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2030 Agenda, health and food systems in times of syndemics: from vulnerabilities to necessary changes

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Abstract *This article, an essay, and narrative review, analyzes the relationship between the 2030 Agenda, food systems, and their relevance to global and collective health. The concept of syndemics contextualizes the COVID-19 pandemic in relation to poverty and social injustice, as it also reveals the synergy with other pandemics related to the advancement of the global food system: malnutrition, obesity, and climate change, which all have strong influence of the dominant model of agriculture. We also use four strategic concepts to think about the transition towards healthy and sustainable food systems: food system, food and nutrition security (FNS), human right to adequate food (HRAF) and agroecology. Then, we gather international reports and data that systematize studies on the growing threats imposed by the dominant agricultural model, often denied by powerful economic sectors and neoconservative groups. We also highlight challenges imposed at different scales, from global to local, so that public policies and social mobilizations developed in the last two decades can resist and reinvent themselves in the construction of fairer societies.*

Key words *Sustainable development, Diet, food, and nutrition, Health promotion, Sustainable agriculture, Agroecology*

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Introduction

This article, a mix of academic essay and narrative review, aims to clarify the strategic relevance of food systems for health promotion in different levels and dimensions, in dialog with the great changes that have been occurring worldwide and the globally agreed Agenda of essential transformations (2015-2030).

In this sense, contemplating the 2030 Agenda in line with concepts such as global health and syndemic, we seek to highlight the prominence of agroecological food systems, considered sustainable and promoting of healthy diets, for the promotion of health at different levels: local, regional, national, and global.

The perspectives on the 2030 Agenda also influence and work as an important basis for the Global Health concept. This may be considered an emerging Public Health issue that brings together political ethics principles and knowledge aimed at facing health inequities in the world's globalization. In academic terms, it may be defined as a field of a multidisciplinary and interdisciplinary nature that surpasses territories and multi-scale health issues and problems that go beyond national geographic, and political borders. Its social and environmental determinants *may arise from anywhere, as well as its plausible solutions requiring interventions and agreements between different social actors, including countries, governments, and international public and private institutions*[1] (p.370).

We believe this to be a strategic theme for the possible advancement of the Sustainable Development Goals (SDGs). Therefore, in the article, a systematic arrangement of central concepts is presented, and ten international reports produced since the 2030 Agenda agreement were used as references and sources of information. The selected documents show literature systematizations with analyzes of food systems from different focuses and were produced by different international groups of experts on food and nutrition security, or by experts on biodiversity and climate change at the service of organizations linked to the UN. The review of these reports may contribute to mapping the current discussion on a broad and complex issue, raising questions, and contributing to the updating of knowledge on themes that are still little explored in articles published in public health journals.

The variety of studies in the selected references add scientific evidence that helps to outline an understanding of the dangerous situation that the dominant food system currently causes worldwide, besides proving arguable consistency about the relevance and alternatives that drive other food systems, with emphasis on agroecology. Finally, even though synthetically, we point out critical aspects of Brazilian reality, assuming that, alongside the seriousness of the ongoing setbacks, there are also potentialities expressed in the resistance and advances towards agroecological food systems.

2030 Agenda: health and food associations in times of syndemic

At the 70th United Nations (UN) General Assembly, in September 2015, the 193 Member States committed themselves to the Resolution "Transforming Our World: The 2030 Agenda for Sustainable Development". They recognized that eradicating poverty in all its forms is the greatest global challenge and an indispensable requirement for sustainable development – in the economic, social, and environmental needs[2].

The Resolution is supported by the purposes and principles of the United Nations Charter (1945), the Universal Declaration of Human Rights (1948), the Rio Declaration on Environment (1992), the Millennium Declaration (2000), the final Declaration of the Rio+20 Conference (2012), among other international treaties and agreements. The Rio+20 and the Millennium Development Goals (2000-2015) context worked as the basis for the establishment of the new Agenda for the upcoming years, considered to be more participatory and including several countries and different sectors of society. The 2030 Agenda has as its starting point a broad and sharp diagnosis of the challenges facing humanity at the beginning of the 21st century, realizing that the survival of many societies and biological systems on the planet is at risk[2]:

Billions of citizens are still living in poverty and are deprived of a decent life. There are growing inequalities within and between countries. There are huge disparities in opportunity, wealth, and power. Gender inequality remains a major challenge. Unemployment, especially among young people, is a big concern. Global health threats, more frequent and extreme natural weather events rising conflicts, violent extremism, terrorism, and related humanitarian crises, and forced displacement of people threaten a setback in the progress made in recent decades. Depletion of natural resources and the negative impacts of environmental degradation, including desertification, drought, land deg-

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radation, freshwater scarcity, and loss of biodiversity increase and worsen the list of challenges facing humanity. Climate change is one of the greatest challenges of our time and its negative effects undermine the ability of all countries to achieve sustainable development. (p. 6)

On top of this scenario is the trend of the global population growth, which should reach 70% in 2050, totaling nearly 2 billion inhabitants[3]. Faced with such challenges, the countries involved agreed to make transforming efforts over the next fifteen years, such as ending hunger; combat inequalities; to build peaceful, just, and inclusive societies; to protect human rights and promote gender equality; to ensure the lasting protection of the planet and its natural resources.

The 2030 Agenda is organized into 17 sustainable development goals (SDGs) and 169 targets, which are closely related and must be analyzed in an integrated and inseparable way. This understanding is consistent with the broad and socially constructed health perspective established in Brazil by the organic health law (8,080/1990), that health is socially produced and is expressed unequally in different groups, given their insertions in society. The processes of health, illness, care, and the distribution of morbidity and mortality of a country or region encompass a collection of determinants and conditions in which social inequalities relate to health inequities[4].

The current international scenario imposes huge obstacles to the advancement of the 2030 Agenda, given the process of strengthening neoliberalism and neoconservatism in many countries worldwide, which threaten the values of solidarity[5]. This affects humanity's commitment to human rights and the overcoming of social, economic, and environmental inequalities, and directly affects social protection systems, which include national health policies that directly impact SDG 3 (Health and Well-being). Despite the global dimension of this Agenda, the political strategy for implementing the SDGs is a national responsibility[2], with each country's government determining priorities, governance structures, monitoring of results, and ways of funding[6].

One of the targets of the Agenda is SDG 2, dedicated to the theme "Zero Hunger and Sustainable Agriculture". However, since the 2015 Resolution, when the world pledged to *end hunger, food insecurity, improve nutrition and promote sustainable agriculture*, data indicate that there is nothing to celebrate, quite the contrary. The number of people affected by hunger has slowly increased since 2014[7], in a global crisis context of multiple dimensions: social, ethical, economic, democratic, ecological, and sanitary.

It is well known that, with the outbreak and advancement of the COVID-19 pandemic, pre-existing social inequalities and vulnerabilities have worsened, especially affecting, other than risk groups with comorbidities, certain countries, territories, and populations. The poorest, black, indigenous, precarious workers, and health professionals who are on the front line of service to the population stand out. In this sense, authors such as Boaventura Santos[8] point to the current crisis as civilizing, with the pandemic being a milestone that effectively begins the historic time of the 21st century with its challenges for humanity.

There are close associations between the goals of SDG 2 (Zero Hunger and Sustainable Agriculture) and SDG 3 (Health and Well-Being). This is obvious in the relationships between end hunger (2.1) and all forms of malnutrition (2.2) reducing the global maternal mortality rate (3.1) and ending preventable deaths from newborns and children under 5 years (3.2). The food theme has special intersections in the collection of SDGs, and is considered essential for the health of people and the planet. There is a fair consensus that a large part of the social and health issues worldwide will only be solved as several actions taken at multiple levels ensure healthy, affordable, and quality food for the entire world population.

The spread of COVID-19 and the several crises that devastate the country have reinforced the concept of syndemic[9], which is close to that of vulnerability[10], widely used by environmental and health sciences since the 1990s. Vulnerability is a polysemic concept developed by many subjects and fields of knowledge focused on studying themes such as development and sustainability, poverty and food and nutrition security, natural and technological disasters, global climate change, and public health issues, among others. It is applied to analyze why some countries, regions, and population groups have worse consequences or impacts in the face of events with similar characteristics, such as disasters and epidemics.

The syndemic concept, however, broadens and makes complex those of epidemic and pandemic, while adding the concept of vulnerability. It was developed in an interdisciplinary way by epidemiologists and medical anthropologists in the US amongst the health, political economy, and political ecology debate. The concept was created in the 1990s[11] based on pioneering work carried out with populations from urban periph-

eral neighborhoods, homeless people, and drug users. Later, it began to be widely used in public health and regarding community health issues whose effects of social conditions affect and worsen some combined diseases, such as chronic degenerative and communicable diseases like diabetes, hypertension, obesity, and HIV, in association with other risk factors[9].

The syndemic concept has a lot in common with the principles and conceptual basis of Public Health, including an exchange with the theory of social determinants. Pandemics related to hunger, obesity, and climate change were recently considered a Global Syndemic[12] as they relate with each other, share common socio-environmental determinants, and have a mutual influence on their health burden for society.

In this sense, COVID-19 must be considered a new syndemic in addition to the previous ones, being at the same time a cause and a consequence generating a complex cycle, making it even more difficult to reach the goals globally negotiated by the 2030 Agenda.

Sustainable food systems: key concepts and official documents

The number of official reports that urge for major changes in food systems to make them healthier, more sustainable, and equitable is growing rapidly[12]. With different approaches, these documents have analyzed the complex relationships between food, health, environment, and agriculture, showing the interdependence of the 2030 Agenda objectives, especially SDGs 2 and 3.

The resolutions adopted by the UN General Assembly that announced the Decade of Action on Nutrition (2016-2025), Decade of Family Farming (2019-2028), and Decade on Ecosystem Restoration (2021-2030), as well as the nations united declaration on the rights of peasants and other people working in rural areas (2018), strengthen and stimulate efforts to transform food systems, as they indicate that there will be international reports on the subject in the coming years.

Such complex themes require a systemic approach that combines strategic concepts created in the last decades, and in the article, we highlight four of them. The first comprises the *food system*, understood as all the elements (environment, people, inputs, processes, infrastructure, institutions, and civil society organizations, among others) and activities that relate to the production, processing, distribution, preparation, and consumption of food, which includes the characteristics and the outputs of these activities, including socio-economic and environmental outcomes[13].

The degree of complexity of a food system depends on the distance between producers and consumers, as well as the number of traders, including sellers, industrialists, and transporters. They are made up of varied and superimposed food circuits, which may go from peasant communities living in self-consumption in subsistence agriculture, up to circuits of local, regional, and/or national markets, with or without food processing. On larger scales, there may be circuits of planned economies (with State intervention) and/or international circuits, a typical case of the commodity trade type of export agribusiness, which is the predominant model in Brazil in terms of economic and political power. In the same region or country, several circuits can work simultaneously, depending on food products, relations between rural and urban populations, the participation of large companies and industries, economic characteristics related to the external or internal market, or even ecological and cultural aspects that outline the complexity of food circuits in different societies and agroecosystems[14].

A *sustainable food system* (SFS) fulfills its social function, that is, providing Food and Nutritional Security (FNS) for all people, *so the economic, social and environmental bases that generate food and nutrition security for future generations are not compromised*[13].

The FNS concept is the second strategy we adopted. Established in Brazil in 2006 at the end of the first Lula administration as one of the milestones of the Zero Hunger (Fome Zero) Program and guarantees the right to regular and permanent access to quality food, of sufficient quantity, without compromising access to other essential needs. It is based on health-promoting dietary practices that respect cultural diversity and that are environmentally, culturally, economically, and socially sustainable (Art. 3)[15].

This framework was established based on social participation, the formulation of public policies, and academic research that involve the re-creation of the National Council for Food and Nutritional Security (Conselho Nacional de Segurança Alimentar e Nutricional - Consea) and the development of the Zero Hunger program, in 2003, and other related public policies, including the II National Conference on Food and Nutritional Security (2004). All these processes

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strengthened the concepts of food sovereignty and endured the human right to adequate and healthy food, essential for the organization of fair and sustainable food systems[16].

The third strategic concept is that of *agroecology*, which has gained global prominence due to a significant body of scientific and empirical evidence that contributes to making the *human right to adequate food* effective. The last one composes the collection of four strategic concepts and is characterized based on its five dimensions: availability, accessibility, adequacy, sustainability, and participation[17]. Two International Symposia on Agroecology for FNS, organized by FAO, in 2014 and 2018, as well as the III International Conference on Agriculture and Food in an Urbanizing Society (2018) held in Brazil, have as focus the need for change in the global food system and to scale up agroecology to achieve SDG[18].

Agroecology may be understood as a way of redesigning food systems, starting with investigation and management of rural or urban agroecosystems to the consumers' table, aiming sustainability with environmental protection, economic viability, and social justice. Through research and actions to change in a transdisciplinary, intercultural, and participatory way, agroecology combines science, agricultural practices, civil society movements, and public policies focused on social transformation[19,20], being strategic in the redesign and transition of food systems and circuits.

In this article, we selected 10 international reports published between 2016 and 2020, which contribute to food systems approaches and allow a cross-ground dialogue between SDG 2 of the 2030 Agenda and health. There are two documents from each of the three international groups of FNS experts: (i) Panel of Experts on FNS (HLPE) of the Committee on World Food Security/UN; (ii) International Panel of Experts on Sustainable Food Systems (IPES-Food); (iii) EAT-Lancet Commission on Food, Planet, Health. For HLPE and IPES-Food, where there are more reports published in the mentioned time frame, those that address greater approaches to food systems were selected. We included to the selection, official reports that add an overview of food systems, whether more focused on FNS and diet impacts: the 2020 version of "The State of Food Security and Nutrition in the World"' and the 2019 version of the "The State of the World's Children", which has as its theme "Children, Food and Nutrition". Finally, two documents that provide a complex and deep understanding of the association between food systems and environmental sustainability were included: one on climate change, the other on biodiversity and ecosystem services (Chart 1).

The importance of food systems for global health and the 2030 Agenda

Between 1990 and the mid of the second decade of the 21st century, there were significant advances in reducing the global rate of adults and children with some degree of malnutrition. Sixty developing countries met or surpassed the Millennium Development Goals (2000-2015) targets of reducing by half the ratio of people suffering from hunger[21]. However, the number of people affected by severe food insecurity, worldwide, has been increasing slowly since 2014, reaching about 750 million people in 2019[7]. Estimates for 2015 suggested that about 2 billion people were affected by micronutrient deficiency (MNDs or "hidden hunger") and almost 2 billion others due to being overweight or obesity[22]. For at least four decades, the obesity pandemic has been changing the pattern of malnutrition and is currently advancing worldwide at a constant pace, affecting high, middle, and low-income countries[7,12].

Malnutrition in all its forms, including undernourishment, obesity, and other dietary risks for chronic non-communicable diseases (NCDs) is currently the leading cause of illness and premature death worldwide[12,23]. The Lancet Commission highlights that obesity and its determinants are related to three of the four main causes of NCDs on the planet, "including cardiovascular disease, type 2 diabetes and some types of neoplasms" (p. 17) and that the annual economic impact of obesity is roughly US$ 2 trillion (2.8% of global GDP)[12].

Children and pregnant women are typically vulnerable to the triple burden of malnutrition - undernourishment, MNDs, and overweight - which threatens survival and impairs the ability of millions of children and adolescents to grow and develop to their full potential, significantly impacts the mother's health, with short, medium, and long-term effects (Chart 2). At least one in three children under 5 is malnourished or overweight, and one in two suffers from hidden hunger. This scenario perpetuates poverty between generations and regions, given that the greatest burden of all forms of malnutrition is shouldered by children and adolescents in the poorest and most marginalized communities[23].

The analyzed reports indicate that global food systems are currently unable to offer

Chart 1. Selected international reports on Food Systems, by year of publication.

Authorship	Title	Year
IPES-Food	From Uniformity to Diversity: A paradigm shift from industrial agriculture to diversified agroecological systems	2016
IPES-Food	Unravelling the food-health nexus. Addressing practices, political economy, and power relations to build healthier food systems	2017
HLPE	Nutrition and food systems	2018
EAT-*Lancet* Commission on Food, Planet, Health	The global syndemic of obesity, malnutrition and climate change	2019
EAT-Lancet Commission on Food, Planet, Health.	Food in the Anthropocene: the EAT - *Lancet* Commission on healthy diets from sustainable food systems	2019
HLPE	Agroecological and other innovative approaches for sustainable agriculture and food systems that enhance food security and nutrition	2019
United Nations Children's Fund (UNICEF)	The State of the World's Children 2019 Children, food, and nutrition: Growing well in a changing world	2019
Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)	Global assessment report on biodiversity and ecosystem services	2019
FAO, OMS, FIDA, PMA and UNICEF*	The state of food and nutrition security in the world Transforming food systems for affordable and healthy diets	2020
Intergovernmental Panel on Climate Change (IPCC)	Climate Change and Land An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems	2020

* FAO - United Nations Food and Agriculture Organization; WHO - World Health Organization; IFAD - International Fund for Agricultural Development; WFP - World Food Program.

Source: Author's elaboration.

healthy diets[12,21-25]. It is a system ruled by global capitalist agriculture that shapes food empires, composed of agribusiness producing commodities, by transnational industrial and logistical corporations responsible for inputs, processing, transport, and retail companies, including supermarket chains, as well as the financial sector[26].

Control over the production, processing, and food retail, as well as advertising strategies, has enabled corporations to encourage the consumption of industrialized and processed foods that are rich in trans fats, sugar, salt, and flavors, which are growing in most countries and are the main responsible for the increase in the prevalence of overweight and obesity. The large scale of production and the tax benefits obtained in several countries tend to make such foods cheaper compared to nutritious and fresh foods[12]. It was estimated that more than 3 billion people worldwide cannot afford to pay for healthy diets, which cost, on average, five times more than foods that only meet energy needs through starchy and nutrient-poor foods[7].

Global food systems are also considered the main cause of environmental change on the planet. The expansion of agricultural, livestock, and planted forest areas in recent decades contributed to deforestation and increased net emissions of Greenhouse Gases (GHG), with the degradation of natural ecosystems (such as forests, savannas, natural pastures, and swamps) and declining biodiversity. Agriculture, sylviculture, and other land use activities account for 16–27% of GHG emissions (or 21–37% if we consider

pre- and post-production food system activities), with cattle in pasture accounting for more than half of the total anthropogenic N_2O emissions in 2014[27].

The Intergovernmental Panel on Climate Change (IPCC) considers that climate change has already affected the FNS due to warming, changes in rainfall patterns, and a higher frequency of some extreme events. Fruit and vegetable production - a key element of healthy diets - is particularly vulnerable to climate change. Climate extremes have an impact on the livelihoods of poorer and vulnerable communities, contributing to migration. Several pieces of research indicate that increased levels of carbon dioxide in the atmosphere are reducing the levels of nutrients in food[12].

Biodiversity loss is the planetary limit most impacted by human action, and it is estimated that this could hamper progress by up to 80% of the assessed SDG targets related to poverty, food, health, water, cities, climate, oceans, and land. Food production may be jeopardized by the loss of natural pollinators, as 75% of global food crop types rely on animal pollination, but our pesticide-intensive farming methods-dependents threaten to extinguish these ecosystem services[28].

It is considered that every diet has hidden costs and that it has synergies due to its consequences on health (SDG 3) and climate (SDG 13), depending on the foods consumed and the food systems they are part of[7].

An approach based on food systems allows the identification of five key channels that influence health: 1) occupational risks; 2) environmental contamination; 3) contaminated, unsafe and altered foods; 4) unhealthy eating patterns; e, 5) food insecurity. The hegemonic global food system contributes decisively to such channels, causing human and economic losses that threaten the development of humanity and the health of the planet. The contamination of soil, air, and water with fertilizers, pesticides, and antibiotics, for example, exposes different living beings to several consequences. It is estimated that only resistance to antimicrobials has led to an additional 8 million days of hospitalization and health costs between US$ 20 to 34 billion[21].

The different reports addressed in this article agree on what deep and transforming changes in the food global system are necessary and imperative[12]. The efforts of the different groups in studying the data in a unified manner and proposing transition paths bring together quite significant contributions.

The EAT-Lancet Commission advocates a global food system reorganization agreement committed towards diets that promote global

Chart 2. How the triple burden of malnutrition harms children, adolescents, and women.

Children and adolescents	
Malnutrition, chronic malnutrition (short stature for age) and acute malnutrition (low weight for height)	. Low growth, infection, and death . Poor cognition, school-readiness, and school performance . Poor earning potential later in life
Hidden hunger: deficiencies in micronutrients	. Poor growth and development . Poor immunity and tissue development . Poor health and risk of death
Overweight (including obesity)	. Short-term: cardiovascular problems, infections and poor self-esteem . Long-term: obesity, diabetes, and other metabolic disorders
Pregnant women	
Undernutrition: stunting and underweight	. Perinatal complications . Prematurity and low birth weight . Chronic diseases for child in later life
Hidden hunger: deficiencies in micronutrients	. Maternal mortality and morbidity . Neural tube defects in newborns . Prematurity, low birth weight and impaired cognitive development in newborns
Overweight (including obesity)	. Gestational diabetes and pre-eclampsia . Obstetric complications . Overweight and chronic disease for child in later life

Source: UNICEF, 2019.

health for nearly 10 billion people by 2050. The proposal involves "more than doubling the intake of healthy foods such as fruits, vegetables, vegetables and nuts, and reducing more than 50% in overall intake of not so healthy foods such as added sugars and red meat" (p.12) besides cutting by half food waste in the world and hold back so that there is no expansion of the area intended for food production[24]. The United Nations Children's Fund (UNICEF) claims that children's nutritional needs should be at the heart of national food systems as a major condition for sustainable development[23]. However, it will be necessary to change not only the argumentative basis, but the public, economic and symbolic policies that nurture the current global food region[29].

The growing international respect of agroecology relevance for the promotion of sustainable food systems is expressed differently in some of the reports. Interestingly, the EAT-Lancet Commission does not even mention agroecology in its studies. The IPCC and Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) highlight in their documents the contributions of agroecology in the promotion of FNS from the management of agroecosystems to the reorganization of food systems that enable the mitigation of climate change and the protection of biodiversity through more diverse and resilient systems[26,27].

The FAO (HLPE) panel of experts on FNS advocates an agroecological approach for sustainable food systems that enhance the human right to adequate nutrition[30]. The HLPE has 13 principles of the agroecological approach (Chart 3) in dialogue with previous editions, among them "The 10 elements of agroecology"[31], with a comprehensive vision that places agroecology as a central alternative for the future of the planet and humanity.

An agroecological approach favors the use of natural processes, limits the use of external inputs, promotes closed cycles with minimal negative externalities and stresses the importance of local knowledge and participatory processes that develop knowledge and practice through experience, as well as scientific methods, and the need to address social inequalities. An agroecological approach recognizes that agri-food systems are coupled with social-ecological systems from the production of food to its consumption with all that goes on in between, it involves science, practices and a social movement, as well as their holistic integration, to address food security and nutrition. (p. 43)[30]

IPES-Food works with a focus on the elements that favor progress in the transition to "agroecological food systems" (AFS), available in a collection of publications. In a study comparing the global food system[22], it is evident how AFSs respond to a collection of interconnected problems, with the potential to contribute to the advancement of several of the SDG goals.

We highlight two fundamental needs for the desired changes: 1) reasserting scientific integrity and research as a public good[21], free from conflicts of interest with economic sectors interested in maintaining their profits despite social, environmental and health impacts. Interdisciplinary efforts, including Public Health, are needed to better understand and enhance sustainable food systems and agroecology. 2) it is necessary to address power inequalities within food systems at all levels and different dimensions, which includes protecting countries and vulnerable groups from exploitative and predatory practices by food and beverage industries[25]. This implies the participation of organized civil society in equal governance processes. It must mobilize and ensure the main role of women, young people, consumers, among others.

Final considerations

Low nutritional quality diets are the main risk factor for the global burden of disease and are intrinsically related to men's impacts on climate change and accelerated biodiversity loss in recent decades. The poorest and most vulnerable population groups suffer the greatest burden of these impacts, condemning them to poverty while powerful groups concentrate on wealth. Global food systems, the results of neoliberalism, the expansion of capitalist industrial agriculture and food empires[26], contribute decisively to this scenario. It is therefore a strategic theme for global health in the coming decades or even centuries.

The origin of the concept of food systems is in the context of the 1972 world food crisis, which unfolded in the 1974 "World Food Conference" and in the "Universal Declaration for the Definitive Elimination of Hunger and Malnutrition"[14]. After five decades, the problem has not been resolved, despite the efforts of several countries: there is a global syndemic of malnutrition, obesity, and climate change. To make it worse, the advance of the COVID-19 pandemic brought great repercussions for the health of humanity, including the worsening of pre-existing social inequalities and vulnerabilities. It is estimated that, among the negative effects of this pandemic, the

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Chart 3. Agroecological principles, since HLPE compilation.

Principles	The 10 Agroecology elements (FAO)	Scale application*
Improve resource efficiency		
1. Recycling. Preferentially use local renewable resources and close as far as possible resource cycles of nutrients and biomass.	Recycling	FI, FA
2. Input reduction. Reduce or eliminate dependency on purchased inputs and increase self-sufficiency.	Efficiency	FA, FO
Strengthen resilience		
3. Soil health. Secure soil health and functioning - and enhance them - for improved plant growth, particularly by managing organic matter and enhancing soil biological activity.	Diversity; Resilience	FI
4. Animal health. Ensure animal health and welfare.	Resilience	FI, FA
5. Biodiversity. Maintain and enhance diversity of species, functional diversity and genetic resources and thereby maintain overall agroecosystem biodiversity in time and space at field, farm and landscape scales.	Diversity	FI, FA
6. Synergy. Enhance positive ecological interaction, synergy, integration and complementarity among the elements of agroecosystems (animals, crops, trees, soil and water).	Synergy	FI, FA
7. Economic diversification. Diversify on-farm incomes by ensuring that small-scale farmers have greater financial independence and value addition opportunities while enabling them to respond to demand from consumers.	Diversity	FA, FO
Secure social equity and responsibility		
8. Co-creation of knowledge. Enhance co-creation and horizontal sharing of knowledge including local and scientific innovation, especially through farmer-to-farmer exchange.	Co-creation and sharing of knowledge	FA, FO
9. Social values and diets. Build food systems based on the culture, identity, tradition, social and gender equity of local communities that provide healthy, diversified, seasonally and culturally appropriate diets	Human and social values; culture and food traditions	FA, FO
10. Fairness. Support dignified and robust livelihoods for all actors engaged in food systems, especially small-scale food producers, based on fair trade, fair employment and fair treatment of intellectual property rights.	Resilience	FA, FO
11. Connectivity. Ensure proximity and confidence between producers and consumers through promotion of fair and short distribution networks and by re-embedding food systems into local economies.	Circular and solidarity economy	FA
12. Land and natural resource governance. Strengthen institutional arrangements to improve the recognition and support of family farmers, smallholders, and peasant food producers as sustainable managers of natural and genetic resources.	Responsible governance	FA, FO
13. Participation. Encourage social organization and greater participation in decision-making by food producers and consumers to support decentralized governance and local adaptive management of agricultural and food systems.	Responsible governance; Resilience	FO

*Scale application: FI = field; FA = farm, agroecosystem; FO = food system

Source: Adapted from HLPE, 2019.

number of people living in hunger in the world in 2020 has increased from 83 to 132 million[7].

Due to its continental dimensions, agricultural production, the concentration of natural wealth, and wide sociocultural diversity, Brazil has stood out in debates on food systems, but in recent years there have been important setbacks. The weakening of the Brazilian economy in re-

cent decades, supported by the State, was evident in the commodity boom, with the expansion of beef cattle and soy, corn, and sugar cane crops, specifically. Such monocultures threaten even more biomes rich in socio-biodiversity and essential for water and climate balance, such as the Amazon and the Cerrado. The 2017 Agricultural Census revealed, compared to 2006, the negative consequences of the agribusiness advancement, whose economic agents profit billions of reais per year: the concentration of land and income increased, with a reduction of 9.5% of agricultural establishments family farming, cut in jobs and hired personnel, increased use of pesticides, and decreased cropping of diversified foods[32]. On the other side of the food chain, supermarkets are increasingly concentrating power and income, reinforcing the consumption of ultra-processed and contaminated foods[33] in a progressively urbanized society. At the same time, family farmers who supply healthier foods are no longer supported.

The current Brazilian minister of environment endorsed that the attention given to COVID-19 should be used for infra-legal changes that guide the actions of the Brazilian State. The term "run the cattle herd" is reflected in the dismantling of environmental protection, in the utmost release of pesticides and in the deforestation and wildfires that sign the Bolsonaro Government. He, on the first day of his term, extinguished the National Council for Food and Nutritional Security, in addition to weakening a collection of FNS policies for which the country was already an international reference[34]. While agribusiness celebrates its economic gains, food insecurity is accelerating in the country[35].

In the context of the Decade of Action to deliver the SDGs by 2030, the UN will hold in 2021 the World Summit on Food Systems. UN Special Rapporteurs on the Right to Food decried the appropriation of the Summit's leadership by actors linked to the World Economic Forum, with a gap in the central place of the UN Committee on World Food Security as a space for the governance of global food systems. With the participation of civil society harmed, the Summit has its legitimacy compromised[36]. If, on the one hand, Agenda 2030 characterizes a pact around human rights and the health of the planet, on the other hand, it is the economic power concentrated in large corporations hindering the advance of agreed changes, which is one of the central issues.

But there are hopes: agroecology characterizes an emerging paradigm that keeps advancing towards the 21st century, with the Brazilian agroecological movement being a world reference for change[22]. We highlight the results of two surveys carried out in 2020 to illustrate the valuable efforts to build local, diverse, sustainable, and healthy food systems with decisive participation from the agroecological field.

The "Real Food Collective Action: learning in times of pandemic" project tracked 310 proposals created or adapted and expanded in the first months of the epidemic in the country. Organized by popular organizations, collectives, networks, and social movements from across the country, rural and urban, these experiences show the resilience and diversity of local food systems committed to guaranteeing real food[37]. The survey "Agroecological Municipalities and Policies for the Future - municipal initiatives to support family farming and agroecology and to enhance FNS" identified 721 initiatives, in 531 municipalities in 26 states, that directly or indirectly support agroecology. The diversity of these experiences involves 41 themes[38] that emphasize the coherence of thinking about agroecology as an ecology of food systems[19].

The analysis of these experiences discloses strategies, challenges, perspectives, restrictions, and advances. Networking in conducting research committed to action is progress, seeking to promote interaction between these experiences to strengthen and create new initiatives and forms of knowledge production.

Feeding humanity with nutritious diets, guaranteeing the right to a balanced environment, reducing social, health and environmental inequalities and inequalities, promoting health and well-being are complementary and interdependent goals that may be promoted through sustainable food systems (SFS). It is argued that the approaches to food and nutrition security, the human right to adequate food and agroecology are vital for the redemocratization and sustainability of food systems. It is an organic approach to a collection of problems and challenges that impact global health.

In this article, we endorsed the impact of food systems for health and the 2030 Agenda, in the context of a syndemic that was already underway and that feeds back on COVID-19. We recognize the limitations of this article in dealing with the set of issues addressed in such complex and complementary reports. Other reports are available from the same selected groups and organizations that are complementary and support critical contributions on food systems as well as recommendations for changes. Issues such as

food waste, ocean contamination, exploitation of seafood and the importance of artisanal fishing are examples of gaps in this essay. We support a more strategic consideration from the collective health field to food systems, approaching more and more to the agroecological field in Brazil, intensifying its contributions towards the transformations necessary for the health of the planet[18].

Collaborations

AC Burigo participated in all stages of the article, and MFS Porto participated in the analysis and data interpretation, review, and approval of the final version.

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