biofuel production will be influenced by national policies and incentives to farmers, including regulations on fuel blending (OECD and FAO, 2019).

The "livestock revolution" has brought increased consumption of meat products and a major increase in the use of cereal-based feeds (Delgado *et al.*, 1999; HLPE 10, 2016), thus shifting the use of cereals from direct human consumption of food to indirect consumption via animal feed. The increase in larger scale industrial livestock systems has driven higher demand for crop product feed (HLPE 10, 2016). In 2010, about 34 percent of global cereal production went to animal feed, and this percentage is projected to increase to almost 50 percent by 2050 (FAO, 2012a). Capture fish is also used as animal feed (FAO, 2018f).

The world is also experiencing a convergence of food and bioenergy markets that has led to a concentration of production of common feedstocks, such as maize, soy, oil palm and sugar cane. These multiple-use crops are sometimes referred to as "flex crops" (Borras *et al.,* 2016; Oliviera and Schneider, 2016), which can be marketed either as food, feed or fuel depending on relative prices (HLPE 5, 2013).

LIMITED ACCESS TO LAND, RESOURCES AND MARKETS FOR SMALL-SCALE PRODUCERS

Small farms constitute most farms worldwide, yet it is producers on small-scale farms that most often lack access to agricultural resources, including land, inputs, and markets (HLPE 14, 2019; HLPE 6, 2013). Small farms (less than 2 hectares in size) account for an estimated 84 percent of all farms, which collectively account for only 12 percent of global available farmland (Lowder, Skoet and Raney,, 2016). According to some recent estimates, small- and medium-size farms (below 50 hectares) are the source of over 50 percent of commodities (Herrero *et al.*, 2017). Other estimates indicate that farms of less than 2 hectares in size collectively produce approximately 28 to 31 percent of global crop production and 30 to 34 percent of food supply on only 24 percent of gross agricultural area (Ricciardi *et al.,* 2018). Although the precise estimates vary due to differences in methodology and data limitations, these findings are consistent with previous estimates of production arising from small-scale farms (HLPE 6, 2013), although with marked regional differences. In sub-Saharan Africa, South-East Asia and South Asia, small farms dominate agricultural production systems (HLPE 6, 2013).

Despite their role as primary contributors to food security, particularly in developing countries, small-scale producers are most affected by development challenges, as addressed by the recently adopted UN Declaration on the Rights of Peasants and Other People Working in Rural Areas (UNGA, 2018). Small-scale producers, especially women, face many barriers to adopting innovative and sustainable agriculture. These barriers include limited access to land, water, agricultural inputs, markets and price information, credit, improved technologies, extension services, weather information, risk management tools, social protection and low negotiating power in economic and political relations (FAO, 2016a; HLPE 6, 2013). In the wake

3 Global biofuel production increased by a factor of 5 from 2001 to 2011, from 20 billion litres/ year to 100 billion) (HLPE 5, 2013).

of the 2008 food crisis, the rise in large-scale land acquisition in many parts of Africa, Asia and Latin America further exacerbated these trends as many producers lost land access to investors, many of whom established large-scale farm operations to capitalize on high commodity prices at the time (HLPE 2, 2011; Cotula, 2012; Cotula *et al.,* 2011). Intellectual property rights legislation continues to weaken farmers' seed systems—which are the basis of diverse, nutritious and healthy diets, and of farmers' resilience to climate change—undermining social justice and good governance. Smallholders also face barriers to accessing markets, as weak market infrastructure and local market concentration can hinder their participation in these markets.

Access to land and resources matters for food security and nutrition outcomes, especially in the context of the world's poorest countries, where small farms provide a significant proportion of the food consumed locally. There is evidence of an inverse relationship between farm size and diversity of agricultural and nutrient production (Herrero *et al*., 2017 in HLPE 14, 2019). This difference is attributable to the fact that monoculture production systems dominate in large farms and diverse mixed cropping production system prevail in small farms. Some studies indicate that yields per hectare on small-scale farms can be high (Pretty *et al.,* 2006; Badgley *et al.,* 2007). However, farms in less industrialized countries tend to have lower yields per hectare than in more industrialized countries (FAO, 2014a). These yield gaps are particularly pronounced in sub-Saharan Africa. Yield potential and nutritional implications of farm size are important questions that require further research.

POLITICAL AND INSTITUTIONAL TRENDS

WEAK AND FRAGMENTED FOOD SECURITY GOVERNANCE

Recent decades have seen important changes in the roles and responsibilities of states, rights holders and the private sector in the governance of food security and nutrition at local, national, regional and global scales. States have generally scaled back their role while the voices of other stakeholders, including the private sector and civil society, have increased through a proliferation of multi-stakeholder governance initiatives, including with respect to food systems and FSN (Fuchs, Kalfagianni and Havinga, 2011). The Committee on World Food Security, widely recognized as a leading body in establishing international norms and guidance on food security and nutrition CFS, was reformed in 2009 to include civil society and private sector actors as non-voting members (McKeon, 2015; Duncan, 2015). Many policy recommendations and guidelines approved by CFS, however, remain largely unimplemented since there is no specific mandate to enforce the implementation of such policy recommendations and guidelines.[4] There has also been a plethora of recommendations emerging from other multi-stakeholder initiatives to improve sustainability and other food system outcomes. But many of these initiatives have very little monitoring or enforcement, and lack clear assignment of responsibility and accountability, which renders them weak in the face of growing challenges for food systems and FSN (Swinburn *et al.,* 2015; Clapp, 2017b). Multi-stakeholder certification schemes offer somewhat stronger measures, as they often include some type of monitoring and enforcement, but because they give prominent roles to the very firms that they seek to regulate, they are often weak in terms of targets, and do not require oversight or accountability to governments (e.g. Tartanac *et al.*, 2019).

4 These include the Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security, which were endorsed by CFS in 2012 (FAO, 2012b); the Principles for Responsible Investment in Agriculture and Food Systems (PRIAFS), endorsed by CFS in 2014 (FAO, 2014b); the Framework for Action for Food Security and Nutrition in Protracted Crises, endorsed by CFS in 2015 (CFS, 2015); the UN Declaration on the Rights of Indigenous Peoples adopted by the UN General Assembly in 2007; and the Voluntary Guidelines for Securing Sustainable Small-scale Fisheries in the Context of Food Security and Poverty Eradication adopted in 2015.

Although states have been leading actors in governance arrangements in other areas—such as international environmental agreements and economic and trade governance and institutions— recent years have seen states step back from the pursuit of international cooperative governance arrangements. With the United States of America withdrawing from the Paris Agreement on climate change, and many states scaling back efforts to improve the Agreement on Agriculture at the World Trade Organization (WTO), many analysts have expressed concern for the current state of international cooperation (Baldwin, 2016). The current lack of a globally-coordinated response to the COVID-19 crisis is a further example of this phenomenon.

Also, FSN governance at both the national and international levels is often weak and fragmented across different departments and organizations, leading to a lack of coordination and coherence in food and nutrition security policy and governance (Cohen, 2019; Candel, 2014). There are many other factors that influence FSN outcomes, such as economic inequities, trade rules, climate change and other environmental stresses, not all of which are dealt with specifically in the food policy context, and which are often governed by other international governance arrangements. The SDGs address this long-standing problem head-on by declaring the 17 Sustainable Development Goals as a highly integrated, indivisible web of challenges that can only succeed if achieved together. Accountability is implied with the reporting requirements by countries, SDG custodians and other international bodies, including the CFS. However, there is no specific mandate to enforce implementation of commitments.

At the national level, private sector actors also regularly lobby governments in order to influence regulatory requirements all across food systems, from registration of seeds and agrochemicals, to food safety regulations, to agricultural trade policy, to food labelling and marketing laws (Nestle, 2013; Grant and Stocker, 2009; Clapp and Fuchs, 2009).

DECLINING PUBLIC SECTOR INVESTMENT IN AGRICULTURE

The share of public expenditure devoted to food and agriculture has declined in almost all regions since the 1980s (FAO, 2012b). Government spending on agriculture in relation to the sector's contribution to GDP fell by 37 percent between 2001 and 2017 (UN, 2019b). Sub-Saharan Africa, the region with the highest level of food insecurity, has seen sharp declines in public investment in the sector (FAO, 2019e), despite the commitments to increase the share of agricultural expenditure to at least 10 percent of national budget in the 2003 Maputo Declaration and 2014 Malabo Declaration (Cohen, 2019). Decreasing public attention to food and agriculture is also reflected in development assistance priorities. Donor assistance to the agricultural sector in developing countries fell from nearly one-quarter of all aid allocated to various sectors in the mid-1980s to only 5 percent in 2017, a decline of USD 12.6 billion (UN ECOSOC, 2019).

Although investment in food and agriculture overall has increased somewhat since the 2007/2008 global food crisis, much of this investment has been from the private sector and foundation community (Giller *et al.,* 2017), marking a shift from public to private funding of food and agriculture research. Private spending on agricultural research and development (R&D) tripled from USD 5.14 billion per year in 1990 to USD 15.61 billion per year in 2014 (Fuglie, 2016). Increasingly, private sector food and agricultural R&D focuses on developing countries, which now account for 28 percent of this private expenditure (Fuglie, 2016). Private dominance in R&D spending in the sector has many implications. For example, it is often concentrated on the most traded commodities, and not on crops that are most significant for food security. R&D can also contribute to increasing the market power of multinational corporations, further strengthening their influence over national policies while restricting options available to farmers (Fuglie, 2016). At the same time, there is a lack of research and training for low external input agriculture.

More research is needed on the potential implications of declining public investment for FSN outcomes.

CIVIL STRIFE AND CONFLICT

In 2017, more than half the people experiencing chronic food insecurity and malnourishment lived in countries experiencing or affected by conflict, including approximately 489 million undernourished people and 122 million stunted children (FAO *et al.,* 2017). According to the 2017 Report on the *State of Food Security and Nutrition in the World*, "[a]nother increasingly important cause of hunger, food insecurity and malnutrition is conflict. People living in countries affected by conflict and violence are more likely to be food insecure and malnourished, particularly in those countries characterized by protracted conflict and fragile institutions" (FAO *et al.* 2017, p. 27).

While subsequent reports have focused on other issues (FAO *et al.,* 2018, FAO *et al.*, 2019), most of the conflicts highlighted in the 2017 report have yet to be resolved, while new areas of strife and conflict have emerged. Conflict impacts various dimensions of food security, including availability, access, utilization, stability, agency and sustainability. Agricultural producers in war torn areas may have difficulty getting to, and working in, their fields. Farmers may grow shorter season crops or invest less in soil conservation if the future is more uncertain. They also may migrate out of the region, leaving agriculture altogether. The mobility of pastoral livelihoods is also deeply impacted by conflict as herders are often no longer able to range over large areas in search of pastures, instead being forced to congregate in safe zones, leading to range land degradation. With the mobility of grain traders compromised, people's ability to access food at local markets declines with ruptures in supply and increased local price volatility (CFS, 2015; Moseley, 2012, 2013, 2017b). It should also be noted that the relationships often go both ways, in that food insecurity is often already a background condition in cases of international conflict, and in some cases exacerbates the situation (Arezki and Brückner, 2011).

SOCIO-CULTURAL TRENDS

PERSISTENT INEQUALITIES

There is growing awareness of the problems associated with social and economic inequality, including its threats to social cohesion and political stability both nationally and globally (Piketty, 2013). High rates of inequality have had a negative impact on poverty reduction. But even in countries where there have been reductions in poverty, inequalities persist between rural and urban dwellers, between different ethnic groups, among marginalized communities and between genders (FAO, 2017b; UN, 2019b). Inequality is particularly stark in emerging economies where wealth accumulation by elite classes has not been accompanied by the emergence of a middle class. These inequities can be exacerbated in political contexts that do not prioritize equitable distribution of resources within society.

Unequal access to agricultural resources and unequal distribution of income are linked to food and nutrition insecurity, and are especially problematic for the most marginalized people, who are commonly rural agricultural populations (HLPE 14, 2019) although poverty rates and food insecurity are also prevalent in urban areas. High rates of inequality also affect the resilience of communities to withstand shocks such as climate-related disasters and food price increases. Rural women face disproportionately high rates of poverty and barriers against accessing productive assets for agriculture, such as land, credit and inputs (FAO, 2017b). Indigenous peoples, although closely connected to the land and holders of invaluable indigenous knowledge systems for food production, are often vulnerable and marginalized due to poverty, discrimination and living in remote regions, resulting in limited access to secure land rights, productive agricultural resources and markets (Kuhnlein, Erasmus and Spigelski, 2009).

For these reasons, the SDGs identify inequality as a pressing concern. SDG 10 calls for a reduction in inequality both within and among countries, and SDG 2 recognizes that hunger and food insecurity disproportionately affect

the poorest and most marginalized people in society. The HLPE has identified inequalities, vulnerability and marginalized groups as an important critical and emerging issue for food security and nutrition (HLPE, 2017d) and has identified inequality as an important barrier to agency, access and sustainability in food systems (HLPE 14, 2019). The persistence of inequalities and their relationship to food security and nutrition is an important area that deserves further research. The HLPE is slated to report on this issue in the near future.

SLOW PROGRESS ON WOMEN'S EMPOWERMENT

Women play a central role in all stages of food systems, from agricultural production to ensuring household food and nutrition security. Yet the work women perform is not sufficiently recognized or adequately supported by public policy, including social protection measures, or social institutions (ILO, 2017; Rao, 2020). Women are less likely to have ownership of and decision-making power over key productive assets, such as land and finance, have less access to training and information, and are less represented in community-based economic organizations (such as cooperatives and producers' organizations), that would allow them to secure greater benefits for their work (Rao *et al.,* 2019). Moreover, women are overrepresented in vulnerable categories of employment, such as casual and part-time jobs, are generally paid less than men and are less represented in unions (Dey de Pryck and Termine, 2014; ILO, 2018). The hours worked as unpaid, family labour in production, transformation of food and care activities are also high for women, especially in low and middle-income countries (Johnston *et al*., 2018; Rao and Raju 2019; HLPE 12, 2017).

In addition to all the other challenges confronting women, the double burden and responsibility for both productive and reproductive work, and consequent time-poverty, has meant that progress on the empowerment of women in food systems has been slow. This has adverse consequences on both child and maternal nutrition (Malapit *et al*., 2015a; Malapit *et al*., 2015b; Rao *et al*., 2019), especially in patriarchal societies where the dietary energy and protein needs of women and girls are often secondary to those of men and boys (Levine *et al*., 2001). Micronutrient deficiencies are of particular concern for women, especially at critical stages of their life cycle such as during pregnancy and lactation, due to its intergenerational effects, alongside lowering of productivity (HLPE 12, 2017; FAO *et al.* 2019). For optimal growth, development and health, WHO recommends exclusive breastfeeding for infants in their first six months, followed by complementary feeding with foods that are nutritionally adequate and safe, while continuing to breastfeed for up to two years or beyond (WHO, 2019). However, nearly two out of three infants are not exclusively breastfed at six months of age (Victoria *et al*., 2016).

In a context where smallholder farming is increasingly feminized, as men are migrating to cities and industrial centres in search of remunerative, non-farm employment, there has been growing policy emphasis on reducing the gender gap in agriculture through legal empowerment, reducing the drudgery of women in farm operations and capacity building to act as equal partners for food and nutrition security (Paroda, 2018). Such policy recognition now needs urgent action. At the same time, context and social position matter, as men of certain social groups—including manual workers and migrant labour—may do worse than women who stay in villages (Rao and Raju, 2019).

DEMOGRAPHIC TRENDS

POPULATION CHANGE AND URBANIZATION

Demographic changes affect patterns of both food production and consumption, with complex effects that must be considered when assessing policy options for food security and nutrition. Although population growth rates are declining globally, as countries go through their demographic transition, world population continues to increase and by 2050 there are projected to be 2 billion additional people, mainly in Africa, bringing the total world population to

an estimated 9.7 billion (UN DESA, 2019). In this context, food demand is projected to continue to increase, though by how much will depend on consumer food choices and the ability to reduce food losses and waste (FAO, 2018f). These effects will influence the need for food production levels to meet this increasing demand and to continue addressing equitable access to food.

Urbanization patterns have important implications for food systems (HLPE 6, 2013). While in 2018 global growth of urban populations was 1.9 percent, in most countries in Africa this percentage was between 3.5 percent and 4.5 percent (with peaks at 6 percent)[5], in part due to rural to urban migration. Rural depopulation is a major trend impacting farming systems across developed and developing countries alike (albeit driven by different factors), with profound implications for agriculture, such as accentuating labour constraints, shifting gender divisions of labour and favouring labour-saving practices (including potentially hazardous herbicide use) (Haggblade *et al.,* 2017). Growth of small- and medium-size towns contribute to the revitalization of rural areas and have an important role to play in food processing and marketing (Akkoyunlu, 2015).

Urbanization also contributes to changing diets (HLPE 12, 2017; Ruel *et al*., 2017). Urban lifestyles go hand in hand with increased demand for easy-to-prepare and processed food, especially as women, who are often the primary cooks in many households, enter the labour market and have more demands on their time (e.g., Moseley, Carney and Becker, 2010). This increased demand for pre-packaged and processed foods has important implications for health and for food systems, especially as imported staple food may be more available and demanded than traditional foods in urban areas. High rates of urban poverty are associated with food insecurity and all forms of malnutrition among urban dwellers (Ruel *et al*., 2017). At the global scale, urban populations suffer marginally less undernutrition than rural populations. In the least developed countries, however, one study estimates that food insecurity is higher among urban residents (50 percent) than rural dwellers (43 percent) (Tefft *et al.,* 2017). Rural to urban migration patterns also affect diets and nutrition in complex ways. On one hand, rural outmigration weakens the capacity of rural communities to produce food, because of the loss of labour. On the other hand, remittances sent from urban to rural areas can be utilized for productive farming investments and to access more diverse foods (HLPE 12, 2017; Thow *et al.*, 2016).

DECLINING YOUTH INTEREST IN AGRICULTURE

Food systems represent an untapped reservoir of employment opportunities for youth, especially in sub-Saharan Africa and South Asia, where the needs in terms of availability, access and quality of food and nutrition are also the greatest. Despite a narrative around the lack of youth interest in farming and agricultural employment, and the rising age of farmers globally, recent studies estimate the average age of farmers in low-income countries is declining or stationary (IFAD, 2019; Yeboah and Jayne, 2018). In contrast, high-income areas such as Japan, Europe and North America have aging rural populations (USDA, 2019; European Commission, 2018).

Rural out-migration of youth in search of alternate sources of employment is indeed a reality (IFAD, 2019). Rather than blaming youth for the decline in the rural economy and negatively affecting the capacities of rural communities to produce food (Thow, Fanzo and Negin, 2016), this process can be seen as a product of both agricultural transformation and stagnation. Agricultural transformation is often visualized as innovative and capital-intensive agriculture, with a higher demand for new skills and higher standards, and a lower demand for unskilled work. Agricultural stagnation is driven by the unequal terms of global trade for primary products, alongside ongoing challenges, such as limited access to land, infrastructure, finance, insurance, technology, markets and information,

5 World Bank open data at https://data.worldbank.org/

and declining public investments. These factors imply low profitability and often poor working conditions, failing to provide enough decent jobs for youth. However, migration can also positively feed back into rural development, both through investments and the dynamics of return (Castagnone and Termine, 2018). Such processes can affect diets and nutrition positively by contributing to better livelihoods and food security, or negatively through a loss of dietary diversity or an increase in the incidence of diet-related chronic diseases (see for example, Cockx *et al.,* 2019; and FAO *et al.*, 2019).

The younger generation presents both opportunities and challenges for poor countries. Youth are presented as a "demographic dividend" of energetic, healthy and ambitious young people ready to drive economic development (Ahmed *et al*., 2016; IFAD, 2019). Yet, young people's demands for economic, social and political empowerment is perceived as potentially destabilizing for states struggling to provide their citizens with access to public services, productive resources, decent jobs and attractive livelihood opportunities (Ayele, Khan and Sumberg, 2017). While youth are often not keen on manual labour agriculture, or other low paid food systems activities (White, 2019), a majority of young women and men continue to engage with agriculture for consumption, or sale, for paying school fees or investing in assets and equipment (Sumberg *et al*., 2019). They also engage with wage-work across a range of food system activities, off-farm and on-farm, in urban, peri-urban or rural locations, in selling food, processing and value addition, transportation, amongst others (Yeboah *et al*., 2020). Yet youth continue to be under-represented in agriculture and food systems governance mechanisms, thus limiting their ability to influence policy processes.

TO SUM UP THIS CHAPTER, FSN outcomes today are highly uneven, including increasing hunger and different forms of malnutrition, uneven quality of food environments, food safety concerns, precarious food system livelihoods and external costs of food systems. These outcomes point to the need to understand their complex underlying drivers. It is essential to be aware of these underlying trends, and to appreciate that:

(1) these trends are constantly evolving and interact with one another in complex ways;

(2) the main drivers of food system change are biophysical and environmental, technology, innovation and infrastructure, economic and market, political and institutional, sociocultural and demographic;

(3) the trends in food system drivers have important implications for food security and food system outcomes; and

(4) the overview of these trends helps to highlight barriers and opportunities with respect to progress on SDG 2 and provides insight into potential policy directions going forward to improve FSN outcomes.

Chapter 3

POTENTIAL POLICY DIRECTIONS

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What are the most promising policy directions that better position the global community to meet the SDG targets, especially SDG 2? This chapter shows that some of the most promising pathways are those that embrace the critical policy shifts outlined in Chapter 1. That is, those that: (1) support a major transformative change in food systems that moves away from focusing on production at all costs to instead focus on the quality of food systems more broadly; (2) take a broader food systems approach recognizing the interaction between food systems and other domains and systems; (3) take a wider view of food security and nutrition to address not just undernutrition but also other forms of malnutrition such as overweight, obesity and micronutrient deficiencies; and (4) are stylized for their specific context, recognizing that no one solution will work in all situations. In order for these four critical policy shifts to be implemented within a new coherent policy framework, important enabling conditions are required, including effective and supportive governance at all scales as well as support for advanced FSN research, especially on emerging issues and in areas of contention. The implementation of these policy directions must take place at different levels—local, national, regional and global—through a range of initiatives.

The theory of change outlined in Chapter 1 suggests that food security initiatives and policy frameworks that embrace these shifts work to build more sustainable food systems that support the six dimensions of food security. This chapter outlines in more depth how such an approach strengthens food systems in ways that mitigate the challenges and create openings to take up the opportunities that emerge from the trends in food system drivers as identified in Chapter 2. TABLE 1 summarizes the relationship between key policy shifts and FSN trends and drivers.

Since its inception ten years ago, the 14 HLPE reports published to date provide detailed research-based assessments on key themes related to the above critical policy shifts. These reports detail numerous policy experiences and recommendations, many of which have been adopted by CFS as policy advice for member governments to implement. At the same time, there has been little systematic monitoring of national level uptake of CFS recommendations (CFS, 2017). This was noted by the 2017 evaluation of the CFS (CFS, 2017), which also underlined that such information would be useful, although it stressed that "Detailed monitoring of policies, programmes and plans are the responsibility of national governments" (CFS, 2017, p.71).

TABLE 1

THE RELATIONSHIP BETWEEN KEY POLICY CHARACTERISTICS AND ADDRESSING FOOD SECURITY AND NUTRITION DRIVERS AND TRENDS

KEY POLICY SHIFTS	SUPPORT FOR A RADICAL TRANSFORMATION OF FOOD SYSTEMS	RECOGNIZE COMPLEX INTERPLAY BETWEEN FOOD SYSTEMS AND OTHER SECTORS AND SYSTEMS	FOCUS ON HUNGER AND ALL FORMS OF MALNUTRITION	RECOGNIZE THAT DIVERSE SITUATIONS REQUIRE DIVERSE SOLUTIONS
FSN DRIVERS				
Biophysical and environmental	Shift to a model of nutrition-driven and regenerative agriculture	Better recognize linkages between environment and natural resource degradation and FSN	Focus more on nutrition to inhibit disease and degradation	Work at multiple scales (local, national, global) to address international challenges & locally with attention to situation specific characteristics
Technology, innovation and infrastructure	Refocus technology and infrastructure to achieve quality food production	Better recognize how FSN interacts with digital farming, genetic engineering, food loss and infrastructure	Adopt a nutrition focus to target food loss as a major problem	Better adapt technology and infrastructure to local constraints and opportunities
Economic and market	Support more vibrant smallholder activity and more diverse production and distribution networks	Better understand how economic shifts impact FSN	Employ a nutrition focus to address changing diets and related drivers	Recognize that changes in the global economic system have varied impacts and varied solutions
Political and institutional	Emphasize quality food production when making public investments in agriculture	Ensure coordination across sectors for effective food security governance	Redesign food production and access programmes with a nutrition focus	Address conflicts and policy design at multiple scales
Socio-cultural	Prioritize empowerment and equity to ensure that quality food and its production is accessible to all, including vulnerable and marginalized people and groups	Make equity and human rights an integral part of FSN policies	Strengthen the focus on malnutrition to improve the lives of vulnerable categories (e.g. those living in poverty, women)	Ensure that strategies for improving the FSN of vulnerable categories, including gender, age and income considerations, are context specific
Demographic	Create more opportunities for young farmers by enhancing quality food production	Ensure that FSN policy and thinking spans the rural-urban divide	Better capture urban-related dietary challenges through a focus on malnutrition	Tailor policies to consider demographic shifts and migration patterns, which vary greatly by region

Given the primary data constraints, this chapter reviews the types of initiatives that embrace the four critical policy shifts consistently recommended by the HLPE along with examples of such initiatives from the scholar literature and policy contexts that are consistent with those recommendations. These examples are meant to be illustrative, rather than exhaustive, and as such they are presented to show ways in which the necessary shifts in policy direction have begun to take place, rather than as definitive evidence of the success of these initiatives in all cases. However, the examples, collectively, show the importance of these types of policy directions for addressing the main challenges facing FSN today.

SUPPORT FOR A RADICAL TRANSFORMATION OF FOOD SYSTEMS TO IMPROVE FSN AND ACHIEVE AGENDA 2030

Shifting food policies to support a radical transformation of food systems is a necessary step toward building sustainable food systems. Such an approach, which prioritizes a whole-of-food-system transformation, works to ensure food systems are not only productive in terms of the amount of food they deliver, but they also bring about qualitative improvements across multiple dimensions of the entire system. Here, the focus on quality refers to food systems that are empowering and offer decent livelihood opportunities for all food system participants, support regenerative and resilient production-to-distribution networks and provide access to healthy and nutritious food for all. Policy initiatives that support this radical transformation of food systems include measures that boldly reshape the underlying principles that guide all aspects of that system from production to consumption. These include, for example, stronger measures to promote agency and equity among food system participants, measures to ensure more sustainable, diverse and less wasteful food system practices, and measures to reshape food production and distribution networks to be more diverse and equitable, especially for small-scale food producers and for vulnerable and marginalized people.

STRONGER MEASURES TO UPHOLD THE RIGHT TO FOOD AND OTHER HUMAN RIGHTS

At a foundational level, food system transformation requires states and other food system actors to take much stronger measures to uphold the right to food and other human rights. Such efforts must include not only more robust social protection programmes for vulnerable and marginalized populations, but also the provision of legal and institutional frameworks that guarantee access to resources and empower citizens to exercise agency as food system participants. As outlined in previous chapters of this report, the global community has fallen far short on respecting, protecting and upholding the right to food for all. Some people, particularly small-scale producers, women, youth, indigenous peoples and other vulnerable and marginalized groups, face severe inequities in access to resources and lack agency to define their own place in, and engagement with, food systems. A radically transformed food system would ensure equity and agency for these food system actors.

Improving the capacity of individuals or groups to act independently and make free choices about what they eat and how their food is produced is critical for addressing key challenges that are affecting the ability to meet the SDGs and SDG 2 in particular. Such an approach requires a role for the state in establishing policies and institutions that uphold rights (Sen, 1981). For example, women's outsized roles in food systems, e.g., as farmers, labourers, cooks, etc., means that their well-being is deeply interlinked with FSN outcomes. However, as outlined in Chapter 2, women's empowerment around the globe, and relative power within households and in the public sphere, has been highly uneven (Sen, 1990; Kabeer, 1999; Van den Bold, Quisumbing and Gillespie, 2013). Efforts to

speed women's empowerment will help address persistent inequalities, as women are over-represented amongst poor people (Duflo, 2012). More participatory research and extension, and the inclusion of the voices of women farmers and workers in decision-making platforms, are important avenues for improving the conditions of marginalized people and groups, including women (Agarwal, 2019; Rao, 2013).

Foundational work on women's empowerment has emphasized the need for the simultaneous access to resources, the exercise of agency and the achievement of wellbeing outcomes in measuring women's empowerment (Kabeer, 1999). An application of this conceptual framing to the agricultural sector has contributed to the development of the Women's Empowerment in Agriculture Index (WEAI), which measures empowerment across five domains. Resources are measured through the access to productive assets and control of income; agency in terms of decisions about agricultural production and productive resources, and leadership in the community; and wellbeing outcomes through an understanding of time allocation, especially availability of leisure time (Alkire *et al.*), 2013).

Youth similarly require more support and agency in food systems. The future of agriculture and the sustainability of food systems depends on its youth. Agriculture and food systems need to be recognized and supported as economically rewarding, intellectually satisfactory and socially respectable professions (White, 2020). This requires attention to developing appropriate skills and knowledge for sustainable production and processing, alongside infrastructure, services and an enabling policy framework to ensure equitable access to markets and supply chains at remunerative prices.

MORE REGENERATIVE AND RESOURCE EFFICIENT FOOD PRACTICES

Policies and initiatives that encourage more sustainable food practices from production to distribution are fundamental to a radical transformation of food systems as they emphasize the quality of production methods, rather than just the quantity of its outputs. Such measures are vital to help mitigate the challenge of the agrifood sector's significant contribution to climate change and natural resource degradation, while also ensuring that food systems regenerate the natural resource base, rather than undermine it (HLPE 3, 2012; HLPE14, 2019; IPES-Food, 2016). Food system transformation thus needs to take different kinds of resource efficiency into account along agrifood supply chains to consider the full ecological costs and benefits of different strategies (IPES-Food, 2016).

Agroecology initiatives (BOX 2), for example, promote regenerative, diverse and resource efficient production practices that are carbon absorbing while also building and protecting agricultural biodiversity (HLPE 14, 2019 IPES-Food, 2018; Altieri, 2018; Snapp and Pound, 2017). In addition to being more resource efficient, many agroecological approaches to farming are also less susceptible to the challenges of insect and weed predation (Altieri and Nicholls, 2004). Agroecology also promotes more diverse and nutritional diets. Some agroecological approaches may also be designed in a way that spreads out labour demands (e.g., multiple harvests in a poly-cropping system vs one big harvest in a monoculture system), which provides employment while minimizing labour bottlenecks and risks of disease and pest outbreaks.

Initiatives to address food losses and waste also contribute to reducing food insecurity and promote a more efficient use of resources. From an environmental perspective, reducing food losses and waste contributes to reducing carbon, water and land footprints (HLPE 8, 2014). A focus on reducing food losses at primary production stages in developing countries with high food insecurity is considered to have a high positive impact on food security (FAO, 2019d). In 2014, following the publication of HLPE 8, the CFS adopted a recommendation on reducing food losses and waste, and since that time a number of countries have developed policy and legislation

BOX 2

AGROECOLOGY INITIATIVES: EXAMPLES FROM NICARAGUA, MEXICO AND MALAWI

A growing number of initiatives and policies are promoting agroecology in diverse regions around the world (FAO, 2018e; Cacho *et al*., 2018). Among the policies that can support wider adoption of agroecology are measures that:

i) strengthen governance and policy coherence across sectors;
ii) support plural market structures along the lines of territorial markets (see BOX 3 below);
iii) secure land access, credit, and insurance for family and small-scale producers;
iv) incorporate true cost pricing in measuring productivity; and
v) provide support for participatory research, education, and training (FAO, 2018f; HLPE 14), 2019.

There are a variety of examples of initiatives that promote agroecology at different scales.
The Community Agroecology Network is an example of a non-profit organization which works with local organizations in communities in San Ramon, Nicaragua, and Veracruz, Mexico, to improve rural livelihoods and environments through a participatory research and capacity building approach (Méndez *et al.*, 2017). The aim of the project was to assist these smallholder coffee-growing communities to transition from dependency on export-oriented commodity production to more diverse and sustainable food systems. A number of successes resulted from the project, including improved soil fertility and greater resistance to crop diseases owing to more regenerative production practices; empowerment of community members, including capacity building among women and youth; the development of alternative markets, both locally and for organic coffee exports; and more sustainable livelihoods of community members (IPES-Food, 2018).

A participatory research project in Malawi is another example of a successful agroecology initiative. This initiative is based on participatory and transdisciplinary research methods that integrate agroecological education and training in farming practices with nutrition and social equity. Farmer-to-farmer training is a central component of this initiative that enables producers to test and advance agroecological practices utilizing traditional knowledge (Nyantakyi-Frimpong *et al.*, 2017). This project has resulted in positive outcomes for thousands of households participating in the initiative, in terms of their food security, crop and dietary diversity, health, and gender equity (*Bezner Kerr, Berti and Shumba,* 2010).

aimed at this goal, such as Italy (2016), France (2016), Saudi Arabia (2019), Australia (2017), Egypt (2019) and Tunisia (2019).

MORE DIVERSE FOOD PRODUCTION AND DISTRIBUTION NETWORKS

Policy initiatives that reshape food production and distribution networks, leading them towards more diverse and distributed ownership and control in order to bolster their resilience are also vital to food system transformation. As outlined in Chapter 2, concentrated and financialized food supply chains and uneven trade practices present challenges, especially for smaller-scale producers and distributors to ensure decent livelihoods and food access, especially in cases where there are extreme discrepancies in power and wealth between small-scale operators and large-scale enterprises Concentrated markets also contribute to supply chain vulnerabilities and instabilities, as has been made clear by the disruption to food supply chains during the COVID19 pandemic. The widespread occurrence of

BOX 3
TERRITORIAL MARKETS

Territorial markets sell food that is produced, processed, sold, distributed and consumed within a given territory (Kay *et al.* 2016). Small scale producers are already present in territorial markets, although these markets are often invisible in policy initiatives because they are sometimes informal in nature and they largely serve local communities. Examples of territorial markets include the Pout Market in rural Senegal, and the Xin Fa Market in Beijing, as well as numerous farmers' markets around the world. Territorial markets are often much more remunerative for small-scale producers, keeping the economic benefits of trade within territories instead of benefiting large transnational food corporations. Territorial markets also tend to be more inclusive, including women and indigenous producers, and have embedded governance systems that support producers. Governments can support territorial markets by ensuring availability of infrastructure and credit, and through public procurement initiatives, as is the case in Brazil through its Public Food Acquisition Procurement Programme that explicitly sources from small-scale farmers and poorer producers in rural areas. The food procured under this programme supports the national school meals programme (Burlandy, Rocha and Maluf, 2014; Rocha, Burlandy and Maluf, 2012).

these disruptions has already encouraged a resurgence in interest in supporting more local and regional food systems around the world (Hobbs, 2020). For countries that rely on the export of a small number of commodities for a significant portion of their foreign exchange while at the same time also relying on imported staple grains from just a handful of suppliers—which is the case for many countries in sub-Saharan Africa—there are incentives to bolster local and regional production and market arrangements.

Policies that support territorial market arrangements (van der Ploeg, Jingzhong and Schneider, 2012) can revitalize local and regional production and markets in ways that promote more stability along with enhanced equity and agency in the face of economic and market challenges. In response to the CFS's high-level forum on "Connecting Smallholders to Markets" initiative in 2015, which sought to improve market opportunities for small-scale producers, the Civil Society Mechanism (CSM) of the CFS, which engaged in that process, recommended stronger support for small-scale producers who are already engaged in vibrant markets at the local, national and regional level, rather than focus on linking smallholders exclusively to global supply chains controlled by large transnational corporations (see BOX 3). A territorial market approach can help to improve food system equity and can strengthen the agency of producers and citizens, by empowering them *vis à vis* concentrated agricultural supply chains and retail outlets dominated by powerful transnational corporations (e.g. Battersby, 2019). The provision of credit at a more territorial scale can also work to build more inclusive financial markets that are geared towards providing benefits for producers themselves, rather than prioritizing global financial investors. Encouraging local food production and making sure fresh local produce is available to low-income populations also combats changing diets and rising overweight and obesity, as well as associated non-communicable diseases. Brazil's experiment with its Food Acquisition Programme has been successful in this regard (Rocha, Burlandy and Maluf, 2012; Burlandy *et al.*, 2014) (see BOX 10) and deserves to be emulated.

As HLPE 14 outlines, agroecology initiatives are a good example of efforts to implement a radical transformation of the food system as a whole, across all the dimensions outlined above. Agroecological approaches stress the

right to food and greater agency for all food system participants including women and the most vulnerable groups, promote regenerative food system practices, and stress diversity and resilience, especially for small-scale producers, across the entire food system.

RECOGNIZE THE COMPLEX INTERPLAY BETWEEN FOOD SYSTEMS AND OTHER SECTORS AND SYSTEMS

Food systems interact in complex ways with economic and market systems, ecological systems, energy systems, social systems and health systems, among others. Policies that take these interconnections into account are critical elements of sustainable food systems because they are better able to ensure that different systems and government sectors that intersect with food are working towards mutually supportive goals, and not working at cross purposes. The COVID-19 pandemic is a prime example of these sorts of interconnections between food systems and other systems and illustrates clearly the need for FSN policies to take these complex interlinkages into account. The types of policies that support this shift to recognizing and addressing the interconnectedness of food systems with other systems include measures to improve coordination of policies and measures across sectors and systems, measures that specifically address challenges at the intersection of food systems and ecosystems, and measures that build on lessons about inter-system connections from past crises to make food systems more resilient in future crises.

COORDINATE FOOD POLICIES ACROSS A RANGE OF SYSTEMS AND SECTORS

It is important to consider food policies in close coordination with policies across a range of systems and sectors, including food and agriculture, economic, trade, ecosystem, health, energy, etc. Such coordination does not always happen smoothly at present, with fragmented governance arrangements and lack of appreciation for how policies in one arena, such as energy policies that promote biofuels, may impact food security (Ewing and Msangi, 2009). Stronger coordination between systems and sectors in relation to food systems can lead to more mutually supportive approaches that better address existing challenges such as economic and trade inequities, limited access to land and resources for small-scale producers, tensions between food and fuel crops and market concentration (Ericksen, 2008; Ericksen, Ingram and Liverman, 2009).

The interconnection between economic systems and food systems is an example of where greater policy coordination across sectors is needed. In the wake of the 2007/2008 food crisis that brought higher food prices, there was increased interest in investment in the food and agriculture sector (Fairbairn, 2014; Clapp, 2014). While most investment in the sector is undertaken by agricultural producers themselves, a range of financial investors were also attracted to the sector, resulting in large amounts of capital being invested in the sector, including for land acquisition and large-scale production operations. This large influx of financial investment spurred concerns that such investments could have harmful consequences, such as a loss of land rights and environmental consequences from large production operations (Deininger and Byerlee, 2011). As a response to these concerns, the CFS oversaw the negotiation and adoption of The CFS Principles for Responsible Investment in Agriculture and Food Systems—also known as the RAI (BOX 4) to ensure such investments contribute to food security and nutrition and respect human rights. Although they are voluntary in nature, the RAI guidelines are widely viewed as an important initiative to ensure that financial investment does not work at cross purposes with food security.

There are other complex interactions between food systems, economic systems and ecological systems that would benefit from greater

BOX 4

THE CFS PRINCIPLES FOR RESPONSIBLE INVESTMENT IN AGRICULTURE AND FOOD SYSTEMS

The CFS Principles for Responsible Investment in Agriculture and Food Systems—also known as RAI—are a set of 10 principles that seek to guide all types of agricultural investment to ensure that it respects a range of environmental, social and economic goals and supports sustainable food systems (FAO, 2014b). Developed from 2012 to 2014 through an inclusive and multistakeholder process, RAI defines responsible investment as that which supports sustainable livelihoods for small-scale producers and marginalized and vulnerable groups. RAI covers investments by all types of stakeholders at all points along food supply chains and can be applied at the local, national and international levels. The ten principles are:

Principle 1: Contribute to food security and nutrition

Principle 2: Contribute to sustainable and inclusive economic development and the eradication of poverty

Principle 3: Foster gender equality and women's empowerment

Principle 4: Engage and empower youth

Principle 5: Respect tenure of land, fisheries, forests and access to water

Principle 6: Conserve and sustainably manage natural resources, increase resilience and reduce disaster risks

Principle 7: Respect cultural heritage and traditional knowledge, and support diversity and innovation

Principle 8: Promote safe and healthy agriculture and food systems

Principle 9: Incorporate inclusive and transparent governance structures, processes and grievance mechanisms

Principle 10: Assess and address impacts and promote accountability

Because the RAI principles were developed through an inclusive multistakeholder process, they have wide acceptance among food system stakeholders. The CFS is due to review the progress on the application of the RAI guidelines in 2022.

coordination in terms of policy responses. For example, while increasing global trade in food stuffs has some advantages, such as bringing food into regions that may be in deficit and expanding the variety of foods on offer, it may also expose some markets to increased instability if there are perturbations in the global system. In addition, large-scale export production of certain crops—for example, palm oil and soy production, both of which have been associated with higher rates of deforestation—have been associated with environmental costs that are often externalized (HLPE, 2017a; Wicke *et al*., 2011; Boerema *et al*., 2016). The market disruptions that happened in the 2007/08 food crisis illustrated the need for better coordination. HLPE 1, on the theme of food price volatility, explored the various causes behind volatility in food prices and advanced recommendations for policies to calm those markets. Among its recommendations were "better and transparent information systems are essential for policy decisions and management of stocks" (HLPE 1, 2011). The relatively new agricultural market information system (AMIS) being developed at the time was noted as a welcome development. CFS 37 took note of this report and adopted the recommendation to "Support the Agricultural Market Information System (AMIS) to enhance food market information and transparency, and urge the participating international organizations, private sector actors and governments to ensure the public dissemination of timely and quality food market information products" (CFS, 2011).

BOX 5

RICE-FISH-DUCK SYSTEM

HLPE 14 illustrates sustainable agricultural practices with the rice-fish-duck system practiced in China and a number of other East Asian countries. This traditional agroecosystem, which has been handed down over thousands of years, involves integration of crops and animals in a circular economy (HLPE 14, 2019). Fish and ducks, stocked in rice paddy fields, provide biological control by eating weeds and pests, fertilize the pond with their droppings and aerate the soil (Cagauan, Branckaert and Van Hove, 2000). The rice stalks provide shade, food and shelter for fish and ducks. More than 100 species co-exist in the ponds, including more than 40 varieties of glutinous rice, multiple types of fish and duck breeds, as well a variety of plants (GIAHS, 2020). The system saves land resources by tripling the types of production in the rice pond, and is important for food security because it provides rice and protein for subsistence farmers in ecologically fragile regions (Lu and Li, 2006). This agroecosystem does not rely on chemical pesticide or herbicides, which would be toxic to the fish and ducks. There is a high market demand for products from rice-fish-duck systems because they are considered to be safe and of high quality. The rice-fish-duck system in Guizhou Province, China, has been designated as a Globally Important Agricultural Heritage System (GIAHS) because it combines a living model of human culture that has co-evolved with the natural environment to provide sustainable use of water and soil resources (GIAHS, 2020).

ADDRESS THE IMPACT OF CLIMATE CHANGE AND NATURAL RESOURCE DEGRADATION ON FOOD SYSTEMS

Policies that specifically address the impact of climate change and natural resource degradation on food systems are vital to the broader policy shift that sees food systems as interconnected with other systems. Agriculture plays a major role in the challenge of not exceeding the planetary boundaries (Rockström *et al*., 2009; Campbell *et al.,* 2017; Conijn *et al.,* 2018). As outlined in the discussion of food systems in Chapter 1, ecosystems are inextricably linked with food systems with feedback loops running through these systems in complex ways, and as such it is important that these two systems are mutually supportive. Policies along these lines help to build food system resilience in the face of climate change, including the protection of water and biodiversity resources, especially in vulnerable ecosystems, and a buffer against surging pests and emerging diseases. The rice-fish-duck system of production (BOX 5) practiced in a number of East Asian countries is a good example of an effort to ensure mutual support between ecological systems and food systems.

Adaptation to climate change is essential for food security in the worst affected areas and in the longer-term (FAO, 2016a). Small-holder farmers will be hardest hit (Harvey *et al.,* 2014) and although farmers' experience can help with adaptation strategies, the rapid rate of climatic change makes adaptation that much more challenging (Vermeulen *et al.,* 2018). Given this diversity in impacts, food policies must place a higher emphasis than other sectors on adaptation to climate change to increase their productivity and resilience (HLPE 3, 2012). These efforts will need to include deep transformations at all stages of food supply chains and consumption to maximize the co-benefits of adaptation and mitigation efforts, including agriculture that is better adapted to new climate realties (FAO, 2016a) and agroecological practices (HLPE 14, 2019). Furthermore, because the sector has a high impact in terms of climate effects, food systems have a crucial role to play in efforts

to mitigate the impact of climate change by adopting environmentally sensitive practices and technologies, including agroecology (HLPE 14, 2019). It is important to identify climate-adaptive agriculture alternatives to current practices in close dialogue with smallholder farmers and develop, as well as evaluate, efficient science-policy engagement efforts to address the challenge of supporting and protecting the farmers most vulnerable to climate change (Dinesh *et al.* 2018).

LEARN FROM CRISES TO BUILD MORE RESILIENT AND ROBUST FOOD SYSTEMS

The COVID-19 pandemic has highlighted the need to build more resilient and robust food systems in the face of unexpected events that have complex linkages across multiple systems (BOX 6). Emerging diseases such as COVID-19 clearly have implications for FSN in terms of people's ability to earn a living and buy adequate food, maintain adequate nutrition for disease resistance as well as potential impacts on agricultural labour if producers fall ill (HLPE, 2020). The current fragile and uncertain global economic situation has been made significantly worse by the COVID-19 pandemic, a situation that may also disrupt some aspects of the global food trade. HLPE's paper on the implications of COVID-19 for global food security noted that "Governments will need to support food supply chains and avoid disruptions in food movement and trade, to ensure that they function smoothly in the face of the crisis" (HLPE, 2020). Furthermore, poor people in urban areas will be some of the most vulnerable to the economic slow-down associated with COVID-19 because their incomes and ability to buy food may be compromised.

FOCUS ON HUNGER AND ALL FORMS OF MALNUTRITION

Nutritional outcomes of food systems are diverse and multifaceted, requiring a shift from past policy approaches that focused exclusively on hunger to a broader suite of policies that also address hunger as well as all forms of malnutrition, including obesity, overweight and micronutrient deficiencies. As outlined in Chapter 2, more than one-third of humanity faces at least one type of malnutrition, and the trend is an increase in all categories of malnutrition. A shift in policies to address hunger and all forms of malnutrition encourages more sustainable food systems by ensuring the availability and equitable access to safe and nutritious foods, and supports agency to choose diverse, culturally appropriate and sustainably produced foods on a consistent basis. Policies that support this shift include measures to support healthy and sustainable food choices as well as measures that specifically address multiple forms of malnutrition, especially for the most marginalized populations.

IMPLEMENT INITIATIVES THAT SUPPORT HEALTHY, NUTRITIOUS AND SUSTAINABLE FOOD CHOICES

It is important to implement initiatives that support healthy, nutritious and sustainable food choices at all stages of life. Increasing the rates of breastfeeding worldwide, for example, is an important avenue for achieving the SDGs, as breastfeeding is fundamental to improved nutrition and maternal and child health (Liu *et al.*, 2016). Policies that specifically promote healthy and sustainable diets help to address multiple challenges facing food systems, including social and economic inequality that affect food access as well as demographic changes that affect the quality of food environments. HLPE 12 called for addressing nutritional vulnerabilities of specific groups and improving data collection and knowledge sharing on food systems and nutrition, as well

BOX 6

COVID-19 AND FOOD SECURITY: COMPLEX LINKAGES ACROSS DIFFERENT SYSTEMS

The COVID-19 pandemic has revealed the interconnected nature of different systems, including **food systems**, as well as the need for coordination across different government sectors to ensure food security.

Most studies indicate that COVID-19 has a zoonotic source that originated in animals and was transferred to humans (WHO, 2020b). Many analysts have identified fragile **ecosystems**, in particular the degradation of wildlife habitats, as a driving force behind an increase in closer human-animal interactions that have created greater opportunity for diseases to be transferred between animals and humans (Everard *et al.,* 2020). For example, as the agricultural frontier pushes further into forested areas, some wild animals (that were once rarely consumed) are initially killed as agricultural pests and then secondarily sold as wild food, bringing humans and these wild species into close contact, where viruses can spread from animals to humans. In the case of COVID-19, the sale of wild animals in a wholesale food market in Wuhan, China is believed to be the origin of the initial outbreak in the disease among humans (WHO, 2020b; Lake, 2020).

Efforts to halt the spread of the disease, including travel restrictions and lockdowns, had an impact on **economic and market systems** in ways that have affected food systems. These measures resulted in paradoxical situations where enormous amounts of food went to waste due to restaurant closures and the difficulties of getting products to markets while panic purchasing of food items resulted in empty shelves in shops and rising prices for food items in short supply (Barrett, 2020). These types of shortages led a number of countries including the Russian Federation, Ukraine and Viet Nam, among others, to impose restrictions on food exports in order to keep domestic food prices from rising, although such measures can lead to price increases in countries that rely on food imports (*Laborde, Mamun and Parent,* 2020). At the same time, many countries have lost export markets for certain perishable agricultural products due to lockdowns, contributing to rising poverty and hunger.

Food supply chains were further disrupted when large numbers of food system workers fell ill with the disease, illustrating the connection between **health systems** and food systems. These impacts were seen, for example, among workers in meatpacking plants and among migrant farm labourers—both of which are often vulnerable and marginalized groups working and living in cramped conditions—where infection rates have been especially high (Hendrickson, 2020). In addition to the health implications, work stoppages and labour shortages have had impacts on food productivity and availability. People experiencing poor nutrition were also more susceptible to the disease (Naja and Hamadeh, 2020). The pandemic also exacerbated poor nutrition due to the lack of availability of fresh fruits and vegetables, which encouraged an increase in consumption of ultraprocessed foods (Gray, 2020).

The broader economic recession that accompanied the lockdowns resulted in widespread job losses and economic hardship for many people (OECD, 2020), exacerbating inequalities in **socioeconomic systems,** which in turn affected food security. Vulnerable and marginalized workers, including food service workers, have been especially hard hit not only by the illness, but also by these job losses, and with diminished incomes these groups have often had to access food banks and other forms of social assistance. Lockdowns have also affected access to school feeding programmes and other social protections that supported food security. The World Food Programme has predicted that an additional 130 million people will experience acute hunger as a result of the crisis (Anthem, 2020). Countries that depend on food imports are likely to be hard hit as their income is likely to fall due to the global economic recession, hindering their ability to purchase food from abroad, combined with potential rises in food prices due to export restrictions and reduced supply due to COVID-19 disruptions in production and processing stages of food supply chains.

BOX 6
(CONTINUED)

The result of these interconnections between food systems and ecosystems, economic and market systems, health systems, and socio-economic systems highlights the importance of supporting all six dimensions of food security. Ecosystem fragility highlights the importance of sustainability, economic and market disturbances and restrictions illustrate the importance of stability, health system fragilities highlight the importance of availability and utilization, and socio-economic inequalities highlight the importance of agency and access.

WHO, FAO and the World Organisation for Animal Health have launched the One Health initiative to jointly address the challenge of zoonoses. This initiative seeks to address complex challenges posed by zoonotic diseases that affect human and animal health, food security, poverty and the environment (FAO, 2011). This partnership is essential to ensure joint action and is highly relevant to attempts to address this challenge and its impact on FSN as evidenced by COVID-19.

More broadly, it is imperative that post-COVID-19 food systems build greater resilience in the context of complex linkages across multiple systems. As noted above, this includes adopting more regenerative agricultural and food production practices that mitigate the emergence of diseases and climate change, supporting more diverse production, market and processing arrangements that have greater flexibility in the face of disruptions, and ensuring greater agency and equity for food system workers and those whose food security is most affected by food system disruptions.

as improving the quality of food environments, including the adoption of national guidelines for healthy, nutritious and sustainable diets.

Food environments can also be improved with policies specifically targeting increased availability and consumption of fresh, seasonal and local fruits and vegetables as well as legumes, for example, through government supports and educational campaigns, which could coordinate with 2021 as the International Year of Fruits and Vegetables (Glasson *et al.*, 2013). Policies along these lines must integrate nutritional considerations throughout food systems, including nutrition-driven agriculture that advocates attention to greater dietary diversity, including at the production stage (Fan, Yosef and Pandya-Lorch, 2019). At the same time, a number of countries have moved to incorporate sustainability into their national dietary guidelines (Ahmed *et al.*, 2019), including Brazil, Canada, Germany, Norway, Qatar, Sweden and Switzerland.

Increased demand for more diverse and nutritious food can also help to diversify agroecosystems by promoting the growth and consumption of neglected and underutilized crop species and locally adapted varieties, bringing diverse nutritional profiles to diets. Such measures also raise awareness of the interconnections between the natural environment and food systems and also empower citizens to choose foods that have a lower impact on climate change and natural resource degradation. The United Nations Decade on Ecosystem Restoration, 2021 to 2030, can also incorporate elements of biodiversity for food and nutrition, and principles of sustainable food systems to improve the nutritional profile of both rural and urban consumers.

TARGET POLICIES TO ADDRESS ALL FORMS OF MALNUTRITION

Policies need to address diverse nutritional issues that often occur in the same geographical and social contexts, including the problems of

BOX 7
INDIA'S NATIONAL FOOD SECURITY ACT

India's National Food Security Act (NFSA), adopted in 2013, is an example of the importance of agency in support of food security. This legislation was the result of collective action through a domestic right to food campaign in the country that aims for a more equitable distribution of food to ensure it reaches a larger share of the population, in particular the most vulnerable and marginalized populations (Chakraborti and Sarmah, 2019). This law, an effort bringing together NGOs, academia, unions and activists, and political parties, effectively made the right to food a legal entitlement for approximately 75 percent of India's rural population and 50 percent of its urban population (Puri, 2017). At the time that the law was being debated, there were strong voices in favour of dismantling the food distribution system and opting for cash transfers. The NFSA opted for the public distribution system of food. The law also designated maternity benefits and nutrition for children from the age of six months to 14 years as legal entitlements. Preliminary studies of the law's implementation show that the coverage of eligible beneficiaries increased, that exclusion errors decreased, that the amount of entitled food grain actually received by beneficiaries increased, and that the transportation of food grains improved (Drèze *et al.,* 2019; Puri, 2017).

undernutrition, overweight and obesity. Policies that provide more robust social protection to guard against undernutrition for vulnerable groups and individuals are vital for FSN, especially during economic recessions and other crises. HLPE 4 recommends that social protection programmes "should be underpinned by the human rights to food and social protection at every level" (HLPE 4, 2012). India's National Food Security Act, which enshrines the right to food in law, is a good example of this type of approach (see BOX 7). This act covers 80 percent of poor people in the country and is now the primary mechanism for ensuring that extra food reaches people who need it, which is especially important in the current COVID-19 crisis.

HLPE 1 recommended consideration of strategic regional food reserves in times of emergencies, to ensure access for vulnerable populations. CFS 39 reinforced this recommendation (CFS, 2013). A pilot project in the region of West Africa on strategic grain reserves has seen positive results (Galtier, 2019). HLPE 4 also recommended consideration of cash transfer initiatives, specifically including smallholders as vulnerable populations. This recommendation was reinforced at CFS 39 (2012). The FAO Cash + initiative combines cash transfers with improved access to productive assets, such as agricultural inputs and technical training. Piloted in a number of countries in sub-Saharan Africa—including Burkina Faso, Lesotho, Malawi, Mali, Mauritania, the Niger and Somalia—this programme has seen initial positive results (FAO, 2017c). More research is needed on operationalizing these types of initiatives on a wider scale.

Poor nutrition is often linked with the lack of basic sanitary conditions needed to prepare nutritious food. Investing in municipal water systems and infrastructure is critical for sound utilization of food. HLPE 9 highlights the many aspects of clean water, for example, for preventing diarrheal diseases, which are a major cause of malnutrition and the second highest cause of child death around the world; and water for the physiological utilization of nutrients and foods. UNICEF's Water, Sanitation and Hygiene (WASH) initiative promotes awareness of these connections in the context of the SDGs.

Fruits and vegetables, which are often part of diverse production systems of small farms, are sources of essential micronutrients and other beneficial bioactive components necessary for

BOX 8
CHILE'S LAW OF FOOD LABELING AND ADVERTISING

Chile's implementation of its Law of Food Labeling and Advertising in 2016 is an example of how stronger nutritional labelling can improve food environments. The law was adopted in response to a dramatic increase in the consumption of highly processed foods, including among children, which were accompanied by growing rates of domestic overweight and obesity and associated non-communicable diseases (PAHO, 2015). The legislation aims to reduce consumption of highly processed foods in several ways. First, it requires labels on the front of food packaging that warn consumers about those food and drink products that contain higher than desirable levels of certain nutrients. Up to four 'high-in' warning labels in black octagonal 'stop signs' are now mandatory on all food items that go beyond specified thresholds of energy, sodium, sugar and saturated fats. Second, it restricts the marketing and distribution of foods with warning labels to children under the age of 14 by banning advertisements on children's television and removing cartoons and free items targeting children from products. Third, it restricts schools from selling foods with black warning labels or having them in vending machines at schools (Corvalán *et al.*, 2019). These measures were taken in addition to Chile's 2014 sugar-sweetened beverage (SSB) tax and trans-fat labelling law.

Recent studies on the impact of Chile's Law of Food Labeling and Advertising have found multiple benefits of these types of measures, which include: purchases of sugar-sweetened beverages significantly declined (Smith Taille *et al.* 2020); over 90 percent of people in the Metropolitan region of Santiago de Chile recognized the front-of-pack nutritional warnings and said their decisions to purchase products had been influenced by the labels (Valdebenito *et al.*, 2017); and mothers of young children demonstrated increased awareness of the healthfulness of different food products, in many cases encouraged by children who are no longer allowed products with the black warning labels in schools (Corre*a et al.*, 2019).

Chile's experience demonstrates the utility of mandatory food policies to improve food environments which are key to addressing the incidence of obesity and diet-related diseases. While few countries have as yet implemented a suite of policies that mirror Chile's Law of Food Labeling and Advertising, front-of-package labelling has become a popular measure in a number of countries, especially in Latin America and the Caribbean, to improve food environments (FAO *et al.*, 2020).

human health (Herrero *et al.*, 2017). They are essential for adequate diets and for nutritional wellbeing, yet they make up the highest proportion of food losses and waste. As such, reducing food loss and waste can have positive nutritional benefits, especially for the more than 2 billion people who are estimated to suffer from one or more nutrient deficiencies.

In addition to efforts to address undernutrition, most countries have adopted initiatives to address overweight and obesity, including measures to improve information and awareness on the causes of this complex problem as well as other more regulatory approaches such as taxation of unhealthy foods (FAO, 2016b). A transformation of the food retail environment is also an important step, as ultraprocessed foods are increasingly part of both urban and rural food environments (WHO, 2016; Bixby *et al.*, 2019). Discouraging the promotion of unhealthy foods by food processing companies and food retailers is also important (Battersby, 2019). Policies that require clearer nutritional labelling, such as Chile's recently adopted Law of Food Labelling and Advertising (see BOX 8), can go some way towards raising awareness of these issues and result in better consumer choices (Jones *et al.*, 2019).

TAKE DIVERSE SITUATIONS INTO ACCOUNT AND PROPOSE CONTEXT-SPECIFIC SOLUTIONS

The shift towards more context-specific policies encourages more resilient and empowering food systems suited to particular situations and supports both productive and regenerative agricultural practices matched to different contexts. Stylized efforts can help to promote equity and agency more effectively within local contexts. Policies that support this shift include measures that tackle the unique challenges that arise in diverse types of rural and urban contexts as well as policies that address unique challenges posed by conflict situations that are a key cause of hunger.

TAKE RURAL-URBAN DIFFERENCES INTO ACCOUNT, AS WELL AS CHANGES IN THE RURAL-URBAN CONTINUUM

Policies that take into account rural-urban differences, as well as the unique characteristics at various points along the rural-to-urban continuum, help to address challenges arising from rural to urban migration and the growing disinterest in agriculture among youth. Successful strategies for addressing these challenges must include: a recognition that strong FSN requires policy thinking that spans the rural-urban divide; a broader understanding of malnutrition that encompasses urban-related dietary challenges; a push for quality food production that creates more opportunities for young farmers; and a realization that demographic shifts and migration patterns vary greatly by region and demand tailored policies.

In rural areas, building a more vibrant small-scale farming sector will help to address key challenges facing food systems, which will encourage more young people to seek livelihoods in the sector. In many cases this means improving access to land and productive resources for small-scale producers. Most attempts at land reform in the past 25 years have relied on a market-based approach premised on the principle of "willing seller, willing buyer" (McCusker, Moseley and Ramutsindela, 2015). While this approach has worked in some cases, in many instances it has led to marginal changes in land ownership and emphasized a commercial model that is inappropriate for many small-scale farmers (Moseley and McCusker, 2008). Greater experimentation with different types of models, considering the unique circumstances of each location, needs to be undertaken in this area. HLPE 6 recommends investing in smallholder production and calls for increased investment in agriculture, particularly for sustainable production by smallholders in developing countries, to bolster production in regions where hunger is greatest.

CFS 39 recommended strengthening "participatory research, extension and farming service systems, particularly those that respond to the specific needs of small-scale agricultural producers, including women producers, to increase their productivity, diversify their production, and enhance its nutritional value and build their resilience, including with respect to climate change, according to the tenets of sustainable development" (CFS, 2013). Malawi's "Soils, food and healthy communities" project is an example of a sustainable, agroecology- inspired approach that is appropriate to the context in northern Malawi, nutrition-driven (and helpful for combating disease) and diminishes degradation and insect predation in agricultural fields (see BOX 9).

As the world grows increasingly urban, improving urban residents' access to nutritious food is key to addressing hunger and malnutrition. Food access has been highlighted in a number of HLPE reports, but especially HLPE 1 on price volatility and food security (2011), HLPE 4 on social protection for food security (2012), and HLPE 12 on nutrition and food systems (2017). CFS 39 recommended that member states "design and put in place, or strengthen, comprehensive, nationally-owned, context-sensitive social protection systems for

BOX 9

MALAWI'S "SOILS, FOOD AND HEALTHY COMMUNITIES" PROJECT

Malawi's experimentation with different approaches to address food insecurity is a good example of a country that had a more traditional, production-focused approach involving subsidies for fertilizers, and then switched to one that acknowledged the importance of agency, women's central roles in food provision and nutrition (Graeub *et al.,* 2016). While still experimental and small in scope, this approach to strengthening the agency of women has led to dramatic improvements in household nutritional outcomes (*Bezner Kerr, Berti and Shumba,* 2010). The Soils, Food and Healthy Communities project was an initiative of the Ekwendeni Hospital in northern Malawi, and is focused on the improvement children's nutritional status in conjunction with smallholder farmers in a nearby rural area. This project has made positive contributions toward reducing malnutrition by encouraging agroecological farming practices alongside community mobilization, women's empowerment and changes in intra-household gender dynamics (Patel *et al.,* 2015).

food security and nutrition" (CFS, 2013, p.5). Increasingly, however, municipal governments are playing a critical role in the design and implementation of policies and programmes for FSN. The city of Belo Horizonte, Brazil provides an example of how a municipal government creatively made nutritious and healthy food accessible, with dignity, for an urban population, while also supporting the livelihoods of farmers in the surrounding countryside (Rocha, 2016; IPES-Food, 2017) (see BOX 10).

As populations continue to grow in some areas of the world, there is a need for FSN policies and programmes that will connect growing urban food needs to sustainable livelihoods in the countryside that appeal to young people. With a shift to a focus on the quality of ood production, new types of farming are better able to capture the imaginations of young people. In Botswana, for example, women farmers (of all ages) with access to adequate water can establish more lucrative, small-scale horticulture operations (Fehr and Moseley, 2019). Community supported agriculture (CSA), also known as subscription farming, in North America has higher levels of young and female farmers than conventional farming (Trauger *et al.,* 2010). Urban and peri-urban agriculture are also increasingly important for ensuring dietary diversity and food security in urban areas, as well as for contributing to more sustainable production methods (Warren, Hawkesworth and Knai, 2015; Benis and Ferraro, 2017; Pribadi and Pauleit, 2016).

Migration may simultaneously be a problem and a solution. In areas where rural livelihoods are in decline, we may see large numbers of people leaving for the city or other countries, which may become a problem if there is not adequate employment to be found at the destination. In other instances, countries and/or rural areas experiencing depopulation often depend on migration to fill key jobs, many of which are in the agricultural arena. Policies that support rural livelihoods and vibrant rural economies will keep migration to manageable levels, reducing the need for people to leave some areas, or ensuring adequate availability of labour force in others.

ADDRESS UNIQUE CIRCUMSTANCES IN CONFLICT SITUATIONS

Given that the vast majority of the chronically food insecure and malnourished people live in countries affected by conflict, ending conflicts and providing emergency food relief is a key component of addressing world hunger. The CFS endorsed the Framework for Action for Food Security and Nutrition in Protracted Crises (CFS-FFA) in 2015, with the aim of providing guidance on improving FSN for populations at risk due to

BOX 10

FOOD SECURITY COUNCIL IN BELO HORIZONTE, BRAZIL

The experience of Belo Horizonte, Brazil is a good example of an integrated policy approach to improving food access and nutrition for an urban population. As the military dictatorship came to an end in Brazil in the late 1980s, the country underwent constitutional reforms that allowed for power to be decentralized to municipalities. These reforms, combined with grassroots activism leading to the establishment of a national food security council, the CONSEA, facilitated the creation of a new city department in Belo Horizonte (Brazil's sixth largest city) known as the Food Secretariat. The revival of popular restaurants was arguably the most famous component of the Secretariat's programme. The programme's first restaurant opened in 1994 and would grow to serve 12 000 to 14 000 meals per day by 2009 via three main facilities and several smaller lunchrooms. The restaurants served meals prepared from scratch and patrons paid one Brazilian real for lunch, and less for breakfast and dinner, for its first 17 years in existence. The approach upheld the idea of food with dignity because everyone, rich and poor, paid the same amount, thereby removing any social stigma associated with frequenting these establishments. The local schools also had kitchens and staff preparing meals from fresh ingredients. Both of these programmes required a large amount of fresh vegetables and these were increasingly supplied by small, local farms. These small farms were organized in associations in surrounding areas and could sell their produce directly to the city rather than working through intermediaries. Until the early 2000s, groups at risk of malnutrition also received enriched flour from the city. The final major component of the programme was controlling the prices for 25 major foodstuffs on offer at a network of stores in the city. This multifaceted programme produced impressive and unprecedented outcomes. These results included a 25 percent increase in per capita household consumption of fruits and vegetables, a 33 percent reduction in child hospitalizations for diabetes, significant declines in mortality rates for children under five, and child hospitalizations for malnutrition dropped by 60 percent. This programme was an innovative laboratory and a source of inspiration for Brazil's national zero hunger strategy in 2004 (Chappell, 2018) and the CONSEA was a channel for dialogue between civil society, the Presidency of the Republic and different sectors of government. The CONSEA was extinguished on January 1, 2019 through Provisional Measure 870/2019, one of the first acts of the newly elected president of the Republic. The social mobilization that followed throughout Brazil (for example the Banquetaço) and internationally pushed for the reopening of the Council, showing the importance of collective action, but the amendment voted by the Congress in May 2019 was vetoed by the president of the Republic and the CONSEA remains extinct.

protracted crises (CFS, 2015). While one does not traditionally think of it as such, conflict management is a way to keep food systems functioning and reduce hunger. While resource scarcity may play a role in some conflicts, most tensions are political in nature and require political solutions that address drivers at multiple scales. For example, a local farmer-herder conflict may require addressing local level dynamics as well as adjusting national level policies that may be contributing to the problem (Benjaminsen and Ba, 2019). BOX 11 on Burundi's crop-livestock integration project (CLiP) shows how CGIAR is innovating in a country wracked by unrest and food insecurity.

ENABLING CONDITIONS

Good governance and a robust research agenda are important elements that can support the four critical policy shifts outlined above and better enable FSN policies and initiatives to meet the SDGs, especially SDG 2. For too long, policy inertia has slowed progressive FSN policy change and public sector research agendas. In some cases, this lack of action has been the result of political pressure from powerful food system actors who benefit from the status quo (Monteiro and Cannon, 2012; McMichael, 2005). As outlined in Chapter 2, corporate actors, for example, have actively lobbied states regarding

BOX 11

BURUNDI'S CROP-LIVESTOCK INTEGRATION PROJECT

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Burundi's crop-livestock integration project (CLiP) is a research action project jointly facilitated by the International Livestock Research Institute (ILRI) and the International Institute for Tropical Agriculture (IITA) (ILRI, 2015). Amidst social unrest and geopolitical isolation, Burundi's economy has been contracting since 2015, its population is among the poorest in the world, and 60 percent of its population is malnourished (WFP, 2020b). Burundi's farming households have little to no access to credit, which means that agricultural development actors must consider different approaches to improving agricultural production and household food security than the conventional agricultural development models with purchased inputs. The main idea of the project is to use manure from penned animals to maintain farm field soil fertility, and to use the by-products from crops as feed for the penned livestock. While this is not an entirely novel idea, CLiP refined the approach for different income groups. It developed combinations of: rabbits with vegetables, and chickens with beans, for poorer households; pigs with cassava, sweet potatoes or soybeans for median households; and cattle with maize for wealthier households. This innovative approach, that is sensitive to local constraints and possibilities, is critical for addressing hunger in a politically isolated and poor country facing land constraints and declining soil fertility (Moseley, 2016, 2018).

policy changes that affect their business operations (Nestle, 2013; Clapp and Fuchs, 2009). In this context, it is vital that states set policies and fund research that prioritize public goals, including prioritizing the right to food.

MORE EFFECTIVE GOVERNANCE

Multilateral cooperation and coordination are essential to ensure that the four critical policy shifts are implemented in a consolidated and coherent manner within a consistent policy framework. A renewed commitment to multilateral governance initiatives for FSN would help to address the challenge of a fragmented international governance landscape and the weakening commitment to global cooperation. It is important for national governments to implement existing initiatives at the global level, for example, global guidelines sponsored by the CFS such as the Principles for Responsible Investment in Agriculture and Food Systems (BOX 4), the Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security (VGGT) (BOX 12), and the Voluntary Guidelines on Food Systems and Nutrition (BOX 13).

The idea of a multilateral framework convention on food systems has been proposed by some food system analysts to provide an international regulatory and policy framework that supports equity, sustainability, health and livelihoods within food systems (de Schutter, 2015; Swinburn *et al*. 2019). The benefit of such an agreement is that it would strengthen the ability of national governments to address power imbalances in the food system, particularly in instances where concentrated private sector firms have

BOX 12

VOLUNTARY GUIDELINES ON THE RESPONSIBLE GOVERNANCE OF TENURE OF LAND, FISHERIES AND FORESTS IN THE CONTEXT OF NATIONAL FOOD SECURITY

The Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security (VGGT) is a voluntary guidance document that promotes secure tenure rights and access to land, fisheries and forests with the aim of supporting FSN and sustainable development. Because many land and natural resource tenure problems are the product of weak governance, the VGGT seek to promote best practices around tenure rights as an international norm. Building on the Right to Food Guidelines, the VGGT outlines key principles and internationally accepted practices for tenure systems with an emphasis on protecting the rights of vulnerable and marginalized people in order to ensure the right to food, poverty eradication, sustainable livelihoods and rural development (CFS, 2012). The document calls on states to recognize and respect the legitimate tenure right holders and their rights, and to provide access to justice when those rights are infringed upon. Among its principles for implementation are human dignity, non-discrimination, equity and justice, gender equality, a holistic and sustainable approach, consultation and participation, the rule of law, transparency, and accountability (CFS, 2012). The process of developing the VGGT started in 2009, at the height of international concern around large-scale land acquisitions in many countries in circumstances where tenure rights, especially for vulnerable and marginalized people, was unclear. The VGGT were developed through an inclusive process that included regional consultations and the participation of a wide range of stakeholders including governments, civil society organizations, the private sector and academia. Endorsed by the CFS in 2012, the VGGT are now widely recognized as an international standard for establishing regimes for land tenure governance (Cotula, 2017).

significant influence in policy formulation that can override the public good aspects of food systems. As Swinburn *et al*. (2019, p.820) note, "Such a strategy would enable national governments to strengthen the public health, social equity, and environmental protection purposes of food systems in relation to the current dominant commercial purpose."

Effective FSN governance also requires coordination across different sectors. This often means implementing programmes that involve departments of agriculture, health, welfare, environment and human development (Battersby and Watson, 2019). This need for coordination has become ever more evident as the intersection of food systems with biodiversity and climate change have become major themes in recent global assessments such as the Intergovernmental Panel on Biodiversity and Ecosystems (IPBES, 2019) and the Intergovernmental Panel on Climate Change (IPCC, 2019).

Enhanced coordination across different scales, from the local level—including municipal and translocal governance—to the national, to the regional and global levels, is also required for effective FSN governance (Candel, 2014; McKeon, 2015). Food safety, for example, is an area where global, national and local actions need to be better coordinated. As the food system has become more globalized, the problem of food contamination can easily be spread to populations in a number of countries.

Representative participation is important in FSN governance to ensure governance processes are participatory and inclusive of all stakeholders, including states, food producers, civil society organizations and the private sector. HLPE 13 recommends developing the contribution of multi-stakeholder partnerships for the promotion of sustainable food systems. It also recommends supporting partnerships and organizations of vulnerable groups through targeted financing,

BOX 13

VOLUNTARY GUIDELINES ON FOOD SYSTEMS AND NUTRITION

The Voluntary Guidelines on Food Systems and Nutrition (VGFSyN)provide evidence-based guidance on effective policies, investments and institutional arrangements to address malnutrition in all its forms, in the context of food systems (CFS, 2020). The VGFSyN are an elaboration of the Report on *Nutrition and Food Systems* (HLPE, 2017b) and subsequent recommendations from the CFS. Three constituent elements of food systems provide the framework and the policy entry points for transformations for improved nutrition: food supply chains, food environments and consumer behaviour. The VGFSyN will contribute to the goal of reshaping or promoting food systems to ensure that foods contribute to healthy, sustainable diets. They will be non-binding and can be interpreted and applied with existing obligations under relevant national and international law, and with due regard to other voluntary commitments. The final version for endorsement by the CFS will be available in October 2020.

to ensure they can contribute to the transition towards sustainable food systems and that any impact of policies and interventions on communities and stakeholders is fully considered (HLPE 13, 2018). Such measures should ensure representative participation, including the voices of marginalized and vulnerable groups. Civil society and social movements, especially those representing small-scale food producers and vulnerable and marginal groups, have an important role in these contexts to provide an alternative perspective to more powerful actors like states and private sector corporations (McKeon, 2015; Duncan, 2015).

There is a significant gap in the funding needed to achieve the SDGs, which will be difficult to meet with public resources, especially in fragile contexts and in countries with weak governance systems and low incomes. It is important in this context for states to play a lead role in funding investments in more sustainable food systems and in upholding the right to food. This includes investments not only in agricultural development, but also across food systems as a whole to support more diverse production and supply networks, public education and awareness campaigns, and social protection policies for the most vulnerable members of society. It is also important for the CFS and its member states to collect data and report on the implementation of food system policies at the local, national and international levels to track progress on FSN initiatives and ensure accountability with respect to meeting the targets for SDG 2 in the context of all SDGs. Such measures are essential for effectively taking stock of current impediments to increasing food security at the national, regional, global and local levels. This data can also serve as a benchmark to review and monitor future progress at all levels.

THE NEED FOR A ROBUST RESEARCH AGENDA

It is vital that states encourage and support a wide range of FSN research, especially on key critical and emerging issues as well as contentious areas. The HLPE regularly identifies critical and emerging issues (e.g. HLPE, 2017a) that merit further consideration (BOX 14). It is important that these critical and emerging issues, including in the case of unforeseen crises such as the COVID-19 pandemic, receive full research consideration with respect to their impact on FSN policies and outcomes, especially their effects on the most marginalized and vulnerable groups. No doubt there will be continuing challenges and barriers of various types that will influence the policy agenda outlined above. It is important to support ongoing

BOX 14

DEFINING A ROBUST RESEARCH AGENDA: HLPE WORK ON CRITICAL AND EMERGING ISSUES

The HLPE periodically conducts inquiries into "critical and emerging issues" that affect FSN outcomes. The HLPE defines critical and emerging issues as "an issue that has a profound influence on one or more of the dimensions of food security, either directly or indirectly, positively or negatively," while "emerging" issues are those "for which there are concerns that they could become critical in the future" (HLPE, 2014c). These inquiries involve extensive consultation with the scientific community to identify these pressing issues that can guide the future research and policy of the CFS and are conducted periodically. The most recent Note on Critical and Emerging Issues from the HLPE was published in 2017 (HLPE, 2017a). This note identified the following issues as being critical and emerging:

(1) anticipating the inter-connected future of urbanization and rural transformation;
(2) conflicts, migrations and FSN;
(3) inequalities, vulnerability, marginalized groups and FSN;
(4) impacts of trade on FSN;
(5) agroecology for FSN in a context of uncertainty and change;
(6) agrobiodiversity, genetic resources and modern breeding for FSN;
(7) food safety and emerging diseases;
(8) from technology promises towards knowledge for FSN; and
(9) strengthening governance of food systems for an improved FSN.

These issues have featured prominently in this report, as well as other longstanding issues that continue to impact FSN, and new issues that have emerged since the last review was completed, including the COVID-19 pandemic and its impact on FSN.

research into these obstacles as part of the HLPE's future work.

Support for research into contentious FSN issue areas is also important to shed light on potential policy directions where there are disagreements over both causes and consequences of particular trends and challenges. Further investigation into these issues is necessary in order to build more nuanced knowledge that can move the policy community beyond simplistic binaries, and to enhance understanding of how best to shape policies. For example, as outlined in Chapter 2, emerging technologies—such as digital farming and genome editing—have enormous potential for improving food production and FSN. However, they also have the potential to impact ecosystems and exacerbate inequality and gender disparities if they are not designed and shared in an inclusive and equitable way with the capabilities and limitations of local populations and environments in mind (Gengenbach *et al.*, 2017; Carolan, 2018).

It is also important for states to invest in public goods research to ensure equitable access to new technologies, inputs and services throughout all elements of food systems. This effort will require striking an appropriate balance between public and private sector FSN research, as private research has increased rapidly in key areas of the food sector in recent decades while public sector research levels have stagnated (Fuglie and Toole, 2014).

Research initiatives should also be participatory, including key stakeholders, especially the input of vulnerable groups most likely to be affected. When considering the limited access

to resources of low-income, smallholder farmers, for example, participatory research methodologies should be used to develop new technologies that are available at low cost and not trade-marked (Moseley, 2017a). Incorporating traditional knowledge, including through participatory research efforts, should also be supported. In addition to being participatory, innovations should also be scalable and accessible to small-scale producers and supported by institutional mechanisms for capacity building and knowledge dissemination.

Finally, the research agenda should include the development of integrated assessment and system modelling tools to support the foresight of the likely impact of different policy options for meeting FSN. Importantly this approach also allows a better understanding of likely interdependencies and impacts of different policy options across different SDGs and provides a basis for monitoring progress towards FSN. For example, the Foresight4Food Initiative provides a useful framework for consideration (Woodhill and Hasnain, 2020).

TO SUM UP THIS CHAPTER, HLPE's reports have contributed to advancing understandings of policy and practice in ways that have fed into CFS recommendations. The key messages are:

(1) The four critical shifts in policy approaches outlined in Chapter 1 are necessary to build sustainable food systems that can address and mitigate the challenges outlined in Chapter 2.

(2) Numerous examples of policies that illustrate these critical shifts in approach have had positive impacts in advancing the six dimensions of food security.

(3) These examples can be a starting point for further policy development to improve the global community's performance on SDG goals, especially SDG 2.

CONCLUSION

More effective policy frameworks are urgently needed to facilitate a fundamental transformation of food systems to address the numerous challenges facing food systems today and that are hindering progress on Agenda 2030, especially SDG 2. This report articulates a global narrative to support this goal.

The first step is to widen the concept of food security to recognize the centrality of agency and sustainability along with the four other dimensions of availability, access, utilization and stability. As the report outlines, these six dimensions of food security are reinforced in conceptual and legal understandings of the right to food, and each provides important insights into the elements that are necessary to ensure food security for all people.

The second step is to embrace a sustainable food system framework underpinned by the right to food. This approach provides for a much more nuanced understanding of the interlinkages between food systems and other systems and drivers and provides a conceptual framework of how policy fits into broader food system change. Sustainable food systems support the six dimensions of food security, and as such are well positioned to mitigate the threats and create opportunities that emerge from food system drivers.

The third step is to embrace the critical policy FSN shifts that have been informed by the evolving understandings of food security and food systems thinking. These shifts are necessary to move towards more sustainable food systems, and call for policies that: i) support radical transformations of food systems; ii) appreciate food system complexity and interactions with other sectors and systems; iii) focus on a broader understanding of hunger and malnutrition; and iv) develop stylized policy solutions to address context-specific problems. More effective governance practices and a strong research agenda are enabling conditions for these policy shifts to occur.

Together, these steps form the theory of change that underlies this report. That is, the four critical policy shifts, supported by a strong enabling environment, work to bring about more sustainable food systems that support the six dimensions of food security and ultimately support the realization of the right to food and the achievement of the SDGs, especially SDG 2.

The report recognizes the serious nature and complexity of the vast range of challenges facing food systems today. It also outlines promising policy directions that demonstrate that some policies and initiatives have already begun to move in a direction that supports more sustainable food systems that are able to overcome those challenges, and to create opportunities for positive change.

The conceptual frameworks and policy shifts discussed in this report have been consistently emphasized by the HLPE, but they have been unevenly applied in practice. Given the weak performance with respect to SDG 2 and all SDGs as they relate to FSN to date, the time is past due

for these frameworks and policy approaches to be consistently adopted in a coherent way across food systems and by all food system actors.

The urgent and worsening FSN situation due to the COVID-19 crisis makes these findings even more relevant. The crisis has been a wake-up call to address the multiple complex challenges facing food systems, and demands measures to improve food systems to make them not only more resilient to crises, but also more equitable and inclusive, empowering and respectful, regenerative, healthy and nutritious, as well as productive and prosperous for all.

RECOMMENDATIONS

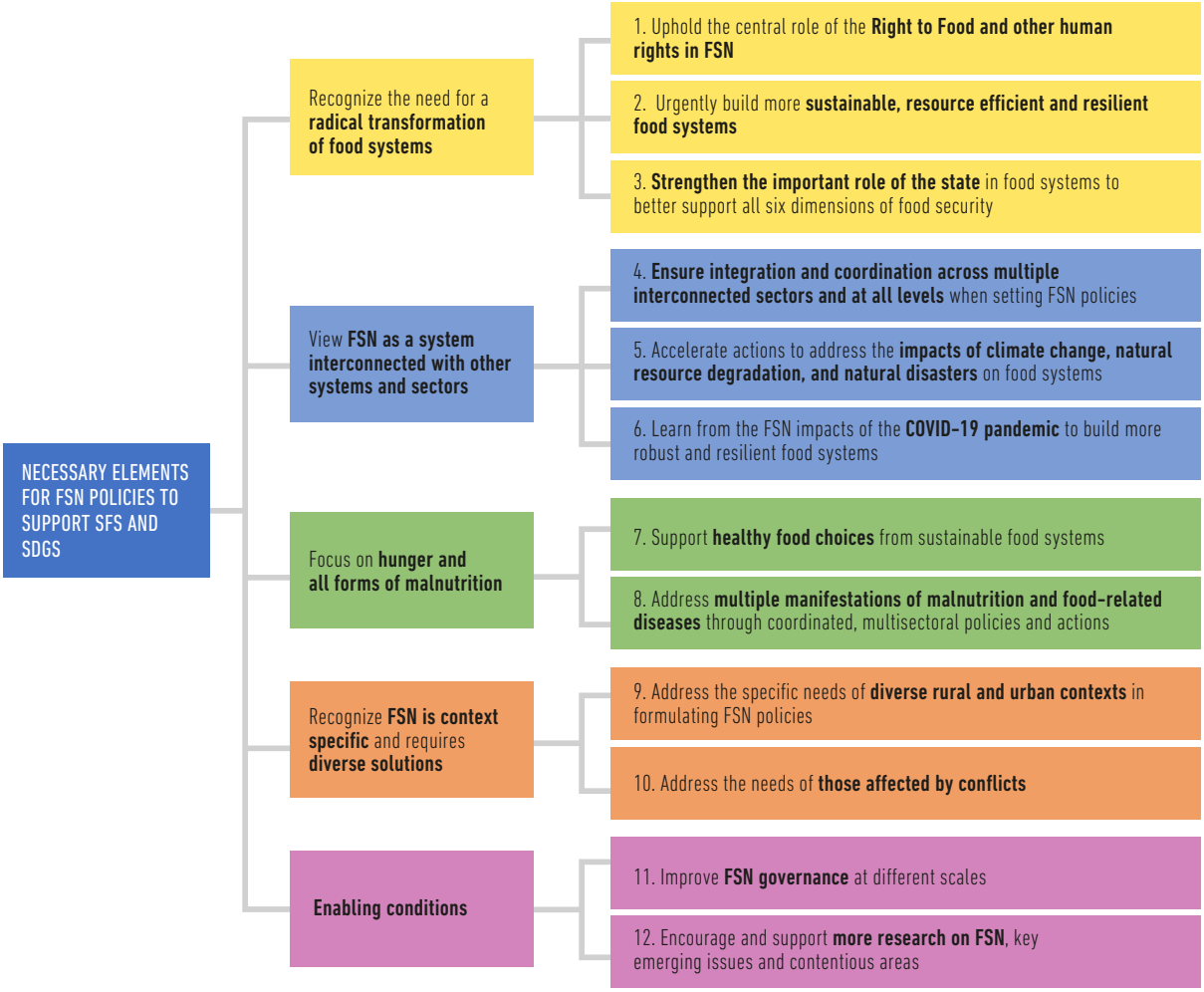
The following recommendations, which emerge directly from the analysis presented in this report, are intended to provide guidance to decision-makers as they develop concrete policies to support the realization of the right to food and the achievement of the Sustainable Development Goals, and especially Sustainable Development Goal 2. SDG 2 exhorts the global community to "end hunger, achieve food security and improved nutrition and promote sustainable agriculture by 2030" (UNGA, 2015). The necessary transformations will involve a diversity of transitions, adapted to the conditions and challenges of different places and peoples, while also being cognizant of the broader structural conditions that bind locales together and condition local action.

The recommendations flow from the four critical policy shifts, plus the enabling conditions, as articulated in the report (See FIGURE 6). These policy shifts and the enabling conditions that support them build upon and reinforce one another in complex ways. Together, they support efforts to bring about more sustainable food systems and help to address the main challenges facing food systems today.

1. UPHOLD THE CENTRAL ROLE OF THE RIGHT TO FOOD AND OTHER HUMAN RIGHTS IN FSN
   - **a.** States should take stronger actions to honour their obligations and duties to respect, protect and fulfil the right to food and protect agency. This affects all states in the world in a spirit of solidarity.
   - **b.** Empower citizens as food system participants, especially women, indigenous people, migrant workers, displaced people and refugees and other vulnerable people and communities to exercise agency over their own livelihoods and ensure access to diverse, nutritious and safe food.
   - **c.** Ensure that food systems are more equitable and work for the world's most marginalized producers, consumers and workers. The global private sector has a great responsibility here.
   - **d.** Provide support services and social protection, including in crises and complex emergencies.
   - **e.** The CFS should formally strengthen the Voluntary Guidelines on the Right to Food, by moving from "progressive realization" to "unconditional realization."

2. URGENTLY BUILD MORE SUSTAINABLE, RESOURCE EFFICIENT AND RESILIENT FOOD SYSTEMS
   - **a.** Implement a comprehensive transformation in the food system including food production, processing, distribution and consumption in order to address outstanding food security and nutrition challenges.
   - **b.** Support transition to agroecology and other innovations for sustainable and

FIGURE 6
LINKS BETWEEN POLICY SHIFTS AND RECOMMENDATIONS



resilient food production methods, to gradually overcome the overuse of natural resources for food production.

c. Take measures to reduce food losses and waste by at least half, especially post-harvest losses in developing countries and consumer food waste in industrialized countries.

d. Support diverse food production and distribution networks, including territorial market arrangements.

e. Take responsible trade measures to maintain food price stability, especially in situations of public health and food emergencies.

3. STRENGTHEN THE IMPORTANT ROLE OF THE STATE IN FOOD SYSTEMS TO BETTER SUPPORT ALL SIX DIMENSIONS OF FOOD SECURITY.

a. Improve public investment in infrastructure for markets, storage and other necessary food system components to support deconcentration of production and distribution networks and bring more diversity for resilience.

b. Invest in public good research to ensure equitable access to new technologies, inputs and services in food systems and agriculture.

c. Strengthen national and regional strategic food reserves.

d. Provide public training and support for small-scale and family farmers, especially in agroecological and sustainable production and marketing, and especially in rainfed and harsh environments.
e. Ensure market access, both upstream and downstream, at remunerative prices for smallholder producers through government procurement programmes (e.g. public distribution and school feeding).

4. ENSURE INTEGRATION AND COORDINATION ACROSS MULTIPLE INTERCONNECTED SECTORS AND AT ALL LEVELS WHEN SETTING FSN POLICIES

a. Take strong measures to immediately address wealth, income and social inequality, which has profound implications for FSN.
b. Protect the essential ecosystem services that underpin sustainable food systems.
c. Ensure food trade is equitable and fair for countries that depend on food imports, for agricultural exporting countries, for producers, including small-holders and for consumers.
d. Improve policy coordination in all relevant sectors including, for example, agriculture, environment, economy, energy, trade and health to improve policy responses to issues such as food availability, malnutrition, food safety and disease.
e. Restrict the use of agricultural crops for non-food production (e.g. biofuel).

5. ACCELERATE ACTIONS TO ADDRESS THE IMPACTS OF CLIMATE CHANGE, NATURAL RESOURCE DEGRADATION AND NATURAL DISASTERS ON FOOD SYSTEMS

a. Promote and support adaptation to climate change to build resilience.
b. Take significant steps to reduce greenhouse gas emissions from the food system in areas of the world where agricultural production contributes most to climate change.
c. Take measures to improve agricultural resilience against pests and diseases that may threaten the food supply and public health.
d. Take measures to protect existing and especially threatened agricultural biodiversity.
e. Encourage more sustainable agriculture in the most vulnerable ecosystems, including, for example, mountain and dryland environments, small island developing states and low-lying coastal areas.
f. Recognize increased water scarcity and take immediate measures to rationalize and optimize use of scarce water resources, as well as water management, in agriculture and food systems.
g. Develop and support more robust climate finance mechanisms that really work and target small-scale food producers (e.g. farmers, livestock keepers, fishers, food processors).

6. LEARN FROM THE FSN IMPACTS OF COVID-19 TO BUILD MORE ROBUST AND RESILIENT FOOD SYSTEMS

a. The CFS should take a lead role in coordinating the global food security policy guidance in response to COVID-19 and its aftermath.
b. Social protection mechanisms, including national and international food assistance, for the poorest and most vulnerable people during, and in the aftermath of, the COVID-19 pandemic, must incorporate provisions on the right to food, in terms of quantity and nutritional quality.
c. When developing action plans for minimizing the impact of COVID-19, governments need to take into account the broader interactions with food security and nutrition.
d. Support food supply chains and avoid disruptions in food movement and trade (including providing clear health and safety guidelines for food workers).
e. Support local communities and citizens to increase local food production and consumption.
f. Collect and share data, information and experiences on the status and impact of the COVID-19 pandemic on food systems and draw lessons learned.
g. All relevant UN agencies must urgently

develop a rapid response mechanism at global scales for food in order to support poor and vulnerable people.

7. SUPPORT HEALTHY FOOD CHOICES FROM SUSTAINABLE FOOD SYSTEMS
   - a. Facilitate the supply of nutritionally diverse, minimally processed staple foods such as fresh, seasonal and local fruits and vegetables.
   - b. Facilitate the supply of a culturally-acceptable, diverse basket of foods of both plant and animal origin to ensure sustainable diets (i.e. both healthy and environmentally sustainable).
   - c. Facilitate biodiversity conservation through sustainable use by promoting the production and consumption of nutritionally-rich neglected and underutilized food species and local varieties.
   - d. Provide incentives for improving the nutritional quality of processed foods and their promotion in food retail and advertising, as well as disincentives for non-adherence.
   - e. Establish and/or improve nutrition and food system education at all levels and promote nutrition awareness campaigns to foster behaviour change.
   - f. Create economic structures and support services to encourage and support better nutrition for pregnant and lactating women, exclusive breast-feeding for infants up to six months and complementary feeding of children up to two years.

8. ADDRESS MULTIPLE MANIFESTATIONS OF HUNGER, MALNUTRITION AND FOOD-RELATED DISEASES THROUGH COORDINATED, MULTISECTORAL POLICIES AND ACTIONS
   - a. Reframe the right to food as freedom from hunger and all forms of malnutrition —underweight, overweight, obesity, micronutrient deficiencies and non-communicable diseases—reaffirming the importance of "safe and nutritious food" along with freedom from hunger.
   - b. Reduce the prevalence of childhood undernutrition by addressing its direct (food insecurity) and indirect causes (hygiene, clean water, civil strife, unsafe food supply, etc.).
   - c. Promote food system solutions to address the pandemic of overweight and obesity.
   - d. The agriculture sector should engage the health and environment sectors in establishing policies and programmes that are nutrition-driven and environmentally sustainable.
   - e. The health sector should engage the agriculture and environment sectors in addressing overweight/obesity and malnutrition in all its forms, and illnesses associated with food- system-related chemical and microbial exposures.
   - f. Initiate and strengthen social protection programmes for vulnerable groups, such as school feeding programmes, that address the quality and quantity of foods and diets to prevent malnutrition in all its forms.

9. ADDRESS THE SPECIFIC NEEDS OF DIVERSE RURAL AND URBAN CONTEXTS IN FORMULATING FSN POLICIES
   - a. Ensure more equitable access to land and productive agricultural resources for small-scale producers who remain vital providers of food and food security in much of the less industrialized world.
   - b. Encourage investment in rural infrastructure development, agricultural services and access to markets, in order to mitigate rural to urban migration.
   - c. Develop policies that are targeted to helping people living with poverty in rural and urban areas to access nutritious food and healthier food environments.
   - d. Ensure that FSN policies and programmes connect growing rural and urban food needs, including in small- and medium-size towns, to sustainable livelihoods in the countryside that appeal to young people.
   - e. Support private and public sector investment in, and state-facilitated development of, peri-urban and urban agriculture in order to bring fresh foods, especially perishable horticultural products that are rich in micronutrients, closer to markets.

10. ADDRESS THE FSN NEEDS OF THOSE AFFECTED BY CONFLICTS

a. Provide timely, adequate and nutritious emergency food relief for people affected by conflicts, including displaced people.

b. Ensure the availability of clean and adequate water and sanitation to facilitate food production, preparation and utilization in conflict and post-conflict situations.

c. As emergency relief is phased out, rebuild the conditions to have normal functioning food systems in post conflict situations.

d. Revitalize development and governance capacity and expertise in areas relevant to sustainable FSN during conflict and in post-conflict situations.

11. IMPROVE FSN GOVERNANCE AT DIFFERENT SCALES.

a. Enhance FSN governance and coordination at the global level to strengthen and renew commitment to multilateral cooperation. In particular:

- National governments need to implement existing CFS and other UN guidelines related to FSN governance.
- CFS and its member states should consider making their commitments legally binding through an appropriate multilateral agreement.
- A financial mechanism supplemented by public and private contributions should be established to support the proposed multilateral agreement and the implementation of national FSN strategies and policies.

b. National governments should support existing efforts to ensure representative participation in FSN governance, e.g. creating or strengthening participatory and inclusive FSN national committees.

c. CFS and states need to collect and report data on the implementation of food system policies and initiatives at different scales (local, national, international) and develop systems for auditing and accountability.

12. ENCOURAGE AND SUPPORT MORE RESEARCH ON FSN, KEY EMERGING ISSUES AND CONTENTIOUS AREAS

a. Encourage the development of a global initiative to model the global food system to predict future shocks and to forecast the likely impact of different solution pathways for sustainable food systems.

b. Assess knowledge gaps and research needs to address various challenges to inform policies to achieve food system transformation, such as the interconnectedness of food systems with all relevant sectors and systems.

c. Develop a better understanding with enhanced research into critical and emerging issues that affect all six dimensions of food security.

d. Strike an appropriate balance in food systems research between public and private sectors, including participatory research programmes that incorporate traditional knowledge.

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APPENDIX

GLOSSARY

Access (economic, social and physical)	Having personal or household financial means to acquire food for an adequate diet at a level to ensure that satisfaction of other basic needs are not threatened or compromised; and that adequate food is accessible to everyone, including vulnerable individuals and groups.
Agency	Individuals or groups having the capacity to act independently to make choices about what they eat, the foods they produce, how that food is produced, processed and distributed, and to engage in policy processes that shape food systems. The protection of agency requires socio-political systems that uphold governance structures that enable the achievement of FSN for all.
Agroecology	Agroecology encompasses a science, a set of different practices and a social movement, characterized by the application of ecological principles to agriculture and ensuring a regenerative use of natural resources and ecosystem services, while also promoting socially equitable food systems within which people can exercises choice over what they eat and how and where it is produced (HLPE 14, 2019).
Availability	Having a quantity and quality of food sufficient to satisfy the dietary needs of individuals, free from adverse substances, and acceptable within a given culture, supplied through domestic production or imports.
Committee on World Food Security (CFS)	The Committee on World Food Security (CFS) is the foremost inclusive international and intergovernmental platform for all stakeholders to work together to ensure food security and nutrition for all. The Committee reports to the UN General Assembly through the Economic and Social Council (ECOSOC) and to the FAO Conference. (http://www.fao.org/cfs)
Consumer behaviour	All the choices and decisions made by consumers, at the household or individual level, on what food to acquire, store, prepare, cook and eat, and on the allocation of food within the household (including gender repartition and feeding of children). It is influenced by personal preferences and shaped by the existing food environment. (HLPE. 2017, http://www.fao.org/3/a-i7846e.pdf)

Food environment	The physical, economic, socio-cultural and policy conditions that shape access to, affordability of, safety of, and preferences over, food (Kraak et al., 2014; HLPE 12, 2017; UNSCN, 2016). The key elements of the food environment that influence food choices, food acceptability and diets are: physical and economic access to food (proximity and affordability); food promotion, advertising and information; and food quality and safety. (HLPE, 2017, http://www.fao.org/3/a-i7846e.pdf)
Food Insecurity Experience Scale (FIES)	Indicator 2.1.2 of SDG 2, is the prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES). FIES is an innovative experience-based method aiming to measure access to food at the level of individuals or households. It focuses on self-reported, food-related behaviours and experiences associated with increasing difficulties in accessing food due to resource constraints. (http://www.fao.org/sustainable-development-goals/indicators/212/en/)
Food losses and waste	A decrease, at all stages of the food chain from harvest to consumption, in mass, of food that was originally intended for human consumption, regardless of the cause. Food losses indicate a decrease in the quantity or quality of food in the supply chain, excluding retail, food service providers and consumers. Food waste is the decrease in the quantity or quality of food resulting from decisions and actions by retailers, food services and consumers. (Source : HLPE 8, 2014; FAO, 2019d, http://www.fao.org/3/ca6030en/ca6030en.pdf)
Food security	"Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO, 2001).
Food supply chains	An important component of food systems, include all the stages and actors, including private sector businesses, from production to trade and processing to retail and consumption, including waste disposal (HLPE 12, 2017; HLPE 15).
Food Systems	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 output of these activities, including socio-economic and environmental outcomes" (HLPE 8, 2014). The three constituent elements of food systems are: food supply chains, food environments and consumer behaviour. (HLPE 12, 2017).
Healthy and sustainable diets	Healthy and sustainable diets refer to dietary patterns that fulfil the aims of the guiding principles of sustainable healthy diets, namely: promote all dimensions of individuals' health and wellbeing, have low environmental pressure and impact, are accessible, affordable, safe and equitable, and are culturally acceptable (FAO and WHO, 2019. http://www.fao.org/3/ca6640en/ca6640en.pdf)

Hunger	Hunger is an uncomfortable or painful physical sensation caused by insufficient consumption of dietary energy. It becomes chronic when the person does not consume a sufficient amount of calories (dietary energy) on a regular basis to lead a normal, active and healthy life. Hunger may also be referred to as 'undernourishment'. (FAO, IFAD, UNICEF, WFP and WHO, 2019. The State of Food Security and Nutrition in the World 2019. Safeguarding against economic slowdowns and downturns. Rome, FAO. http://www.fao.org/3/ca5162en/ca5162en.pdf)
Malnutrition	An abnormal physiological condition caused by inadequate, unbalanced or excessive consumption of macronutrients and/or micronutrients. Malnutrition includes undernutrition, micronutrient deficiencies, overweight and obesity, and the resulting diet-related noncommunicable diseases. (ICN2 Glossary, http://www.fao.org/faoterm/collection/nutrition/en/; SOFI, FAO, 2019; WHO, 2020 Fact Sheet Malnutrition https://www.who.int/news-room/fact-sheets/detail/malnutrition)
Micronutrient deficiencies	Inadequate intake of vitamins and minerals (often referred to as micronutrients) essential for proper growth and development. Their deficiency represents a major threat to the health and development of populations worldwide, particularly children and pregnant women. (WHO, 2020, Fact Sheet Malnutrition https://www.who.int/news-room/fact-sheets/detail/malnutrition)
Non-communicable diseases (NCD)	The result of a combination of genetic, physiological, environmental and behavioural factors. The main types of NCDs are cardiovascular diseases, cancers, chronic respiratory diseases and diabetes. Risk factors contributing to NCDs are unhealthy diets, physical inactivity, exposure to tobacco smoke or the harmful use of alcohol. (https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases)
Nutrition transition	It refers to changes in lifestyle and dietary patterns driven by urbanization, globalization and economic growth, and their resulting impacts on nutrition and health outcomes.
Overweight and Obesity	Abnormal or excessive fat accumulation that may impair health. Often expressed as Body Mass Index (weight in kilograms divided by height in metres squared): overweight is BMI of more than 25 but less than 30; and obesity is BMI of 30 or more. (ICN2 Glossary, http://www.fao.org/faoterm/collection/nutrition/en/; WHO, 2020 Fact Sheet Obesity and overweight https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight)

Prevalence of undernourishment (PoU)	Indicator 2.1.1 of SDG2, the prevalence of undernourishment (PoU) is an estimate of the proportion of the population whose habitual food consumption is insufficient to provide the dietary energy levels that are required to maintain a normal active and healthy life. (source : FAO, Sustainable Development Goals http://www.fao.org/sustainable-development-goals/indicators/211/en/)
Right to adequate food	The right of every individual, alone or in community with others, to have physical and economic access at all times to sufficient, adequate and culturally acceptable food that is produced and consumed sustainably, preserving access to food for future generations (de Schutter, 2014).
Stability	Having the ability to ensure food security in the event of sudden shocks (e.g. an economic, health, conflict, or climatic crisis) or cyclical events (e.g. seasonal food insecurity).
Sustainability	Food system practices that contribute to long-term regeneration of natural, social and economic systems, ensuring the food needs of the present generations are met without compromising the food needs of future generations.
Sustainable diets	"Sustainable diets are those with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. 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" (FAO, 2012 : Sustainable diets and biodiversity: directions and solutions for policy, research and action. Rome.).
Sustainable Food Systems	Food systems that ensure food security and nutrition for all in such a way that the economic, social and environmental bases to generate the food security and nutrition of future generations are not compromised Sustainable food systems embody the following qualities: productive and prosperous; equitable and inclusive; respectful and empowering; resilient; support the six dimensions of food security. ((HLPE 8, 2014) http://www.fao.org/3/a-i3901e.pdf)
Undernutrition	Includes wasting (low weight-for-height), stunting (low height-for-age) and underweight (low weight-for-age). (WHO, 2020, Fact Sheet Malnutrition https://www.who.int/news-room/fact-sheets/detail/malnutrition)
Utilization	Having an adequate diet, clean water, sanitation and health care to reach a state of nutritional well-being where all physiological needs are met.

The global community is falling short on Agenda 2030's sustainable development goals (SDG), especially on **ending hunger and malnutrition in all its forms (SDG 2)**. The COVID-19 pandemic has revealed and exacerbated the challenges that food systems were already facing and made it obvious that urgent and radical reforms are needed to guarantee the fundamental human **right to adequate food for all**. In this bold and forward-looking report, the HLPE's Steering Committee sets out an analytical and conceptual framework and suggests **strategic orientations for a radical transformation of food systems**. The report calls for agency and sustainability to be elevated as essential dimensions of food security and nutrition (FSN), together with availability, access, utilization and stability. **Concrete solutions to ensure the right to food** will require **major policy shifts** to make this radical transformation of food systems possible, according to different contexts, while acknowledging the complexity of their interactions with other sectors and understanding better the drivers of hunger and malnutrition. As a **decisive Food Systems Summit** will gather the world's heads of state and governments in 2021, it is vital that the global community seize this moment to adopt new food system frameworks, which will not only be more resilient to crises, but also more equitable and inclusive, empowering and respectful, regenerative, healthy and nutritious, as well as productive and prosperous for all. This radical transformation is urgently needed in order to eradicate hunger and all forms of malnutrition as a fundamental part of achieving all SDGs.