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"Pandemic Food". Rethinking agri-food after COVID-19

Alessandra Narciso

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Special Issue

Il filo sottile dell'emergenza: controllo, restrizioni e consenso

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"Pandemic Food". Rethinking agri-food after COVID-19

Alessandra Narciso
(Roma Tre University, Rome)
ORCID Id: https://orcid.org/0000-0003-1293-1833

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Abstract
The relationship between unsustainable agri-food practices and the spread of food-related diseases has been confirmed by the COVID-19 pandemic. Current agri-food systems are not able to respond to global population growth, migration, and urbanization, nor to hunger caused by climate change and by insecurity in conflict zones. Increased food production, intensive farming, long supply chains and consumer demand – particularly for animal products – pose risks not only to human health, but also to biodiversity and the climate. Some commonalities in the history of pandemics oblige us to reflect and rethink food production and processing in a more sustainable and holistic way, as proposed in the EU *Farm to Fork Strategy*.

Keywords
Agri-food pandemics; EU Food Law and Policy; Sustainable diets; Farm to Fork Strategy.

Résumé
La relation entre les pratiques agroalimentaires non durables et la propagation des maladies liées à l'alimentation a été confirmée par la pandémie de COVID-19. Les systèmes agroalimentaires actuels ne sont pas en mesure de répondre à la croissance démographique mondiale, aux migrations et à l'urbanisation, ainsi que à la faim, en raison du changement climatique et de l'insécurité dans les zones de conflit. L'augmentation de la production alimentaire, l'agriculture intensive, les longues chaînes d'approvisionnement et la demande des consommateurs – en particulier pour les produits d'origine animale – présentent des risques non seulement pour la santé humaine, mais aussi pour la biodiversité et le climat. Certains points communs dans l'histoire des pandémies nous obligent à réfléchir et à repenser la production et la transformation des aliments d'une manière plus durable et holistique, comme le propose la stratégie de l'UE de la Ferme à la Table.

Mots-clés
Pandémies agroalimentaires ; législation et politique alimentaires de l'UE; régimes alimentaires durables ; stratégie de la Ferme à la Table.

Alessandra Narciso

Introduction

The recent COVID-19 pandemic has made clear how incredibly interconnected the world is, and that collaboration across many disciplines is necessary to guard against similar events in the future. This outbreak has tracked momentum of a prior and after with many lessons learnt for us to apply today and in the years to come. It has also revealed clearly that agri-food systems – particularly in relation to food safety rules – are often responsible of huge crises and pandemic events (Lacombe - Quintela - Liao - Wu, 2021).

The Huanan Seafood "wet market" in Wuhan, China – where the recent pandemic seems to have originated – sold dead and live animals (even wild animals and pets) without respect for hygiene, animal welfare or biodiversity preservation (Lin - Dietrich - Senior - Wilcove, 2021; Xiao et al., 2021). Images of this market, which have circulated world-wide, confirm the extreme fragility of systems linked to these sorts of "food chains" (Xiao *et al*., 2021, p. 5 Fig. 2).

There is truly a global paradox: on the one hand, we have unrestrained modernity, and on the other hand, we have unhinged tradition. The stridently modern (animal welfare rules and regulations for increasing consumer protections as well as costly high-tech agri-food mechanization, increasingly plastified food packaging, hyper-sophisticated eco-labelling, and bar codes), and on the other hand traditional foodways – some of which respect and protect human health, animal welfare and the environment, yet others (such as the Huanan market) that do not. In other words, not all food traditions by themselves – and especially when accompanied by poor hygienic standards – are sustainable for the planet, for animals and for human beings in general. Even though we grew up with these eating habits, we need to rethink them for sustainability.

This essay emphasizes that respecting the nexus of human interests, nature, and social equity is key for the foundation of new international regulations and policy actions, as shared global tools for prevention and containment are needed, and where priority should be given to the change of unsustainable human behavior and eating habits (Michie - West, 2021). Malnutrition (with its different forms of undernutrition, overweight/obesity, and/or micronutrient deficien-

cies) should be considered as a complex of factors and actors – from individual choices to politics, policy, and governance (Gillespie - van den Bold, 2017).

The methodology used in this essay is comparative and multidisciplinary, with a socio-legal approach that references agri-food and bio-medical sciences to support the analysis. References to some historical episodes are used as examples to highlight how pandemics are multi-sectoral as well as multifactorial and therefore require different institutional and social tools.

On a structural level, this essay outlines, from a European legislative and policy context, the developments that have taken place to create a food system in the EU. The historical references to Pellagra come from Emilio Sereni's Archives[1] where the author, from the 1950s, started to collect various scientific-and-non-information on the causal-effect link triggered between unsustainable agri-food rules, conditions of malnutrition, unbalanced diets and the social aspects linked to marginalization, excessive urbanization as well as population density/growth[2], poverty, and social exclusion.

All of these elements will then help us to reflect upon the policy directions for agri-food sustainability that the EU may embrace in the years to come in many areas including food loss and waste, biodiversity preservation, the fight against climate change, reusable energy and, last but not least, the social dimension of diets. How to better address consumers' sensibilities and behavior, not only to healthy aspects of diets but also to match diets with Sustainable Developments Goals (SDGs), will also be a key point of consideration.

The EU Green Deal with its Farm to Fork and Biodiversity Strategy seems to marry the approach of the UN Food Summit 2021, increasing, *inter alia*, the understanding of social aspects of food and diets[3].

1. "Pandemic food"

Many diseases, which have led over the centuries to pandemic events, are linked to agri-food practices, mostly – as with COVID-19 – through pathogens that spread from animals to human beings (Wolfe - Dunavan - Diamond, 2007)[4], and there is

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1 Emilio Sereni's archives are in Gattatico, Cervi's House, Emilia-Romagna.

2 United Nations, 2019 "(…) Global population is likely (95 per cent) to number between 8.5 and 8.6 billion in 2030, between 9.4 and 10.1 billion in 2050, and between 9.4 and 12.7 billion in 2100".

3 During the Food Systems Summit 2021, the UN reinforced the need "of balancing food production with climate action, affordable food with healthy diets, and stable food supplies with fair and open trade", Kalibata, 2021.

4 The authors differentiate among cases of transmission where pathogens are confined only to animals and those that evolve to cause human diseases (see as schematic example Fig. 1, p. 281).

every reason to believe that this phenomenon will continue to occur in the future (Bakalis *et al*., 2020, p. 166). These diseases are also directly and indirectly linked to unbalanced agri-food systems: directly – as connected to rules related to nutrition (food safety), and indirectly – because pandemics spread even more in contexts where food insecurity as well as poor and unsustainable diets are present.

Infectious diseases that cause many pandemics are mainly linked to zoonoses (Jones *et al*., 2008, pp. 990-993)[5] and intensive farming processes (University of Bath, 2020) have also been proven to increase the possibilities of pandemic zoonosis. Although the need to satisfy a hungry world is often used to justify it, agri-food intensification (Matson - Parton - Power - Swift, 1997) can be among the causes of pandemic diseases as well as obesity and chronic illness[6]. Industrialized intensive agriculture – including limited crop choices and long supply chains (The World Bank Group, 2017, pp. 5-6) – impose significant risks and thus other alternative systems to intensive agri-food must be searched. As a global trend, animal products are becoming increasingly important (Khourya et al., 2014), even though producing and processing them contributes greatly to climate change (Schiermeier, 2019) and consumption of meat is considered unhealthy. The same applies to high consumption of fish for various reasons, including marine pollution and loss of biodiversity when fish are harvested from the sea and the negative impact of intensive farming practices when they are grown on fish farms.

The same argument is applicable to crop selection. FAO estimates that "we are becoming increasingly dependent on fewer and fewer crop varieties (...) [having already lost] from the beginning of this century about 75 percent of the genetic diversity of agricultural crops" (FAO, 2021a). Reducing food loss and waste is critical to improving the food security situation of vulnerable groups and decreasing the environmental footprint of food production activities[7]. Achieving this target has the potential to contribute to several dimensions of the 2030 Agenda, such as eradicating food insecurity and hunger, improving sustainable water management, addressing climate change, and improving sustainability of both marine and terrestrial ecosystems.

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5 The authors report that emerging infectious diseases (EIDs) events are dominated by zoonoses (60.3% of EIDs): the majority of these (71.8%) originate in wildlife.

6 Burrows, 2017, reporting Cecilia Rocha, the leading author of the report by the International Panel of Experts on Sustainable Food Systems (IPES-Food).

7 Responsible consumption and production are the objective of SDG 12. "Although limited data is available, it is estimated that globally around 14 percent of the world's food is lost from production before reaching the retail level. These estimates vary across regions, going from as high as 20.7 percent in Central Asia and Southern Asia to 8.9 and 5.8 percent in Oceania and Australia and New Zealand respectively", FAO, 2021b.

Thus, when something in the agri-food chain has gone terribly wrong, we may conceptualize this as "pandemic food". Rapid urbanization as in the recent East Asian outbreaks (World Bank Group, 2015), social inequalities, demographic growth as well as intensive agricultural production[8], and migration[9] are also among the factors of pandemic disease. Containment measures that accompany these events have not always served to stem the spread of pandemics, with consequent huge public health costs, great loss of life and even increased marginalization of vulnerable people (Saladino - Algeri - Auriemma, 2020; Henderson, 2020; Michie - West, 2021, p. 752). Without changes in human behavior, future pandemics might not be prevented (Michie - West, 2021), and how we choose to live and to eat will determine the future of the earth and our own health (Fig. 1).

Furthermore, the global COVID-19 outbreak has not only obliged us to "reconceptualise" health interventions (Duek - Fliss, 2020, pp. 68-71) but also to look more into complex factors of the origin of many pandemics. Food systems should become more resilient at "multiple levels (...) [in order] to provide sufficient, appropriate and accessible food to all, in the face of various and even unforeseen disturbances" (Tendalla et al., 2015, p. 19), since sustainability and resilience are in fact complementary (Tendalla et al., 2015, p. 18 and Fig. 1).

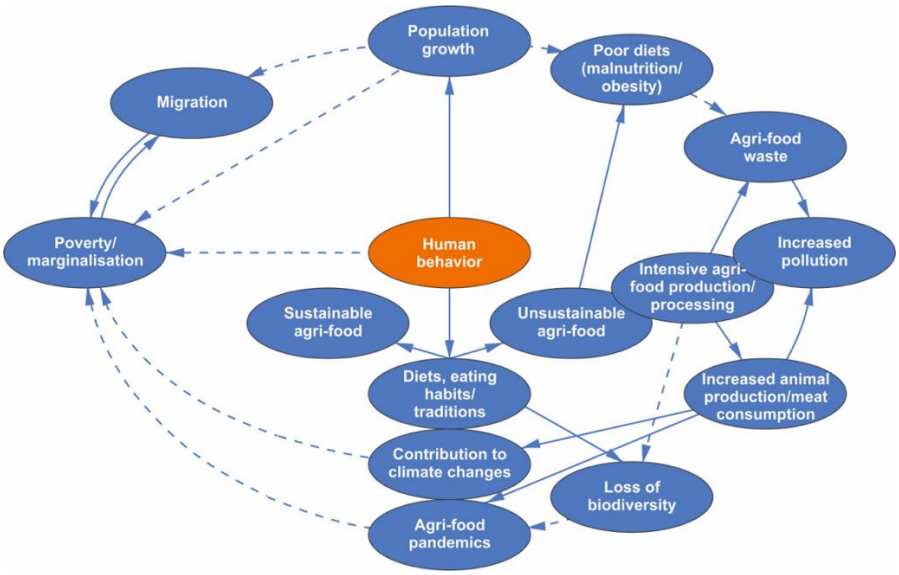

Fig. 1. Human behavior and agri-food relations

[8] Rohr *et al.*, 2019, at Fig. 2: Proposed effects of human population growth and associated increases in agricultural production on the risk of human infectious diseases.

[9] The terminology is politically overloaded. However, for the purpose of this paper we refer to the economic connotation that relates to the action of people moving from one country to another.

The analysis in this paper will focus on the European context, not to ignore the universal dimension of the pandemic phenomena but because it was precisely during COVID-19 that the EU Commission promoted the Green Deal Strategy. This Strategy focuses on the ecological transition, a "revisited dimension of progress", that should foster the implementation of new technologies respecting the life of human beings, animals and nature in general by rethinking the scale of values. Breaking new ground by moving away from unsustainable human practices is the necessary first step in founding all other future EU policies and legislations, including those to combat climate change.

The recent COVID-19 pandemic was a harbinger of potential future pandemic events (Galanakis, 2020), and the theme of agri-food, nutrition and diets under the umbrella of sustainability must become the fulcrum for rebalancing agri-food systems to help guard against future pandemics (*Ibidem*). World hunger and food loss/waste, the world-wide dichotomy between obesity and undernutrition (FAO, IFAD, UNICEF, WFP and WHO, 2021) as well as between excessively packaged and "plasticized" food products are opposing faces of the same phenomenon. This obliges politicians in addition to every actor in the agri-food value chain (from farmers to consumers) to review agri-food practices through the lens of social, environmental and economic sustainability. The EU Green Deal – with the Farm to Fork and Biodiversity Strategies – seems to marry the approach of the UN Food Summit 2021, increasing, *inter alia*, the social aspects of food and diets[10].

2. Pandemic food within poverty and unsustainable traditions: the case of Pellagra and HIV-AIDS

If one common denominator could be found in the history of many pandemics, it would be that dysfunctional agri-food chains, unsustainable and poor diets are crucial factors, as historical data show. Further, poor, marginalized and vulnerable people are the first categories to become victims and suffer most during and after these plagues.

Over the centuries, episodes from different countries with different disease aetiology, refer to pandemics that arose and developed in contexts of poverty and marginalization: poor farmers, marginal communities, immigrants, women, elderly people, children, disabled people, Jews, etc[11]. Pellagra, for example, was first

[10] On the occasion of the Food Systems Summit 2021, the UN reinforced the need "of balancing food production with climate action, affordable food with healthy diets, and stable food supplies with fair and open trade", Kalibata, 2021.

[11] As reported in the intellectual and politician researched on the social aspects of epidemics and pandemics in Emilio Sereni's Archives in Gattatico.

recognized at the beginning of the 18th century by a physician in Spain. From there, it then spread to Northern Italy, where it was given its name, "pelagra", from the Italian meaning "rough skin". The disease developed first with dermatitis, diarrhea, dementia and final death (Hegyi *et al*., 2004, pp.1-5). It was a well-known social disease caused by poverty and malnutrition in the 19th century (Lavinder, 1913, p. 746; Mușat, 2015, p. 538), both in the countryside and in urban areas where people relied on only one or two staple foods (Boyden, 2016, p. 74). At the beginning of 20th century, Pellagra also became epidemic in the United States, particularly in marginalized groups in the Southern States (Sebrell, 1934, p. 1153; Kenneth - Kiple, 1977) but also in some other regions (Lavinder, 1913, p. 746). During the building of the Panama Canal, West Indians and Chinese, who were used as workers, reportedly "died as flies" from Pellagra (Malcioln, 1978, p. 87).

Although physicians long disputed the origin of the disease, linking it to either corn zea (Lavinder, 1913, p. 747) or to a parasitic infection (MacCarthy, 1927, p. 1180; Chalmers, 1934 pp. 283-84; Lavinder, 1913, p. 748), the real cause was insufficient nutrition among the poorest of the poor. Pellagra in Italy, for example, was a widespread disease among farmers of the Po valley at the end of the 19th century, which then easily spread in several regions in the Northern and Central Italy causing a public health problem[12]. An investigation at the beginning of 1900s concluded that peasants and women in the spinning mills of the lower Milan area were those "who ate the most unhealthy and insufficient foods" (Buzzi, 1906, p. 24) almost exclusively, "zea bread of corn often moldy, always badly cooked" (Buzzi, 1906, p. 24).

Characterized as "poverty's disease", Pellagra in Italy had a close causal link between the worsening of living conditions, particularly in the countryside, due to the introduction on a large scale of non-native crops (such as the rapid introduction and spread of corn as a substitute for wheat) with consequent rapid changes in food habits and availability of alternative foods (Messedaglia, 1927; Livi Bacci, 1986; Whitaker, 1992).

> A serving of polenta (corn meal mush) of equal weight to a portion of bread has significantly lower calorie content. In addition, maize have any vitamin PP (PP stands for Pellagra Prevention); thus, a diet based solely on polenta facilitates the spread of pellagra (...) (Dalla-Zuanna - Rosina, 2011, p. 37).

[12] *Legislation Against Pellagra in Italy*, 1901. In intervening in the debate between the responsibilities of the province and municipalities, that in the absence of economic aid have stopped reporting cases of pellagra, the Commission on Pellagra reiterated the need for synergic actions in the "living habits, needs, methods of nutrition, the way of working in the various places" that go beyond a strictly medical approach. Buzzi, 1906, pp. 67-68.

Pellagra is still an endemic disease and occurs regularly in some areas of the world where people are subject to malnutrition due to incorrect diets lacking in important nutrients, as in poor rural communities (Bengu, 1992, p. 74) as well as among immigrants (Ramlogan, 1996, p. 84; Huffman, 1992).

Whereas pellagra is an example of a disease generated by the absence of dietary biodiversity (and also due to the use of one sole crop), HIV/AIDS is an example of a devasting pandemic of zoonotic origin (in addition to other factors). The contact among people which increased "unpreceden[tedly] in the last 100 years" (Hillis, 2000, p. 1757), and the broken link of respect for wildlife and animals in general, can be counted among the causes of this pandemic (Martin, 2001).

The origins of HIV/AIDS have been studied by the scientific community to investigate when the disease truly originated, and thus when the virus spread to humans from infected non-human primates (Sharp - Hahn, 2011, p. 4 and Fig. 2; Hillis, 2000, p. 1757; Sharp - Hahn, 2001, p.5). Although scientists have advanced different theories on the routes of transmission of an existing non-human primate virus – simian immunodeficiency virus (SIVs) – to humans (Shannon - Pyle, 1989, pp. 7-9; Martin, 2001, p. 120), one of the most credible theories is that of the "natural transfer" or "cut hunter" of infection through contamination with an infected primate's bodily fluids or undercooked meat (Hahn - Shaw - De Cock - Sharp, 2000, p. 611; Giles-Vernick - Gondola - Lachenal - Schneider, 2013, p. 14 and note 10). "Monkey meat" is bushmeat traditionally eaten primarily in some parts of Asia and Africa (Fuentes - Wolfe, 2002, p. 94) and still represents a threat to people (McDonald, 2016) and wildlife. Outbreaks of Ebola virus have also been linked to zoonotic spillover, and now SARS-CoV-2 (COVID-19) has been even more credibly attributed to this phenomenon (Wilensky, 2021 p. 2).

3. Starting off on the right foot: from Food Safety rules to the Farm to Fork. Emerging new values after Covid-19

3.1. From Food Trade to Food Health: Precautionary Principle and Consumer Protection

Many epidemics originate from the food sector, and over the centuries people have tried to deal with diverse aspects of food regulation. Some ancient rules that have regulated food can be traced back to Roman times, but this punishment for adulterating food was more about regulating trade than about people's health (Roberts, 2001, p. 90). Only with the arrival of the twentieth century, however, do we find a modern version of food safety policy. The crucial starting point has been the acceleration of mechanization, which brought to the "scandals in the meat packing and

food processing industries" and miserable conditions of workers in that sector (Sinclair, 1906).

If we look at the European context, and in particular at the EU policy level, the national dimension prevailed for a long time over a more collective EU responsibility: food laws and policies focused on trade at the beginning of this process, rather than on food safety. Art. 36 of the EEC Treaty established that member states were allowed to restrict imports in order to protect the life of their human, animal, and plant populations (Skogstad, 2002, p. 297) but with "only with the Treaty of Maastricht in 1992 and the Treaty of Amsterdam in 1997 there has been a clear EU commitment to consumer protection" (König, 2015, p. 279).

In 1969 EU member states' interests merged towards a common vision[13], with the intent of eliminating "technical obstacles" to facilitate trade among member states that owe diverse legal systems and approach to food laws (Costato - Albisinni, 2012). Other attempts were made after that to regulate part of the complex system of food laws in the EU[14]. The Bovine spongiform encephalopathy (BSE) crisis and other foodborne illnesses of the mid-to late 1990s shifted the approach to food safety: human health and consumer protection became the main priority (van der Meulen - van der Velde, 2008). Article 152 of the Treaty of Amsterdam affirmed the EU's commitment to public health and article 153 established consumer protection (König, 2015, note 19, p. 279). Regulation n. 178/2002[15] represents an important step in EU food law legislation: it introduces the precautionary principle as "extreme ratio"[16] to guide risk management (Alemanno, 2006). The EU created a European Food Safety Authority (EFSA)[17] and the Rapid Response System (RRS) to prevent and respond to food safety outbreaks (Halkier and Holm 2006 pp. 127-133)[18].

Under the precautionary principle, a decision maker has the option to act immediately to protect public health or the environment while awaiting more complete scientific information. This information should include societal, economic, traditional, ethical and environmental factors[19], that can be used to measure risk levels prior to scientific proves[20]. The precautionary principle adds a "human di-

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13 Council Resolution of 28 May 1969, *Official Journal C 076 du 17/06/1969.*

14 European Commission (1999), White Paper on Food Safety. COM (99) 719 final.

15 Regulation (EC) 178/2002, Art. 11.

16 European Commission, 2000.

17 Established in 2002 as an independent agency based in Parma, Italy, EFSA's goal is to conduct risk assessment and provide scientific analysis for the EC and national food safety agencies across Europe.

18 See also *Regulation 178/2002*, Artt. 32 et ss.

19 Regulation (EC) 178/2002, Art. 19.

20 Ibidem Art. 21. See also European Commission (2000). Communication from the European Commission on the Precautionary Principle. COM (2000) final.

mension" to the scientific approach because the "risk involve(s) not only description of nature, but also our understanding of the world in which we live" (König, 2015 p. 275). The precautionary principle has been introduced to try and achieve a difficult balance between the diverse interests at stake: consumer and economic protection of EU food products and free movement of food, given the fact that EU agri-food products should be competitive in external markets. Traceability and "food quality" for agri-food products became crucial to cover all aspects of the food industry: production, processing and distribution. The balance between trade and health will be crucial in fighting future pandemics.

The EU Commission hence set out to guarantee a harmonious application of food safety rule within the EU, the so called "hygiene package" (Costato - Albisinni, 2012). This legislative framework ensures the quality of foodstuffs intended for human consumption and animal feed. It guarantees the free circulation[21] of safe and secure food and feed in the internal market and the protection of health and well-being of animals, plant health and the environment[22].

3.2. The Farm to Fork and the collective responsibility for sustainable food systems: Food Laws 4.0

According to the dominant doctrine (European Commission, 2000), food laws in the EU went through three different periods of evolution, following the changes intercurred in the Common Agricultural Policy (CAP). The first set of laws were focusing on industrial safety practices, the second set was a mixed system where industrial food safety and risk analysis rules established at institutional national level. Finally, a more centralized approach to food safety was introduced, with the EU Commission acting as collector and director of risk control (through EFSA), with each part of the agri-food value chain to "contribute to the fullest extent possible" (European Commission, 2000; König, 2015, p. 277).

The recent EU Green Deal developed the Farm to Fork Strategy (Fig. 2), which is intended to promote a new era of food laws to "make food systems fair, healthy and environmentally-friendly" (Farm to Fork Strategy, 2020).

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21 The free movement of food and feed within the Community can be achieved only if food and feed safety requirements do not differ significantly from Member State to Member State, and this at the purpose of Regulation 178/2002.

22 Regulation (EC) 852/2004; Regulation (EC) 853/2004; Regulation (EC) No 854/2004.

Fig. 2: EU Farm to Fork Strategy (Source: EU Commission Farm to Fork Strategy: https://ec.europa.eu/food/horizontal-topics/farm-fork-strategy_en)

Consumers should be informed about "good diet" that is a concept that includes a complexity of factors (Lang, 2021), included healthy, environmentally, economically and socially sustainable elements.

EU consumers' change of diet is considered to be a key element of this strategy, since a more "conscious and sustainable style of eating is necessary" (Ridoutt - Baird - Hendrie, 2021), although conceptualizing a uniform formula of sustainability is not easy and, in the EU, different approaches to what is meant by "sustainable" prevail (Vieux - Perignon - Gazan - Darmon, 2018). The current debate is about the content of the Front of Pack (FoP) labels (still on a voluntary basis for member states) with the goal being to better inform consumers on what is sustainable to eat from a health, environmental, social, and economic approach. This indication should be added to the one already available and obligatory on the Back of Pack (BoP) labels, which includes allergens and origin – now limited only to meat, oil, and fat[23].

In the current debate over sustainable diets in the EU different "battle lines" have been drawn: the Med Diet, for example – recognized as UNESCO heritage and synonymous with healthy eating – is strongly contested by Northern European Countries that have recently codified the "Northern Diet".

This "war" is not only about food traditions and eating habits, however. It is also a conceptual war on their application in combination with or removed from health and sustainability criteria. The war is also against specific agri-food products that have acquired popularity over the years for being recognized as "quality

[23] Key changes in favor of a more transparent use of information are set under the new Regulation (EU) No 1169/2011 on the provision of food information to consumers.

products" due to their localized, *terroir* origin and specific intrinsic characteristics (Narciso - Fonte, 2021) – i.e., geographical indications (PDO, PGIs).

Despite the argument that they help to build local economies, boost territorial development, and preserve landscape as well as biodiversity, this is only true when geographical indications are managed well (Vandecandelaere et al., 2021). Specific sustainability indicators will help to effectively measure their socio-economic and environmental aspects (Vandecandelaere et al., 2021) to verify that raw materials, production methods and technologies are assessed and monitored.

Yet, consumers can only reach responsible purchasing decisions if information on food safety is made available in a manner that is correct, transparent and in line with the interests of each target group – as no one diet can suit everyone. Furthermore, consumers should know the value of a product in terms of environmental and social sustainability[24]. Experience has shown that labels can help, but they are not enough to orient consumers' choices. Not all consumers are responsible or well-informed about the environmental and social impacts of food. The proliferation of labels could actually confuse consumers – creating a sort of information-overload, which consumers might perceive as unnecessary. Basically, not all consumers are indeed "responsible consumers" and this could be influenced by many factors: if we only looked at the socio-economic aspect of diets, we would see that not all consumers can afford quality food. Just by looking at the EU context, the presence of new categories of marginalized people, including immigrants/refugees and elderly people, shows the vulnerability of a system that is not currently able to guarantee "quality food" for all.

This is why relying on consumers' capacity to make "sustainable" choices is not a simple task. A holistic and scientifically-based label system should certainly help in the direction of creating a uniform information approach to consumers at EU level but it is not enough. Public-health choices should not be left solely to consumers because not everyone has the same knowledge of what to eat and food culture in general. At the same time, if we want to assist consumers in choosing not only what is healthy but also what is environmentally and socially sustainable, a medical approach is not enough (Pollan, 2009). Both education and governance should be the future path in addition to a holistic and multidisciplinary approach to the interrelated themes of food security, food safety and food production (Garcia - Osburn - Jay-Russell, 2020). Further, the risks of future food-related pandemics should oblige to rethink our broken food systems and to set up health planetary boundaries that encompass the well-being of ecosystems as well as that of human beings (Willett *et al.*, 2019).

[24] While discussing social sustainability attached to products, we should include both the social aspect of work in the value chain and the purchasing power of consumers.

4. Conclusion

The long history of epidemics shows that human beings have had to face many terrible outbreaks, and that the recent COVID-19 pandemic is just one of them. This pandemic upheaval has reinforced our knowledge of the many threats that lie in unsustainable agri-food systems from farmers to consumers.

The EU system of food laws has evolved to balance diverse interests: originally, trade in the internal and then external market; next, public health; and now, finally, the climate change turning point and the EU commitment to cutting down of 55% greenhouse emission by 2030, which requires a new paradigm and style of living. The fight against obesity and Western diet-driven diseases should go along with the fight against intensive farming as well as unsustainable eating traditions and diets. Good quality, healthy, and sustainable food should serve this purpose.

The recent EU Green Deal, with its *Farm to Fork Strategy*, moves towards a more comprehensive "collective" system where each agri-food stakeholder plays a role. Particularly, consumers are called to be more accountable and "conscious" of their food choices. How to motivate food consumers towards sustainable choices, using multi-disciplinary/independent approach, should be one of the priorities in the years to come for the private and public sectors.

Sustainability and the nexus of human interests, nature, and social equity should become criteria for rethinking any human action, including agri-food practices. In a context of increasing world population growth and migration, the present agri-food rules are not designed to withstand these challenges.

Global agri-food value chains are intertwined with many phenomena: poverty and social inequalities; food security and food safety; hunger and obesity; overproduction as well as food loss and waste; and intensive farming, marine, and soil pollution.

We know that "Food systems have the potential to nurture human health and support environmental sustainability; however, they are currently threatening both" (Willett *et al*., 2019, p. 447). Thus, it is up to all stakeholders, included consumers, to contribute to a durable turnover, and the route should be paved by politicians and global influencers in the agri-food sector, who bear a huge responsibility in making this change possible.

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6. Curriculum vitae

Alessandra Narciso, D.Phil, is a Research Fellow at Roma Tre University having previously held that position at the Institute of Mediterranean European History of the National Research Center. Her research focuses mainly on political, socio-economic, and legal agri-food history and traditions.

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Via Giovanni Battista Tuveri, 128 - 09129 Cagliari (Italy).
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