



Viewpoint

Viewpoint: The case for a six-dimensional food security framework

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ABSTRACT

The definition of food security has evolved and changed over the past 50 years, including the introduction of the four commonly cited pillars of food security: availability, access, utilization, and stability, which have been important in shaping policy. In this article, we make the case that it is time for a formal update to our definition of food security to include two additional dimensions proposed by the High Level Panel of Experts on Food Security and Nutrition: agency and sustainability. We show that the impact of widening food system inequalities and growing awareness of the intricate connections between ecological systems and food systems highlight the importance of these additional dimensions to the concept. We further outline the ways in which international policy guidance on the right to food already implies both agency and sustainability alongside the more established four pillars, making it a logical next step to adopt a six dimensional framework for food security in both policy and scholarly settings. We also show that advances have already been made with respect to providing measurements of agency and sustainability as they relate to food insecurity.

1. Introduction

Definitions of food security have evolved over time since the first introduction of the term to the policy context in the early 1970s. In the following years, food security has come to be widely understood as resting on four key pillars: availability, access, utilization, and stability. Since the 2007–08 food crisis, this four-pillar framework has become somewhat of a canon within the United Nations Committee on World Food Security (CFS) and the Food and Agriculture Organization of the United Nations (FAO). The four pillars feature prominently, for example, alongside the definition of food security in the 2009 reform document of the CFS (CFS, 2009). Recent decades have also seen growing awareness of important challenges that affect hunger and malnutrition, including widening food system inequalities characterized by uneven power dynamics and worsening global climate and ecological crises. These developments raise important questions about whether the four-pillar approach to conceptualizing food security sufficiently captures the full range of dimensions that matter for food security.

In this article, we argue that it is time to update our conceptual understanding of food security to encompass the broader dynamics that affect hunger and malnutrition. Rather than dismiss food security as

being incomplete, we argue that the incorporation of two additional dimensions – specifically agency and sustainability – into food security policy and analysis frameworks will better ensure that everyone on the planet is food secure, not just today, but into the distant future. Agency and sustainability have each been widely recognized in the scholarly literature as being relevant to food security for several decades. However, the four-pillar framework has continued to dominate in policy contexts, creating a situation where policy documents often note inequalities and unsustainable food systems as contextual features of food systems, but these aspects do not receive systematic attention in food security policies and interventions on the ground. While the scholarly literature points to the importance of these additional dimensions, food security scholarship also continues to refer to the four pillar framework even as it often supplements it with other frameworks. Given our enhanced understanding of the importance of agency and sustainability for food security as demonstrated in the literature in recent years, we argue here for a more explicit and systematic incorporation of both agency and sustainability into the definition of food security, effectively expanding the concept from a four-pillar framework to a six-dimensional one.

We first proposed this six-dimensional framework for food security in

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the 15th report of the High Level Panel of Experts on Food Security and Nutrition (HLPE), *Food Security and Nutrition: Building a Global Narrative Towards 2030* (HLPE, 2020). As the project team authors for the 2020 HLPE report, in this article we build on that work, as well as earlier HLPE reports (HLPE, 2017, 2019), to provide a deeper analysis on why agency and sustainability should be accepted as dimensions of food security, including in policy contexts. We also emphasize that current international policy guidance already implies agency and sustainability along with the other four dimensions, and as such, a more explicit adoption of the six-dimensional framework is a logical next step. We stress that there is an urgency to formally embrace this shift in framing because the way multilateral organizations and governments conceptualize food security has important implications for the design of policies and programs on the ground, as well as monitoring efforts, which matter profoundly in the current context of rising global hunger. Recognition of the importance of agency and sustainability in policy contexts would thus pave the way for more nuanced analysis as well as more concrete policy pathways to address systemic inequities within food systems and to embed sustainability considerations firmly within food and nutrition policies. We further note that while bringing these dimensions more fully into food policy frameworks will require thinking through ways in which these elements can be measured and tracked to evaluate progress, there are several metrics already established in the wider literature that are potential candidates.

We start by providing a brief review of the ways in which the concept of food security has evolved over the past 50 years, including the introduction and refinement of the four commonly cited pillars of food security that emerged in response to improved understandings of the factors that contribute to hunger and malnutrition. Next, we outline how growing awareness of food system inequities and the intricate connections between ecological systems and food systems have given rise to new approaches to food security that highlight the centrality of agency and sustainability as key dimensions of food security. We then show that recent official policy guidance, including with respect to the implementation of the right to food, already incorporates agency and sustainability, and as such, codifying these concepts within food security policy frameworks in settings such as the CFS makes sense. Finally, we provide a brief overview of the advances that are being made with respect to providing measurements of agency and sustainability as they relate to food insecurity.

2. The evolution of food security and the four pillars

There have been many attempts to define food security as a concept and there exist several hundred definitions of it in the literature to date (e.g., Maxwell, 1996; Clay, 2003; Tansey, 2013). A closer look at this literature reveals the extent to which our understanding of the term has advanced over time, including in ways that are often overlooked in current understandings of this evolution. Today's definitions – particularly in policy contexts – typically refer to 'four pillars' of food security: (1) availability; (2) access; (3) utilization; and (4) stability (FAO, 2006; Webb et al., 2006; CFS, 2009; Upton et al., 2016). While we tend to think of these pillars of food security as obvious and second nature when we use the term today – especially because they give us a shorthand summary of some of the key components of the concept – it is important to recognize that this four-pillar approach only gradually emerged over the course of 50 years. In fact, these various dimensions gained prominence at different historical moments, in direct response to wider events and scholarly insights that sparked a growing understanding of distinct aspects of food security and their relevance for the formulation of policy. Although the literature on the evolution of the concept typically presents these pillars as each being added over the decades starting with availability, then access, then utilization, and finally stability, a closer look at this history reveals that stability as well as access were in fact prioritized from very early on.

While the term "food security" first appeared in a policy context in

the 1970s, important developments in earlier decades provided ideas that are foundational to the term (CFS, 2012). The UN Conference on Food and Agriculture held in 1943 at Hot Springs, Virginia, for example, focused on food supply, stating: "a secure, adequate, and suitable supply of food should be a cardinal aim in every country" (United Nations 1943, 173). Food security was first formally defined in a policy context at the 1974 World Food Conference as: "[the] availability at all times of adequate world food supplies of basic foodstuffs, particularly so as to avoid acute food shortages in the event of widespread crop failure, natural or other disasters, to sustain a steady expansion of food consumption in countries with low levels of *per capita* intake and to offset fluctuations in production and prices" (United Nations, 1975, 14). This definition reflected concern at the time about an unfolding global food crisis that saw hunger expand as food prices rose sharply on world markets. The broad understanding of hunger at that time was that a decline in the availability (supply) of food within countries was a key culprit for hunger and that instability of food prices resulting from uneven supply exacerbated the situation (Upton et al., 2016). The solution to hunger in that era was typically a prescription to expand food production. For example, the Green Revolution, beginning in the 1950s, sought to address this conception of the problem by focusing on technological solutions to intensify production and bridge yield gaps.

While early interpretations of food security focused mainly on availability, there was some recognition that market fluctuations affected levels of food consumption, which hinted at the importance of both access and stability. These additional elements were more explicitly recognized as dimensions of food security in the 1980s. Amartya Sen in his pathbreaking work *Poverty and Famines* (1981) highlighted the importance of access in exploring how famines continued to emerge even in contexts of widespread food availability. This work shifted the focus of food security thinking to consider demand, and not just supply, as being central. Sen's work showed that throughout history, even where food was widely available in markets, famine situations arose because large numbers of people simply could not access that food. Specifically, a person's entitlement to food was influenced not only by whether food was available on markets, but also by their endowments of productive land, their employment status, their ownership of and ability to trade assets, and their rights within society. If any of these avenues to food entitlement failed – for example, if prices rose sharply, if a recession resulted in job losses, if one lost their land or other possessions, if a climate event reduced productivity, or if human rights were violated – a person's access to food was affected, even in contexts of surplus production and market availability (Sen, 1981).¹

Similar concerns were highlighted in the early 1980s by the then director general of the FAO, Edouard Saouma, in a report on the need to update conceptual approaches to food security presented to the CFS in 1982 (FAO, 1982). This report was prompted by changes in the world economy – a serious global recession, developing country debt, and instability in food production, demand and prices – that affected the ability of the world's poorest countries and people to purchase food on world markets. It noted that food security actions proposed at the 1974 World Food Conference were conceived of too narrowly for such a complex and evolving situation that had emerged by the early 1980s because they focused mainly on physical availability of food. As the report notes: "over the last eight to ten years the conceptual framework of world food security has been extended reflecting the shifts in perception of the world food problem as a whole... It is also recognized that while a satisfactory rate of production growth is, in most cases, a necessary condition for achieving food security, it will not by itself

¹ In addition to highlighting access, Sen's entitlements framework also implicitly introduced agency as a conditioning factor of food access, in particular by highlighting the importance of human rights. Sen further addresses the question of agency in his capabilities framework, on which we elaborate more in Section 3.1.

suffice to ensure that food is available in sufficient quantities to those who need it” (FAO, 1982, 7).

The 1982 FAO Director General’s report also explicitly highlighted the importance of stability of food supply as central to conceptualizations of food security. It warned of the potential for economic cycles to lead to instability in the world food system that could affect food prices and noted that “there is reason to think that relatively modest pressures on demand or supply could be magnified into price swings on international markets under the effects of currency instability and speculation” (FAO, 1982, 8). It further suggested that certain large countries’ engagement in cereal markets could affect prices in ways that could reduce the ability of the world’s poorest countries to secure food supplies. The report stressed the need to widen the conceptual understanding of food security, focusing on several key elements: “food security should have three specific aims, namely ensuring production of adequate food supplies; maximizing the stability in the flow of supplies; and securing access to available supplies on the part of those who need them” (FAO, 1982, 9).

These important insights widened the understanding of food security from what was mainly a macro view (what food was available broadly and the stability of its supply) to also incorporate more micro considerations (whether individuals or households have steady access to food). At the same time, it also recognized complexities between and within these scales, including the problems faced by developing countries of being able to access food via imports in a context of global economic instability (Maxwell, 1996). In other words, hunger was reinterpreted as being a product not just of food supply or availability, but also the socioeconomic conditions that shaped demand – i.e., people’s (and countries’) ability to command that food for their own consumption (Burchi and De Muro, 2016). These shifts in focus made their way into definitions of food security that were prominent in the early 1980s, a time when many sub-Saharan African countries faced chronic food shortages and rising hunger. For example, the FAO Director General at that time stressed: “The ultimate objective of world food security should be to ensure that all people at all times have both physical and economic access to the basic food they need” (FAO, 1982, 9) and the World Bank defined food security as “access by all people at all times to enough food for an active, healthy life” (World Bank, 1986, 1).

Further refinement in official definitions of food security came in the 1990s with growing understanding of the importance of the nutritional and preference dimensions (Clay, 2003), which were highlighted at the first International Conference on Nutrition held in 1992 (FAO, 1992). These elements reflected broader developments in the rural poverty literature that increasingly focused on diet quality (Maxwell, 1996). A 1995 report of the International Food Policy Research Institute (IFPRI) on the role of women in providing food security, for example, identified three pillars of the concept where women play crucial roles: availability, access, and nutritional security. The latter of these, it noted, “often depends on the availability of nonfood resources such as childcare, health care, clean water, and sanitation” (Quisumbing et al. 1995, 1). While nutritional adequacy was always an underlying assumption of food security, stressing the wider context that shapes the nutrients in the food supply, particularly high-quality protein and micronutrients, and the capacity to utilize that nutrient content, was explicitly recognized in this report as an additional pillar of the concept, which has more recently come to be labeled as “utilization.”

The 1996 World Food Summit’s definition of food security took on board many of these insights that were being expressed in the scholarly and policy literatures. The second commitment outlined in the 1996 Rome Declaration featured all four pillars: “We will implement policies aimed at eradicating poverty and inequality and improving physical and economic access by all, at all times, to sufficient, nutritionally adequate and safe food and its effective utilization” (FAO, 1996, Commitment 2). The definition of food security adopted at that time, updated slightly in 2001 to add the word ‘social’, still stands as the most widely referenced in international food policy 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” (FAO, 2001, 49). The four pillars were reinforced in FAO’s annual flagship publication, the *State of Food Insecurity in the World* (SOFI), from its first year of publication in 1999 (FAO, 1999), as well as in several FAO policy briefs in 2006 and 2008 (FAO, 2006, 2008).

Today, the four pillars are almost always referenced in a specific order (availability, access, utilization, and stability), despite the fact that the elements after availability were not added in that order, as outlined above. The pillars are referenced, for example, by the Integrated Food Security Phase Classification (IPC) guidelines, which stress that field assessors should view these pillars as interacting with one another in a sequential manner: “food must be available; households must have access to it; they must utilize it appropriately; and the whole system must be stable” (IPC, 2019, 29). Other studies also explicitly stress a hierarchy in the first three pillars, seeing availability as necessary, but not sufficient for access; access as necessary but not sufficient for effective utilization; and stability as a cross-cutting factor that is necessary for the others to hold (Webb et al., 2006; Upton et al., 2016).

3. Agency and sustainability as key dimensions of food security

Despite progress in bringing more nuance to our understanding of food security and aiding policy formulation, we have not made sufficient headway toward the goal of achieving food security for all. According to FAO et al. (2021), some 2.37 billion people – nearly one in three – faced food insecurity at the moderate or severe level in 2020. These numbers climbed steadily since 2014 and experienced a sharp increase in 2020 as the COVID-19 pandemic took hold (FAO et al., 2021). With hunger on the rise, we must consider whether the existing four-pillar framework for food security needs further updating to take the complexities of the current situation more fully into account in policies that aim to address food insecurity.

Specifically, widening inequalities and persistent hunger among those who are least advantaged in society have prompted some scholars to approach food security from a ‘human development’ perspective that highlights the importance of ensuring that people have agency to shape their own relationships with food systems and to address power imbalances within those systems (e.g., Sen, 1985). We have also seen growing awareness of the interconnection between food systems and other global systems, including ecological systems, which has encouraged a growing literature that approaches food security via a ‘food systems’ lens (e.g., Ericksen, 2008). Yet while some literature on food security has explicitly linked agency and sustainability to food security outcomes, and practitioners in the field sometimes consider these aspects, formal food policy frameworks at the international level have not explicitly recognized these elements in a systematic way. In the absence of a formal adoption of a six-dimensional conceptualization of food security in policy settings, the scholarly literature continues to utilize the four-pillar framework, sometimes with supplementary frameworks to capture missing elements (e.g., Devereux et al., 2020; Battersby et al., 2018). Below we outline the intellectual lineages and policy implications of both agency and sustainability to make the case for their more formal inclusion as additional dimensions of food security in food policy frameworks.

3.1. Why agency matters for food security

Agency, which refers to the capacity of individuals and groups to exercise a degree of control over their own circumstances and to provide meaningful input into governance processes, is widely seen today as an important aspect of addressing widening inequities within food systems, including imbalances of power among actors within those systems. For example, Action Track (AT) 4 of the 2021 Food Systems Summit (UNFSS) featured agency as a key component of advancing equitable livelihoods in sustainable food systems. The UNFSS Scientific Group’s

paper on the AT4 agenda notes “inequality and power imbalances – at household, community, national and global levels – are consistently constraining the ability of food systems to deliver poverty reduction and sustainable, equitable livelihoods” (Neufeld et al., 2021, 4). The same report further stresses that “Efforts to address inequality and power imbalances must build agency, change relations, and transform the structures that underpin this imbalance of power and result in inequalities” (Neufeld et al., 2021, 4).

Recent advances in thinking within the human development literature are central to the growing focus on agency as a component of food security. This literature on human development emerged from an expansion of the understanding of the goals of development beyond material qualities such as economic growth and income. The capabilities approach to development put forward by Sen – which in many ways builds on his work on entitlements – focuses on non-material aspects of the development process, including people’s rights and capabilities to determine their own well-being (Sen, 1985, 1999; Drèze and Sen, 1989; Fukuda-Parr, 2003; Hill, 2003). As defined by Sen, agency refers to “what a person is free to do and achieve in pursuit of whatever goals or values he or she regards as important” (Sen, 1985, 203). In other words, agency is the ability to not only exercise voice and make decisions, but also to act upon them in order to improve one’s own and their community’s well-being (Fukuda-Parr, 2003; Ibrahim and Alkire, 2007). Much of the development studies literature on agency has focused on ‘situated agency’ or the ways in which inequities in society, including gender inequities, constrain people’s ability to exercise control over their own life circumstances, which in turn affects their capabilities to determine their own well-being (Kabeer, 1999; Fukuda-Parr, 2003; Frediani, 2010; Thompson, 2015). Agency, in this sense, can be both economic and political. As the UN Department of Economic and Social Affairs’ *Report on the World’s Social Situation 2016* (UNDESA 2016, 84) notes: “equal opportunity to participate in political life and an equitable distribution of power, voice and agency in a society are key to ensuring that no one is left behind.”

These insights from the broader development literature have great significance for food security (Crocker, 2008; Burchi and De Muro, 2016; Chappell, 2018). Agency highlights the importance of process aspects such as the capacity for individuals and communities to make meaningful decisions about and participate in food systems on their own terms in ways that allow them to be free from hunger and its associated deprivations (Burchi and De Muro, 2016; Drèze and Sen, 1989). A focus on agency also recognizes that structural inequities and power differentials in society – be they based on gender, race, literacy, or other factors that are often beyond the control of individuals – can be barriers to the exercise of voice and participation in both individual and community decision-making about food systems, which in turn can undermine food security (Rocha, 2007; Chappell, 2018; Collins, 2021).

Agency is important at both individual and community levels, and both types of agency move us toward the idea of active ‘food citizens’ rather than passive food consumers (Fernandez-Wulff, 2018; Vivero-Pol, 2017). At the individual level, enhanced agency increases one’s autonomy and self-determination over their participation in food systems to ensure that they have access to foods and livelihoods within food systems that are culturally acceptable, uphold human dignity, and reduce their fear of going hungry (Maxwell, 1990, 1996). A growing number of studies confirm this link between food security and agency at the individual level. For example, when agency is enhanced via improved access to education and greater land ownership, particularly among women who face gender-based inequities, diet quality and childhood nutrition outcomes improve (Malapit and Quisumbing, 2015; Rehman et al., 2019; Bezner Kerr et al., 2011). At the community level, enhanced collective agency through greater voice and participation in shaping food and agriculture development projects and food system governance also results in better food security and nutritional outcomes (Crocker, 2008; Bezner Kerr et al., 2019). As Sen famously noted, famines do not occur in democratic societies that provide equitable opportunities to

exercise voice (Sen, 1999; see also Burchi, 2011).

Similar ideas about the importance of agency in relation to food security have gained prominence in social movements that advocate for food sovereignty and the right to food (Thompson, 2015). Food sovereignty emerged in the 1990s as a goal of social movements, such as La Via Campesina, to push back against the inequities associated with the globalization of food systems that members of that movement saw as being dominated by transnational corporations and shaped by trade rules determined at the global level without farmer participation (Wittman et al., 2010). Food sovereignty advocates call for a stronger voice for farmers in shaping food systems as well as the institutions that govern them (Anderson et al., 2019). Although definitions of food sovereignty have shifted over time, not unlike definitions of food security as outlined above, the idea has consistently emphasized the right of people to define their own food systems to ensure their own livelihoods and access to culturally appropriate foods. Some thinkers portray food sovereignty as being oppositional to food security because the latter says little on questions of agency and rights (Wald and Hill, 2016). However, at the same time, social movements have stressed that food sovereignty is a precondition for food security (Patel, 2009). In this sense, although there is some tension between the ideas, the two concepts are more complementary than oppositional (Jarosz, 2014; Clapp, 2014). That is, rather than seeing food sovereignty and food security as working in opposite directions, the idea of rights and agency that is embodied in the former is also important for achieving the latter. Consistently recognizing agency as a dimension of food security would acknowledge its relationship with food sovereignty and the concerns of social movements.

A focus on agency is also particularly relevant to Indigenous peoples’ food systems. The United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) (UNGA, 2007) affirms Indigenous peoples’ agency as the right to self-determination in any policy discussion that could affect their livelihoods or food systems. Nevertheless, despite UNDRIP, Indigenous peoples’ agency is too often not recognized, and their food systems, knowledge, and practices, have been and continue to be marginalized in food security policy forums (FAO, 2021).

Enhancing agency within food policies requires action to ensure greater capabilities and participation in food systems at both individual and community levels. Such measures include robust social protection programs for the most vulnerable and marginalized segments of society – including small-scale producers, women, youth, and Indigenous peoples – to reduce inequities. It also entails the establishment of stronger legal and institutional frameworks to uphold the right to food as well as equitable access to productive resources (HLPE, 2020). Measures along these lines call for an important role for the state to put in place policy frameworks and institutions to uphold rights (Sen, 1981; Drèze and Sen, 1989). Initiatives to empower and uphold the rights of women, for example, through participatory research and extension and involvement of women in decision-making at all levels, can go a long way toward reducing inequities, especially because women play significant roles in all aspects of food systems (Kabeer, 1999; Duflo, 2012; Rao et al., 2019). It is also important to enhance collective agency via public policy and governance structures that distribute power more evenly within food systems, as well as to implement broader measures to address concentrated power in food systems resulting from corporate consolidation (Clapp, 2021). Such redistribution of power within food systems can enhance both individual and collective agency by opening channels for participation and representation, especially for historically marginalized populations, in policy and governance frameworks that shape the rules by which food system actors must operate.

3.2. Why sustainability matters for food security

Sustainability refers to “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 food needs of future generations” (HLPE, 2020, 10). Sustainability is, in our view, distinct from stability. The latter was included to account for shorter-term disruptions, such as those created by market fluctuations, conflict, and natural disasters, that may undermine food security in the immediate or near future (FAO, 2006, 1982). Sustainability, by contrast, emphasizes the connections between ecosystems, livelihoods, society, and political economy to maintain food systems and support food security into the distant future. Broader policy initiatives such as the Sustainable Development Goals (SDGs) stress the importance of sustainability. SDG 2 explicitly ties sustainability to food security in its call to: “End hunger, achieve food security and improved nutrition and promote sustainable agriculture.”² Sustainability was also a central goal of the 2021 UN Food Systems Summit, which sought to deliver progress on all 17 of the SDGs, which require “healthier, more sustainable and more equitable food systems” (UN, 2021, paragraph 1).

Growing attention to broader questions of sustainability, especially since the 1980s and 1990s, encouraged an increased focus on food security within the context of *food systems* (Ericksen, 2008; HLPE, 2014, 2017). The idea of considering food security as an outcome of the functioning of food systems is certainly not new (e.g., Tansey and Worsley, 1995; Maxwell, 1990). However, the concept of food systems has attracted growing attention in recent years, especially in the face of increased awareness of the degradation of ecological systems in the context of climate change (Ingram, 2011; Ericksen, 2008; HLPE, 2017; Burlingame, 2020). Food systems are defined as gathering “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, 2014, 12). Understanding food security as a product of complex food systems reveals the extent to which the systems that result in food and nutrition outcomes intersect in complex ways with other systems – ecological, health, economic, political and socio-cultural. The result is that the long-term viability of food systems depends on the long-term health and functioning of those other systems and their relationships with one another (Ingram, 2011; Ericksen, 2008; Berry et al., 2015; Schipanski et al., 2016; Béné et al., 2019; Béné, 2020).

Ecological systems deserve special attention in relation to food systems as they provide the material foundation for food production and dietary diversity, including biodiversity in ecosystems, which provides the basis for nutritional adequacy. There is growing recognition in the literature that food systems – in all their activities and relationships from production through to processing, distribution and consumption – must respect the limits of ecosystems and contribute to restore them (El Bilali et al., 2018; Meybeck and Gitz, 2017; Carlsson et al., 2017). Yet the degradation of ecosystems via these activities ultimately compromises the capacity of food systems to produce and distribute food over the long term. In 2013, the Commission on Genetic Resources for Food and Agriculture recognized that nutrients in foods, and whole diets, were essential ecosystem services (CGRFA, 2013). At the same time, political economy and social interactions shape human engagement with ecosystems, including in ways that affect food systems.

The literature is clear that the dominant, industrial model of food production is not environmentally sustainable, and that technological innovations over the past century have often exacerbated this situation. Most farm fields are simplified ecosystems, or agroecosystems, that humans manipulate to produce food. The conventional productionist paradigm in agronomy, for example, emphasizes monocultures, a strategy that ignores ecological interactions to maximize the production of a preferred crop. Monocultures, however, have become increasingly dependent on external industrial inputs – inorganic fertilizers and pesticides, for example – that can undermine the health of ecosystems by

causing soil acidification, eutrophication in surface waters, pesticide resistant weeds, and the contamination of groundwater (Moseley et al., 2013; Ramankutty et al., 2018). Monoculture production systems rely on genetic uniformity, which has led to a significant erosion of plant genetic diversity (FAO, 2010). Overuse of surface and groundwater resources for agriculture has also become the norm in many areas of the world, with aquifers suffering unsustainable extraction (e.g., Ogallala aquifer), rivers dammed and diverted (e.g., Mekong River), and fisheries destroyed (e.g., Aral Sea) to supply inefficient sprinkler irrigation and flooded agricultural schemes (Hoekstra and Mekonnen, 2012). The advancement of the productionist agriculture paradigm also separated what were once integrated crop-livestock systems. One manifestation of this trend is the growing establishment of Confined Animal Feeding Operations (CAFOs) for beef, pork and poultry production. Concentrated industrial livestock operations of this sort have led to a significant animal waste problem, and frequent manure pond breakages, leading to water contamination (Hu et al., 2017).

Climate change introduces further complex dynamics that affect food production systems. A changing climate is both a symptom of unsustainable food production practices as well as a trend that further affects the capacity of food systems to function into the long future. The Intergovernmental Panel on Climate Change (IPCC) estimates that between 21 and 37 percent of greenhouse gas emissions are associated with food systems, including both pre- and post-production activities (IPCC 2020). Fossil fuel energy use on farms has grown with increased mechanization and use of fossil fuel-based inputs. Large-scale industrial animal agriculture is also a major contributor to climate change (Borhan et al., 2011), especially of methane, a more potent greenhouse gas than CO₂. Climate change will also affect crop yields, with the harshest impacts expected in the poorest parts of the world, including Africa South of the Sahara. More frequent and intense storms, more variable rainfall, and warmer temperatures and increased evapotranspiration in some areas will adversely impact food production systems (Pereira 2017). There is also a mounting body of evidence suggesting that climate change is diminishing the nutritional quality of food (Smith and Myers, 2018). Studies show that climate change is exacerbating malnutrition, generating negative synergies between obesity, undernutrition and a changing climate (Fanzo et al., 2018; Swinburn et al., 2019; Dietz, 2020).

Dominant models driving food processing, distribution and consumption patterns also have enormous implications for the integrity of ecological systems, which in turn affect food security and nutrition outcomes. Around one quarter of world food production is now traded internationally (D’Odorico et al., 2014) and there is considerable debate over the ecological impact of food trade (e.g., Balogh and Jámbor, 2020; Clapp, 2017). Some make the case that trade can be more ecologically efficient by focusing the production of crops in agroecological zones to which they are best suited, thus ensuring greater access to those foods, especially for ecologically stressed food importing countries (Hertel, 2015). However, at the same time, the production of highly traded commodity crops has been associated with ecological stresses in the countries that specialize in them. For example, growing trade in soy and palm oil has been associated with deforestation, climate change, and other environmental problems in countries that export those crops (Boerema et al., 2016; Wicke et al., 2011). Meanwhile, a growing body of research shows that the industrial processing of food is associated with higher environmental impacts than fresh foods that are prepared at home (Hadjikakou, 2017; Scott, 2018). These impacts include energy use as well as refrigeration and packaging (Schmidt Rivera et al., 2014). Environmental implications of these activities in food systems are important to consider, especially as processed and ultra-processed foods make up a high and growing proportion of diets globally (Monteiro et al., 2018; Baker and Friel, 2016).

More sustainable food systems are within reach if supported by government policy and research. While it has been around for some time (Carroll et al., 1990), agroecology, or the science of leveraging

² See UN Sustainable Development Goals website for SDG2, at: <https://sdgs.un.org/goals/goal2>.

ecological interactions within farming systems, has begun to gain traction in policy circles (HLPE, 2019). Multiple case studies have shown that agroecology is often more accessible to poor people (Moseley, 2017), better for agrobiodiversity (Perfecto and Vandermeer, 2010), soil health and the atmosphere (Altieri and Nicholls, 2020), and improves yields and nutritional diversity at the household and national scales (Akram-Lodhi, 2021). Central to this approach are techniques such as intercropping, organic soil amendments and crop-livestock integration. Despite the promise of agroecology, most national research centers and government policies continue to support high external input forms of agriculture. More broadly, shorter commodity supply chains, less energy intensive food processing and more sustainable food choices can improve overall sustainability. Policies to support more sustainable food consumption choices are also important (Nemecek et al., 2016). The sustainable diets literature considers these factors in suggesting policy directions that reach back through production, processing, and trade (Burlingame and Dernini, 2019).

4. From 'de facto' to 'de jure': The need to formalize the six dimensions of food security

Even as we have seen growing attention to the importance of agency and sustainability in the academic food security literature, as well as some recognition in high-level policy documents at the international level, these considerations are largely absent from most food security assessments on the ground (Gustafson et al., 2016; Anderson et al., 2019). It is important for policy bodies such as the CFS – which is widely seen as the foremost inclusive intergovernmental body for food policy coordination at the international level – to give formal recognition to agency and sustainability as dimensions of food security alongside the four established pillars, since its recommendations influence policy and programs at both the national and international levels. The adoption of an updated, six-dimensional food policy framework would ensure that food policies on the ground take agency and sustainability fully into account, including in their complex relationship with the other dimensions of food security. The failure to do so only risks a further chasm between broad policy statements at the national and international levels and the implementation of food policies on the ground. It would also go some way to addressing the concerns of civil society actors – especially those representing small-scale and peasant and Indigenous farming communities – who have been actively calling for greater attention to agency and sustainability at the CFS, including through their calls for food sovereignty and agroecology, which they argue is deeply interlinked with food security outcomes (Anderson et al., 2019; Wezel et al., 2020).

The formal adoption of agency and sustainability as dimensions of food security in the context of the CFS would also codify ideas already agreed in other policy contexts. All six dimensions of food security, for example, are already incorporated to varying degrees in current international policy guidance on the right to food. The introduction to the UN Voluntary Guidelines on the Progressive Realization of the Right to Adequate Food – also known as the Right to Food Guidelines – passed unanimously by all FAO member states in 2004, explicitly reference the four established pillars of food security (FAO, 2005, 5). States are called upon in Guideline 2 to “promote adequate and stable supplies of food” (availability and stability) as well as to “ensure access to adequate food” (access) (FAO, 2005, 10) and in Guideline 10 they are asked to take measures that “adapt or strengthen dietary diversity and healthy eating habits and food preparation” (utilization) (FAO, 2005, 21).

Beyond the traditional four pillars, agency is implicitly embedded in Guideline 1, which calls on 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, 9). Guideline 11 further implies agency by recommending that “States should provide information to individuals to

strengthen their ability to participate in food-related policy decisions that may affect them, and to challenge decisions that threaten their rights” (FAO, 2005, 23). Guideline 10 also calls on states to “recognize that food is a vital part of an individual’s culture, and they are encouraged to take into account individuals’ practices, customs and traditions on matters related to food” (FAO, 2005, 22).

Similarly, the Right to Food Guidelines also stress the importance of sustainability. Guideline 8, on access to resources and assets, explicitly calls 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, prevent water pollution, protect the fertility of the soil, and promote the sustainable management of fisheries and forestry” (FAO, 2005, 19). Guideline 8 also highlights the importance of sustaining biodiversity and genetic resources for food and agriculture as well as the conservation and sustainable use of land and water.

The six dimensions of food security as proposed by the HLPE in 2020 were also recently acknowledged by the FAO and other UN agencies in the *State of Food Security and Nutrition in the World 2021* report (FAO et al., 2021). The use of this framework in this flagship report signifies that these agencies have found the six-dimensional approach useful for policy analysis on the causes and responses to hunger. While the report notes the relevance of this six-dimensional framing of food security, it also states that the FAO or other bodies have not yet formally adopted this framework.

The recognition of agency and sustainability alongside the other four dimensions of food security within policy guidance on the right to food and in other contexts, as outlined above, indicates that it is not a huge leap to bring these additional dimensions into food security policy frameworks in a more formal way. Doing so would strengthen food security policies on the ground, and incorporate aspects that are vital for addressing the alarming rise in food insecurity in the world in the present moment.

5. Implications of adding agency and sustainability for food insecurity indicators

The inclusion of agency and sustainability into formal understandings of food security for policy purposes will have important implications for questions of measurement. Policymakers typically look for indicators that track broader trends and evaluate the effectiveness of policy initiatives. Yet food security is notoriously hard to measure (Vaitla et al., 2017; Maxwell et al., 2014; Headey and Ecker, 2013; Coates, 2013). But without some degree of measurement, there is a risk that the expansion of the definition of food security might only increase the gap between conceptualization and measurement (Barrett, 2010; Upton et al., 2016). Here we suggest that there is no shortage of measures for agency and sustainability to add to existing metrics assessing food insecurity, which further supports the case for a more formal adoption of the framework in policy contexts. It is also likely that the addition of these two dimensions would spur a new round of measurement innovation for food security beyond what we already know today.

Metrics associated with the four more established pillars of food security typically focus on both food and nutrition specific data, such as prevalence of undernourishment (PoU), food prices, and nutritional quality and diversity of foods, as well as broader data that can be a proxy for food insecurity, such as household income, assets, expenditure, and individual perceptions (Upton et al., 2016). Attempts to measure agency and sustainability will require different kinds of indicators, such as indices that capture a range of aspects of each of these dimensions to account for their complexity. It is important, at the same time, to be careful not to focus too much on any one food security metric in isolation, which could distract from gaining a greater understanding of how different dimensions of food security interact with one another within food systems (Vaitla et al., 2017).

5.1. Measuring agency

Agency in a food security context may be conceived of at many different scales, including individual, household, local community, national and global. It is at the household and individual scales where scholars and practitioners have devoted the most time and energy to explicitly measuring agency. Several important evaluation tools already capture elements of agency with respect to food security at this scale. These include the Women's Empowerment in Nutrition (WEN) grid and the Women's Empowerment in Nutrition Index (WENI), which explicitly incorporate agency, alongside knowledge and resources, as crucial dimensions of empowerment with respect to food and nutrition (Lentz et al., 2021; Narayanan et al., 2021). The agency related indicators for this framework include, among others, women's decision-making ability with respect to expenditures, status of employment, and perceptions of domestic violence. Other metrics that incorporate elements of agency at the individual and household scales include the Women's Empowerment in Agriculture Index (WEAI) and the Women's Empowerment in Livestock Index (WELI). These indicators highlight women's agency in farming and animal husbandry by measuring women's involvement relative to men across a range of decision-making contexts (IFPRI 2012; Alkire et al., 2013; Malapit et al., 2019; O'Hara and Clement, 2018; Bonis-Profumo et al., 2021; Galiè et al., 2019). These measures of empowerment provide important insights into linkages between women's agency and nutritional outcomes, although recent work shows some variability in their correspondence with nutritional indicators, pointing to the need to take the dynamic relationship between different factors affecting food security into account (e.g., Quisumbing et al., 2021).

The Household Food Insecurity Access Scale (HFIAS) and the Food Insecurity Experience Scale (FIES) highlight the agency of households and individuals and are increasingly used in research as general measures of household food insecurity. Several of the component questions of these surveys provide insights on the agency of households as food consumers, or how much power people feel over their household food supply and choices. Examples include queries regarding feelings of uncertainty or anxiety over the future supply of food, perceptions that food is of insufficient quality or undesirable, and views that there is not enough food (Coates et al. 2007; FAO, 2017). The FIES, for example, is able to calibrate the responses into an indicator that can be compared across countries, and it is already being used as the indicator for SDG 2.1.2, severity of food insecurity (Cafiero et al., 2018). A subset of questions in these surveys could be used to develop a separate index, such as a household or community food agency index.

Additional measures of the agency dimensions at the individual, household and community scales could include conditions that empower consumers over food purchase and consumption, such as more precise labelling and nutritional information as well as information on social, economic and environmental conditions under which the food was produced. Data on participation in local food systems decision-making and governance could also be incorporated in such indices as a way to capture collective agency at the community scale, such as municipal food security councils in some countries (Chappell, 2018).

At the national level, a mix of institutions, including government entities, private sector actors and social movements, all shape the character of a national food system, but government policy may determine how much control a population has over its food system or how autonomous the national system is vis à vis the global system. A number of different types of indicators can give us some insight over the power of a country and its people, individually and collectively, to shape the food systems with which they interact. These include, for example: national commitments to uphold the right to food and other human rights; levels of national food self-sufficiency; numbers and types of food producers; measures of domestic market concentration; participation in member-based associations; cooperatives and unions; availability of opportunities to engage in food system governance; rates of farmer suicide; and

national rates of hunger, malnutrition and obesity.

At the global level, institutional actors, such as agrifood corporations, the World Bank, World Trade Organization, the FAO, and social movements have varying degrees of power to shape the contours of the global food system in a way that is consistent with their policy agendas, sales objectives, or goals. Market share and corporate concentration, the prevalence of fair trade, and effective global social movement campaigns such as boycotts, might be seen as indicators of agency and power at the global scale. Clearly, some of these indicators might reveal trends that are good for one actor, but bad for others within global food systems. For example, when transnational food company X controls 70% of the trade in grain Y, this may highlight the agency or power of said firm and the lack of agency of many individuals and communities.

5.2. Measuring sustainability

Measuring the sustainability dimension of food security is to some extent already integrated in policy. For example, indicator 2.4.1 for SDG 2 measures the share of productive and sustainable agriculture. Food security is conditioned by the quality of food systems, and the sustainability of a food system may be measured in many ways. This could include focusing on soil health parameters (e.g., soil pH, soil aggregate stability, soil bulk density, soil infiltration rates), agrobiodiversity indicators, agrochemical use, water quality, or adherence to voluntary sustainability certification systems. The FAO already tracks several sustainability measures, including fertilizer, pesticide, and land use indicators, as well as information on soil nutrient budgets and livestock patterns (FAO, 2021). The challenge is that these measures may move in different directions and not give us a clear sense of whether the food system as a whole is becoming more, or less, sustainable over time. As such, several scholars have tried to conceptually capture a broader set of indicators utilizing an energy input/output type analysis to evaluate the efficiency of different food systems at different scales (e.g., Moseley and Jordan, 2001; Bayliss-Smith, 1982).

Indicators focused on diets can also convey elements of sustainability. One study proposes assessments of the sustainability of healthy diets that draw on 13 indicators using the Mediterranean diet as a model (Donini et al., 2016). Others have proposed a Sustainable Nutrition Security (SNS) framework that incorporates seven types of metrics, including ecosystem stability, food loss and waste reduction, and sociocultural wellbeing (which includes gender equity, community rights, etc.) (Gustafson et al., 2016). Eme and colleagues have reviewed methodologies for assessing sustainable diets, based on sustainable food systems, and proposed the development of harmonised indicators drawing on existing data from health and nutrition, environment, agriculture, and social/economics disciplines (Eme et al., 2019). Furthermore, Seekell and colleagues (Seekell et al., 2017) have developed resilience indicators for food systems, incorporating biophysical capacity, production diversity, and socioeconomic access. Common among these methods and metrics is the agreement that an increased focus on agroecology indicators could improve our capacity to assess whether food systems evolve towards more sustainable pathways.

5.3. The need for multiple means of measurement

While understanding and measuring the different dimensions of food security is important, singling out only one indicator or dimension of food security can give an incomplete picture of what is a complex and interactive situation. As other analysts stress (e.g., Vaitla et al., 2017; Maxwell et al., 2014; Coates, 2013), the use of multiple indicators, including indicators from different dimensions of the concept, gives greater diagnostic understanding of the food security status of different populations and provides better guidance for policy formulation.

The interactive dynamics of the different dimensions of food security also require consideration in the interpretation of data and metrics. How do we interpret food security trends when one indicator shows

improvements while another shows deterioration? How do we model the interaction of these different dimensions with each other? And how do we consider those elements – such as the quality of a state's commitment to upholding human rights – which are harder to assign quantitative measures? Much work remains to be done to model a dynamic food system and in its different dimensions and how these factors affect food security outcomes in broader contexts. Some scholars (e.g., Allen and Prosperi, 2016) call for methods and metrics that give a full system picture that takes interactions between variables into account. Along similar lines, Paloviita and colleagues have developed a vulnerability matrix, arguing that we need to shift from a focus on discrete components of food systems, to food systems as a whole (Paloviita et al., 2016). Yet measuring the quality of food systems overall is also challenging, although some efforts have made a start in this direction, such as with the recently established Food Systems Dashboard (Fanzo et al., 2020). Also along these lines, the HLPE's 17th report, to be published in 2022, is focusing on questions of data, including how best to capture the six dimensions of food security within food security metrics (HLPE, 2021).

6. Conclusion

The concept of food security has never been static. Knowledge and interpretations arising from research, practice, and world events have long informed the ways in which our understandings of the dimensions of food security have become more nuanced over time. The growing reference to the four pillars of food security reflects the need for a shorthand way to take into account the complexities and nuances of food insecurity. This approach has helped policymakers to not fixate on only one dimension, to recognize that its root causes are complex, and that the improvement of policies to enhance the prospect of achieving food security requires action on multiple fronts. However, as we have argued here, it is time once again for food policy bodies, including the CFS, to update their understanding of food security in policy frameworks to take new insights brought forward in the literature more systematically into account, especially around the importance of agency and sustainability for food security. Doing so would codify what is already incorporated in international legal guidance on the right to food. Measurement of these additional dimensions, while challenging, should not be a barrier to their inclusion in food security policy and analysis. Several indicators already measure aspects of agency and sustainability, and these provide a good benchmark for assessments that take these dimensions into account as well as their interactions with other dimensions.

As we have shown, the significance of both agency and sustainability has become increasingly evident in the context of widening food system inequities and growing awareness of sustainability implications of current food systems. As such, it is time to move beyond simply noting these trends in high-level policy documents to adopting formally a six-dimensional framework for food security policy that brings agency and sustainability more fully into the formulation of food security policies alongside the other four dimensions.

CRedit authorship contribution statement

Jennifer Clapp: Conceptualization, Writing – original draft, Writing – review & editing. **William G. Moseley:** Conceptualization, Writing – original draft, Writing – review & editing. **Barbara Burlingame:** Conceptualization, Writing – review & editing. **Paola Termine:** Conceptualization, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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