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Foreword

Malnutrition in all its forms continues to be one of the greatest challenges faced by humankind. Global nutrition trends show that hunger is increasing – the number of undernourished people on the planet has increased to 820 million, up from 785 million in 2015. Undernutrition persists and remains acute in certain regions and population groups, and micronutrient deficiencies are widespread. At the same time, overweight, obesity and nutrition-related non-communicable diseases (NCDs) have risen to unprecedented levels, with an estimate of nearly two billion adults and 340 million children aged 5–19 years overweight or obese. While the causes of the current state of malnutrition around the world are complex, unhealthy diets remain one of the main contributors to malnutrition in all its forms.

In 2014, the Food and Agriculture Organization of the United Nations/World Health Organization Second International Conference on Nutrition (ICN2) made it clear that the increased prevalence of malnutrition is the result of failed food systems. It highlighted that “current food systems are being increasingly challenged to provide adequate, safe, diversified and nutrient-rich food for all that contribute to healthy diets due to, inter alia, constraints posed by resource scarcity and environmental degradation, as well as by unsustainable production and consumption patterns, food losses and waste and unbalanced distribution.”

Ample evidence exists showing that food provisioning is a major determinant of unprecedented and possibly irreversible changes in ecosystems. High-input, resource-intensive agriculture and overfishing are creating serious challenges in terms of fresh-water availability, soil degradation, continuing deforestation, loss of biodiversity and depleted marine life. Food systems are responsible for 20–30 percent of anthropogenic greenhouse gas (GHG) emissions, with agriculture and related land use contributing around one-fifth of total global GHG emissions.

How to provide nutritious diets for optimal health that can be sustained for generations within planetary boundaries is a question that has a high priority for the research community and policymakers alike. Answering this question is particularly urgent in light of the challenges that the global food system is facing regarding rapidly increasing world population – estimated to reach around 9.7 billion people by 2050 – rapid urbanization, changing diets, climate change and protracted crises in many parts of the world. The environmental pressures attributed to the food system because of socio-economic developments, particularly population growth and income increase, have been predicted to increase by 50–90 percent by 2050 relative to 2010 in the absence of technological change and other mitigation measures.

Business as usual is not an option. Food systems must deliver sustainable healthy diets for present and future generations. For such a transformation to happen, global and national commitments are needed. These commitments are not expected from governments only but also from all relevant actors in the food system including academia, the private sector, civil society and consumers. People need to rethink what they eat, and how the foods they eat are produced, processed, transported, prepared and consumed.

There is also an urgent need to apply effective governance to food systems that go beyond national boundaries; governance that spans all levels from global to local and encompasses informal as well as formal organizations. Political commitment, leadership, accountability and policy coherence are essential elements for effective governance, as are data, knowledge and capacity development to take effective action. Innovative approaches in science, research and policies, including in food safety, are paramount. We believe academics have a big responsibility in providing the scientific evidence we need for a change in paradigm.

Against this background, FAO organized a 2-day symposium on the **Future of Food**, held on 10 and 11 June 2019 in Rome. This drew on up-to-date knowledge and innovations among the scientific community represented by academics and researchers from different universities for addressing challenges related to the sustainability of food systems and the persisting challenges of malnutrition in all its forms. It also acted as a platform for stakeholders, including policymakers, analysts, non-governmental organization, the private sector, parliamentarians and government institutions to share experiences and best practices in meeting the challenges of our times and creating food systems that are sustainable and capable of providing nutritious and healthy food for all.

José Graziano da Silva
Director-General
FAO

Executive summary

Introduction

Despite the progress that countries have made in addressing hunger and malnutrition since the beginning of the twenty-first century, in 2016 the global trends show an increase in hunger – more than 820 million people were undernourished in 2018, up from 785 million in 2015 (FAO *et al.*, 2019). Undernutrition persists and remains acute in certain regions and population groups, and micronutrient deficiencies are widespread. At the same time, overweight, obesity and nutrition-related non-communicable diseases (NCDs) have risen to unprecedented levels, with nearly two billion adults (18 years or more), 340 million children aged 5–19 years and 40 million preschool children overweight (FAO *et al.*, 2019).

The complex issue of the simultaneous presence of undernutrition and overweight in the same population is challenging households, communities and countries. In some contexts, moderate levels of food insecurity is associated with increased risk of overweight (FAO *et al.*, 2019). Different forms of malnutrition are found within the same country, community, household and individual. Furthermore, undernutrition in early life is associated with increased risk of overweight and related NCDs later in life across contexts. Malnutrition in all its forms affects all countries, whether low, middle or high income. These complicated scenarios are occurring in increasingly challenging contexts and are exacerbated by environmental problems such as climate change, water scarcity, soil degradation and other factors that threaten the health and nutrition of individuals. While the cost of malnutrition is normally calculated in terms of its effects on human health as represented by physical impairment, illness and NCDs, the real cost goes much further. Malnutrition impedes social and economic development. Malnourished children underperform in school, limiting their future job opportunities. Malnourished adults are less able to work, contribute to local economies and provide care for their families. It has been estimated that malnutrition costs the global economy USD 3.5 trillion per year (FAO, 2013).

While the causes of the current state of nutrition around the world are complex, unhealthy diets remain one of the main contributors to malnutrition in all its forms and risk factors for the global disease burden. In addition, the world's population is expected to reach nearly 10 billion by 2050. Two-thirds of the world's population will be living in cities and nearly all of the population increase will occur in developing countries. In order to feed this larger, more-urban population, food production must increase by some 50 percent compared with 2013. Ensuring the availability and accessibility of safe and nutritious foods will necessitate a transformation across food systems, from production to consumption. This transformation will need to address the different forms of malnutrition and simultaneously preserve limited planetary natural resources. In 2014, the Food and Agriculture Organization of the United Nations (FAO)/World Health Organization (WHO) Second International Conference on Nutrition (ICN2) acknowledged that: “current food systems are being increasingly challenged to provide adequate, safe, diversified and nutrient-rich food for all that contribute to healthy diets due to, *inter alia*, constraints posed by resource scarcity and environmental degradation, as well as by unsustainable production and consumption patterns, food losses and waste, and unbalanced distribution.” To address these challenges, food systems will have to be transformed to promote healthy diets and improve nutrition to achieve global nutrition and diet-related NCD targets in line with commitments of ICN2 and the United Nations Decade of Action on Nutrition (2016–2025).

Against this background, FAO organized a symposium on the future of food at its headquarters in Rome, Italy on 10 and 11 June 2019.

The objective of the symposium was to examine the state of the art in both evidence and thinking regarding the sustainability of food systems and the nexus with healthy diets. The symposium drew on the most up-to-date knowledge and innovative thought in the scientific community and academia. It also provided a platform for stakeholders, including policymakers, analysts, civil-society and private-sector actors, parliamentarians and government agencies, to share experiences and best practices in meeting the challenges of our times and to deliberate on tomorrow's solutions that can ensure healthier and safer diets while safeguarding and promoting more-sustainable food systems.

Summary of outcomes

1. There is a lot known about what constitutes a healthy diet and the effective actions for promoting such a diet. We also know more now than ever before about how our diets need to change to support environmental sustainability. However, there are major gaps in understanding:
 - a. exactly what people are eating – we need more consistent measurements of diets;
 - b. what the optimal food environment is from the perspective of people who experience poverty and deprivation – we need more qualitative research that listens to people’s lived experiences of food environments in order to design changes that will create consistency and coherence in their lives towards healthier diets;
 - c. how existing actions can work double duty to promote diets that reduce all forms of malnutrition – we need more pilots to show how actions currently designed to address undernutrition can reduce the odds of populations eating diets that increase risk of obesity and diet-related disease.
2. A lot is known about how food systems function. However, there are major gaps in understanding:
 - a. how food systems can be economically viable in making healthy diets available, affordable and appealing for all;
 - b. the definitive top-priority policy actions needed to make healthy diets available, affordable and appealing for all; and
 - c. how to quantify the potential trade-offs to make healthy diets available, affordable and appealing for all.
3. There is a lot of experience in developing and delivering actions by specific sectors to promote healthy diets, such as actions delivered through the health sector, or the agricultural sector. However, there are major gaps in understanding:
 - a. inconsistencies across government ministries and sectors that are undermining positive change;
 - b. the necessary governance structures to manage tensions and create synergies for healthy diets across the system;
 - c. which government policies work and which do not work for promotion of healthy diets; and
 - d. how to apply effective governance to food systems that go beyond national boundaries, that is, governance that spans all levels from global to local, encompassing informal as well as formal organizations and relationships.
4. Dramatic inequalities and inequities across the world influence individuals’ ability to meet their dietary needs. There is a need to understand:
 - a. which foods are available and accessible in diverse contexts in terms of quantity and quality and where and why mismatches in food supply and demand exist;
 - b. whether affordable and desirable foods for a healthy diet are available for the most vulnerable, especially children;
 - c. the monetary and human cost of food-related diseases to individuals and societies; and
 - d. how to organize resources and services to leave no one behind.
5. Much is known about how current food systems are depleting the resources of the planet while current diets are resulting in global health crises with different forms of malnutrition occurring within the same country, community, household and even individual. There is a need to better understand:
 - a. how to apply a systems thinking to food systems transformation that address Nutrition & Health, Biodiversity & Ecosystems, Climate Resilience & GHG Mitigation, Livelihoods & Human Rights concerns
 - b. how to develop and implement ambitious science-based solutions to the food crises that reflect regional and cultural preferences.

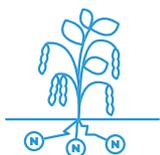
Agreed points

- Food systems pursue multiple outcomes and their governance therefore implies the involvement of a broad range of actors across different policy areas. To achieve food security and nutrition at all times, diets must become both healthy and sustainable, thus requiring a broader food-systems approach.
- This multisectoral approach requires engagement of policymakers and society including civil-society actors, private-sector actors across the food value chain, farmers and producers, chefs, caterers and consumers.
- Creating an enabling environment requires governance mechanisms, incentives and disincentives; legal frameworks; engagement of parliamentarians; and regulatory instruments.
- Acknowledging the centrality of the relationship between health and food, there is need to move away from a focus on a few staple crops to providing diverse diets that are healthy and sustainable. Public support for agricultural systems and services will need to be realigned with health goals through quality diets.
- It is crucial to have in place and to develop proactive and robust national food safety and food control systems to secure the food supply chain and protect consumers' health. Food needs to be not only safe, but also nutritious.
- Policy coherence is key in transforming food systems. Policies relating to agriculture, food environment and health need to be interconnected. Policy actions need to set in motion a transformation of global and local food systems to support healthy diets for all.
- A new business model is needed. This needs to go beyond efficiency of food production to encompass reducing costs, enhancing nutrient density of foods and reducing food loss and waste.
- Consumers are important agents of change in the transformation of food systems. In many countries, consumption is not sustainable and not conducive to good health. We need to change behaviours. People have the right to know what they are eating. Providing the right information through labelling helps in changing behaviours. In addition, behaviour-focused education is necessary for consumers to make the right choices.
- The food industry can and must be a key partner in supporting innovation, driving marketing and retail efficiencies, and helping consumers make better choices. While processing of food has contributed to increasing the shelf life and safety of food, some industrial-level processing may be contributing to the increase in overweight and obesity by promoting change in the gut microbiome.
- There is a clear case for public–private partnerships to drive demand for healthy diets. Public spending on demand creation needs to do three things:
 1. create demand for a wide range of nutritious and safe foods (including unpackaged and unbranded ones);
 2. create demand for nutritious and safe diets as a whole; and
 3. discourage marketing of food that contributes to unhealthy diet.
- Supply-side measures cannot be neglected, particularly where lower prices are needed in order for low-income people to access healthy diets.
- What we measure is important. Traditionally there has been a focus on measuring productivity. More and better data are needed on food systems and diets. Cross-cutting issues include climate change; youth; region-specific knowledge; land tenure; biodiversity; gender; trade; and urbanization. All these need to be factored in food-system data-collection and analysis.
- Diverse knowledge systems, including indigenous knowledge, exist. There is a lot to be learned from indigenous food systems.

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FAO. 2013. *State of Food and Agriculture 2013: Food systems for better nutrition*. Rome. (also available at <http://www.fao.org/3/i3300e/i3300e.pdf>)



Symposium Opening session

Welcome statements

Roberto Ridolfi, Assistant Director-General, Programme Support and Technical Cooperation Department

Sustainably feeding the world's growing population, reducing malnutrition and improving public health are among the greatest challenges facing humankind. The future food must move towards the path of sustainability.

This symposium brought together a broad range of FAO partners, including representatives of governments, academics and researchers from universities and research institutes from all over the world, private sector and civil-society organizations to share knowledge and innovative ideas that are practical and feasible and to explore together ways to overcome one of the most pressing challenges humankind – how to produce enough healthy food and enable healthy diets for all while preserving the resources of the planet. This requires sharing knowledge, building synergies and strengthening collaboration to facilitate the shift to more-sustainable food systems and healthy diets to eradicate hunger and malnutrition.

The experiences, insights and perspectives of the participants were fundamental to the symposium discussions, which include four panels:

- Panel 1: Research, knowledge, gaps and needs for sustainable food systems and healthy diets
- Panel 2: Governance of food systems for healthy diets
- Panel 3: Building consumer confidence in food systems
- Panel 4: Transforming food systems: What does it take?

José Graziano da Silva, Director-General of FAO

José Graziano da Silva welcomed the speakers at the podium and the participants in the symposium. He set the stage by highlighting the importance of the symposium and provided some background of FAO's evolution and efforts since its establishment.

He noted that FAO was created after the Second World War to eradicate hunger, particularly in the areas devastated by war, like Europe and Japan. He added that in the middle of the twentieth century, the Organization embraced the Green Revolution approach, based on the belief that increasing production was the best way to eradicate hunger and avoid famine, which was a big concern at the time in Asia and Africa.

We now produce more food than we need, which has major impacts on the environment. Despite this, hunger is once again increasing, mainly due to conflicts, the impact of climate change and the slow recovery of the world economy since 2010. Malnutrition is also growing rapidly, particularly obesity, with its associated health consequences.

The state of food security and nutrition in the world 2019 (SOFI) (FAO et al., 2019) presents data that suggest that for the first time more people are obese than are hungry. In contrast with hunger, obesity is everywhere: in developing and developed countries, in rural and urban areas, among children, youth, adults and elderly people. This is mainly due to changes in our diets and consumption patterns.

Changes need to be made, otherwise diet-related diseases will compromise our future. Therefore, FAO is shifting its focus from production only to nutrition in order to promote the production of healthy foods. FAO cannot achieve this on its own, and needs the assistance of others, in particular from academia, on whom the Organization depends for guidance. This is the purpose of this symposium.

Several issues need to be addressed in order to improve nutrition globally.

First, countries should put in place public policies and laws that protect healthy diets and encourage the private sector to produce healthier food. These laws could establish, for instance:

- taxes on non-nutritious food products;
- more complete and understandable food labelling; and
- restriction of advertising of junk food to children.

Second, local governments, mayors and cities should promote the production and consumption of local fresh food. Cities have a very important role to play by promoting as markets for products from family farming.

The third issue is about trade. Obesity is growing fast, especially in countries that import most of their food, such as the Pacific and Caribbean islands. This is because there are no rules on trade that alert countries to the nutritional implications of what they are importing. Codex Alimentarius has made a lot of progress in identifying safe foods, but not all safe food is healthy and guiding trade to provide both safe and nutritious food is a challenge in many countries.

We need to change our food systems because they are not always delivering healthy diets. To produce nutritious food we need to start with healthy soils, healthy seeds, sustainable agriculture practices and so forth. The whole food system needs to be addressed.

Reference

FAO, IFAD, UNICEF, WFP and WHO. 2019. *The State of Food Security and Nutrition in the World 2019. Safeguarding against economic slowdowns and downturns*. Rome, FAO. (also available at <http://www.fao.org/3/ca5162en/ca5162en.pdf>).

Hilal Elver, Special Rapporteur on the Right to Food, Office of the United Nations High Commissioner for Human Rights

Developing concrete solutions for tackling hunger and malnutrition in the years to come requires making use of the knowledge, innovation and existing tools at our disposal, but above all, on empathy and compassion.

Starting with biotechnology, we have an enormous toolbox that includes both low-tech solutions (such as biopesticides and biofertilizers) and high-tech solutions (such as those involving advanced genomics) that might have a potential to help produce the 60 percent more food that is needed to feed the world population in 2050, and do so without destroying the environment or harming social structures. We had the previous experience with the Green Revolution that greatly increased the production of food but inflicted a huge cost on the environment and had some serious adverse social impacts that are still causing damage.

As a result, we know that it is dangerous to focus too much on technology while ignoring the root causes of these underlying issues. Technology alone is not a solution and it should not be perceived as a quick fix to erase the effects of destructive policies and practices.

Today, despite producing enough food to feed the whole population of the world adequately, hunger and malnutrition are on the rise. Extreme weather events, mostly attributable to climate change and violent conflicts, and destructive economic policies are resulting in environmental degradation, mass migrations and human-rights violations, harshly affecting the most vulnerable among us.

Meanwhile, manipulation of science and attacks on scientific integrity at the highest levels of government have left many sceptical of innovation. All of this poses the question: Why has scientific innovation not been able to solve global hunger and malnutrition challenges?

I believe that current industrial agriculture, despite its high productivity, has serious downsides: food waste, poor working conditions, polluted ecosystems, undermining quality for the sake of quantity, mistreating animals, increasing greenhouse gas (GHG) emissions, displacing agricultural labour and disrupting traditional farming communities.

The human rights of food-system actors, including agricultural workers, smallholder farmers and consumers,

are often ignored or their rights are violated. This pattern has continued, even though the 2030 Global Agenda of Sustainable Development claimed that “no one [would be] left behind.”

Moreover, new biotechnologies, mostly developed and owned by the private sector, are protected by patents and other intellectual property rights. In the context of seeds, for example, four multinational agrochemical firms control more than 60 percent of global seed sales. Utility patents are restricting farmers’ freedom to preserve and exchange seeds and interfering with breeders’ rights to use the seeds for research.

While these innovations might help protect the biodiversity of crops and ecosystems, they must also support the diversity of food-system actors. Biotechnology has the potential to accentuate inequalities and cause human-rights violations affecting the most vulnerable populations.

Reconciling biotechnology with agroecology, traditional knowledge and human rights will help ensure that all relevant actors have an opportunity to engage in the development and use of biotechnology.

Silicon Valley is becoming a leading global hub for food innovation; new technologies, such as automated vertical farms, aquaponics, *in vitro* meats and other artificial animal products will be on the market in the next 10 years if not earlier. This includes the emerging field of personalized nutrition that will offer healthy-eating choices based on an individual’s DNA. We may all soon have to get used to the new tastes of meat-free meat and dairy-free “dairy” products.

These technologies will have a profound effect on how we eat, live and produce in the future. The effects may be mostly positive, allowing us to more easily make a global transition to plant-based diets, which, as the recent EAT-Lancet Commission report (Willett *et al.*, 2019) and other experts have explained, are integral to the future of food.

Implementing the precautionary principle will help reduce harmful, unintended consequences and side effects arising from these new technologies. However, some important countries do not recognize, much less apply, this key principle of international law.

Unfortunately, the universal realization of the right to food and elimination of hunger remains an ambitious, remote goal. Governments in both developed and developing countries continue to endorse trade liberalization, regressive unilateral measures, financial speculation and the commodification of agriculture. These practices perpetuate inequalities and add to the concentration of wealth within food systems, infringing upon the right to food.

Meanwhile, climate change continues to be often regarded as a taboo subject, an issue for future generations, instead of a very serious, very current threat to our well-being and even survival. Migrants and refugees displaced by the impacts of climate change, economic problems and violent conflicts are frequently treated as if an exception to the human-rights obligations of governments. These obligations should be treated as a key component of the food-system workforce to which governments owe adequate legal and social protections.

For the first time in human history, the challenges we face threaten the species as a whole, not just particular societies or civilizations. Faced with these global-scale challenges, we have to cope by relying on problem-solving frameworks that continue to be organized around state sovereignty, national interests and the logic of global capital. The current world order is not oriented towards solving global-scale problems. Diplomats after the two world wars were preoccupied with peace and security and did not understand that international challenges were becoming more comprehensive, posing unprecedented threats to human survival. Moreover, states are unequal and have different values and clashing priorities that place severe limits on cooperation sensitive to the global public good.

These concerns might signal a negative destiny for our future. However, this is not my message. We have the capacity to create humane, healthy and sustainable food systems. My own response to these challenges is to advocate a human-rights-based approach to overcome the difficulties posed by an over-reliance on technocratic and market solutions.

What is this approach? It is a restorative thinking, telling us that we can arrive at decent food policy by balancing and protecting human interests as identified by international human-rights principles. These principles require promoting participatory, transparent and inclusive systems, supporting the integrity of scientific discovery and application and adhering to principles of equality and non-discrimination. It is vital that we protect and empower

the most vulnerable sectors of societies, including women, children, smallholders and peasants, indigenous peoples, migrants and minorities. Their equitable inclusion in food production and access to innovations is a fundamental aspect of a human-rights approach.

More practically, investing in capacity-building for technology transfer and in intellectual property rights management in developing countries will prove necessary if these technological innovations are to support and benefit the most marginalized and vulnerable communities, especially smallholder farmers (including women and youth).

Scientific discourse always needs to be supplemented by a normative dimension, and a human-rights-based approach can be helpful in reaching this goal.

I will leave you with this final thought: the future of food is already here. Now is the time to rebuild food systems based upon a foundation of human rights, incorporating principles of sustainability, trust, inclusion, transparency, health and equality. If we wait until the future to take transformative steps, it will be too late. Let us begin now with an appropriate sense of urgency.

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Tedros Adhanom Ghebreyesus, Director-General, World Health Organization (video message)

Unhealthy diets and malnutrition are responsible for almost one in three deaths globally. Although we have made great progress against hunger over the past 50 years, access to diverse and nutritious food has not improved equally for everyone.

Foods with salt, sugars, saturated fats and trans fats have become cheaper and more-widely available. The global demand for sugary drinks and processed foods has increased dramatically. Conversely, foods that contribute to healthy diets are often not available or not affordable.

From farm to fork, we need food systems that deliver safe, healthy, sustainable and affordable diets, especially for vulnerable and marginalized people. We are pleased that the International Food and Beverage Alliance, representing some of the world's biggest food-producing companies, have committed to eliminate industrially produced trans fat from the global food supply by 2023. WHO is committed to working with FAO and other United Nations organizations to improve food systems. We are now in the fourth year of the United Nations Decade of Action on Nutrition and are making good progress on our ambitious goal to reduce malnutrition in all its forms.

Sandy Thomas, Director, Global Panel on Agriculture and Food Systems for Nutrition

In 2013, following the Nutrition for Growth Summit in London, an unprecedented group of distinguished leaders came together to create new global initiatives. One of these was the Global Panel on Agriculture and Food Systems for Nutrition. Its aim has been to identify robust evidence for policymakers in low- and middle-income countries to improve nutrition. It works on the premise that food systems and agriculture are at the heart of not just feeding people but of nourishing them.

Prof Sandy Thomas thanked the Director-General on behalf of the Global Panel for the enormous support he provided as a founding member and the enormous support FAO provided to the Panel over the past 5 years.

The Global Panel's efforts have focused on the transformation of food systems to enable the delivery of healthy diets for all because healthy diets underpin the solution to malnutrition in all its forms. Suboptimal diets are one of the top risk factors for death and morbidity. Food systems are reaching breaking point as they are pushed to produce ever more food stuffs as cheaply as possible, with little concern for impacts on consumers' health and the environment.

We need to be honest about why food systems are so difficult to fix, when the scientific basis for making cost-effective policy-level and household choices is strong and compelling. One of the biggest hindrances to providing healthy diets and delivering the Sustainable Development Goals (SDGs) is that government policy agendas are fragmented and rarely align across the food system. A key question that we need to support policymakers in answering is: how do they deliver healthy diets?

Policy actions need to set in motion a transformation of global and local food systems to support healthy diets for all. So what are the opportunities to stimulate change?

- More and better data are needed on food systems and diets.
- New technologies can help improve efficiencies, reduce costs, enhance nutrient density of some foods, reduce waste and more.
- The food industry can and must be a key partner in supporting innovation, driving marketing and retail efficiencies and helping consumers make better choices.
- Prices of different foods might change if public support for agricultural systems and services were realigned with health goals through quality diets, making healthy diets more accessible.
- Diets must be linked with poverty eradication and climate change agendas.
- International agriculture research systems can build diet quality and sustainability into their core programmes, moving away from a focus on a few staple grains.

But all of this will not be sufficient. Policymakers must take responsibility for shaping and managing food systems, just as they do with transportation, finance, land and water systems and public health.

For the past 5 years, the Global Panel has witnessed growing political commitment towards better diets, for example from the Poverty Alleviation Council in Pakistan, the Nigerian Government and initiatives such as the African Leaders for Nutrition and the South Asian Nutrition Leadership. Policymakers have a choice. Food and environmental systems can promote healthy diets and good nutrition, unleashing huge potential for societal and economic growth or deteriorate under cumulative pressure.

The Global Panel's Foresight 2.0 report, to be published in 2020, seeks to address these challenges by focusing on policy leverage-points that must be resolved to enable fully functional and sustainable food systems. It is vital that, together, we raise the level of urgency of global dialogue around the policy actions required to secure our common future. Six years on from the first Nutrition for Growth summit in 2013, we can look to next summit in Tokyo in 2020 with a greater scientific understanding on how food systems can deliver healthy diets. However, time is short. Governments and business can no longer stand on the side-lines. Their leadership and collaboration will be fundamental to win the battle against malnutrition.

David J. Lane, President of the Annenberg Foundation Trust

Mr David J. Lane started by thanking FAO Director-General for his thoughtful framing of the issues and for his more than seven years of leadership at FAO. He added that under his leadership, FAO has been a true force for ending hunger, improving agriculture and fisheries practices, and ensuring good nutrition and food security for all. He complemented the Director-General, for his leadership of FAO and for his entire career of service.

He also thanked FAO for their wisdom in hosting this important discussion on the future of food at this important time.

The challenge of envisioning a future food system that is sustainable, equitable and achievable is certainly not a new one. However, the focus on food systems is relatively new, and is an important change.

He added: "I was fortunate to work alongside many of you during my previous service as US Ambassador to the United Nations Agencies here from 2012 to 2016. I would like to note that my successor, Ambassador Kip Tom, arrived in Rome a few weeks ago, and I know he will be a thoughtful and effective leader and representative of the US. I wish him well in his work here."

When I worked in Rome alongside the FAO and others, we were focused on solving the equation of how to feed

9–10 billion people by 2050, in the face of climate change, population growth and other challenging forces. But I do not recall hearing people talk so relentlessly about food systems in 2012 and I think that represents an important change.

The Annenberg Foundation Trust at Sunnylands, USA has a mandate to “promote world peace and facilitate international agreement,” and includes issues of food insecurity in its programme, a recognition of the relationship between food security and traditional security or conflict mitigation. The Trust hosts high-level retreats at its estate in California, where experts and policymakers can have intimate and confidential discussions on pressing global challenges. One area in which the Trust is deeply invested is the future of food, having hosted two major retreats on the topic in as many years. In February 2019, it convened 22 leaders on food security, agriculture and nutrition – including the Director-General of FAO – for three-day retreat titled on SDG2, Food Security and the Future of Food.

The hope was, that by bringing top experts together and asking them to think creatively and cross-sectorally, they could identify targeted solutions, interventions and innovations to set us on the path for a more-sustainable future food system. Several of the findings relate to the agenda of this symposium, including the following two.

First, participants agreed that ending hunger and malnutrition will not be accomplished without transforming the global food system, and that doing so may require transformational change within multiple other systems that relate to or support the food system. Success will require that a range of complex systems work together, aligned behind a common vision of a sustainable future food system. This includes usual suspects like agricultural and nutritional sectors, as well as new sectors such as climate change and natural resources, health, subnational governments and technology. Each sector will need to identify, prioritize and incentivize the interventions necessary for transforming our food systems.

This finding is entirely in line with FAO’s 2018 report on the future of food (FAO, 2018), which found that business as usual is no longer an option if we are to meet the targets set by the 2030 Agenda of the SDGs. Relatedly, the participants recommended exploring models for national food agencies to integrate functions generally distributed among multiple government agencies. Doing so would allow for a degree of coordination across sectors, which will be essential.

Second, participants agreed that a renewed focus on nutrition must be paramount. This is another significant change over the past decade. There is a new consensus that nutrition must be a cornerstone of any effort directed at food-systems transformation. As FAO has noted, malnutrition continues to be one of our greatest enduring challenges. While undernutrition persists in certain countries, we are also witnessing an unprecedented rise in overnutrition and obesity in developing and developed nations alike. Diet-related NCDs are on the rise as well. At the same time, our agricultural sectors currently prioritize a small number of staple crops over more localized, nutritious ones. As a whole, it is clear that our existing food systems are not producing to healthy diets and outcomes – and we must fix this problem.

This symposium affirms the importance of this finding, and I am pleased to see nutrition taking its place at the top of the agenda. It is my hope that our discussions over the next two days will generate tangible steps forward on this critical issue.

I would like to offer a couple of observations about the challenges ahead.

- As I closed our future of food convention earlier in 2019, I made the casual observation that our food system is broken, and I was immediately corrected by one of our more thoughtful participants, a scientist: “No,” he said, our food system is doing exactly what we’ve asked it to do – we’ve just designed it to do the wrong things!”
- If that is true – and that seems like a reasonable observation – then we have a lot of work to do. Changing a system is hard, as is changing behaviour.

But there are also reasons for optimism:

- As someone in the business of convening thoughtful people from across sectors – in this case farmers, scientists, business leaders, environmentalists, poverty activists, health experts and even chefs – I believe

there is an increasing convergence around the key questions and issues.

- And finally, with respect to behaviour change, I am reminded that a very thoughtful food writer recently observed that this rising generation – young people now becoming adults – is the first generation for whom eating is seen as an ethical act.
- If this is true – and I believe based on my experience that it is – then gatherings like this one, and the knowledge and guidance that they transmit, will play a critical role in helping all of us, from policymakers to consumers, make smart, ethical, sustainable decisions.

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Mario Arvelo Caamaño, Chair, Committee on World Food Security

The nation-state, upon which the entire political architecture of the world is based, is a recent invention. For example, across the street from FAO headquarters, the 2 000-year-old ruins of Caesar Augustus' palace and the foundations of the largest stadium ever built bear witness to the power and prosperity of the Roman Empire. Then again, the Italian nation-state that we know today was founded less than 200 years ago.

A similar story is true for all other members of the United Nations: my hometown of Santo Domingo, the first European outpost in the American continent and the port of entry of Africans into the so-called New World, predates the foundation of my home country, the Dominican Republic, by over 300 years. Over the last two centuries, the globe became a mosaic of nation-states.

The Committee on World Food Security (CFS), which was founded in 1974 in response to a world food crisis, became a venue for debate among government delegates. While it is true that political will is an essential, indispensable component of any viable approach to the fight against hunger and malnutrition, political will, in and by itself, is not enough.

Realizing that the plans and actions of governments were insufficient led to revolutionary change for the CFS, when governments welcomed non-state actors into this cause as equal partners.

While the CFS continues to be an intergovernmental platform in which member states make all decisions, a renewed United Nations governing body comprising all three specialized Rome-based agencies – FAO, the International Fund for Agricultural Development (IFAD) and the World Food Programme (WFP) make it the most inclusive platform for discussing, in openness and transparency, better ways for defeating the most shameful scourge of our time.

Inclusiveness is, in point of fact, the first guiding principle of the renewed CFS, as per the 2009 Reform Document: the Committee partners with civil-society organizations (CSOs), the private sector, other United Nations agencies such as WHO, research centres under the umbrella of the CGIAR, international financial institutions like the World Bank, academia through the CFS High Level Panel of Experts on Food Security and Nutrition, philanthropic entities such as the Bill & Melinda Gates Foundation, and many others, all working together to make sense of available knowledge and relevant experience in moving towards zero hunger.

This symposium takes place as the Committee discusses and builds consensus on voluntary guidelines on nutrition and food systems for approval by the forty-seventh CFS plenary session in October 2020. This is one of the boldest endeavours the CFS has undertaken since we agreed on the voluntary guidelines on the right to food, the fundamental human right proclaimed by unanimous consent under article 25 of the Universal Declaration of Human Rights.

The leading questions for this symposium are: (i) What is wrong with our food systems? and (ii) How will we feed

a growing and urbanizing world population with natural resources that are more and more limited and depleted?

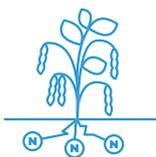
These and other crucial questions are at the core of the CFS workstream on nutrition and food systems. The voluntary guidelines that will emerge will address food supply chains, food environments and consumer behaviour, with a focus on healthy diets.

The process is, indeed, ambitious. It is also beset by danger, because the need to act must produce guidelines that break the business-as-usual approach. FAO advises us, in this specific context, that perpetuating the business-as-usual cycle will keep us off-track, preventing us from achieving Sustainable Development Goal 2 of Zero Hunger.

“Change” is a word that sounds great, which is why we hear it all the time, but agreeing to actual change and implementing it is extremely difficult, because those who stand to benefit will only begin to profit at some point in the future, whereas those that stand to lose in the short term will suffer the consequences immediately.

The point, of course, is that boldly reforming food systems and creating a science-based global culture of healthy diets will, in fact, end up benefiting everyone.

This is what CFS offers to all concerned about the future of food, which is everyone on earth: a place where the legitimacy of inclusiveness and the strength of consensus can lead to concrete solutions for policymakers to implement in every country.





Panel 1:

Research, knowledge gaps and needs for sustainable food systems and healthy diets

Introduction

Policymaking requires sound evidence as it is difficult for governments to make improvements in areas that are not well measured and not well understood. Of high priority is the question of how to provide nutritious diets for optimal health that can be sustained for future generations. To answer this question, evidence is needed on the links between health, nutrition, diet quality and the market-driven processes that shape food systems, food environments and consumer demand.

Large data gaps persist regarding exactly what people eat and drink (Development Initiatives, 2018). Therefore, improving the quality and quantity of data on food intake among different categories of the population is a priority. Closely linked to this is the need for consensus on how to measure diet quality and the development of novel metrics to capture the full range of dimensions of quality, which include adequacy of macro- and micronutrients, food safety, dietary diversity, protection against diet-related NCDs and desirability (Development Initiatives, 2017; Global Panel, 2015; Haddad *et al.*, 2016; Vandevijvere *et al.*, 2013). Data are also lacking on how different food-system domains are linked to, and interact with, the food environment in which dietary choices are made (Global Panel, 2015).

When considering the environmental sustainability of diets, most studies consider only GHG emissions, lacking an integrated analysis that includes other core environmental impact dimensions of food systems (Willett *et al.*, 2019). Research that combines the sociocultural and socio-economic sustainability aspects of diets with health and environmental aspects is scarce. There are knowledge gaps around what really drives consumer and business decisions towards healthier and more-sustainable food choices (Ranganathan *et al.*, 2016). Metrics that measure women's roles in dietary choices are also needed (Global Panel, 2015). The evidence base on policy interventions and agri-food business models that shift food systems towards healthier and more-sustainable outcomes while fulfilling their role as a generator of jobs and incomes in an inclusive manner also needs to be further developed (IFPRI, 2018).

Robust mechanisms are needed to collect better system-wide data to evaluate the impacts of food-system policy interventions. Considering the dynamic nature of food systems, interdisciplinary research and monitoring will be essential to establish the links between and among food-system domains to understand how each part of the system contributes in an integrated way to sustainable and healthy diets (Global Panel, 2015; Haddad *et al.*, 2016). The potential role of public-private partnerships in funding data-collection and ways to obtain public access to data collected by industry are avenues to consider (Global Panel, 2015).

This session started with a keynote presentation (Corinna Hawkes, Director of the Centre for Food Policy, City, University of London) which addressed what we know about our current food systems and healthy diets and highlighted the knowledge and research gaps that need to be filled to re-position our food systems to ensure that healthy diets are accessible and affordable to all by 2030.

The panellists addressed various research issues around the theme of the keynote. The panel session started with a summary from a round table between FAO and academic partners on research priorities around food systems and healthy diets, presented by Marcela Villarreal, Partnerships Division, FAO. It then continued to provide answers to the following questions:

- How could research from microbiome studies influence our way of eating and subsequently diet-related NCDs? (Rob Night, Professor of Pediatrics, Bioengineering, Computer Science and Engineering, University of

California, San Diego, United States of America).

- Looking towards 2030, what are the policies and research gaps we should be addressing now to make healthy diets accessible and affordable to all? (Carlos Monteiro, Professor of Nutrition and Public Health, University of São Paulo, Brazil).
- Looking towards 2030, what are the disruptive innovations that can be applied to our food systems to deliver healthy diets? (Sara Roversi, Founder, Future of Food Institute, Bologna, Italy).
- The 2030 Agenda promises to “leave no one behind.” What are the research gaps we should address now to ensure that vulnerable populations – such as women and children – are not left behind? (Grace Marquis, Associate Professor, School of Human Nutrition, McGill University, Montreal, Canada).

Panel 1 Chair, David Nabarro, 2018 World Food Prize Laureate, Curator, Food Systems Dialogues, London, introduced the speakers and topics.

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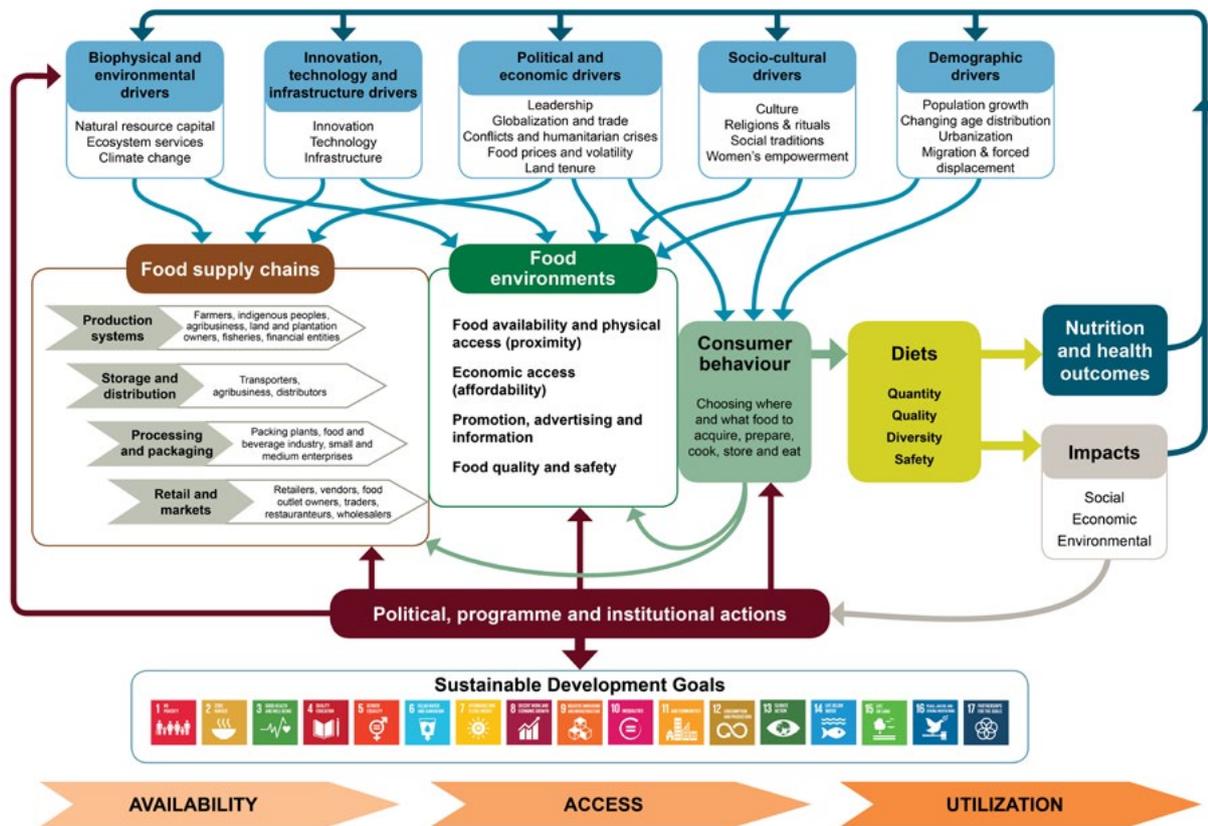
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Keynote address

Corinna Hawkes, Director, Centre for Food Policy, City, University of London and Distinguished Fellow, The George Institute for Global Health

While there are many knowledge gaps that need to be filled to support the goal of producing healthy diets from sustainable food systems, the most critical gap is the evidence needed to support more-effective action. We need knowledge in order to support the design and delivery of effective actions that promote health by supporting people to add, remove or substitute foods so that their diet as a whole becomes healthier. To be effective, actions should also be equitable, efficient (not in the classical sense, but in the sense that policies are not creating unintended consequences) and, importantly, executed. The key question is: what knowledge is currently missing to identify and design of effective, equitable, efficient actions? Figure 1 shows the many entry points where we can act.

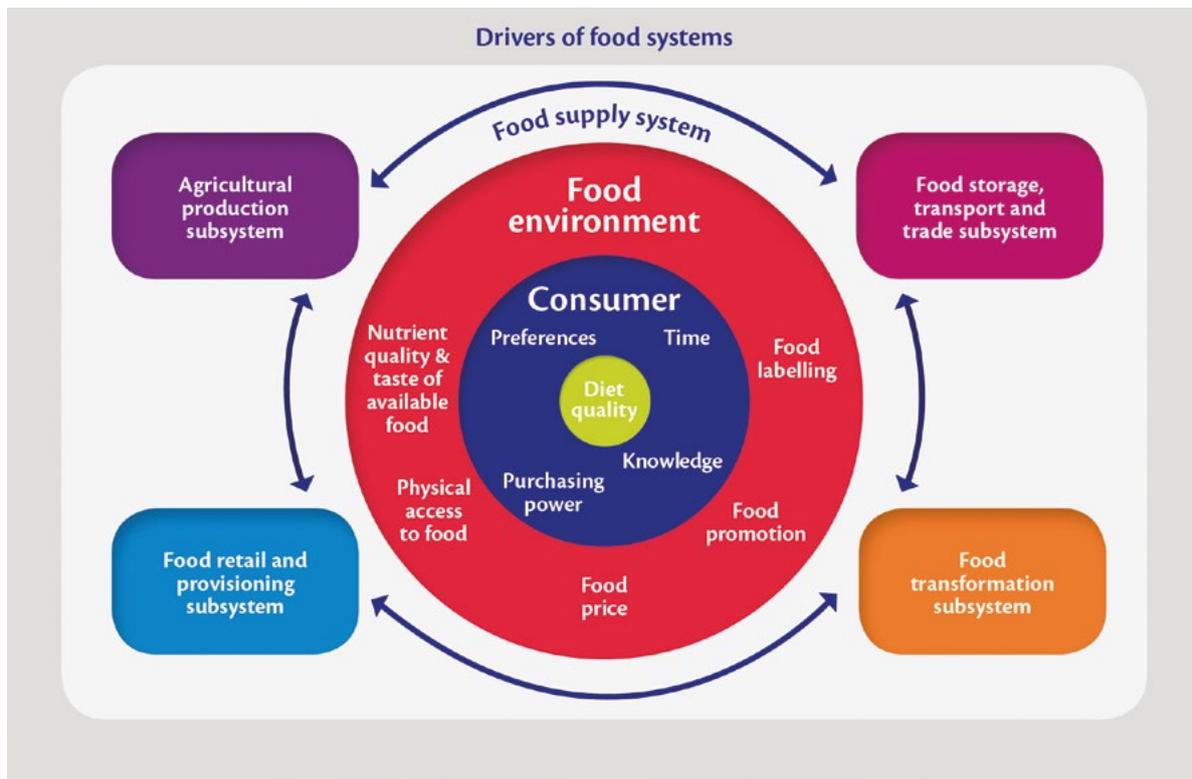
Figure 1. Conceptual framework of food systems for diet and nutrition



Source: HLPE (2017)

Figure 2, provides a relatively straightforward schema to identify some of the knowledge gaps. The diagram places diet quality in the centre. This in essence places people – the people who eat – at the centre. It shows that people are surrounded by food environments, which are in turn influenced by food supply systems as the drivers of food systems.

Figure 2. Diagram of the components of food systems



Source: GLOPAN (2016)

The first key knowledge gap is at the centre – what are people actually eating?

There is a lot known about what constitutes a healthy diet and the actions that can be effective in promoting a healthy diet. We also know more than ever before about how our diets need to change to support environmental sustainability. However, there are major gaps in understanding exactly what people are eating – we need more consistent measurements of diets. The *2018 Global nutrition report* (Development Initiatives, 2018) identifies some of the gaps that need to be filled here. A major part of the gap relates to measuring how diets change in response to nutrition policies, programmes and interventions. Evaluations often do not measure this, yet it is not enough to know their impact on nutritional status: we need to understand how mechanisms of dietary change work.

The second critical knowledge gap related to this latter point is: why do actions to promote healthy diets succeed or fail? A key aspect of this is understanding how actions that aim to change food environments influence what people eat and what is making them succeed or fail. There is research on how food environments are associated with diets, and research into eating behaviours, but no research connecting the two from a solutions perspective. In order to find out how they connect, we need to know peoples' lived experiences of policies that change food environments. For example, for food labelling there is a high variability in responses: how people react to it and whether they use it or not depends on their education, age, income and other variables. This is what is meant by understanding the interaction between people's lived realities and actions that change food environments: how effective they are depends on the context into which they are delivered. Thus, while quantitative impact studies are vital and necessary, they need to be complemented by qualitative work that provides insights into the mechanisms of change. This is particularly important since the burden of poor diets often falls on people who experience poverty and deprivation. What is the optimal food environment from the perspective of people who experience poverty and deprivation? We need more qualitative research that listens to people's lived experiences of food environments to understand if actions are likely to succeed or fail. Then we can design changes that will create consistency and coherence in their lives moving towards healthier diets.

However, even if we know how to optimize food environments, we need to know how to change them in a way that is economically viable and environmentally sustainable. Knowledge gap three is thus: how can we re-incentivize food systems to produce healthy food environments? There is a lot known about how food systems

function. However, there are major gaps in understanding (a) how food systems can be economically viable while also making healthy diets available, affordable and appealing for all and (b) the definitive top-priority policy actions that would make healthy diets available, affordable and appealing for all.

We need to adjust supply systems to deliver the healthy food environments and reduce the amount of food out there which food-based dietary guidelines show we should be consuming less of (e.g. salty, sugary, high-fat snacks). Which supply chain incentives are needed to incentivize business to do this? Brouwer and Tedesco (2019) provides an excellent example of the type of analysis needed to answer this question. Looking at the commodity chain for biofortified sweet potatoes, it shows what the costs, revenues, profits and incentives are in the supply chain. From such studies, we can learn which incentives work and develop supply chains that are economically viable and successfully reducing the unhealthy “eat less” foods and increasing the healthy “eat more” foods. This is needed not only for alternative food systems, but especially in order to change the mainstream food system.

While value-chain work is often focused on how to get nutritious foods into the market, we also need to remove unhealthy foods from markets by developing disincentives that work. WHO (2017), for example, shows that incentives to include sugar in products far outweighed the disincentives. To make it work we need to understand the finances at every step of the supply chain and develop radically different business models.

The fourth major gap is on understanding how to manage tensions and create co-benefits in the food system in order to make actions more efficient. There is plenty of work that has been done in developing and delivering actions from specific sectors to promote healthy diets, such as actions delivered through the health sector or the agricultural sector. However, there are major gaps in understanding the incoherencies that exist across government and between sectors. Many of these are between economic goals and nutritional and environmental goals and mean that policies are undermining each other, leading to inefficiencies. Therefore, we need to recognize the (often economic) tensions in the food system and identify where the inconsistencies create conflicts. Following from the previous knowledge gap a key question is: what new business models are needed to overcome existing conflicts, so that inefficient tensions become efficient co-benefits? Solutions would need to place nutritious foods that promote health at the core of the food system and ensure that they are produced using methods and processes that support environmental sustainability, by a private sector, including farmers, entrepreneurs, small and large businesses, in a way that creates jobs and generates wealth that is equitably shared with the workforce and national and local economies. This is set out in a recent report, *Connecting food systems for co-benefits: how can food systems combine diet-related health with environmental and economic policy goals?* (Parsons and Hawkes, 2018). In the context of the structure of the current food system, this is a big ask, but experience shows that fragmented actions are not going to make the change: action needs to be taken system-wide, connecting the system for co-benefits. Questions about what governance structures can manage tensions and create synergies for healthy diets across the system need to be answered, as do questions about the policy and economic incentives needed at global level.

While this is a complex picture, it is possible to start to fill knowledge gaps about the connections that need to be made in a very focused way. For example, how can existing actions focused on undernutrition work double duty in promoting diets that reduce all forms of malnutrition? We can fill knowledge gaps by developing pilot studies to show how actions currently designed to address undernutrition can reduce the risk of populations eating diets that increase the risk of obesity and diet-related disease. There is a developing literature in this area, but more knowledge is needed (Hawkes, 2018). We also need to explore which double-duty actions can also enhance environmental sustainability and thus become triple duty (Swinburn *et al.*, 2019).

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Panellist presentations

Marcela Villarreal, Director, Partnerships Division, FAO

Today's world food systems are fundamentally flawed. While enough food is produced to feed the entire world population, there are still approximately 821 million people going to bed hungry every night. Today's food systems are also contributing to the rise of obesity, which is now growing even faster than hunger. This is due to an imbalance in food systems. Moreover, in the current food system, more than one-third of the food that is produced is thrown away or otherwise wasted.

An Academia Round Table Dialogue was held before the opening of this symposium. This brought together the FAO Director-General and more than 40 representatives of academia from across the world, many of them FAO partners. A rich dialogue was held on knowledge and driving research to arrive at zero hunger and good nutrition by 2030.

The main take-away message from the discussion was the need to address the future of food through a food-systems perspective to create a food system that is complex and interconnected. This new, sustainable food system needs to be flexible to address changes and requires the participation of all actors, including policymakers, consumers, civil society, the private sector and farmers to generate multisectoral solutions. Each of these actors must play a role, armed with better knowledge to demand better food. A new business model is needed. It must go beyond efficiency, as traditional measurements based only on productivity are not providing the right answers. The SDG indicators highlight that measuring systems need to be in place to address impacts such as climate change. Are country statistics in place? What capacity development is needed? What data are needed? A good food system also must address the health of ecosystems, including health of soils. Further, the new food system must be looked at with a territorial dimension for greater understanding, including the qualitative aspects. In this regard, a concrete proposal was made to set up a Mediterranean diet task force.

The Round Table also discussed the need to establish an enabling environment for food systems with good governance mechanisms and incentive systems and disincentives, such as a sugar tax. The need for a proper legal framework cannot be over-emphasized. The role of parliamentarians is key.

The Round Table also looked at the centrality of the relationship between food and health. This goes beyond food safety; not all safe food is healthy. Healthy food systems must ensure they produce healthy food, as one-third of deaths today are caused by unhealthy diets. Ultra-processed food impacts not only health but also the environment, such as water resources. The nexus of health and food includes biodiversity in all its aspects, including understanding how decreasing biodiversity is changing our eating habits. Knowledge systems are

diverse and indigenous knowledge needs to be respected and preserved at the same time as innovations need to be introduced. People have a right to know what they are eating and this requires good legislation.

Another element of the academic discussion focused on the need for sound policies for the future of food. Good food systems require policies that are interconnected and address food, environment and health impacts. They require cross-cutting approaches to address climate change, which is impacting agriculture production. These policies must consider youth, be region specific, support family farmers who produce 70–80 percent of the world's food and consider other aspects such as land tenure, gender and urbanization.

***Rob Knight, Professor of Paediatrics, Centre for Microbiome Innovation
Bioengineering, Computer Science and Engineering, University of California,
San Diego, United States of America***

How can research from microbiome studies influence our way of eating and subsequently diet-related Non-communicable diseases (NCD)?

A century ago, humanity was plagued by complex NCDs that often affected multiple organ systems, including the immune system and the brain, and were thought to be completely intractable. There were often clues: these diseases ran in families and affected specific populations, suggesting a genetic component; their severity was often seasonal; diet seemed to be involved, but guesses about which dietary components were important proved notoriously difficult to verify in clinical trials. Today we know that diseases, including rickets, pellagra, goitre, cretinism and beriberi are caused by deficiencies in vitamins and minerals that were then unknown. The work to define these diseases in animal models, connect them to epidemiological work in humans and then to perform clinical trials demonstrating reversal of symptoms was painstaking. It took several more decades to implement national systems for supplementing basic staple foods with vitamins and minerals as preventive measures to eliminate these diseases. These measures have now been highly effective for decades.

Today, we face many problems with NCDs that are prevalent in developed countries and skyrocketing in lower- and middle-income countries. Obesity, diabetes, inflammatory bowel disease, multiple sclerosis and many other disorders are increasing rapidly and are closely linked to dietary changes (although these changes are themselves correlated with many other social, lifestyle and environmental factors that change in concert). We now know that these diseases are associated with the microbiome in humans, and that aspects of their symptoms can be transmitted from humans to mice by transmitting the microbiome. However, we do not yet know whether these altered microbiomes are primarily caused by the absence of beneficial dietary components, the presence of harmful food additives or industrial pollutants, the input of harmful microbes, the absence of beneficial microbes or some combination of these factors. Many of these diseases are influenced by human genes, which makes it easy to search for a human genetic cause. However, a detailed investigation of the genetics of, say, rickets or pellagra, followed by a targeted approach, would have been far more costly and likely less effective from a public health perspective than identifying cheap, safe and effective supplements.

If today's chronic diseases are caused by a deficiency or insufficiency of dietary components or microbes, why have these causes not already been discovered? First, many of these diseases were extremely rare a century ago and were not subject to the same types of nutritional research that uncovered the well-known cases involving vitamins and minerals. Many of them have still not been studied in this manner. Second, the damage from some of these conditions may be irreversible or slow to reverse, in contrast to the very rapid recovery observed on supplementation with vitamins (a possible exception is insulin resistance, where bariatric surgery can restore insulin sensitivity as a very rapid metabolic switch: the search for a molecule or a microbe that can flip this switch without the surgery remains ongoing). Third, unlike the situation with the well-known supplements, the situation with these chronic diseases may require combination therapy, or may require treatment at doses that are sufficiently high to be toxic for some members of the population, that are too expensive to supplement or that depend on the microbiome.

Microbiome studies have already provided several key pieces of information over the past 15 years. First, we now know that the microbiome is linked to many NCDs and that alterations of the microbiome can cause or cure these diseases in animal models. Second, we have powerful tools such as gene editing with CRISPR/Cas9, barcoded transposon mutagenesis libraries, metabolomics analysis with mass spectrometry, DNA and RNA

sequencing, fluorescent tagging, super-resolution microscopy, etc. that reveal the mechanisms of host–microbe interactions with unprecedented detail. Third, we know that the microbiome is highly individualized and relatively stable in healthy adults under business-as-usual conditions. Fourth, we know that the microbiome can be radically reshaped, in the short term with drugs or surgery but over the long term with diet. This long-term dietary reshaping is among the most powerful forces affecting the microbiome, much larger than the effects of drugs or diseases; what we do not yet know is whether a particular diet can be chosen by an individual that will reshape their microbiomes in a direction that is good for their health. However, there has been considerable success already in predicting, based on the human microbiome, whether particular food items will be good for an individual's blood glucose control: we need to extend this type of analysis to other phenotypes including inflammation, mood and other factors known to be influenced by diet and by the microbiome. What is needed is straightforward but expensive: we need large populations (because of high inter-individual variability) who are willing to undergo baseline monitoring over time (because variability in the microbiome in itself is important), then induce a defined sequence of diet and/or drug perturbations (so that we can tell cause from effect), with monitoring that links these factors to health.

Studies of individual food items in small numbers of humans, and in rodent models, have been useful. However, what they can tell us is limited because the same food may have very different effects in different contexts (e.g. purified sugar versus sugar in the context of the fibre and other components of a whole fruit), because individual responses to the same food item can be very different based on the individual's microbiome and because there are so many different food items to test (especially considering details of different proteins, different polysaccharide configurations, etc.). An additional complication is that technical variation among different microbiome readout methods is very high, so it is extremely challenging to reconcile results from different studies at present. Cross-lab validation projects such as Microbiome Quality Control (MBQC) and International Human Microbiome Standards have been very useful in this respect, as have the Genomic Standards Consortium checklists for reporting, widely used laboratory protocols such as the Earth Microbiome Project Standards and large databases such as Qiita that make it possible to integrate and compare data sets at the whole-study level, not one sequence at a time. These individual food item studies provide a lot of useful clues, such as the deleterious effect of artificial sweeteners and emulsifiers on the microbiomes of some people (but not others), the differential responses to different forms of fibre (which is not always good, for example in patients with inflammatory bowel disease), the beneficial impact of specific herbs and their components on the microbiome, the deleterious impact of sugar, the conversion of choline and carnitine in meat to trimethylamine and then trimethylamine-N-oxide by some individuals' microbiomes (which then contributes to atherosclerosis), etc. However, our ability to interpret these studies and connect them to public health outcomes would be transformed if we could repeat these studies in a consistent, standards-compliant framework with adequate sample sizes and against the different microbiomes found at baseline in different countries, in conjunction with large epidemiological cohorts such as the National Health and Nutrition Examination Survey, where diet is already carefully tracked, would transform our ability to interpret these studies and connect them to public health.

In terms of what we can pragmatically do, the potential to transform health by transforming the food supply in ways that benefit the microbiome, either at a population-wide level or on a more personalized level stratified by a microbiome test, is very high. However, the recommendations that can be made right now (“eat your vegetables,” “don't eat too much sugar”), although supported by cutting-edge microbiome research, might seem intuitively obvious to our grandparents who did no microbiome research whatsoever. Finding the counter-intuitive and surprising results (the equivalent of knowing that lemons are far more protective against scurvy than limes, and vinegar and hydrochloric acid have no benefit) will take concerted additional research. We can only hope that it does not take a third world war to prompt governments to do this research and implement the evidence-based policies needed to act against the chronic NCDs that incapacitate an increasing fraction of the population today.

Carlos Monteiro, Professor of Nutrition and Public Health, University of São Paulo, Brazil

All over the world, long-established dietary patterns based on a variety of unprocessed or minimally processed foods and freshly prepared meals are being displaced by ultra-processed foods. These are formulations of industrial ingredients made ready to eat, heat or drink. Examples include sweet or savoury snacks, pre-prepared

frozen or shelf-stable dishes and desserts, and sweetened drinks. This process started around the middle of the twentieth century in some high-income countries, but in recent decades has advanced worldwide, most conspicuously in middle- and low-income countries.

There is mounting and consistent evidence from large cohort studies, and recently from a randomized controlled trial, that displacement of unprocessed or minimally processed foods and freshly prepared meals by ultra-processed foods induces passive overconsumption of dietary energy and increases the risk of obesity, diabetes, hypertension, dyslipidaemias, cardiovascular diseases, cancer and other chronic NCDs and of mortality from all causes. These studies also show that the ill effects of ultra-processed foods are not related only on the use of large amounts of fat, sugar or salt in their manufacture. Other likely mechanisms are due to ultra-processing itself, such as the destruction of the food matrix and the loss of the synergy existing in the original foods between nutrients and other bioactive compounds or the presence of harmful substances created by high temperatures and compression or released by synthetic packaging material. Ultra-processing also depends on the use of myriad additives whose effects on health, cumulatively and in combination, are unknown. This is why ultra-processed foods reformulated with less salt, sugar or fat remain harmful to health.

There is no need to consume any form of ultra-processed foods. Official international and national dietary guidelines should all emphasize consumption of a great diversity of unprocessed or minimally processed foods, mostly plants, and freshly prepared meals, and clearly state that all ultra-processed foods should be avoided. Some national guidelines already do so. This will benefit human health and well-being. It will also have social, cultural, economic and environmental benefits, including the support of local agricultural, retail and catering businesses and protection of non-renewable resources and biodiversity. Statutory policies and programmes should now be put in place, similar to those now used to limit smoking and use of tobacco. They should also support, protect and encourage the production, distribution and consumption of unprocessed and minimally processed foods and the preparation and enjoyment of fresh meals at home and in schools, workplaces, hospitals, community facilities and modestly priced restaurants.

Sara Roversi, Founder, Future of Food Institute, Bologna, Italy

Disruptive innovations can be applied to our food systems to deliver healthy diets.

Eating is an essential act for human beings, but it requires consciousness and awareness.

By analysing food from the viewpoints of both culture and accessibility, we have begun to map the places where a food revolution is taking place and actively study its dynamics in order to grasp both opportunities and to help our partners seize these opportunities. The Future Food Institute also assists in the creation of new niches of production and consumption that use the potential of technology and new knowledge generated by data.

The Future Food Network focuses on food innovation as a key tool to tackle the immense challenges humankind faces in the areas of affordable nutrition, world hunger and sustainability. The Future Food Institute seeks to create new models and culture by strengthening food research projects, spreading knowledge about healthy diets and providing food education and opportunities for positive cross-pollination of ideas and inspiration through its Food Innovation Programs. Its entrepreneurial spirit helps to support food corporations and institutions committed to such innovation. A key element of this effort is the Future Food Living Lab, which feeds the knowledge acquired to innovative projects capable of generating real impact on the health of humans and the planet.

The Future Food Institute has six research, prototyping and foresight focus areas:

- Environment: Innovating food production with climate-sensitive models
- Production: Discovering new technologies and services for domestic and industrial transformation of food
- Access: Finding the best solutions for malnutrition and creating new tools to guarantee food safety
- Nourishment: Experimenting with healthy and nutritious food that preserves culture, improves the food experience and strengthens biodiversity
- Eating lifestyle: Discovering new spaces and models of sustainable consumption

- Awareness: Developing tools to produce insights from data and artificial intelligence; investing in food education; promoting digital platforms to spread knowledge and awareness.

The Future Food Purpose drive model

The Future Food's Purpose drive model is built around three elements:

- People: this relates to the concept of a hyper-connected human community and the need to work for the integral good of humankind
- Planet: this stands at the centre of the models to ensure the focus on ecological deficits and review of ecological spending review (Mann and Toles, 2016)
- Prosperity: this focuses on the regenerative power of a purpose that takes into account multiple indicators of well-being.

This approach conveys its messages through examples of life and of lives, with the objective of inspiring virtuous behaviours.

The disruptive drivers that are changing the face of food

There are a number of disruptive drivers that are changing food systems towards increasing personalization, transparency and authenticity, shifting trust from multinationals to small brands and to social responsibility. These include digitalization, which enables consumers to see where their food has come from and who produced it; new distribution channels that allow producers to connect directly with consumers; the increasing need for sustainable production in the face of water and land scarcity, climate change, loss of biodiversity and food waste; and the increasing demand for fresh, unprocessed food and better nutrition in the face of global epidemics of obesity and malnutrition.

Challenges and opportunities

There are numerous challenges facing sustainable food production. The world's population is increasing, and will reach 8.5 billion by 2030 and 10 billion by 2050 (FAO, 2017). Nearly all this population increase will occur in developing countries. Moreover, two-thirds of the world's population will live in cities by 2050 (UN DESA, 2018). In order to feed this larger, more-urban and richer population, food production must increase by some 50 percent compared with 2013 (FAO, 2017).

This means that the future of food must address two big issues:

- the need to create a growing demand for nutritious foods that are produced sustainably; and
- the need to promote change in the food and beverage industry towards products that are more sustainable and more in line with the demands of the SDGs.

In which areas are changes needed?

The food system is complex and multifaceted. In order to formulate a robust solution for change, the Future Food Institute focuses on three major aspects: supply and production, consumers and context. Supply and production is the foundation on which change is made. The first step is to adopt a system of regenerative agriculture in order to help mitigate the current harmful effects of large-scale conventional production and cultivation. Next step is to target consumers in order to shift the current demand in the direction of more-sustainable options. The Institute aims to achieve this by facilitating a free flow of accurate information to consumers, thereby encouraging them to change their food consumption behaviour. The final step is to encourage development and adoption of policies that promote sustainable production and consumption. This will, in turn, result in targeted ethical marketing and retail adaptation.

Focus on Foodscape

Health is defined by WHO as “a state of complete physical, mental and social well-being”. Therefore, health needs to be tackled in a comprehensive and systematic way, which requires many sectors to be involved. Among these, the food sector plays a key role, given that poor nutrition is the number one cause of poor health. The food landscape (e.g. rural or urban area, food desert or food garden) is also a key aspect to be considered.

Shopping for food and encountering foods in various forms creates a landscape of foods or foodscape that is a powerful and independent determinant of health, food behaviour and experience in any given location.

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Grace Marquis, Associate Professor, School of Human Nutrition, McGill University, Montreal, Canada

Sustainable food systems need to support equitable access to healthy diets

There are dramatic inequalities and inequities across the world in individuals' ability to obtain a diet that supports a healthy life. These differences are determined by both environmental conditions and societal actions that contribute to excessive food access for some people and inadequate access for others. Inequities need to be addressed through changes in political systems, economic and social policies (e.g. land-rights reforms, introduction of social safety nets) and in social norms and cultural practices (e.g. education on gender and age discrimination). A sustainable food systems approach that supports healthy diets for everyone will require redistribution of resources, including redirection of research funds to develop solutions for everyone, including the most disenfranchised populations. A willingness to collaborate across sectors and levels, from the international to the district level, is needed to allow the identification of locally relevant barriers to a healthy diet and to facilitate development of multifaceted solutions within a sustainable food system. The specific barriers and the solutions will vary across the globe.

This presentation emphasizes the need to assure access to a healthy diet for children and adolescents, especially those living in poor rural communities of sub-Saharan Africa. The challenge is substantial – what actions are needed to make available a sustainable food system that makes nutrient-rich healthy diet including animal-source foods (ASF), fruits and vegetables, foods that are environmentally demanding, in these deprived settings?

Why prioritize healthy diets for youth?

Globally, one-quarter (27 percent) of the world's population are younger than 15 years of age; among 13 sub-Saharan African countries the rate is 45 percent or higher (World Bank, 2019a). This age group experiences a disproportionately high rate of poverty, making up 46 percent of the poor, and has a rate that is at least twice that of adults (World Bank, 2018). Poverty is a basic contributing factor to children's experience of poor nutrition; it affects households' ability to grow and purchase food, diminishes caregivers' ability to make good nutrition decisions and places children at high risk of illness (increasing their nutrient requirements). The effect of poverty is evident in the threefold difference in the rate of stunting in Ghana across the wealth quintiles (GSS, GHS and ICF, 2015). Other indicators of poverty (location and maternal education) also demonstrate its effect: the prevalence of stunting was 63 percent higher in rural areas than in urban areas and there was a sevenfold difference between children of mothers with no education and those with secondary education.

Viewing sustainable food systems first through the lens of the nutrient requirements for a child makes sense for all of society. This is not only due to the severity of the consequences of poor nutrition for the child but also the consequences for all of society in lost national productivity and economic growth. Individually, poor nutrition limits children's physical growth and mental development, impairs their school performance and has long-term negative consequences for work productivity, reproduction and later health. McGovern and colleagues estimated that early childhood nutrition interventions that addressed nutrient requirements led to a 25–46 percent increase in wages (McGovern *et al.*, 2017). The implications of poor child nutrition for society as a whole are also large. The World Bank estimated an 11 percent loss of gross domestic product (GDP) in Africa and Asia due to child undernutrition, which could be eliminated with healthy diets (World Bank, 2019b).

Energy and nutrient excesses are also an obstacle to a healthy diet among youth. The 2017 global prevalence of overweight for children less than 5 years of age was almost 6 percent; this increased to 18 percent among 5–19-year olds (FAO *et al.*, 2018). The estimate for overweight for sub-Saharan Africa pre-schoolers was 5 percent, accounting for one-quarter of all overweight children less than 5 years of age globally. Craig, Reilly and Bland (2019) reported about one-quarter of participating rural South African school children (grades 1 to 9) to be overweight (WHO +1 standard deviation criterion), with higher rates for girls and older children. Actions to develop sustainable food systems need to address the challenges of both excess of energy-rich foods and deficiencies of macro- and micronutrients deficiencies.

Healthy diets for children include nutrient-rich animal-source foods

The benefits of ASF have been well documented across early childhood and adolescence in communities living with poverty. A diverse intake of ASF contributes to a healthy diet as each food contains a different range of micronutrients (e.g. calcium and riboflavin in dairy-based foods; haem iron, zinc and vitamin B₁₂ in meat). Growth and cognition are improved with the intake of adequate ASF. Trials testing the addition of ASF to the usual diet (e.g. eggs among Ecuadorian infants, milk among Kenyan school children) have demonstrated a positive effect on height-for-age z-scores among poorly nourished infants and children (Iannotti *et al.*, 2017; Neumann *et al.*, 2007). The addition of meat increased Kenyan children's problem-solving ability and academic performance as well as their physical activity and initiative and leadership behaviours in school (Neumann *et al.* 2007).

Access to ASF varies dramatically across the globe. In contrast to North America, where intakes exceeded the recommended levels for a healthy diet for all types of ASF except fish, ASF intakes in sub-Saharan Africa in 2016 were below the recommendation for all types of ASF except red meat.

National values may not indicate the reality of intake of individuals. A recent review that examined the intra-household distribution of foods relative to individual energy requirements (i.e. relative dietary energy adequacy ratio) reported a mixed pattern with no obvious disparity by age or sex (Berti, 2012). Similar research is needed for key nutrients such as iron-rich foods. Bouis, Eozenou and Rahman (2011) reported higher percentage of energy intake from ASF among young children than other age groups in Bangladesh and The Philippines, suggesting a protection of children within the household. Better research is needed on individual intakes within households to clearly understand the decisions that are made concerning the distribution of scarce nutrient-rich foods such as ASF.

Low fruit and vegetable intakes are a problem for everyone, including youth

Fruits and vegetables are recommended for a healthy diet as they provide a wide variety of micronutrients essential for child growth and development, decrease the risk of becoming overweight, may contribute to bone health and help establish eating behaviours that are protective against chronic diseases (cardiovascular disease, hypertension and type 2 diabetes) (Lien, Lytle and Klepp, 2001). However, Ruel, Minot and Smith (2005) found that although almost all households in the ten sub-Saharan African countries studied consumed vegetables, fruit consumption was much less common and varied between countries. Similarly, in 2005 no country met the WHO's recommended minimum intake level for fruits and vegetables; this has not changed more than a decade later (GBD 2017 Diet Collaborators, 2019). Disparities in intake are linked to wealth, location (urban populations consumed more) and age (consumption is higher among adults). All regions have a large gap between the recommended intake of fruits and vegetables as part of a healthy diet and recent dietary patterns (Willett *et al.*,

2019). The actual intake is also below the Global Burden of Disease estimates for the intake that minimizes the level of risk from all causes of death.

Research is needed to develop sustainable food systems that integrate the needs of children and adolescents as a priority

In poor rural homes, the diets of the youth primarily reflect the foods available to the family. Thus, decisions about food access for healthy diets for the general population need to be viewed with the lens of meeting the needs for youth. To what extent is local production of nutrient-rich foods feasible? What financial resources, infrastructure, training and extension support would be needed to help communities (i) recognize the problem, come to prioritize the diet of the youth and identify feasible ways in which they can meet the need; (ii) assure that successful and environmentally sound agricultural practices are permanently supported in the rural areas; and (iii) develop supportive markets as needed? How can local institutions and civil society best coordinate activities to raise consciousness and commit to the development of a common agenda on the need for sustainable approaches that protect the environment and meet dietary needs (Kania and Kramer, 2011). What parallel support from other locales and vertical support from regional and national institutions is needed and how best can this support be given?

Improving the home diet may improve children's diet

Inconsistent results on intra-household distribution of food suggest the need for better dietary data. Do youth receive their portion of nutrient-rich foods based on biological needs? If access to high-value foods were changed, would the distribution among household members change? What factors influence intra-household distributions and are there effective interventions that influence decision-making about this.

School-aged children diversify their diets with foods outside the home, either from a school feeding programme or from purchases made from street vendors. Both venues open the opportunity for creative approaches to meet their special nutrient needs. More research is needed on how to better use large national programmes such as school feeding programmes to address different local dietary needs and support sustainable agriculture. Creative multisectoral approaches that include street vendors also open opportunities to make nutrient-rich foods available to youth.

Finally, cross-sectoral collaborations are needed to implement actions at the local level. Often the level of technical competence is low among staff in disadvantaged communities. How are institutional collaborations best organized to be effective locally and to sustain support for a nutrition-oriented sustainable food system?

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Panel 2:

Governance of food systems for healthy diets

Welcome statement day 2

Máximo Torero Cullen, Assistant Director-General, Economic and Social Development Department, FAO

Mr Torero started Day 2 of the Symposium by stressing that countries have to deal with the challenge represented by the increasing prevalence of obesity that goes hand in hand with a persistence of undernutrition. In addition, he highlighted the increasing need to produce more food, more efficiently. Various partnerships (with WHO and the African Union for instance) have been designed to identify gaps (e.g. in understanding how food systems can be made more sustainable and in how better-quality food can be made more accessible), address them and close them. To this effect, he added that there is a need to align initiatives. There is also a need to innovate and individualize diets and to improve information to consumers in order to foster better choices when it comes to nutritious foods. In addition, there is a need to support various countries worldwide with tailored food guidance to address and tackle food loss and waste (FAO's *State of food and agriculture* [SOFA] publication is an example).

Introduction

Food systems that work for healthy diets and nutrition require actions across many sectors and actors. Many of the actors who are active in food systems impact nutrition but very often do not have an explicit mandate in nutrition, making it difficult to call these actors to account. Intergovernmental agencies and democratic states are accountable towards their governing bodies and their populations; however, many non-state actors hold power but without clear accountability structures.

Institutional arrangements need to be strengthened at international and national levels to ensure greater coherence of policies and actions that promote good governance at all levels. At the national level, intersectoral policies and coordination of action are needed for effective food-systems management.

Measures for effective food-systems governance include: (i) coherent national policies with explicit nutrition targets; (ii) improved institutional arrangements for effective multisectoral cooperation; (iii) engagement with partners to create and sustain an inclusive enabling environment for improved nutrition; (iv) facilitation of effective implementation at all levels; (v) concerted efforts to encourage effective design, implementation and monitoring of actions at various levels; (vi) regular and systematic public assessment of progress to enhance accountability and effectiveness and to improve resource use; and (vii) support to national governments to enable national authorities to establish and implement their own national policies and strategies.

Swinburn *et al.* (2019) describes the nature of current food systems and their impact on diets and nutrition at several levels, i.e. health, governance, business, supply and demand, and the concern that powerful lobby forces often prevent government policymaking for the public good.

What mechanisms exist or can be put in place to ensure that governments, private sector and civil society hold themselves accountable for the quality and effectiveness of food-system policy, actions and investments including the measurement of their impact?

It is recognized that a systems' approach is the only approach to deal with these challenges. The focus should not solely be on access to food itself but also on consumption and health overall. These multisectoral and multistakeholder issues affect everyone and as such the various actors involved must come together to tackle them.

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Keynote address

Senator Guido Girardi, author of the Chilean Nutritional Labelling and Advertising Law, Republic of Chile

Chile had a great success during the twentieth century in controlling NCDs and malnutrition despite being a country with very few resources. Today, however, Chile faces new public health problems and is suffering from a major setback.

Chile now has one of the highest levels of prevalence of NCDs in the world, with more than half of deaths being related to cardiovascular disease, cancer, hypertension and diabetes. Thirty-seven percent of the adult population is obese, 75 percent are overweight 87 percent of the population are sedentary, one of the highest rates in the world. A quarter of 6-year-old children are overweight and 12.5 percent of them are obese. Among these, 10 percent suffer from hypertension and one-third suffers from high levels of cholesterol and is insulin resistant. As a result, the prognosis of the future for these children is very poor.

In the year 2000, the food industry was heavily criticised for covering up indications that sugar and salt could be addictive. In 2004, the Government of Chile banned the use of hooks such as toys to encourage children to demand junk foods. Several court cases were in process against the private sector for false and deceptive advertisement. This created the environment which led to the creation of the Chilean Nutritional Labelling and Advertising Law.

The creation of the law was led by a Commission on Challenges of the Future, Science Technology and Innovation established by the Chilean Senate. This involves not only members of the parliament but also other stakeholders such as members from academia and civil society. Working with different stakeholders, in particular academia, the Commission has enabled and improved the parliament's decision-making.

The term non-communicable diseases is a misnomer; so-called NCDs are the most communicable of all diseases by the use of aggressive advertising that leads to changes in behaviour. As a result of aggressive advertising, people are no longer eating food but eating "experiences" based on branding. The most affected are the poor. For example, a child growing up in an environment with limited resources in Chile and with a low schooling rate has a 328 percent higher risk of becoming diabetic and 380 percent higher risk of hypertension than those in average-income households. Hence, it is very important to consider the social dimension when planning a strategy against obesity. If this trend continues, the poor of the future will be obese.

Therefore, we must consider the following:

1. NCDs are they spread through advertising, which modifies the behaviour of people, especially children, and boosts consumption of junk food.
2. People are no longer consuming food but experiences. In Chile, children watch around 8 544 advertising spots per year, from which 4 000 are considered deceptive.
3. Due to their negligible nutritional value, these products should not be considered foods because they do not promote health, conviviality, happiness, etc. On the contrary, they promote pain and diseases.
4. Science and nutrition must be brought together to evaluate new developments. In Chile, the Future Congress is organized every year with 100 scientists from all over the world. One of the topics that has been addressed by this Congress is epigenetics, which indicates that some of the characteristics of obesity could modify human genes and be transmitted to future generations. There is a social responsibility towards oneself but at the same time to future generations and these facts are supported by science.
5. Microbiomes are another form of epigenetics; 99 percent of our genes are bacterial and human beings are

almost identical from a human genetic point of view but what makes us different are the bacterial genes. There is a permanent epigenetic process that intervenes and modifies our lives. Increasingly, these bacterial genes behave as a second brain and a second immune system. This is a new development and thus microbiomes can generate many diseases such as cancer, obesity, autism and Alzheimer's. Consequently, this needs to be dealt with because it is through the unhealthy foods that our bacterial genes are being damaged. Junk food modifies the bacterial population in our intestines, and these bacteria influence the prevalence of diseases that are increasingly common in the population.

The development of the law faced numerous challenges, such as the absence of reference values for what constitutes unhealthy levels of salt and sugar and weak support from government in the face of intense opposition/lobbying from the food industry. When this bill was introduced in 2008, the food industry opposed the original labelling concept, which was the use of a traffic-light system to warn consumers about unhealthy food products. The lobbying from the industry was so intense that President Michelle Bachelet asked the Commission not to use the traffic light.

Following focus groups that included over 2000 children, simple black labels were designed to indicate foods high in sugar and high in calories. If a product has a black label, it means it is not a healthy product. The law prohibits any type of publicity/advertisement (TV, Internet, etc.) for such products.

The industry subsequently lobbied for a change back to the traffic-light system because of strong evidence that the simple black labelling is easy to understand and aids consumer decision-making. However, the black labelling system has been retained.

The law obliges all schools to include nutrition education in their curricula. It also prohibits the Government from procuring products with black labels. The idea is not to put a label on every single product but to encourage the industry to reformulate its products. If the industry reduces the levels of critical nutrients (sodium, saturated fats and sugar) and calories in their products, black labels could be removed, the right of advertisement reinstated and access to purchases by the state allowed.

Today, all institutions are required to implement the recommendation of serving of five fruits and vegetables a day as well as to support productive value chains taking into consideration local production, procurement and small farmers while avoiding the production and utilization of ready to eat food.

There was and still is a lot of criticism coming not only from the food industry, but also from scientists linked to the private sector. Nevertheless, the labelling law is still in place and is achieving its aims of defending and promoting health of citizens.

The law has been evaluated and recognized by the international community and bodies such as the Geneva Forum for Health, WHO and the Inter-American Heart Foundation. Recent evaluations found that implementation of the Chilean Nutritional Labelling and Advertising Law has resulted in 68 percent of people changing their eating habits and 20 percent of the industry modifying their products. Labelling has been transformed into a marketing strategy used by the same food industry that initially opposed it. A similar law has been created in Peru and Uruguay, and Mexico, Colombia and Brazil are making progress in developing similar laws.

Currently, the government is working on the possibility of applying taxes to foods with harmful levels of salt and sugar on the basis that eliminating excessive salt consumption in the Chilean population could lead to a reduction of 49 percent in annual cases of hypertension and 41 percent in cardiovascular accidents and reducing obesity could reduce prevalence of diabetes by 59 percent. Reducing both salt and sugar intake could prevent 63.7 percent of hypertension cases, 43 percent of cardiovascular incidents and 22 percent of heart attacks. The funds generated by the taxes will be used to support a public programme that gives low income people access to healthy foods. This will also help to considerably reduce the state's expenses in public health.

In addition, a law – Law of Physical Activity and Modification – has been approved that entitles children to one hour of physical activity, menus and foods without black labels and special menus according to their medical condition with the aim of promoting health and reducing obesity among children of school age.

The Chilean Nutritional Labelling and Advertising Law serves as an experience and example from which others

can learn. Latin America will be the first region to have in place such food regulations and this could put pressure on other countries or regions to work towards a healthier world.

Food cannot be the main driver of disease in the world.

Panellist presentations

Patrick Mink, Co-Chair of the Multi-stakeholder Advisory Committee of the One Planet (10YFP) Sustainable Food Systems Programme, Switzerland

Challenges within food-systems governance

Food systems are complex. They involve a multitude of actors, such as input providers, producers, processors, retailers and consumers. In addition, food systems produce a whole range of different outcomes. For many, food security and nutrition may be the most obvious. However, beyond that there are numerous socio-economic outcomes, including human health, profitability and livelihoods of food producers and other food-system actors. Food systems should also deliver beneficial environmental outcomes, such as climate-change adaptation and the provision of ecosystem services.

We often hear that our food systems are broken: more than 820 million people are suffering from hunger; obesity and diet-related NCDs are on the rise; and food systems are major drivers of biodiversity loss and GHG emissions. Rather than being broken, the problem is that current food systems were not designed to achieve all of the different types of desirable outcomes at the same time.

However, none of these desirable food-system outcomes can be achieved in the absence of the others, at least not in the longer run. Profitability, livelihoods and healthy diets all rely on a healthy natural resource base. Stability is the fourth pillar of food security. In order to ensure stable, sustained access to food, food systems and diets must become sustainable. Sustainable diets are not only healthy, but are produced within planetary boundaries, contribute towards producers' livelihoods and take into account cultural preferences. This requires a holistic, sustainable food systems approach that seeks to promote the different types of food-system outcomes simultaneously.

Tackling this complexity calls for better alignment and coordination of actions. However, in most instances, food systems are characterized by a lack of coordination among different stakeholders and among different policy areas including agriculture, health and environment.

Ways in which countries can address these challenges:

Switzerland supports the promotion of the sustainable food-systems approach at both global and national levels, including by pursuing increased stakeholder coordination and policy coherence.

What Switzerland is doing at global level

Switzerland sees global multistakeholder partnerships as important mechanisms for achieving the SDGs, including goals related to food systems. Since 2015, Switzerland is co-chairing the Sustainable Food Systems Programme of the United Nations One Planet network, together with South Africa, the World Wide Fund for Nature (WWF) and Hivos, and with the technical support of FAO, United Nations Environment and several other organizations and countries. One Planet is a global network that implements a United Nations Framework for Sustainable Consumption and Production patterns that was adopted at the Rio+20 Conference. The Sustainable Food Systems Programme and its 150 partners focus on the promotion of the sustainable food-systems approach to accelerate food-systems transformation. The Programme provides a space where countries, international organizations, research institutions, NGOs and private-sector entities can debate and work on joint solutions.

One example of such a joint output is the Collaborative Framework for Sustainable Food Systems Transformation.

The Collaborative Framework is a manual that lays out steps that governments can take to shift towards more-coherent and holistic food-systems policymaking. Its key recommendations include setting up multistakeholder processes for dialogue and action and strengthening institutional capacity for food-systems governance in the long term.

Thanks to the joint advocacy work of the One Planet Sustainable Food Systems Programme's membership, the need for a sustainable food systems approach has been increasingly recognized at the international level, including in the Ministerial Declaration of the 2018 High-level Political Forum on Sustainable Development and in the Ministerial Declaration of the 2019 United Nations Environment Assembly. Now this recognition needs to trickle down to the national and subnational levels.

What Switzerland is doing at national level

In 2018, a new Article on food security was added to the Swiss Constitution by popular vote. What is particularly interesting about this is that it links the provision of food to production and consumption patterns that are more resource-efficient and environmentally friendly. This means we now have a constitutional mandate to adopt a more holistic approach.

However, Switzerland, being a federal state where power is shared among various levels of government, currently has no centralized effort to promote sustainable food systems. Rather, efforts occur at different levels, with several cities taking leading roles. For example, Zurich will launch a sustainable food strategy in the middle of 2019, with a focus on procurement of sustainable ingredients for healthy meals in public canteens. The role of cities in promoting sustainable food systems was also emphasized by the Swiss National FAO Committee, which is a multistakeholder advisory body to our Government.

In terms of promoting multistakeholder coordination, a dialogue of national food-system actors will be carried out in the beginning of 2020. The goal of this dialogue is to identify roles and opportunities for action in order to stimulate actors to take leadership and develop context-specific solutions. It will build on a national research programme on healthy nutrition and sustainable food production that ran for 5 years and highlighted the importance of multistakeholder dialogues.

The Swiss approach towards a healthy food environment

The importance of multistakeholder coordination also finds recognition in the national action plan for the implementation of the Swiss nutrition strategy. An annual forum brings together representatives from all relevant stakeholder groups to discuss issues related to the strategy and to develop joint actions for its implementation.

Another focus area of the action plan is creating nutrition-sensitive framework conditions. Measures include efforts to reduce the content of sugar, salt and fat in food; optimizing the food offers in the public gastronomy sector; and defining targets to reduce food-related marketing targeted at children. All these measures of the action plan towards creating a healthier food environment rely on the voluntary collaboration of the food industry. For example, as a result of voluntary pledges by key food-industry actors, the sugar content of breakfast cereals was reduced by 5 percent between 2017 and 2018. There are currently no regulatory measures similar to those in Chile presented by Senator Girardi. However, the action plan does include a feasibility study regarding changes to the legal framework conditions that would allow for food labelling indicating sugar, salt and fat contents.

While the nutrition strategy has already shown some positive results, the Swiss National FAO Committee has criticized it for focusing primarily on the health dimension of diets while not sufficiently taking into account other food-system outcomes such as producers' livelihoods and impacts on the natural resource base. This shows that we still have some work to do in terms of implementing the sustainable food systems approach at national level. We will have an opportunity to address this in the next edition of the strategy, which is due in 5 years' time.

To sum up, governance of future food systems should promote diets that are both healthy and sustainable and increasingly apply the sustainable food systems approach for more holistic policymaking at national level, using inclusive formats such as multistakeholder dialogues.

Mariam Harib Sultan Al Yousuf, Executive Director of the Abu Dhabi Food Control Authority

Food-safety initiatives within Abu Dhabi Emirate towards sustaining safe and healthy food supply

Addressing the sustainability of future food systems and their ability to deliver safe and nutritious food requires the collaborative efforts of all stakeholders within and across countries.

Quoting FAO/WHO in their recent food-safety conference in Addis Ababa (February 2019) “attention needed to the safety of our diets through deploying an integrated approach that incorporates food hazards control across the entire food chain within the national and regional policies underpinned by strong political commitment and articulated multisectoral action to promote safe and diversified healthy diets.”

The Abu Dhabi Agriculture and Food Safety Authority (ADAFSA) has been intimately involved in the development of platforms that aim at sustaining and further enhancing food control activities within the Emirate and the United Arab Emirates as a whole. Since the inauguration of the Authority, its main objective has been to create a set of long-term policies and derived action plans that are aimed at changing consumer and producer behaviour and instilling international best practice, tailored to local needs and available resources.

ADAFSA has taken a systematic approach to introducing and implementing initiatives and food-safety control measures across the Emirate of Abu Dhabi. This included developing the overarching strategic plan from year 2006 onwards and adjusting the organizational structure of the Authority to ensure alignment with the Emirate’s vision for strengthening its food-safety system. The first step was to conduct a complete and comprehensive gap analysis and needs assessment of the regulatory model in agriculture, livestock and food safety. This was followed by a benchmark analysis to constructively reform the regulatory platform and a comprehensive process of mapping and re-engineering ADAFSA’s operations in order to provide excellent services to its stakeholders. This resulted in the development of a detailed set of legislation, including laws, regulations, by-laws, codes of practice and guidelines according to best international practices and tailored to the needs of the Emirate and the country as a whole. This was done through a formal and collaborative process of stakeholder consultation to ensure the buy-in and commitment of the private sector. The most important piece of legislation was Food Law No. 2.

One of the key areas that was identified as needing attention was the old conventional food control systems in the Emirate. These were restructured in line with the latest international practices to create a risk-based food-safety inspection system (RBFSIS) for both food imports and local produce. The new system was put into effect starting in 2008. The RBFSIS system focuses on inspecting and testing foods of higher risk to human health. At the same time, an incentive scheme was created for food traders that allows for fast-track procedures based on trading records and key performance indicators. This has increased the level of food-safety protection for consumers while allowing more in-depth and thorough checks of higher-risk foods.

Recognizing the importance of capacity-building for food handlers, the Authority embarked on a mandatory training and certification programme for food handlers working in food businesses within the local market (Essential Food Safety Training).

The Authority also developed a tailored food-safety management system -- for the catering sector in the Emirate; this was based on the Hazard Analysis and Critical Control Point (HACCP) system. This was accompanied by a food-safety management system called *Salamt Zadna* (“safety of our food”) targeting small and medium-sized businesses within the catering sector. The system has been used successfully throughout the United Arab Emirates.

While the HACCP-based safety system was being rolled out, the Authority started designing and implementing a self-monitoring smart system for food businesses. This is the first of its kind in the region and has helped the private sector get involved in food-safety control using smart applications, which has contributed to enhancing the performance of food businesses. The application was launched by H.H. Sheikh Mansour Bin Zayed (the Deputy Prime Minister of the United Arab Emirates, Minister of Presidential Affairs and Chairman of ADAFSA) during the Salon International de l’Alimentation (SIAL) food exhibition in 2018.

The Authority has also developed and implemented a comprehensive awareness plan aimed at helping consumers make informed choices about food and nutrition. The initial focus has been on food labels, their mandatory requirements and how to read the labels to help consumers better understand their dietary needs and to choose their foods accordingly.

The Authority also initiated studies to identify the most-highly consumed food, whether imported or locally produced, with the objective of assessing key health risks. Such studies included checks on pesticide residues in fresh produce and veterinary residues in food products from animal origin.

ADAFSA is a focal point to the International Food Safety Authorities Network and is registered with the European Union Rapid Alert System for Food and Feed (RASFF) as a non-European Union member for exchanging information related to food safety. It has also developed a procedural manual for managing RASFF at the national level. The United Arab Emirates is a member of the Gulf Cooperation Council RASFF, which aims at quickly and efficiently managing food and feed notifications through rapid exchange of information among stakeholders in the Arabian Gulf region. This prevents non-conforming products from being displayed to consumers and allows for expedited recall and withdrawal procedures. The Authority also has a robust training and capacity-building plan for its food inspectors that brings in highly qualified trainers and expertise to conduct continuous in-house technical training and coaching sessions on emerging risks and the latest knowledge in the field of food safety. ADAFSA is currently developing its Food Safety Strategic Plan.

ADAFSA works with the Abu Dhabi Department of Health on several initiatives that aim to change the lifestyle of consumers and encourage better eating habits and healthier food choices. This has been translated into key projects that were successfully implemented in the Emirate, including:

- launching the school canteens guidelines/manual along with concerned stakeholders and strategic partners in the Emirate, which came into force in 2008 and include food-safety requirements and indications of healthy food types allowed for sale/offer within Abu Dhabi schools; and
- introducing the Weqaya (“prevention”) Healthy Food program, which focuses on encouraging the provision of healthy food products by both retail and catering food businesses. The programme helps raise community awareness of healthy food choices through robust awareness campaigns and workshops on how to prepare food in a healthy manner and and by collecting data via questionnaires focusing on dietary habits and means to change behaviour. The programme includes an incentive scheme whereby businesses in compliance with Weqaya food choices (i.e. fruits and vegetables, wholegrain, fat-free or low-fat dairy products, fish, extra lean meat or poultry and beans) are entitled to place the Weqaya logo on their facilities/products.

The Abu Dhabi Department of Health works on several initiatives that contribute to reducing NCDs. Such initiatives include the Eat Right Get Active initiative operated since 2010 in cooperation with the Abu Dhabi Department of Education and Knowledge and private schools; the national programme to reduce the intake of salt and fats that has been implemented since 2015 with the Ministry of Health and WHO; and guides for cities supporting physical activities and the Child-friendly hospitals initiative.

In June 2019, the Cabinet of the United Arab Emirates approved the National Strategy for Wellbeing 2031, which is aimed at improving the quality of life in the country. The strategy has 14 components and nine strategic objectives, which include the promotion of healthy and active lifestyles, the promotion of good mental health and the adoption of positive thinking. The strategy also includes 90 supporting initiatives in 40 separate priority areas including healthy diet.

Among the initiatives is the establishment of a National Wellbeing Observatory to help policymakers of the United Arab Emirates monitor well-being indicators in the country. The Observatory submits regular reports to the Cabinet and proposes training programmes for government employees. Plans are under development to launch an academy of well-being and to form a national well-being council to manage and coordinate the national strategy.

Governance of food systems for healthy diets – Experience of Sweden

A wider perspective on food systems for sustainable healthy diets

The need to transform the way we live and eat is urgent. Our consumption of food is no longer only a matter of health, nutrition and, in some areas of the world, pleasure but also a key to achieving sustainable environmental targets. The SDGs point the direction for a more inclusive perspective on how we need to improve our societies on global, national and local levels. The overall scientific knowledge and subsequent conclusions are clear – we have enough knowledge for action and we need to start now.

In November 2017 the former United Nations Secretary-General, Kofi Annan, was interviewed by Swedish television and when asked what he believed was the most important challenge. He said, “I think today the most worrying problem I would put is climate change. Climate change is an all-encompassing threat to our health, our source of food, our source of water and if we do nothing about it we are wasting our time with all the so-called development projects and the other creative things we are doing. It is extremely important that we pay attention to that.”

Swedish sustainable dietary guidelines

Sweden, including the Swedish Food Agency is actively working towards achieving the 17 SDGs in the Agenda 2030. Sweden was among the first countries in the world to integrate environmental aspects in the national dietary guidelines, doing so in 2015. The national guidelines, *Find your way to eat greener, not too much and be active* (Swedish Food Agency, 2017), include ten steps to healthy and environmentally friendly eating. These steps are based on scientific reports and articles and address (a) diet-associated health; (b) dietary patterns in Sweden; (c) risks and harmful substances in food; and (d) environmental impact of food consumption and production. In the process of writing *Find your way*, it became clear that most nutritional advice was in good agreement with efforts to reduce human impact on the environment, e.g. climate and biological diversity. The guidelines are developed in a transparent procedure according to the *Codex Alimentarius Working Principles for Risk Analysis for Food Safety for Application by Governments* (Codex Alimentarius, 2007), including workshops, meetings and public consultations on guidelines with representatives from other authorities, industry associations, researchers and consumer organizations. Most importantly, both the scientific background reports as well as the risk/benefit management reports are documented and transparently published on the Swedish Food Agency’s web page.

The Swedish Food Agency is commissioned by the government to inform consumers, companies and other interested parties regarding current rules and regulations, dietary guidelines and other important issues in the food area. The Agency is also tasked with promoting the ability of consumers, and particularly children and adolescents, to make conscious decisions regarding healthy and safe foods. Thus, one of the Swedish Food Agency’s main tasks is to promote sustainable healthy dietary habits in the population. As part of this work, the Agency publishes dietary guidelines, both in the shape of specific recommendations for different groups, for example infants, toddlers, pregnant women and breastfeeding women, and as general recommendations aimed for the general population. The most important scientific basis for the nutritional dietary part in the guidelines is the *Nordic Nutritional Recommendations 2012* (Nordic Council of Ministers, 2014).

Since the 1980s, the Nordic Council of Ministers has supported the development and revision of the Nordic Nutritional Recommendations (NNR), which is a scientific base for dietary guidelines and other initiatives to promote healthy eating. NNR are written by leading scientists and experts from the Nordic countries, who review and summarize scientific studies about how nutrients, foods and dietary habits impact our health. The nutritional aspects have been in focus for the nutritional part of the revision, but also toxicological aspects are considered, where relevant. The next revision of NNR has started and will have an extended part addressing climate and environmental aspects of food consumption and production.

At the Swedish national level, the overall goal of the Swedish environmental policy is to hand over to the

next generation a society in which the major environmental problems have been solved, without increasing environmental and health problems outside the borders of Sweden. This is the generational goal, which serves to guide environmental action in Sweden. It has been adopted by the Swedish parliament, along with 16 environmental quality objectives covering different areas. These goals are a promise to future generations of clean air, a healthy living environment and rich opportunities to enjoy nature. To achieve the environmental objectives, everyone has to play their part – public agencies, business communities, stakeholder organizations and, not least, each of us as individuals. The Swedish Food Agency is one of 25 national agencies that have a special responsibility for the environmental objectives. The food sector affects all these objectives to a greater or lesser extent, but some are particularly relevant and it is mainly on these that the Swedish Food Agency bases its description of the environmental impact of different foods. Since a quarter of the household impact on the climate is caused by food production/consumption, the environmental quality objective, Reduced Climate Impact, is one of these. Other objectives are A Non-Toxic Environment, Zero Eutrophication, A Balanced Marine Environment, Flourishing Coastal Areas and Archipelagos, A Varied Agricultural Landscape and A Rich Diversity of Plant and Animal Life.

In 2015, the Swedish Food Agency integrated the impact of food production and consumption on environment into the new dietary guidelines, to point to dietary habits that are sustainable, both for the individual and for our planet. Similar to the nutritional part of the guidelines, the environmental part requested a number of scientifically based reports, which form the basis for the description of the environmental impact of various foods. Thus, the information in the area of environmental impact of food consumption and production is based on existing research and knowledge of national and international analyses of environmental systems and life cycles, in order to give a comprehensive overview of the environmental impact of various foods. Due to changes in production systems and new knowledge in this area, the information needs to be constantly updated.

National initiatives are in place to meet SDG target 12.3 of halving per capita global food waste at retail and consumer levels by 2030. Food waste partnerships and networks hold all stakeholders accountable and set ambitious targets. Civil society has played a significant role in putting food waste on the political agenda. The Swedish Food Agency collaborates with the Environmental Protection Agency and the Swedish Board of Agriculture to reduce food waste. This work has been done in parallel with the creation of new sustainable dietary advice.

The infrastructure for promoting sustainable dietary patterns is well developed in Sweden. We have universal health care, universal nutritious school meals and a strong trust in national agencies through which the sustainable dietary guidelines are communicated. Nevertheless, in Sweden, as in many other countries with similar welfare status, diet is one of the biggest risks for disease and premature death (WHO, Global Burden of Disease). However, the growing socio-economic differences in health and the environmental perspective on food consumption and production have contributed to a more systemic discussion on how to change food habits.

The national food strategy for Sweden (Government Offices of Sweden, 2017) aims to create more jobs and sustainable growth throughout the country. The overall objective of the food strategy is a competitive food supply chain that increases overall food production while achieving relevant national environmental objectives, aiming to generate growth and employment and contribute to sustainable development throughout the country. The strategy is also set out to create greater opportunities for consumers to make informed choices. The strategy also sets objectives for three strategic areas – rules and regulation, consumers and markets, and knowledge and innovation. Successful implementation of the strategy requires commitment and input from companies, organizations and stakeholders throughout the entire food supply chain.

Food is not only about nutrition or climate or local produce. It is about being human and it affects our whole society. Sustainable food systems are not feasible without collaboration on all levels. When done properly, a sustainable food system offers an integrated way to address some of the major global challenges we face. To decrease the negative effects on environment and health, the food consumption in Sweden needs to shift to:

- less meat
- more vegetables, pulses, fruits and berries
- halve food waste.

To achieve this change, the food system needs to transform. Sustainable choices need to be affordable and easily available for everybody. We need to make the sustainable choice the easiest choice.

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Visith Chavasit, Professor, Institute of Nutrition, Mahidol University, Thailand

Governance of food systems for healthy diets – Experience of Thailand¹

Thailand has been successful in the alleviation of maternal and child undernutrition since the 1980s by using a community-based approach in combination with sustainable economic growth. The country is expecting to reach the United Nations SDGs with regard to food, nutrition and health before 2030. However, overweight, obesity and NCDs have increased since 1995 and have become the nation's new major public health problem. Due to rapid improvements in the logistic system and growth in agro-industry, most Thais can easily acquire foods at affordable prices. As a result of urbanization and changing lifestyles, food consumption, particularly nutrient profiles, are becoming more like those of developed country, with protein and fat accounting for more than 15 percent and 30 percent of energy intake, respectively. Moreover, animal protein is increasingly accessible and affordable to all classes in the country.

The government has established a National Food Committee involving all stakeholders within the food system to act as a think tank on developing a sustainable food system. Building on the linkages between agriculture, food, nutrition and health, with concerns for both production and distribution environments, is the key strategy for supplying enough safe, high-quality and nutritious foods for local consumption and exportation in a sustainable way.

Inefficient control of the agricultural sector is the main cause of the country's environmental deterioration problem and chemical hazards in foods. Deforestation, burning of agricultural fields and shifting cultivation are still sporadically practised for feed-crop cultivation, especially maize for the local feed industries. Every year, smoke from burning fields in preparation of cultivation causes health problems for the local people and damages the tourism industry. However, a reforestation policy is being gradually implemented to balance the country's food system. This community-forest-based strategy allows people to conserve the forest and also live within its natural habitat. The community forest provides food and nutrition security to the community as well as maintaining the biodiversity of the environment. However, the nation's cropland has also been encroached upon by urbanization and by plantations that cultivate non-food items, such as palm, rubber and eucalyptus. A government policy on agricultural zoning is being implemented to minimize problems in the production sector.

¹ Presentation is based on a paper developed by Visith Chavasit and Kraisd Tontisirin, Chairman of the University Council, Mahidol University at Salaya, Nakhonpathom 73170, Thailand.

Chemical hazards within the food system are mainly linked with imports of plant and animal drugs, fertilizers and animal feed, which are often untraceable and uncontrollable. These hazards harm consumers, farmers and the ecosystem. Increasing occurrence of cancer and drug-resistant microorganisms are partly the consequences of these imported hazards.

Thailand has realized that commercial monocrop agriculture, either for food or feed, may not be the answer for the country's sustainable food and nutrition security. The new agriculture theory of the late King Rama IX² has been adopted as a significant part of the country's strategy and it has proven to benefit food and nutrition security at the community level and to have a positive impact on biodiversity within the ecosystem. The principle has been adapted and widely practised by different types of farmers and for agriculture of varying scales. Good agricultural practices are being considered as a mandatory measure in this system. Meanwhile, the education of stakeholders and strict law enforcement must be urgently undertaken. The Codex Alimentarius guideline on the national food control system (Codex Alimentarius, 2013) has been reviewed and proposed to the government in order to efficiently manage the country's food system, which finally may lead to the re-engineering of the country's food control system.

Thailand recognizes that an efficient food control system should be based on a multistakeholder approach. An example of this approach is the elimination of trans-fatty acids from foods in Thailand by banning the use of partially hydrogenated oils (PHOs). This success was achieved through joint management of the public, private, professional and people (5 Ps) sectors. As an upstream food-system management component, this programme has clearly shown consequences for food safety within the mid- and downstream of the system.

Results of a study on the national food control system showed that engagement in food exportation has benefited consumers in Thailand as a result of the need to meet international standards for food safety. In addition, most local food-service providers have been trained in food safety and are monitored by the Ministry of Public Health and local authorities. Improvements in food-industry sanitation have also been significant. The key success factors for managing the mid-stream food system (logistics, processing and wholesaling) in Thailand are education and decentralization. Such success is also found to benefit the tourism industry.

While industrial foods are growing in popularity, they only contribute about 20 percent to the Thai diet. The other 80 percent comes from home cooking, street-food vendors and restaurants. Traditional markets are still the major source of fresh foods at affordable prices for most Thais. Street foods have increased in importance in the Thai diet as a result of urbanization. In terms of nutrition, most Thai-style street foods provide adequate energy and have better-balanced macronutrient profiles than street foods in other cultures. Unfortunately, however, sodium and saturated fatty acids contents of traditional Thai-style street foods exceed FAO/WHO recommendations, due to traditional culinary tastes and the local availability of tropical oils, respectively. Food safety is still a major concern for street foods, especially when such foods are promoted for tourism. Local authorities, with the support of a mobile laboratory provided by the Thai Food and Drug Administration, can monitor the safety of street foods at the subdistrict level. Chemical and microbial hazards can be routinely tested by using test kits and the results used to guide further risk evaluation and to design appropriate training protocols on food safety.

The quality and safety of street-food services are also being improved via franchising, with certain successful individual street-food vendors establishing street-food franchises. Preparing the main ingredients in central kitchens allows better control of chemical and microbial hazards.

Food courts are another innovation that is improving distribution of safe street foods at affordable prices. Gathering different types of street food in a food court allows dishes, silverware and even garbage to be properly and economically managed for good sanitation and environmental friendliness. However, authentic style street

foods that are cooked and served on the street are still widely available and are the most acceptable and affordable sources of nutrients for urban Thais.

Efficient food education and an enabling food environment are the main strategies that the Government of

² This aims for household food security and biodiversity and recommends an average holding size of 2.4 hectares, including the house, a pond, rice field and area for horticultural crops.

Thailand is using in the retail and consumer sectors to prevent emerging overnutrition problems. Food industries are being persuaded to voluntarily adjust their products' nutrient profiles towards established nutrition criteria. Products with a healthier nutrient profile carry a logo on the front of their packaging, which is helping educate consumers about healthy food choices. Some nationwide franchise restaurants and hospitals have adopted a similar food-labelling system.

In conclusion, a multistakeholder approach is a necessary strategy to develop good governance for a food system aimed at creating healthy diets in Thailand. At the production level, the new agriculture theory should be implemented as widely as possible to improve food and nutrition security at the household level. The mid-stream elements of the food system have systematically implemented food-safety measures and safety issues are for the most part under control. The food environment for safe and nutritious foods needs to be further developed via an efficient national food control system and consumer education, which must address the whole food system, from farm to fork.

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Stefano Prato, Managing Director and Editor, Society for International Development

When we talk about the future of food, it is my assumption that we are not talking about the predictions of what it will be, because those are somehow discouraging, rather we are talking about the kind of food system we would like to build. Based on that assumption, I would like to add the following notions:

1. We need to clarify what we mean by diets and in particular to go beyond the framing of diets as an individual's choice only. Diets are collective notions, they are socio-culturally rooted and they express the social contract within a society between producers, consumers and transformers, between economy and ecology and between present and future generations. This collective understanding of diets is very often missed in the focus on the individual choices of consumers in today's dietary discussions.

We can only change food systems if we act collectively. Therefore, we need to think about policy interventions for restoring that collective notion of diet rather than pushing for individual dietary choices. This leads to three related points. First, the key transformational entry point is a process that enables actors within the food systems to reconnect; hence, we must focus on how we can connect producers with consumers, health workers with food planners and so forth. The element of reconnection is fundamental if we want to redesign diets. Second, we need to contextualize and seek solutions for the labelling issue. The Chilean experience is a great example of systemic intervention because it operates at so many different levels. However, it is very often referred to in international circles as a labelling intervention, which is very reductive. Labelling is important but very often misses the point because it tends to focus only on the industrial food system. It is fundamental but only if we use it in a systematic intervention that enables reconnection among the various actors within the food system. Otherwise, it presupposes the fact that we accept the inevitability of a food system centred on industrial products. Third, we need to go beyond the health dimension of diet and consider socio-economic and ecological footprints of food.

2. If we want to rethink governance to ensure the notion of diet as collective public good, we really need to transform our governance system. We are not going to do this with the same people, same concepts and same policies that have created the problem in the first place. If we want to be as transformative as we claim, then we need to transform the system. To do so requires three things to be put in place. First, we need the proper actors to be part of this conversation; where are the small-scale producers, where are the younger generations? These actors need to be at the core of the redesign process. At the same time it is important to recognize that some other actors should be excluded from the process because of their conflict of interest. Second, we need to redesign institutions. We are faced with health, economic, ecological and food challenges. Right now, we are building *ex post* coherence among policies designed in silos following separate planning processes. What we need to do is shift to *ex ante* coherence. Third, we need to have a new source of evidence on which to base policymaking in the food and nutrition sector. Currently, there is a lot of bias in the available evidence because much of it has been generated through processes funded by those with vested interests.

To conclude, if we look at diets as collective notions and if we rethink the mix of people, institutions and evidence that supports a new approach to governance as an ecosystem, we can redesign food systems. At the same time, we need to be aware that the push for dematerialization, digitalization and financialization is somehow shifting the locus of decisions from our traditional governance and that is a danger that we need to address.

Erik Wijkström, World Trade Organization (WTO) Counsellor in the WTO Division on Trade and Environment

This presentation addressed three issues: what types of nutrition-related policies are discussed in the trade arena, where and how they arise, and why they are discussed at the World Trade Organization (WTO).

Regarding the "what," the mandatory warning label on fat, sugar and salt content in Chile is a frequently mentioned example of a nutritional labelling scheme. Other labelling issues discussed at the WTO include those relating to tobacco and alcoholic products and certain types of food, including, for example, energy drinks and snack foods.

Not all nutrition-related regulations are about labelling; consider, for example, product reformulation.

On the “where and how,” nutrition and food are matters discussed in the WTO Committee on Technical Barriers to Trade, while food-safety issues are discussed in the WTO Committee on Sanitary and Phytosanitary Measures.

The “why” is often more complicated. One clear trend is an increase in discussions on the regulation of NCDs, which are often relevant to tobacco, alcohol and food. Because there is often a multiplicity of sometimes conflicting approaches across countries, regulatory cooperation is important as it helps bridge differences between approaches, promoting alignment and reducing unnecessary divergences (WTO & OECD, 2019). Governments have the right to regulate, but when they do, sometimes there is an effect on trade, which can cause tension. At what point is a labelling requirement too restrictive? What are the relevant international standards? Has there been enough transparency in the process? Often discussions at the WTO are about clarification, and tensions are diffused through dialogue.

In concluding, there are two main issues with respect to governance.

First, if a chosen health policy is proportional to the public health risk at issue, and if it can make at least some meaningful contribution to addressing that risk, it is unlikely that such policy would fall foul of WTO trade rules (if applied in a transparent and non-discriminatory manner), especially when such policies are based on international standards. This is relatively simple to adhere to: why would a measure aimed at conveying nutritional information on a label be required only of foreign producers and not also of domestic producers?

Second, it is important that the health community is informed about trade issues. It is important that trade rules are not used as an excuse for inaction. Perhaps counterintuitively, more knowledge about trade might help disarm arguments made that it is not possible to undertake measures that impact on trade. The WTO rules on health leave much flexibility for governments in the pursuit of health policy.

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Panel 3:

Building consumer confidence in food systems

Introduction

Climate change, population growth, technological advances, globalization of food value chains and trade liberalization have been important drivers for changes in the nature of and demands on food systems observed during the last decade (Popkin, 2014; HLPE, 2017; Swinburn *et al*, 2019). The impact of the private sector, in particular large-scale international food and agri-businesses and retailers, on food systems and diets has steadily grown. Rapid urbanization, income growth and changing lifestyles have played a major role in shifting dietary patterns (WHO, 2003; Pingali, 2015; HLPE, 2017).

Most consumers are reliant on a range of actors within food systems. Given the complexity of food systems, there are many opportunities for things to go wrong, which may result in trust in the food systems being broken (Wilson *et al.*, 2017). A consequence of this complexity has been an increase in food incidents, which can be defined as “any situation within the food supply chain where there is a risk or potential risk of illness or confirmed illness or injury associated with the consumption of a food or foods” (Wilson *et al.*, 2017).

The growing gap between the points of production and consumption has led to a decline in consumer trust in food and a desire for increased regulation (Meyer *et al.*, 2012). As people lose their connection with farmers, they lose the valuable relationships that offer a connection to their food. Without those relationships, few opportunities are left for farmers to demonstrate first-hand how they produce food responsibly and thus facilitate trust (Reese, 2012). The distance between food producers and consumers and risk of miscommunication on packaged food products have increased greatly. Many foods that are sold in (super)markets are unfamiliar to a large number of shoppers. There is a need to inform consumers about the true quantity and quality of the product and to prevent deceptive sales practices in all regions of the world (FAO, 2016).

Consumers’ embeddedness, or lack thereof, in food production affects their trust in food. Increasing local food production and consumption may increase consumer trust in food and decrease consumer dependence on government regulation (Meyer *et al.*, 2012). To gain the consumer’s trust when it comes to food, it is essential to know what consumers think about the various institutions in the food systems, what their perceptions of agriculture and food are. Consumer trust is driven more by confidence (i.e. shared values and ethics) than by competence (i.e. skill and expertise) (Reese, 2012; The Centre for Food Integrity). New models of public engagements that build and maintain public trust must be developed. The aim is for food-system practices to be ethically grounded, scientifically verified, economically viable and clearly communicated (Arnot *et al.*, 2016).

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Keynote address

Marion Nestle, Paulette Goddard Professor of Nutrition, Food Studies and Public Health at New York University and author of *Food Politics*

The premise of this symposium is that the future of food depends on food systems that are sustainable, publicly supported and efficiently governed, nationally and globally. Today, the food systems of most countries appear seriously unsustainable and badly broken. One consequence of broken food systems is the lack of public confidence in the companies that produce foods, and in the ability of governments to ensure a safe, reliable and trustworthy food supply. As a public health nutritionist, my concern here is how lack of trust in government threatens democracy. If trust in the food supply is essential for democratic societies, then it is essential for food companies to build trust in their motives and values, as well as in their products.

I am most familiar with the situation in the United States of America, but this surely has relevance for global food systems as well. In the United States of America, lack of consumer confidence in information about food, nutrition and health is reported widely and often. In 2018, a group sponsored by food trade associations, the Centre for Food Integrity, surveyed consumer attitudes towards the food supply of the United States of America. The findings were dismal. Only one-quarter of Americans has confidence in the food system. Food companies rank last in consumer trust, and the larger the company the less it is trusted (CFI, 2018). Agriculture groups note a compelling need to counter the public's lack of trust in today's food system (Brandon, 2015).

Countering distrust in the food industry poses challenges. Public health academics who have examined such challenges argue that building or restoring trust in food systems requires companies to be transparent, credible and consistent; to put consumers first; and to keep promises (Wilson *et al.*, 2017). Recommendations like these make sense in theory, but less so in practice. The food industry can only follow advice like this if it contributes to product sales. Food and agriculture companies are not social service or public health agencies; they are businesses with stockholders to support. The primary function of food companies may appear to be feeding the world but is actually to produce returns on investment. No matter how much food-company executives might personally want to promote sustainable food systems, they cannot if doing so increases the cost of their products or reduces profits. Food companies are under intense pressure – from advocates who want them to promote health and sustainability, from regulators who want to tax unhealthy and unsustainable products, from lawyers who file lawsuits to force them to put health and sustainability first and, most of all, from Wall Street, which insists that companies report growth in profits every quarter. Companies have reacted to such pressures in stages, first by ignoring the pressures, then by denying responsibility for the contribution of their products to obesity or environmental damage, later by attempting to produce healthier products and finally by fighting back (Simon, 2006). The hypocrisy of Big Food and Big Agriculture in publicly promoting health and sustainability while fighting back behind the scenes is a principal reason for their loss of consumer confidence.

Big Food refers to the handful of multinational companies that produce most of the ultra-processed drinks and snacks increasingly associated with poor health (Hoffman, 2013; Schnabel *et al.*, 2019). Big Agriculture refers to the increasingly consolidated multinational companies producing seeds and agrochemicals (Howard, 2018). The influence of these entities on food choices is not always apparent. Lists of influences on food choice typically

mention biological, economic, physical, social, psychological and personal determinants but omit food-industry marketing, as if the vast amount of money spent on marketing had nothing to do with what people eat (Eufic, 2006). If we want food systems to be healthier and more sustainable, we need to refocus our discussion on how the food industry influences food choice.

Why this refocus is necessary is best illustrated by the three most important public health nutrition problems facing today's world: undernutrition and its consequent hunger, malnutrition and food insecurity; overnutrition leading to obesity and NCDs; and the environmental impact of current food production and consumption systems – environmental damage, climate change and waste. The need for a closer focus on food-industry practices is also illustrated by the SDGs, every one of which links to food systems (Amiot-Carlin, 2017). If food systems are to inspire public confidence, they must prevent undernutrition and NCDs, protect the environment and promote the SDGs.

However, the food industry's approach to the SDGs is to view them as a business opportunity. The World Business Council for Sustainable Development, for example, describes the SDGs as an "opportunity for businesses to engage more deeply as a strong and positive influence on society" (WBCSD, 2016). Business, the Council says, has a self-interest in the SDGs in offering new growth opportunities, encouraging governments to give businesses a "strong licence to operate," avoiding regulatory risk and, most importantly for this present discussion, regaining public trust (WBCSD, 2017). As Eisenstein (2014) put it, health and sustainability do not make business sense. If companies are sincere about such goals, "considerations such as 'what do you really care about' and 'who do you serve' should be drivers of sustainability, not profit."

In today's global economy, profit must be the food industry's primary reason for existence. That is why food companies follow the tobacco industry's playbook when they publicly promote commitments to health and sustainability while doing all they can to protect product sales and avoid regulation. Like the tobacco industry, the food industry casts doubt on unfavourable science, blames personal responsibility, urges self-regulation, funds favourable science, creates front groups, demands a voice in public policy, lobbies and litigates (Brownell and Warner, 2009).

I have written about the food industry's behind-the-scenes actions in several of my books, most notably *Food politics* (Nestle, 2013), *Soda Politics* (Nestle, 2015) and, most recently, *Unsavory truth* (Nestle, 2018). In *Soda politics*, I described how the beverage industry opposed New York City's proposal to set a cap on the size of sugar-sweetened beverages. In 2012, the American Beverage Association placed advertisements (e.g. in the *New York Times* of 1 June 2012) attacking the science linking sugary drinks to poor health: "Are soda and sugar-sweetened beverages driving obesity? Not according to the facts." In this industry's interpretation of the facts, sugar-sweetened beverages are trivial contributors to sugars in American diets. The beverage industry's ultimately successful campaign against the soda cap must have involved a fortune spent on massive advertising on social media, airplanes, cinemas and trucks; grass roots petitions; lobbying; promises of gifts to the city; and, eventually, lawsuits. In that book, I also describe how the beverage industry opposes soda taxes, spending upward of USD 14 million a year on such efforts (CSPI, 2016).

As I detail in *Unsavory truth*, the Coca-Cola Company invested tens of millions of dollars in research to demonstrate that health risks of sugars and sugary drinks are overstated, that research linking sodas to obesity or type 2 diabetes is so poorly conducted that it can be ignored, and that lack of physical activity is more important than diet in causing obesity. On Coca-Cola's Transparency website, the company states that from 2010 to 2018 it spent more than USD 146 million on "well-being related scientific research, partnership and health professional activities" (Coca-Cola Company, 2019).

In *Unsavory truth*, I also review evidence that industry-funded research almost invariably produces results that favour the sponsor's interests. One example: investigators asked whether industry funding had anything to do with the outcome of studies of consumption of sugary beverages and the risk of obesity and type 2 diabetes. They identified 60 studies examining this association. Of these studies, 26 found no association, of which 25 were industry-funded. In contrast, of 34 studies that did find sugary beverages linked to obesity and type 2 diabetes, only one was industry-funded (Schillinger *et al.*, 2016). This tendency for outcomes of industry-funded research to favour the interests of sponsors has its own name: the funding effect (Krimsky, 2003).

Funding effects have been thoroughly established through studies of the tobacco, chemical and pharmaceutical drug industries. In contrast, research on the effects of industry funding on food and nutrition research is in its infancy. In researching *Unsavoury truth*, I was able to identify only 11 studies of funding effects that appeared between 2003 and 2018 (two more have appeared more recently: Pollan, 2008; DHHS and USDA, 2015). Although these few studies varied in the foods examined, methods of analysis, health effects measured and outcomes, they permit some general conclusions. As expected, industry-funded studies favour the sponsor's products, skew the research question and put a positive spin on results. Sponsorship can bias studies at every stage of the research process, but biases typically appear most prominently in the development of the research question (Dietary Guidelines Advisory Committee, 2015). It is one thing to ask how a food benefits health, but quite another to ask how it might affect health. Industry-funded studies tend to focus on benefits that can be used in marketing. As a result, industry funding is a primary reason for public distrust of nutrition research (Moon, 2019).

The food industry's opposition to public health measures and influence on science is especially unfortunate because the principles of healthful diets are well established. As the 2019 EAT-Lancet report demonstrated, diets that meet these principles serve all four purposes: at one and the same time, they prevent food insecurity and NCDs, protect the environment and promote the SDGs (Willett *et al.*, 2019). These fundamental principles are so easy to summarize that the journalist Michael Pollan can do so in just seven words: "Eat food. Not too much. Mostly plants" (Pollan, 2008). However, such advice poses a major problem for the food industry. If the public followed such advice, the makers of ultra-processed junk foods would go out of business.

The Dietary guidelines for Americans promote these same principles (DHHS and USDA, 2015). They, however, deliberately do not support the SDGs. Although the committee reviewing the research basis of the 2015 Dietary Guidelines stated that "A diet higher in plant-based foods ... and lower in calories and animal-based foods is more health promoting and associated with less environmental impact than is the current US diet" (Dietary Guidelines Advisory Committee, 2015), food-industry pressures ensured that the final guideline document did not mention the word sustainability. It is unlikely that the 2020 Dietary Guidelines will mention it either, an absence considered a victory for special interests – the meat, dairy, beverage, and processed food industries (Moon, 2019).

The need to curb the actions of special interests is one focus of a second 2019 Lancet report, this one on the global syndemic of obesity, undernutrition and climate change (Swinburn *et al.*, 2019). What this report terms "triple duty" policies aim to address all those problems at once. One such policy is to restrict commercial interests. The report suggests multiple options for achieving this goal, such as eliminating subsidies and tax breaks, requiring companies to pay costs that are not externalized, preventing them from opposing public health measures or engaging in public policy, requiring greater transparency in conflicts of interest and political donations, strengthening freedom-of-information laws and holding companies accountable for actions counter to public health. Such measures would go a long way towards building or rebuilding public confidence.

The global syndemic report also emphasizes the need to strengthen civil society's role in pressing for such changes. This too will be challenging. To cite just one example, the American Society for Nutrition, an organization of doctoral level researchers and clinicians, was so concerned about the trust issue that it appointed a commission to recommend ways to maintain confidence in nutrition science. The commission, however, could not come to agreement about how to deal with the association's financial ties to food companies. It offered two possible options: either do not partner with food companies at all or develop "a rigorous, transparent approach" to such partnerships (Garza *et al.*, 2019). To date, the association has not taken a position on these options.

At this point, we can ask: Can the global food industry overcome public distrust of food systems (Goldberg, 2018)? It can, if it puts public health first. To be trustworthy, food companies must be transparent, credible and consistent; keep promises; stay out of public policy; and stop fighting public health initiatives. To be perceived as credible, the food industry must be credible, and the sooner the better.

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Panellist presentations

Tim Lobstein, Director of Policy, World Obesity Federation

An unregulated, free-market relationship between a seller and a buyer of goods and services depends on *caveat emptor* or buyer beware. The interests of the two parties are different: the seller is aiming to maximize profit and the buyer to minimize cost, the seller to cut the costs of production, the buyer to maximize the value of the purchase. It is inevitable that each party's trust in the contract between them is mixed with the purchaser's suspicion of the quality and quantity of the goods supplied. In recognition of this distrust, some of the earliest laws in the food sector concern the supply of accurate weights – e.g. the weights of loaves of bread – and descriptions of the product to minimize the risk of adulteration. These laws were strictly enforced, with state authority inspection schemes and tough penalties for suppliers who tried to cheat the consumer.

The nature of the consumer has changed as food supply chains have lengthened. Whereas once a producer – say a smallholder farmer – grew surplus crops and took this surplus to a local market, where it was sold directly to a consumer who was buying the produce for his or her household. At the end of the day, anything the consumers had rejected was a clear message to the producer: the price was wrong, the quantity too high, the quality inferior. The competitive local market encouraged the supplier to make adjustments to match demand, to give the consumer what he or she wanted. It was reasonable to state that the producer could sell only what the consumer wanted to buy and that the consumer is king.

With a long food supply chain and the production of complex foods, particularly ultra-processed foods, the situation is radically different in at least two specific ways. At each link in the chain from farmer to wholesaler, to processor, to packager, to manufacturer or transporter, to formulator and blender, to retailer or caterer and eventually to shopper there is a seller and a buyer, a producer and a consumer, and the consumer at one stage becomes the producer at the next. There is a long distance between the first producer and the final consumer. The consumers' needs for nutritious, health-promoting foodstuffs is easily lost among the other criteria that dominate a long chain; these include the need for reliability of production (selective breeding, agrochemical stimulation), long shelf life and durability (including unripe harvesting, freezing, dehydrating and chemically preserving), stability during transport (selective breeding again, gassing, packaging), uniformity of ingredients (refining of starches, oils, sugars) and a high level of mechanized handling. In the early and middle stages of these chains there is little or no consideration of the nutritional quality of the food. And with some ultra-processed foods, such as diet drinks, there is little or no nutritious content at all, but the purchase of those products reduces the consumer's budget to buy another, more nutritious item.

The food and beverage industries can be congratulated for remarkable achievements in making their products very cheap and available, but these achievements now threaten global health. Capital investment in the creation of transport infrastructure, mechanized agriculture and highly automated processing and packaging of foods has replaced a large portion of smallholder-based local production in most high-income countries and is rapidly expanding in lower-income countries. Capitalization creates pressure for cost-efficiencies, and these are best realized through mechanized production of ultra-processed food and beverages that use standardized forms of basic commodities – starches, sugars, fats and oils – enhanced with attractive ingredients, flavourings and colourings that make them irresistible and foster the overconsumption that drives obesity rates. These cost-efficient processes are imposed on the supply chain by the drive for returns on investment and the willingness of banks and investors to fund this process, especially where markets benefit from government protection or market support mechanisms. Market support mechanisms can therefore impede or enhance adjustments, offering us an opportunity to change the flow of capital investment. We must note though the historic, embedded investments that shape supply: investments in crop varieties and livestock breeds, investments in equipment and investments in supply chains.

The drive for efficiencies in the supply chain encourages the production of ultra-processed products as these are generally cheap to produce and have a long shelf life compared with fresh and perishable foods. As the markets mature, the supply chain becomes dominated by ultra-processed foods; to maintain their competitive advantage, the manufacturers and caterers have to invest in brand promotion. They need to build brand loyalty and repeat purchase if they are to maintain competitive advantage and maximize revenue and profits. Brand promotion is the key: it provides the essential link between the products of a competitive food supply chain and the creation of consumer demand for these products. The imposition of restrictions on brand promotion, such as restricting claims on packaging or setting limits to advertising for less-healthy foods on children's television, is not surprisingly strongly resisted by manufacturers.

While most industries do not wish to cause ill health to the consumers of their products, there is a particular problem for the food industry: the underlying drive to encourage consumers to purchase more of their products. The idea that, to combat obesity, consumers should eat less, and especially eat less of the highly promoted, profitable ultra-processed products, is not a welcome message to the industry – not to individual companies striving to increase their market share nor to the sector as a whole, which benefits from institutional investment. For obesity, particularly, the reverse is true: average bodyweight in the United States of America, the United Kingdom of Great Britain and Northern Ireland and Australia has risen by around 10 kg in less than 40 years, about 15 percent since the early 1980s. To keep that extra weight warm and move it around requires more calories than were needed in the 1980s. Excess bodyweight means extra demand for food, assuming physical activity levels have not changed much. The food industry has a physical, physiological and indeed very visible investment in promoting increased consumption and the earlier it can increase bodyweight the greater the return over the lifetime of the individual.

The arguments put forward here lead us to a call for greater accountability and regulation. We already have this in the case of food safety: a high level of investment and inspection goes into ensuring that food poisoning is now relatively rare and food contamination is recognized relatively quickly in well-developed food chains. Traceability and stiff penalties are the rule, and the principle is accepted across the industry as a means to maintaining consumer trust. However, in the case of nutritional quality there is little or no requirement for investment or inspection. Even in the case of products making nutritional claims, inspections are only intermittent and penalties are insignificant. If consumers are to gain trust in the nutritional quality of foods and beverages, a much tougher regime is needed, one that requires (i) nutritional quality standards, set by authorities without conflicted interests – we have examples being tried in Public Health England's approach to reformulation; (ii) monitoring of foods and food environments – we have examples from the International Network for Food and Obesity/Non-communicable Diseases Research, Monitoring and Action Support (INFORMAS) protocols for monitoring food environments; (iii) meaningful enforcement – trust is built on justice being seen to be done; and (iv) achieving a global consensus on these approaches, so that food and beverage companies do not exploit individual country weakness in enforcement.

It follows that a strengthening of good governance is required, overseeing the food industry at global level. It is encouraging to see Codex Alimentarius attempting to tackle the issue of front-of-pack nutrition labelling at its

meeting in May 2019 in Ottawa. Civil-society organizations at the meeting were outspoken in their support for strong measures that would help to build consumer trust. Front-of-pack labelling is an interesting test: if it is clear and consumer-friendly it benefits the consumer by providing information and by encouraging manufacturers to improve their products. It also shows that the producer is willing to disclose the nature of the product, increasing trust in the producer. No secrets, no lies. Opposition by industry representatives to the introduction of clear front-of-pack labelling implies they have something to hide, that their commercial secrets matter more to them than consumer health, which immediately creates consumer distrust. Codex Alimentarius has been working on this issue for two years, and presumably there will be several more years before agreement is reached.

Meanwhile there have been several calls from CSOs for a multilateral intervention at the highest level, namely a treaty or framework convention of the sort seen for controlling the marketing of tobacco products. In 2014, Consumers International joined with World Obesity to propose a Global Convention to Protect and Promote Healthy Diets, focusing on protecting what was already nutritious (including breast milk and fresh and perishable foods) and promoting what needed to be more nutritious through a variety of market measures. In 2019, the Lancet Commission on the Global Syndemic of Obesity, Undernutrition and Climate Change proposed a Framework Convention on Food Systems, bringing the issues of sustainable production and environmental degradation as well as human health into a single framework.

The contractual relationship between producer and consumer is one where both parties need each other's business but have potential difficulties in trusting each other. Trust can be built by agreeing rules and having these rules overseen and enforced by a trusted authority. Good regulation means good health.

Simona Castaldi, Barilla Center for Food & Nutrition Foundation, and Department of Environmental, Biological, and Pharmaceutical Sciences and Technologies (DiSTABiF), Università Degli Studi Della Campania Luigi Vanvitelli, Caserta, Italy

How to involve and engage citizens in healthy and sustainable diets

The fundamental link between health and sustainability in food systems

Food provisioning is a key ecosystem service that nature offers to humankind. Agriculture depends on other important ecosystem services, such as clean water, fertile soil, pollination and biodiversity, yet puts considerable pressure on the environment. This pressure has increased dramatically in the last two centuries (Willett *et al.* 2019) and is predicted to exceed the global biophysical limits within which humanity should operate to ensure a stable and resilient earth system (Rockström *et al.*, 2009) in the next 30 years (Poore and Nemecek, 2018; Willett *et al.*, 2019).

Undernutrition is still a major problem in many areas of the globe, commonly as a result of limited availability of agronomic technologies needed to increase crop yields. In these areas, extensification rather than intensification is used to increase agricultural production. This creates less environmental pollution but increases land-use change and deforestation. Diets in these regions are often unbalanced, mostly lacking in proteins and fats (Willett *et al.* 2019) but having a relative abundance of cereals and tubers. The lack of adequate systems along the food chain to store and preserve fresh food results in significant losses and reduces the offer at large scale. In contrast, wealthier countries are experiencing excessive food consumption, especially of meat and highly processed food, but low intake of vegetables. In these countries, agriculture is based on intensive systems, which are more efficient in raising yield but generate significant environmental pollution and soil degradation.

Willett *et al.* (2019) have indicated several important key actions required to balance the right to access to food, a healthy diet and environmental sustainability. These include a significant shift in dietary habits, in particular a reduction in consumption of ASF and an increase in plant-based foods in the wealthiest countries; a significant improvement of technologies to intensify agriculture at lower environmental cost; the transfer of such technologies to poorer countries, together with a better global distribution of fertilizers; the reduction of food losses and wastes; and support to less industrialized countries to develop better systems to process and preserve food.

The active role of citizens in driving change

Willett *et al.* (2019, p. 450) call explicitly on people to drive this change: “The global food system needs to be transformed to reduce its effect on human health and environmental stability and begin reversing current trends. However, this transformation will not be achieved without people changing how they view and engage with food systems.”

Sustainable dietary choices made by many may have a striking effect on the production of GHGs within food systems, consumption of water, land-use, losses of nitrogen and phosphorus losses into the environment and so on. Moreover, people can influence public opinion by committing to both healthy and sustainable food choices, thus driving market transformation through their choices.

A recent survey run by the SU-EATABLE LIFE project (www.sueatablelife.eu) in Italy and the United Kingdom of Great Britain and Northern Ireland supports earlier research findings that European Union citizens are aware of the impact of food on the environment but lack understanding of how health and sustainability are connected and which actions lead to more healthful and sustainable choices. Perceived barriers included too little knowledge, few sustainable choices in contexts where food is served or bought, low transparency about the impact of the food on the environment and no clear messages. These findings indicate that many actors in the food chain feel isolated, each acting on their own without a common strategy.

The SU-EATABLE LIFE project: working with canteens, retailers and municipalities to drive food-systems change towards low carbon emissions and water consumption

Canteens, food retailers and municipalities offer a unique opportunity to maximize the number of people who can be reached with clear educational messages and demonstrative actions.

The European Union project SU-EATABLE LIFE, coordinated by the Barilla Center for Food and Nutrition (BCFN) Foundation (www.barillacfn.com) will run the first large-scale experiment in Europe to encourage citizens to adopt sustainable diets, with particular focus on the impact of diet on GHG emissions and water consumption. This will involve canteens and caterers of universities and workplaces in Italy and the United Kingdom of Great Britain and Northern Ireland from 2018 to 2021. The experiments are coordinated by the Sustainable Restaurant Association (www.thesra.org) in the United Kingdom of Great Britain and Northern Ireland and the BCFN Foundation in Italy. GreenApes (www.greenapes.com) will provide a social engagement platform to engage consumers in the experiments, using a gamification approach. Wageningen University and Research and BCFN will monitor and evaluate the experiments' outcomes in terms of behavioural, social and environmental impacts.

The canteen setting allows for addressing key points indicated by previous analysis on communication on food and environmental issues and general social communication strategies that help the consumer to engage by internalizing important messages and making them their own.

First, people need to know the exact terms of the problem they are facing. The first action is thus to inform them and raise their awareness of diet-related environmental and health issues. Canteens can provide an environment where messages and actions can be consistently and repeatedly delivered over long periods of time. The SU-EATABLE project has identified eight key principles for a sustainable and healthy diet, an optimal average weekly diet based on the right proportions of different food offers which reduce GHG emissions by 5 300 tonnes of CO₂ equivalents and reduce water use by 2 million cubic metres of water over the 3-year project if 5 000 people were each engaged for at least one year. The dietary choices promoted in the canteens are in line with the definition of a healthy diet as determined by WHO, the Joint WHO/FAO Expert Consultation on diet, nutrition and the prevention of chronic diseases, the British Dietetic Association and the EAT-Lancet Commission on Food, Planet, Health. At the same time, the eight principles are designed so that dietary choices should bring clear benefits to the environment, and in particular to reduction of GHG emission and water footprint. Educational materials and other communication tools will be devised and deployed to increase customers' awareness and knowledge on sustainability, the impacts of food production and consumption on the environment, healthy diets and sustainable food choices.

Second, the concepts need to result in actions that translate simple theory into real empowerment. Simple

informative messages are easily forgotten or ignored if the message is not put into action. Canteens can provide practical examples of the types of food that constitute a healthy and sustainable meal and examples of sustainable actions related to food choices, handling and management. They can also provide a variety of choices of diets by varying their offer and helping the consumer to identify the most healthy and sustainable ones. They can lead by example and stimulate thoughts on reducing the use of plastic in general, and single-use plastic in particular, and on reuse and recovery of food which would go to waste. They can provide alternatives to sweetened and chemically produced beverages, and much more. The SU-EATABLE project will work with canteens to prepare all these different options and to find the best strategies to present the most sustainable and healthy options in an attractive and communicative way. The lessons learned in the canteens will provide important examples for customers to take home and apply in the family.

Thirdly, engagement activities act as an initial pull for people to engage on sustainable diets. For example, the initial stimulation of food-based games will encourage people to get more deeply involved in the challenge of sustainable food choice. The Su-EATABLE project will provide a digital social engagement platform to enable learning about the meaning and understanding of sustainable diets and encourage people to develop social and practical skills for sustainable choices through participation in challenges and competitions. Successful completion of challenges taking place at individual and group level will deliver symbolic or actual rewards connected to sustainability to further stimulate learning and doing.

The impact of different strategies will be monitored and evaluated for their effect on reduction of GHG emissions and water use and the development of motivational, cognitive and actionable capacity for making sustainable food choices at canteen level as well as the spillover to choices in other everyday-life settings of customers.

The target of the SU-EATABLE project is the active involvement of at least 5 000 people and to change their dietary habits towards more-sustainable and healthier options. Lessons learned will provide the basis for future efforts to engage other stakeholders, such as food retailers and municipalities.

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Amos Laar, Senior Lecturer, University of Ghana

Can food environment policies contribute to building consumer confidence in the African food system?

Obesity and nutrition-related NCDs are a global health problem (Caballero, 2007). The rate at which these are increasing in sub-Saharan Africa (SSA) is alarming. The 2015 Global Burden of Disease report confirmed this, revealing a 1 400 percent increase in rates of adult obesity in Burkina Faso between 1980 and 2015 and increases of more than 500 percent in Ghana, Togo, Ethiopia and Benin (GBD 2015 Obesity Collaborators, 2017). The report further indicates that eight of the 20 nations in the world with the fastest-rising rates of adult obesity are in Africa. There is evidence that the increase in obesity rates is due in part to food-system failures (Kessler, 2009; Freudenberg, 2014).

This has resulted in the erosion of consumer trust in various food-system actors, particularly the food industry (Anderson, 2000; Brom, 2000; Ekici, 2004; Verbeke *et al.*, 2007; Richards, Lawrence and Burch, 2011). There have been many calls for governments to take action on these matters (Smith *et al.*, 2004; WHO, 2010; Meyer *et al.*, 2012; Wilson *et al.*, 2014). The role of governments in protecting, promoting and assuring the health of their citizens is grounded primarily in national legislation, but is also influenced by local policies and international conventions.

Food environment (FE) policies can engender consumer confidence in the current food system. In public health, the FE is defined as the “collective physical, economic, policy and sociocultural surroundings, opportunities and conditions that influence people’s food and beverage choices and nutritional status” (Swinburn *et al.*, 2013). Developed by INFORMAS, the policies featured in the Public Sector Healthy Food Environment Policy Index (Food-EPI) are particularly relevant. The Food-EPI Module comprises seven policy domains and six infrastructure support domains. The policies focus on “food composition; food labelling; food promotion; food prices; food trade and investment; food provision; and food retail” (Swinburn *et al.*, 2013). As outlined below, effective implementation of these policies in Africa can contribute to building consumer confidence in the food system.

Food marketing/promotion policies and consumer confidence

Supported by several systematic reviews (Hastings *et al.*, 2006; Cairns, Angus and Hastings, 2009; Cairns *et al.*, 2012), the United Nations, the World Health Organization and other stakeholders have relentlessly called for restrictions on marketing of unhealthy foods to children (United Nations, 2011; WHO, 2012). The World Health Assembly (WHA), through resolution WHA63.14, provides a set of recommendations to guide efforts by Member States in designing policies or strengthening existing policies on food marketing to children in order to reduce their impact on health (WHO, 2010).

Food promotion policies should focus on ensuring that: there is a comprehensive policy implemented by governments to reduce the impact of promotion of unhealthy foods to or for children across all media (Swinburn *et al.*, 2013). The principle underlying this policy is that marketing/promotion/advertising should not be deceitful or misleading and should, therefore, contribute to building confidence in what is being marketed, sold, bought and consumed. For example, if governments introduce policy measures that restrict promotion of unhealthy foods (e.g. foods high in added sugars, salt, saturated fats, trans-fatty acids) to children, the production, processing, importation, marketing or promotion of these unhealthy foods by industry will be reduced and such unhealthy foods will be less available. This will lead to confidence in what is being marketed, sold, bought and consumed.

Examples of such policies include the following:

- Restricting promotion of unhealthy food to children in broadcast media: Chile – No advertising of unhealthy foods directed to children under 14 (or when audience share is >20 percent children)
- Restricting promotion of unhealthy food to children in non-broadcast media: Quebec, Canada – Ban on all commercial advertising directed to children (under 13 years) through any medium
- Restricting promotion of unhealthy food in children’s settings: Spain – Legislation requires that kindergartens and schools are free from all advertising
- Restricting marketing of breast-milk substitutes: Various countries – Legislation/adopted regulations encompass all or nearly all requirements of WHA Code on this topic.

Unfortunately, as regulatory diversity in this area is increasing, so are governments conveniently delegating their responsibility to the food industry and allowing it to self-regulate (Reeve, 2016). However, to date this is not protecting children from exposure to advertising. Self-regulation further erodes consumer confidence in the current food system. Sharma, Teret and Brownell (2010) have warned that ceding regulation to industry presents opportunities but is highly risky. In some industries (such as tobacco), self-regulation has been an abject failure and there similar results in food marketing (Hawkes and Lobstein, 2011; Galbraith-Emami and Lobstein, 2013).

Food composition policies and consumer confidence

A food supply system that delivers unhealthy food contributes to the rise in obesity and nutrition-related NCDs

(Swinburn *et al.*, 2011; Moodie *et al.*, 2013 and regulatory standards for food composition are intended to address this issue). The goal of these standards is minimize the availability of unhealthy foods, in particular those containing excessive levels of salt, fat, saturated fat, trans fat and added sugar. Reformulation is a prominent objective of implementation of food composition regulations (Swinburn *et al.*, 2013).

Examples of such regulations include the following:

- Food composition standards/targets set for processed foods: Argentina – Mandatory maximum levels of sodium in various food products; Denmark – Ban on trans fats
- Food composition standards/targets set for out-of-home meals in food-service outlets: the United States of America – Restaurants not allowed to produce foods that contain PHOs; New Zealand – Industry standards set for deep-frying oils.

The WHO Global NCD Progress Monitor (WHO, 2017) reported limited government effort in Africa in implementing measures to reduce unhealthy diets such as restriction on salt/sodium, saturated fatty acids and trans fats and marketing to children. Of 51 African countries on the WHO NCD Progress Monitor, only three – South Africa, the Central African Republic and Mali – fully implement all three measures. Ten other countries implement at least one of the measures; the remaining 38 countries implement none of these three measures (WHO, 2017).

Food-labelling policies and consumer confidence

The objective of food-labelling policy is to enable consumers to easily make informed food choices and to prevent misleading claims (Swinburn *et al.*, 2013). Current efforts in this direction include the following:

- Ingredients lists/nutrient declarations required: Canada, the United States of America and others) require trans-fat labelling on packaged food;. The United States of America – Requirement for added sugar to be included on labelling of packaged food.
- Front-of-pack labelling: Ecuador – Mandatory traffic-light labelling indicating healthiness of food products; Chile – Warning labels for products high in calories, saturated fat, sugar or sodium.

Food in retail policies and consumer confidence

Food in retail policies seek to ensure that there are "...policies and programmes implemented to support the availability of healthy foods and limit the availability of unhealthy foods in communities (outlet density and proximity) and in-store (product density)" (Swinburn *et al.*, 2013). Selected efforts include the following:

- Zoning laws on the density/location of service outlets serving healthy/unhealthy food: South Korea – green food zones (<200 m) around schools ban the sale of foods (fast food, soda) deemed unhealthy by Food and Drug Administration
- In-store availability of healthy/unhealthy foods regulated: UK – Voluntary agreement with commercial companies to increase availability of fruit/vegetables at convenience stores.

Fiscal policies/food pricing policies and consumer confidence

Activating the fiscal lever of the policy arsenal may engender confidence in the food system. Fiscal policies or food pricing policies (such as taxes and subsidies) align with health outcomes by helping to make healthy-eating choices easier and cheaper (Swinburn *et al.*, 2013). Examples of international best practice include the following:

- Increase taxes on unhealthy foods: Mexico – 10 percent tax on sugary drinks, 8 percent tax on unhealthy snack foods; Hungary – Public health tax on sugary drinks and various unhealthy foods; South Africa – 20 percent or 2.29 cents per gram of sugar, the first African country to implement the tax
- Reduce taxes on healthy foods: Fiji – Removed excise duty on imported fruits, vegetables and legumes.

The public health rationale and positive externalities of such policies have been stated (Roache and Gostin, 2017) and yet in Africa only South Africa has successfully introduced a tax on unhealthy foods, in this case taxes on sugar-sweetened beverages (Du *et al.*, 2018). Morocco was forced to repeal a similar tax in November 2018 prior to its planned introduction in January 2019 as a result of commercial pressure from the agri-food industry (Bazza, 2019).

Food trade and investment policies and consumer confidence

Food trade and investment agreements protect the capacity of government to make decisions, favour healthy food environments, and are linked with domestic health and agricultural policies in ways that are consistent with health objectives, and do not promote unhealthy food environments (Swinburn *et al.*, 2013). Ghana and the European Union provide good examples of such agreements.

- Protect regulatory capacity regarding nutrition: Ghana – Standards set maximum percentage fat contents in beef, pork, mutton and poultry. The standards were introduced in response to rising imports of low-quality meat following liberalization of trade (Laar *et al.*, 2018; Thow *et al.*, 2014).
- Trade agreement impacts assessed: -European Union – Mandatory environmental impact assessments (potentially including health impacts) are required for all new trade agreements.

If effectively implemented and enforced, the FE policies highlighted have the potential to engender consumer confidence in the food system. However, globally, between 2014 and 2018, the Food-EPI tool was successfully implemented in only six high-income countries and five upper-income countries, but in on lower-middle-income countries (LMICs) or lower-income countries (Vandevijvere *et al.*, 2019). In 2019, Ghana (Laar *et al.*, 2019) and Kenya (Asiki *et al.*, 2019) became the first LMICs to have successfully implemented the Food-EPI exercise.

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Justin Macmullan, Advocacy Director, Management Team Member, Consumers International

Consumers International brings together more than 200 member organizations in more than 100 countries to empower and champion the rights of consumers. We are their voice in international policymaking forums and the global marketplace to ensure they are treated safely, fairly and honestly.

Consumer confidence is vitally important for the functioning of the food system. However, in order to build trust, the food system itself must be trustworthy and the primary focus should be on the creation of a system that meets consumers' needs. If the system is meeting consumers' needs and is transparent and accountable, consumer confidence will follow as a natural consequence.

What are the characteristics of a trustworthy food system?

For Consumers International, a trusted food system provides reliable access to sustainable, safe, nutritious and affordable food that is socially appropriate. The whole system needs to be supported through an effective combination of regulation, enforcement and transparency.

Regulation and enforcement are important in ensuring standards are met; however, there will always be a degree of choice and consumer responsibility in choosing a safe, sustainable and healthy diet. In these areas, governments and companies have a role in ensuring this is the easy choice for consumers, based on the availability and affordability of choices, accessible, accurate and meaningful information (for example in the form of labelling, but also the absence of misleading marketing) and an awareness of other factors that might influence choice.

Consumers International's members contribute to sustainable food systems in many ways including tackling food fraud and improving transparency in pricing; this presentation focuses on three areas as examples.

Food safety

Food safety is central to consumer safety. Currently, as a result of unsafe food, one in ten people fall ill and 33 million healthy lives are lost every year. It is therefore important that consumers are able to trust that the food they eat is safe and have information about how to safely store and prepare food. This is a key area for regulation, standards and enforcement, though consumer groups also step in to raise awareness among producers, retailers and consumers themselves.

It may be impossible to have completely risk-free production, but it is important to lower risks as much as is reasonably possible and to communicate immediately and honestly about incidents in order to appeal to the consumers' values and ethics, which are the building blocks of their confidence and of a well-functioning food system.

When food is safe, not only do individuals benefit from not falling ill but consumers will also have greater confidence in the system. This, in turn, leads to improved public health because consumers can then freely choose a healthy, diverse and economical diet.

Consumers International and its members are contributing to this through initiatives such as the following:

- Safe Food International's *Guidelines for consumer organizations to promote national food safety systems* (Safe Food International, 2005), an initiative by, among others, FAO, WHO and a number of Consumer International's members, setting out guidelines for consumer organizations on how to promote national food-safety systems. It was created more than 10 years ago but is still used today.
- In 2010, findings from a study by the Consumers Association of Bangladesh informed the design of improved

street-food vending carts and an innovative inspection system that involved teachers and school students. Other members have conducted similar inspection and training programmes among specific sectors such as butcheries.

- In 2010, the Consumer Advocacy Centre in Ghana organized an education programme about food safety in major markets in Greater Accra and pressured food regulatory bodies.

Nutrition

Nutrition is fundamental to a healthy diet and consumers want to be confident that the food they eat provides them with the nutrition they need to live healthy lives. The global rise of diet-related diseases and obesity, which are estimated to kill 41 million people each year, demonstrates the urgency of the issue. For consumers the lack of trusted information and healthy choices and the impact of marketing can make it harder to choose healthy diets and undermines confidence in the food system.

Consumers International and its members are helping consumers to choose healthier diets through initiatives such as:

- international work to support the development of WHO recommendations on the marketing of food and non-alcoholic beverages to children;
- international work at Codex Alimentarius to agree guidance on front-of-pack nutrition labelling; and
- Consumentenbond's Wall of shame of misleading marketing of foods as healthy through packaging.

Sustainable food

Consumers are increasingly concerned about aspects of food production, including the environmental and social impact of production (though these impacts are not limited to production and can include consumption, as in the case of food waste). Consumers are right to be concerned about these issues as, beyond the altruistic concern for other consumers, there is often a negative impact on their own health and their ability to live in a healthy environment as well as the impact on future generations' ability to access affordable, safe and nutritious food, with enough food.

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Sharada Keats, Senior Associate, Policy and Advocacy, Global Alliance for Improved Nutrition

As low-income countries develop, people's diets change, tending to move from being high in cereals, starchy staples and fibre to more westernized patterns that are high in sugars, fats and ASF. This has been termed the nutrition transition. It is usually accompanied by increasingly sedentary lifestyles (as technology displaces manual labour or physical play, for instance) and demographic and epidemiological shifts, including the rise in NCDs.

Diets in China have undergone a dramatic transition to include more ASF, more fruits and vegetables, more micronutrient-rich foods but also more sugar, salt, fat. How does Tanzania compare?

From 1988 to 2017, the GDP per capita of Tanzania almost doubled in real terms. In China over the same period, real GDP per capita grew more than tenfold. In the early 1990s, severe poverty rates (less than USD 1.90/day purchasing power parity) were around 66 percent in China and 72 percent in Tanzania; by 2011, these were 8 percent in China and 49 percent in Tanzania.

In 1980, rates of overweight and obesity among female adults were around 13 percent in China, compared with around 19 percent in Tanzania. By 2013, the rate had increased to 27 percent in China and 39 percent in Tanzania. At the other end of the spectrum, in the early 1990s stunting in children under 5 years of age was around 32 percent in China and 50 percent in Tanzania. By the latest measures, it is down to 8 percent in China and 34 percent in Tanzania.

China and Tanzania are countries at very different positions in the demographic transition. The population of China grew by about 25 percent in the past three decades, whereas the population of Tanzania grew by about 140 percent. In 1960, total fertility rates were around six in China, compared with seven in Tanzania. In 1990 the rates were two in China and six in Tanzania. The latest data from 2017 shows a total fertility rate of 1.6 in China and five in Tanzania.

Thus, countries like Tanzania are at a much earlier stage in the demographic transition and in economic development than in countries like China. While diets have generally diversified and improved in places like China, they are stagnating in places like Tanzania.

In 1990, per capita vegetables supply in Tanzania was about 110 g/day, compared with 270 g/day in China. By 2013, supply had changed little in Tanzania, increasing to 124 g/day, but had nearly quadrupled in China, to more than 950 g/day. Fish and seafood supply per capita per day fell by 65 percent in Tanzania from 1990 to 2013, 44 g to 15 g, whereas in China it trebled, from 30 g to more than 90 g. Meat supply grew by about 150 percent in China over the same period (from around 70 g to 170 g) but was stagnant in Tanzania at just under 30 g.

Clearly, there are heterogeneous experiences in countries going through the nutrition transition; rates of overweight and obesity are strongly linked to economic growth, but the relationships are not straightforward. Even in wealthy settings, it is the relatively poorer segments of society who tend to face greater malnutrition burdens.

To return to the Tanzania example, studies show that large fractions of the poorest families simply cannot afford adequate diets. Many households rely on the cheapest available food energy supplies, which are nutrient-poor.

Tackling this problem requires more investment in protein- and micronutrient-rich crops such as groundnuts and more fortification, for instance of infant porridge, to fill nutrient gaps not being met by more diverse diets. These are two areas GAIN is working on through its food fortification programme, tackling hidden hunger at different scales. GAIN's Marketplace for Nutritious Foods programme provides small grants and technical assistance, as well as convening communities of practice, to help local small and medium-sized enterprises (SMEs) producing nutritious foods to improve supply and to reach more low-income consumers.

Economic factors drive future diets – but future diets drive economics too. Peoples demand for better food can drive improvements in diets. Demand is one of the three main strategic pillars GAIN works on; the others are supply and the enabling environment.

There is a clear case for creating more demand for healthy diets through approaches that lock in healthy eating

habits with emotion and intuition, as well as those that appeal to rationality and logic. Traditionally, most public approaches to promoting healthy diets have used the latter. Food marketing more broadly, particularly by big business, has tended to be more adept at the former. We need to see public demand creation as an opportunity to use diets to improve health, happiness and productivity.

In their daily routine, adolescents are exposed to huge amounts of media replete with marketing of unhealthy food. Adolescents are an emotionally vulnerable group, susceptible to pressure from social norms and peer groups, and are one of the focus groups for demand creation work at GAIN.

Beyond particular demographics though, we need to trial approaches on a large scale that we expect to benefit broad segments of the public. Even if we can encourage private companies to increase funding for promoting individual healthy products, it will never be enough.

GAIN has adopted a number of different approaches to encouraging people to demand better diets. For example, it is currently working with partners on developing ways of boosting demand for eggs as a quality protein and micronutrient-rich food for children in northern Nigeria and in Ethiopia. It is also developing some materials for the Kenyan market to promote healthy diets and healthy eating more generally, using approaches that tap into emotions and habits rather than food-specific marketing. Some of the advertising work our partners are developing to trial in Kenya include slogans like:

- “Wake up to good food” – which stresses that it is easy to end up eating unhealthy food without thinking, that it’s time to stop “sleep eating, and wake up to the benefits of good food and a healthy diet; and
- “Grow your own” – this includes “grow your own dancing queen,” “you’re your own doctor” and “grow your own pilot.” This is tapping into desires of parents to see children grow into successful adults. It emphasizes that parents need to make the right food choices to help their children grow and achieve their dreams. It highlights food is key to growth of children’s bodies and minds.

This material takes the approach of appealing to emotional drivers first, then to logic. The aim is to start shaping the instinctive response people have of reaching for food when they are hungry so that they choose healthy options. This is a big task, and demand creation is only one stream feeding the river of work we need going into this. Still, the strategy of using large-scale public messaging and marketing is worth pushing. Food marketing has traditionally been controlled and deployed by large businesses with large marketing budgets. They are seeking to maximize profits, not the human right to good nutrition. People deserve an alternative, and private companies cannot be relied upon to provide it.

Businesses tend to have lower margins and hence smaller promotional budgets for nutritious products that are affordable to low-income consumers.

There is a clear role for government or philanthropic stakeholders to fund demand creation at the outset. We hope businesses can and will follow. Demand must be created on multiple levels:

- for overall healthy diets;
- for individual protein and/or micronutrient-rich foods;
- for packaged and unpackaged foods; and
- for people on middle- and low-incomes.

Part of creating demand for healthy diets involves curbing demand for over-consumed products that drive dietary imbalances. In our Urban Governance for Nutrition programme, we are working with partners to encourage city governments to adopt policies around, for example, curbing marketing of unhealthy products to children. In our work on improving diets for children in Indonesia, we are using methods developed with behaviour-centred design techniques to tap into emotional responses in order to encourage parents to provide improved diets for their under-twos.

To sum up, there is a clear case for more public spending on promoting demand for healthier diets, particularly since the costs of unhealthy diets are borne by public services and by citizens whose lives or livelihoods are damaged by diet-related ill health and not by the food companies promoting unhealthy food choices. Governments and donors are well placed to support the provision of alternative narratives, nudges and incentives – one of many avenues we need to explore to shift diets from their current trajectories onto more desirable ones.

High-level event on the Mediterranean diet

Introduction

Our current food systems are struggling to deliver the healthy diets needed for optimal health, and this has led to the global call for food systems transformation.

Poor diets have become a major contributor to disease and death. While nutrition is in transition all over the world, climate change and biodiversity loss are seriously undermining our ability to feed and nourish an ever-growing global population.

The Mediterranean diet – which is centred around consumption of fruits and vegetables and use of olive oil – has been widely recognized as a healthy dietary pattern linked to better health outcomes. The Mediterranean region offers an example where food production and consumption are interlinked to produce multiple benefits in terms of health and sustainability.

In 2010, the Mediterranean diet was added to the list of the World's Intangible Cultural Heritage by the United Nations Educational, Scientific and Cultural Organization (UNESCO). According to UNESCO, “the Mediterranean diet is a set of traditional practices, knowledge and skills passed on from generation to generation and providing a sense of belonging and continuity to the concerned communities” (UNESCO, 2010).

Unfortunately, the Mediterranean diet is eroding. Factors such as urbanization, increased availability of prepared and processed foods, mobility and migration are exerting pressure on traditional diets in the region. Other traditional diets around the world are also under pressure.

In our quest for healthy diets for improved nutrition, we can learn from the principles of the Mediterranean diet.

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Introductory remarks

Anna Larrey, Director, Nutrition and Food Systems Division, FAO

Anna Larrey, Director, Nutrition and Food Systems Division, FAO expressed her gratitude to Director-General, José Graziano da Silva, for putting nutrition front and centre of FAO. Given the nature of the Organization, FAO must make the delivery of healthy diets its aim and during the past years the Director-General has succeeded in moving nutrition to where it should be. Moreover, the FAO Council has approved promotion of nutrition to address all forms of malnutrition as its theme for the next biennium (2020-21).

Dr Larrey introduced the speakers, the topic and shared some of the principles of the Mediterranean diet:

- The Mediterranean diet has evolved over time and was considered a diet for the poor.
- The Mediterranean diet is characterized by high levels of plant-based foods, especially seasonal fruits and vegetables, moderate amount of fish, dairy products and meat, with olive oil as the main source of fat, and the use of natural herbal spices.
- The diet focuses on local produce.
- It is not about any particular food offering special benefits but about making the most of the foods that are available.

Opening statements

Plácido Plaza, Secretary General of the International Center for Advanced Mediterranean Agronomic Studies (CIHEAM)

Firstly, I would like to express my warm thanks to José Graziano da Silva and the FAO for inviting CIHEAM to this important event and for including the Mediterranean diet as a food issue of the future. Indeed, I take the opportunity to recall the extent to which the Mediterranean diet is not a matter of the past but, on the contrary, a winning bet for the future. Thanks to the Mediterranean diet, we address nutrition, health and the economy, especially in relation to population growth and the food needs associated with it. We also address urbanization, food prices and food waste. Of course, diet is also an environmental issue. How can we produce more and better food in a context of water scarcity, climate change and loss of biodiversity?

Speaking of the Mediterranean diet evokes sociocultural factors and the homogenization of lifestyles but also socio-economic inequalities because today we know which socio-economic categories suffer the most from malnutrition. The Mediterranean diet questions our food habits and highlights the imbalances caused by the spectacular increase in the world population that has obliged us to produce and market processed industrial products.

Speaking about the Mediterranean diet is also speaking about food systems that can no longer generate shared growth benefiting local producers, small farmers and fishermen. At CIHEAM, we believe in the potential of the realities underlying the concept of Mediterranean diet and the opportunities it provides to contribute to the sustainability of Mediterranean food systems and, beyond that, to sustainable and balanced development of this region that we cherish so much. We have no doubt that the Mediterranean diet can be at the heart of discussions on the implementation of inclusive green and blue economy models. However, in order to achieve all these goals, it is crucial to support the emergence of food governance promoting participatory approaches with the intervention of local actors, the private sector, public-private partnerships, women – who continue to suffer discrimination – and young people, among whom farming and fishing are generally seen as a poor career choice.

The necessary means must be provided to farmers, fisherfolk and craftsmen so that, on the one hand, they can earn a proper living from their professions with dignity and be proud of what they do and, on the other hand, society recognizes the value and role of these vocations and professions. This position will be defended during the twelfth Ministerial meeting of CIHEAM Member States to be held in Tunis on 5 November 2019. This meeting will focus on inclusion and empowerment of youth and women in rural and agricultural areas as a lever for development in the Mediterranean. Our intergovernmental organization, which brings together 13 Mediterranean countries, is devoted to training human resources and promoting research, innovation and cooperation in fields that contribute to supporting agri-food systems that are good for human beings, good for the planet, good for our Mediterranean history and guarantors of social cohesion. In partnership with FAO and the Union for the Mediterranean, we wish to further invest in this theme and consider the possibility of launching a multistakeholder platform on sustainable food systems in the Mediterranean. It could be open to institutional partners, CSOs and the private sector to:

- enhance knowledge and pool expertise on the subject;
- develop and jointly support training actions on the ground; and
- bring these issues into national, regional Mediterranean and international debates.

CIHEAM is considering mobilizing the material resources and expertise required to develop a white paper, the terms of reference of which will be jointly defined. The sectoral themes, their interconnection and sphere of activity will also be clearly identified. This white paper will serve as a basis to propose the first elements of an action plan for sustainable, accountable and inclusive food systems and serve as a tool for decision-making and prioritization of action and investment. These major lines of action that I have just mentioned were discussed in Palermo a month ago at a significant Forum on “Sustainable and inclusive food systems in the Mediterranean” organized by the CIHEAM centre in Bari with the support of FAO. This new collaboration project enhances the outstanding partnership with FAO that dates back to 1977. The extension of our institutional collaboration agreement is a proof of this momentum.

Audrey Azoulay, UNESCO Director-General (video message)

This symposium is a remarkable opportunity to reflect on the issues related to food for sustainable development as part of a holistic approach, taking into account all cultural and social dimensions of food as an intangible heritage. It is also an opportunity to reaffirm our commitment to work together, to give the multilateral system its full strength and purpose.

FAO and UNESCO have set an example in this respect and can rely on a close collaboration reinforced by the cooperation agreement concluded in 2018. This cooperation allows us to pool our respective fields of expertise to address our shared challenges. Together, for example, we organized a symposium in March 2018 on food and sustainable territorial development with the French Ministry of Foreign Affairs. In September, 2019, we will hold a forum in Parma – which is also a UNESCO Creative City of Gastronomy – on the theme “Culture and food: innovative strategies for sustainable development.” FAO and UNESCO are also leading an international campaign on the role of chefs as agents of change, to raise awareness among young people of food waste and of the importance of biodiversity.

I would like to take this opportunity to commend the work of the Director-General of your Organization, José Graziano da Silva, for his dedication to crucial issues of food security. I wish you all an excellent conference, and I have no doubt that it will be another step forward in understanding what our gastronomic cultural heritage can teach us in building a more sustainable world.

Gaetana Ferri, Director-General for Food Hygiene, Safety and Nutrition, Ministry of Health, Italy

It is my great honour to represent the Italian Ministry of Health and participate in this high-level event on the Mediterranean diet. It is a great opportunity to focus on the Mediterranean diet and its potentiality, which is now recognized worldwide. Current data show that one in five deaths are associated with poor-quality diets, which now account for six of the top nine contributors to the global burden of disease. Poor diet has overtaken malaria, tuberculosis and measles as among the greatest threats to public health around the world. So, what is the future for our food?

The Mediterranean diet, like other sustainable diets such as the Japanese diet and the new Nordic diet, has a fundamental role in preventing NCDs by reducing overweight and obesity and by promoting sustainability, protecting biodiversity, reducing GHG emissions, improving food production and economy, limiting food waste and favouring food security. These diets have the potential to have a wide impact on several SDGs.

It is a model of a healthy traditional local diet, a frugal diet that was followed by poor rural societies of the Mediterranean basin, before globalization made its influence on lifestyle, including diet. Key determinants of the traditional Mediterranean diet have been climate and biodiversity and Italy owns the largest part in Europe. Half of flora and one-third of fauna currently present in the Old Continent.

It contributes to reducing poverty (SDG 1) by providing economic opportunity with a positive social impact people's delocalization, the so-called economic migration. It supports the economic development of the territories as shown by the successful export of the Italian agri-food, estimated around 41 billion € in 2017. By providing a balanced diet that helps reduce overweight and obesity, the diet contributes to ensuring healthy lives and promoting well-being for all (SDG 3). It has also a positive impact on sustainability and the environment by relying on local products, reducing emissions and waste and ensuring food security (SDG 2) and supporting responsible consumption and production (SDG 12). At the same time, it promotes life on land (SDG 15) by protecting rural areas, a real example of agro-ecology. The challenge is to bring all together, institutions, producers and consumers to act in one direction, promoting positive lifestyles, starting at school level to educate the new generation to the culture of traditions and territories, in a sustainable and healthy way. The Italian Ministry of Health is fully committed to this path.

In 2017, the Italian presidency of the G7 paid special attention to the impact of climate change on health. This focused on eight main topics (including food system and nutrition), assessing the impact of various climate drivers on human and animal health outcomes. The strategies and potential corrective actions identified were

adopted by the G7 Health Ministers' in the final communiqué.

Another key issue that we must address is the future trend of urbanization and the impact of urban diets, especially rapid increases in type 2 diabetes and other NCDs. This calls for authorities to build smart eco-friendly cities and promote healthy diets, as was outlined at the G7 side event "Health in the cities," held in Rome on 11 November 2017, where the Urban Health Rome Declaration was adopted.

The Italian Ministry of Health started to work on the Nutrition Decade, with the establishment of a working group in July 2017, with specific national smart actions (like memoranda of understanding with the catering sector) and an Action Network for exchanging best practices, drafting, with the help of experts with scientific backgrounds, documents (both for communication campaigns targeting the public and for training health workers using different means such as distance learning courses) on traditional, healthy and sustainable diets.

I am hoping to welcome not only the countries that have promoted the UNESCO Dossier for the Mediterranean diet but also others willing to make our populations resilient to the environmental, social and demographic changes, in a network for the promotion of the Mediterranean diet.

Keynote address

Farah Naja, Associate Professor, Department of Nutrition and Food Sciences, American University of Beirut

Adherence to the Mediterranean diet: from analysis to food-systems intervention

When we think about the future of food, we need to think of it globally. We cannot focus only on developing or developed countries, rural or urban areas. The challenges that we are facing are grand. In order to address them, we need to come together and consider the future of foods for all of us as one.

There have been numerous and diverse attempts to define the key constituents of good-quality diets to meet humankind's future needs. Some people swear by omega-3 fatty acids, others say it is the antioxidants in wine. Some recommendations support fruits, vegetables and whole grains, while others assert that it is mainly about limiting processed foods, meat, dairy and saturated fats. Another body of thought believes it is not about what you eat, but rather about being active and engaging in physical activity. All of these recommendations have overlooked the fact that the nutrients within these foods interact and do so synergistically or antagonistically.

One recommendation that encompasses all of these considerations is support for the Mediterranean diet.

The essence of this diet is that it exists in reality. It is not derived from recommendations that scientists have collated and promoted as being healthy or sustainable. This diet already exists and has remained constant over space and time. A nice feature of this diet is that it puts people at the centre of the recommendations: social and cultural traditions are at the heart of the Mediterranean diet.

Some food guidelines have been modelled around the Mediterranean diet; the *Dietary guidelines for Americans 2015–2020* (DHHS and USDA, 2015), for example, includes a section titled "Healthy Mediterranean-style eating pattern."

However, all evidence for the beneficial effects of the Mediterranean diet has been generated from the northern part of the Mediterranean basin, i.e. southern Europe, with very little from northern Africa and the Near East. A project funded by the Italian Government and conducted with technical support from FAO has been working to rectify this. The project, "Towards the enhancement of the Mediterranean diet in the Mediterranean region: The cases of Lebanon and Tunisia," studied diets and changes in dietary intake in Lebanon and Tunisia, assessed the level of adherence to the Mediterranean diet and identified frameworks for policies and action to promote continued adherence to the Mediterranean diet.

The study used food supply data from FAOSTAT balance sheets from 1961 to 2013 and food consumption data from two national surveys in Lebanon (1997 and 2009) and four national surveys in Tunisia (2000, 2005, 2010

and 2015). Findings were reviewed at every step with key stakeholders, including ministries, NGOs and the private sector.

The study found marked differences between the two countries. In Lebanon, energy supply increased over time, with the contribution of cereals to total energy supply decreasing and the contribution of sugar increasing. Consumption of vegetables increased, while consumption of fruits decreased. In Tunisia, consumption of cereals and olive oil decreased while consumption of fruits increased.

The second objective consisted in evaluating the adherence of these countries to the Mediterranean diet. Now that we know that Lebanese and Tunisian people are eating differently and are having a transition, the question to ask is whether they are adhering more or less to the Mediterranean diet. We wanted one measure that would tell us whether they are moving closer or further to the Mediterranean diet. We were looking for a score that would take into account all of the food groups, and rate fruits, vegetables, olive oil and whole grains positively, while rating refined grains and processed meats negatively. The score would not be based on a one food group or one nutrient- but would rather enable the assessment of a holistic dietary pattern.

The food supply data showed a decrease in adherence to the Mediterranean diet from 1961 to 2013 of 40 percent in Lebanon and 46 percent in Tunisia, based on the Mediterranean Adequacy Index (Alberti-Fidanza and Fidanza, 2004). Results from the food consumption surveys were different because each used different food groups and analytical patterns. However, they all included common foods such as olive oil, fruits, vegetables, legumes, fish and seafood. Results showed a decrease in adherence in Lebanon ranging from 2.7 percent to 8 percent depending on the score used, and a decrease in Tunisia ranging from 3.3 percent to 9.4 percent. In Lebanon, the main drivers for the decreased adherence were the decreased consumption of fruits and the increased consumption of refined grains. In Tunisia, the main drivers were the decreased consumption of olive oil and the increased consumption of meat and meat products.

Thus, while there has been a decline in adherence to the Mediterranean diet in both countries, it is still largely still consumed. The challenge is to prevent any further move away from this diet. This is where policy interventions are needed.

In Lebanon, the project chose to focus on fruits and whole grains, while in Tunisia the focus was on olive oil and consumption of red meat. Recommendations were formulated using a food-systems approach, which includes the food supply chain, the food environment and consumer behaviour.

Tunisia provides a good example of challenges posed by lack of coherence in policies. The country has greatly increased production of olive oil, yet consumption of olive oil is decreasing. The study showed that the primary reason for this is that the country has policies that incentivize the export of olive oil and subsidizes other vegetable oils.

The implementation of the project's recommendations has been hindered by several challenges. The first is that recommendations need to be evidence-based and use context-specific tools for stakeholders to accept them. However, there is no Mediterranean diet score that brings all countries under one umbrella. As such, cross-country comparison is difficult, at best. Moreover, the analysis of the Mediterranean diet score is complex, which makes it difficult to explain to stakeholders. There is thus a need to develop a new score that can put the diets of all Mediterranean countries under one umbrella and that takes into consideration the population distribution and the amount of food to be consumed.

The second challenge faced was that of achieving multisectoral engagement, which has proved problematic. All key stakeholders, from consumers to policymakers, must be engaged and convinced of the benefits of the Mediterranean diet if we are to succeed in promoting its widespread use.

The last challenge that we face is international commitment to protect and enhance the Mediterranean diet. We need to leave this conference as advocates of the Mediterranean diet and work together to create that momentum to make people aware of the Mediterranean diet's benefits on health and the environment. And we need financial support to carry on the research that is needed to raise the Mediterranean diet to further heights and present it as a contributor to addressing the grand challenges that we are facing.

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Concluding remarks

José Graziano da Silva, FAO Director-General, complemented the Director of the Nutrition and Food Systems Division for the delivery of this symposium. He expressed his appreciation of the Keynote Address that gave us an up-to-date information on adherence to the Mediterranean diet. He thanked the UNESCO Representative for reminding us that diet is not only what we eat, it is also a cultural good. The recognition by UNESCO of the Mediterranean Diet as a tangible heritage in 2013 was very important. Sustainable local diets like the Mediterranean diet are around for thousands of years and have a value also apart from health. He also acknowledged the importance of fish as part of sustainable local diets. These diets need to be supported, if not we lose not only the culture but also the environment. CIHEAM is an important partner in the Mediterranean and a new memorandum of understanding (MoU) will be signed with the new Secretary-General.



Panel 4:

Transforming food systems: what does it take?

Introduction

In spite of the progress made in the past decade, malnutrition persists and micronutrient deficiencies and overweight are increasing globally (FAO *et al.*, 2018). One of the reasons for this increase is the increase in consumption of diets that contain limited amounts of fresh fruits and vegetables, legumes, nuts and wholegrains and consist largely of refined carbohydrates and are high in salt, fats and/or sugar (Hawkes and Popkin, 2015; Imamura *et al.*, 2015). There is broad consensus on the key role played by the food system in influencing the quality of diets (GLOPAN, 2016; HLPE, 2017), and of its consequent potential to influence what people eat. Actions would need to focus on increasing the availability, affordability and desirability of nutritious foods, while making foods high in fat, sugars and/or salt less attractive and affordable.

The food systems can be considered as being made up of four subsystems: agricultural production; food storage, transport and trade; food transformation; and food retailing and provisioning (GLOPAN, 2016; FAO and WHO, 2018). Action is needed in all four of the subsystems in order to make nutrient-rich foods more available, affordable and desirable in a sustainable way (Willett *et al.*, 2019). Examples include shifting agricultural research investments to focus not only on staples but also on sustainably produced nutrient-rich crops (Pingali, 2015). This, together with an investment in renewable-energy-driven transport and cold-chain infrastructure to reduce food losses, would not only contribute to increasing the availability of such foods but also to making them more affordable. In terms of food transformation, actions can range from encouraging food reformulation laws to supporting the establishment of investment funds for start-up SMEs that produce nutrient-rich foods (FAO and WHO, 2018). Food environments, the physical space where most consumers buy their food, have a key role to play in steering eating practices. Here actions could include policies to improve food safety in informal and wet markets, taxes to discourage the consumption of foods high in fat, sugar and/or salt or price incentives to encourage street vendors to use ingredients of better nutritional quality while ensuring food-safety standards (FAO, 2016; FAO and WHO, 2018).

In such a comprehensive and concerted effort, all actors are key. The private sector – in all segments of the food system and of all sizes – is an important stakeholder in supporting healthy food environments. Governments have a key role to play in setting appropriate standards and guidelines and in creating an environment that provides incentives to the private sector to make nutrient-rich, safe and affordable foods more accessible (GLOPAN, 2018). Civil society and academia also contribute importantly by raising consumer awareness, transmitting knowledge and changing dominant food cultural and social norms towards healthy eating by making, for example, some foods more socially desirable (Ranganathan *et al.*, 2016).

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Keynote address: Why do we need to transform our food systems?

Jessica Fanzo, Bloomberg Distinguished Associate Professor, Director of Global Food Ethics and Policy Program, John Hopkins University, Baltimore, MD, USA

There are several different viewpoints as to how food systems are failing us, including food systems not producing enough food, food not being equally distributed, food causing environmental degradation and food systems not producing healthy diets.

However, things have improved over the centuries: massive famines have not only decreased both in their severities and in the number of people dying as compared with the late 1800s and the early nineteenth century, particularly in Bangladesh, Ethiopia and India, but also in terms of their frequency (De Waal, 2018).

In addition, energy supply and calories consumed have increased over time, which could be considered both a good thing and a bad thing. Moreover, the prevalence of undernutrition has generally declined although we have recently been witnessing a reversal of this progress. Finally, stunting in children under the age of five, though very hard to shift, has declined, albeit slowly, particularly in very low-income countries such as Bangladesh, Ethiopia and Nepal (Development Initiatives, 2018).

Although progress has been made, a profound paradox remains between families and communities living in low-income countries who are struggling to stay alive and families living in high-income countries who are struggling with the tide of obesity and NCDs. While some in the world have so few and deal with hunger day in and day out, others are dealing with overconsumption in their daily lives and in the food environments they engage with.

Diets are now a top risk factor of death – surpassing tobacco smoke or air pollution, previously reported as the principal culprits (Afshin *et al.*, 2019). Diets are born of food systems: there is something wrong when the element that is meant to nourish you is killing you. Moreover, food systems are both contributing importantly to climate change as well as being a victim of climate change (Fanzo *et al.*, 2018). They are also implicated in natural resource breakdown, including declines in fresh-water resources, forests and vertebrate species and increases in dead zones and CO₂ emissions. Over the last two decades, the pace of this decline and degradation has been massive, which is why the youth are on the streets, protesting. The pace of this climate breakdown is unprecedented. We will be at 1.5°C of warming above pre-industrial levels by 2030 and 2.0°C by 2050 if nothing is done. At that point, earth systems will have taken over and it will no longer be relevant to talk about food systems as we will no longer be at the steering wheel (Willett *et al.*, 2019).

The foods that we produce have significant impacts on the environment, including on GHG emissions, fresh-water use, cropland use and nitrogen and phosphorus applications to crops. In a business-as-usual approach, production of animal-source food will still contribute a significant amount of GHGs; however, other food products will do too depending on how and where they are grown. For instance, staple grains contribute significantly to environmental stresses related to land and water. However, around 60 percent of these grains are being fed to animals that are in turn consumed by us, humans (Willett *et al.*, 2019).

Transformation is inevitable due to urbanization, population growth and pressure. We are witnessing massive urbanization and most of the regions of the world are going to urbanize, with Africa lagging behind. We will also witness extreme population growth particularly in places like Brazil, Indonesia, Nigeria and Pakistan. This urban expansion will have profound impact on croplands, particularly in Asia and Africa.

The question one has to ask is: “Who is going to feed us? If the world is urbanizing, and the average age of the global farmer is 60, who is going to feed us?”

This question is a significant question that we do not have the answer to. We talk about the potential of urban agriculture, but there is a lot of available cropland within rural places that we need to take into consideration when thinking about the future of the urban world.

What are the current trends of transformation?

Transformation is happening.

When looking at a depiction of the food system taken from HLPE (2017), it is evident that the food system is complex and engages and interacts with other systems, such as the health system. As such, a shock to one system could affect another system. For instance, the shock of Ebola to the Liberian health system had significant impacts on the palm oil industry both in Liberia and elsewhere.

When looking at the different components of food systems and their interactions, we can note several different policy entry points and trade-offs. There are many transformations happening in food supply chains, food environments – which are the places where consumers make decisions about what food to purchase – among consumers and within all of the other drivers that are influencing food systems (HLPE 2017).

Food systems are not static: they are dynamic. Sometimes they break; other times they are resilient. We need to think about the flows and feedbacks of food systems and how food systems need to be shaped to ensure they are resilient, particularly in the face of climate change and changing demographics.

People are also transforming and transitioning. As they are moving and migrating, their choices and lifestyles are changing: this is the classic description of nutrition transition that Barry Popkin and Adam Drewnowski developed in the 1990s, and it still holds true (Drewnowski and Popkin, 1997). We witness this pattern as people move to cities, where they are sedentary and have different diets. As such, their disease patterns change from high maternal and child undernutrition to obesity and NCDs. This transition has happened almost everywhere in the world. Most of the world, roughly 5 billion people, sit in that middle, transitioning pattern, about a billion people have the resources to be able to live a long life (and are thus conscious of their diets and exercise purposefully) and about a billion people go to bed hungry every night. The middle, transitioning group is dealing with double burdens and a transitioning lifestyle in a complex set of environments.

Other transformations include more people eating away from home. According to Popkin and Reardon (2018), in Latin America more people are either eating away from home or spending their money watching cooking but not doing cooking. We also witness an increase in the number of supermarkets, which have become the main place from which most people get their fruits and vegetables.

Trends and patterns of packaging and ultra-processed foods often do not align with healthy diets (69 percent of packaged foods do not align with healthy diets) (Development Initiatives, 2018). The private sector is trying to reformulate foods in an attempt to align more with healthy diets; however, overall, packaged processed foods are very high in salt, sugar and unhealthy fats. Moreover, packaged foods that are tasty, convenient and cheap are increasingly available around the world. The private sector is moving into new markets in low and middle-income

countries, including places like Brazil and China with Coca-Cola and Ghana (where you see increasing numbers of KFCs).

We also see concentration of businesses across food systems. Globally, there are 1.5 billion people involved in food production. However, ten or fewer companies control a majority of processing, packaging and transport elements of food value chains (IPES-Food, 2017). There is an incredible concentration and consolidation of the food system, even in landscapes. In Africa, for example, smallholder farmers are selling their farms to larger landowners, and in East Africa (e.g. Kenya and Tanzania), medium-scale farmers are now the predominant producers (Jayne *et al.*, 2016).

What direction do we want transformation to move towards?

Many papers and reports have presented the optimal future of food systems. For instance, the Food and Land Use (FOLU) initiative by Schmidt-Taub, Obersteiner and Mosnier (2019) shows the most important ways to transform food systems so they align with resilient agriculture and food systems, conservation/restoration of biodiversity and natural resources and improving food security and healthy diets.

Transformation is interesting. According to Malthus' vision, as population increases so too does the risk of hunger because of competition for resources. However, Boserup (1966) challenged his approach and argued that as population increased, technology, innovation and the intelligence of the human population would find ways to keep resources afloat with population, and that has proven true in most places around the world. DeFries (2014) refers to a similar process: something happens to a food system but then ingenuity, a pivot, allows people to ratchet it up. To date, humankind has been able to keep pace with being able to feed the population. Whether we can feed it well is another debate and one we could probably argue that we cannot.

However, we need massive transformation. There is no longer time to tinker around the edges. We need systemic massive transformation with bold ideas; not single solutions, not one crop, not one commodity and not one type of producer. We need significant changes that must involve international cooperation with governments being bold and taking the lead.

As such, the following seven strategies are suggested:

First, countries need food-systems policies. Mozaffarian *et al.* (2018) argued that no country has a holistic food system policy that deals with health, environment, economic growth and all of the pillars that we want to see in food systems along with preserving cultures and traditions. There are agriculture strategies and nutrition policies, but nothing that brings it all together. Therefore, governments must think more holistically if they really want to address the food-systems issue that we are faced with. Small innovations are happening in some countries, such as implementing taxes, subsidy programmes, mandatory fortification and city-type policies that are tackling issues like obesity and improving diets. However, more of these approaches are needed and at a larger scale.

Second, we need to increase funding. Only about 5 percent of official development assistance goes to agriculture, about 0.5 percent goes to nutrition and about 0.01 percent goes to tackling obesity and NCDs when we know that there are 2 billion people who are overweight and obese (Development Initiatives, 2018). It is going to cost society significantly not to invest. According to the World Bank *et al.* (2014), ending undernutrition in the high-burden countries would cost USD 7 billion annually to 2030. To put this in perspective, Bezos of Amazon could tackle this single-handedly as he is worth at least USD 75 billion.

Third, we would need to reorient our agriculture systems. We are currently producing mainly cereals and starches but not enough fruits, vegetables and dairy. Our subsidy policies are wrong. CGIAR system funding, for example, focuses mainly on maize, rice and wheat research and very little goes towards vegetables or the indigenous crops that are extremely important to traditional diets. One way to reorient agriculture would be through supporting small- and medium-scale farmers. Herrero *et al.* (2017) showed that not only do smallholder farmers produce a significant amount of food, consisting mainly of nutritious crops, but the foods they produce are supplying between 53 percent and 81 percent of the micronutrients globally. Smallholder farmers are therefore incredibly important.

Fourth, we should invest in rural places. As much as the world is urbanizing, we should not forget about rural

people and places. They are disenfranchised; they tend to be poor, food insecure and obese. We are dealing with places that are being forgotten and this has always been the case. Michael Lipton talked in the 1970s about the urban bias (e.g. Lipton, 1977). A lot of the funding goes to urban development and very little to rural development. However, if we really want to remember the farmers and think about who is going to feed us in the future, we need to keep investing in rural places. Rural places are extremely disconnected from markets and places, with most people in SSA having to travel for more than ten hours to reach their nearest city (IFPRI, 2019), which makes it difficult to improve their livelihoods.

Fifth, we need to maximize entry points and minimize exit points for nutrition along food supply chains. There are multiple entry points to improve nutrition from farm to markets as well as several areas where we can minimize the loss of nutrients along supply chains. There is a lot of evidence on how this could be done; however, it has either never been scaled up, or it has never been thought of in a holistic way, as people tend to focus on applying a nutrition-lens to one piece of the supply chain instead of thinking holistically.

Some of the work that was done with the Rockefeller Foundation as part of the Global Knowledge Initiative in 2017 included looking at different innovations happening in food supply chains to improve them. Those focused not only on packaging and reducing perishability, but also on minimizing food loss and waste and on more environmentally sustainable innovations and technologies. There is a lot that is happening and many of these innovations, which are leapfrogging over the existing technologies in places like the United States of America, have been of interest to Africa and Asia.

Sixth, we need to move more towards sustainability. The EAT-Lancet report (Willett *et al.*, 2019) needed to be developed to create scientific targets around human and planetary health in all of its controversy. The report raised the political and scientific debate on how countries can start to tackle this controversy. It shows that achieving sustainability is not only about changing diets but it is also about changing the technology used on farmlands and about minimizing food loss and waste. Change is required in all of these if we want to really see impacts on improving sustainability and the environment. However, we are living in a rapidly changing world. Who would have thought that Burger King would now be selling the plant-based Impossible Burger, which has been flying off the shelves? Who would have thought that some technologies like lab-grown meat, Finless Foods – which are fish grown from stem-cells – and plant-based burgers could be game changers in how people are changing their diets.

Last, we need to shift consumer demand towards healthy diets. Diets are the number one risk factor of deaths. The diets that most of the world are consuming are high in sodium and low in whole grains, fruits and vegetables. This is a conundrum because consumers are being sold cheap, processed foods that are high in salt, sugar and fat while more wholesome foods are either too expensive for some consumers or difficult to get a hold of in the food deserts that are present in some countries. Price is very important, as it is a big driver of shoppers everywhere. Price, convenience and on-the-go-type foods are consumers' priorities when purchasing foods; environmentally friendly foods are still low on the priorities in the everyday family that is trying to put food on the table.

Who needs to shape that transformation?

Nowadays, it is very difficult for consumers to make good food choices because they are overwhelmed by multiple mixed messages and subject to food environments that are incredibly perverse and toxic. Moreover, attitude-action gaps are evident and there is a lack of evidence of individuals acting to improve their diets. If the literature often appears quite confusing to a trained nutritionist, it should not be a surprise to find the everyday consumer perplexed. As such, we cannot leave it to consumers' willpower alone. We need to help consumers make choices that work for them and fit with their lifestyles and that are healthy for them.

Leaving it to industry's goodwill is not a good option either. Some in the food industry are acting and doing important work towards sustainability but their efforts alone are not enough.

We need governments to govern. Policymakers need to care and create a strong regulatory and fiscal framework. We need cooperation. Governments need to start governing their food systems and understanding who is involved in them and how, and whether it is in the best interest of their citizens.

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Panellist presentations

Tom Arnold, Chair of Task Force on Rural Africa established by the European Commission

Transforming food systems: what are the opportunities to expedite action

This presentation is based on the work of the independent Task Force on Rural Africa, established by the European Commission in May 2018, which issued its report in March 2019 (European Commission, 2019). The primary task given to the Task Force was to recommend the policies necessary to enable the African agri-food sector and rural economy to be transformed and how Europe could best contribute to that transformation. This presentation:

- outlines the broad political, economic and social context within which such a transformation must take place;
- identifies the main strategic policies that should be the basis for this transformation; and
- recommends a strategic partnership between Europe and Africa for the inclusive and sustainable development of Africa's agri-food sector and rural economy.

Context

The major contextual factors against which the agri-food sector and rural economy must be transformed include the need to improve governance and reduce conflict in a number of African countries; the need to invest in the nutrition, education and health of the African people; and the challenge of creating employment and income for the rapidly increasing African population and workforce.

Africa's population is projected to double over the next 30 years and reach 2.5 billion in 2050. Over that period, 800 million people will join the age cohort of 15 to 64 years, the years when they will need jobs. On average, 27 million people will join the workforce each year between now and 2050. Over that period, Africa will account for three-quarters of the increase in the global workforce.

The transformation of Africa's agri-food sector and rural economy has a central role to play in meeting the challenge of providing jobs and livelihoods for these people.

What should be done – policies

The Task Force report recommends four strategic areas of action to be implemented over the medium to long term allied to six short-term initiatives aimed at securing early wins in development outcomes.

The four strategic areas for action are the following:

- Adopting a territorial approach in planning for income and job creation, highlighting the need for public and private investment and the provision of basic services in medium-sized towns and rural areas.
- Sustainable land and natural resource management, and climate action. The report identifies policies to sustainably manage Africa's land and natural resources and to use climate action to build resilience against the impacts of climate change.
- Sustainable transformation of African agriculture. The report proposes measures to achieve rapid inclusive agricultural growth, with a specific focus on family farming and building capacities in farmers' organizations, with African governments, societies and farmers driving the transformation.
- The development of the African food industry and food markets. The report recommends measures for development of local and regional value chains, increased private-sector investments, improved food-safety standards and more intra-African trade in agricultural and food products.

The package of short-term measures includes the development of an innovative local action programme adapted to African contexts; the fast-tracking of financing for food-related plans within African climate action plans; scaling up support for regional trade integration and food-safety systems; and facilitating twinning and exchange programmes.

How it should be done – Africa–Europe Partnership

The Task Force's central recommendation on how to achieve the transformation of Africa's agri-food sector and rural economy is through development of an innovative partnership between Africa and Europe. The partnership would be based on African political and policy leadership, supported by European experience, expertise and finance. It would operate at three levels: people to people; business to business; and government to government. Being long term in nature, it would involve policy dialogue, leading to policy consistency on both sides, and support for institutions necessary for the implementation of sound policy.

As with all ambitious proposals, the key challenge ahead will be whether or not the recommendations will be implemented. The political context within which the report has been launched is favourable. The European Commission and the African Union (AU) Commission have been supportive of the work of the Task Force and have welcomed its recommendations. In April 2019, the European Union Agri-Fish Council warmly supported the work of the Task Force, as did the Agriculture and Development Committees of the European Parliament in March 2019.

The crucial test will be whether the main policy recommendations are adopted by African governments and supported within Africa and Europe agricultural, development, trade and environmental policies that take into account the principles of policy coherence for development. The forthcoming third AU/European Union Ministers of Agriculture Conference will be an important opportunity for commitments to be made to policies aimed at generating sustainable and attractive jobs for African youth in the agri-food sector and rural economy.

In summary, the Task Force proposed a policy menu, to be adapted to local, national and regional circumstances. We stress the importance of giving the agri-food sector and rural economy a central role in national development strategy within Africa and in future African European partnership. To close with the last line in our Executive Summary, "We call on the AU and EU to ... put cooperation in the agri-food and rural sector at the heart of the relationship between the two continents."

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Luigi Scordamaglia, Managing Director of Inalca and President of Filiera Italia

Filiera Italia is a new organization that represents the main companies of the Italian food-processing industry system together with the Italian primary production sector represented by Coldiretti, the largest agricultural organization with more than 1.6 million Italian farmers. This represents a new kind of alliance, one that did not exist in the past when food industry and agriculture have been often in a conflictual relationship.

Improving the food system and making it more sustainable is not only a priority that cannot be delayed but also a direct responsibility for all of us as private sector. And it is our firm belief that Italy can offer an important model to inspire the rest of the world.

Italian agriculture has some important characteristics: it produces 35 percent less emissions of GHGs than the European Union-wide average; one hectare out of every ten is dedicated to organic farming; and it is a leader in the European Union for biodiversity, with 7 000 plant species and 58 000 animal species, 1 200 varieties of wine grapes and 533 olive cultivars despite Italy having only 0.5 percent of the earth's land area.

However, the real value of the Italian food system is the advanced level of technology and know-how in precision farming of many Italian firms. There are state of the art farms in Italy where the combined use of satellites and geo-referencing has doubled the yield per hectare even with traditional seeds while at the same time reducing use of herbicides by 40 percent and water use by 30 percent. These technologies allow each single square-metre of land to receive the optimal quantity of chemicals and needed water to maximize its productive potential. This avoids waste and leaves the land more fertile year after year. Together with Cassa Depositi e Prestiti, the Italian development bank, Filiera Italia is starting projects to transfer these technologies to some SSA countries. The

way to optimize agricultural resources is not to go back to primitive farming methods, as some would like, but to extend the use of the most advanced technology to as many farms as possible.

In the last ten years the Italian food industry has also halved the amount of water employed in the production process, reduced energy consumption and GHG emissions by 30 percent and reduced the amount of packaging used by 40 percent.

However, the challenge is not only to increase sustainability of production and consumption but also to deliver a higher-quality and balanced diet. Here as well, the Italian model has much to offer. Recently, a review of 41 different diets rated the Mediterranean diet as the best by far. The presence of every single food in the diet, without any arbitrary exclusion, makes it the most varied and balanced from a nutritional point of view. In 2018, the Bloomberg global health index ranked Italy as the healthiest country in the world, thanks to its dietary model. (in 2019, it was supplanted by Spain, another country that employs the Mediterranean diet.)

Fighting malnutrition and widespread obesity requires continuous commitment. This includes systematic valorization of traditional diets and improving production systems using advanced technology. These traditional diets are a fundamental heritage that must be preserved, as they provide a balance between taste, nutritional balance and the valorization of peculiar resources each given territory offers.

Recent efforts to promote a “universal diet” focus on a near-total elimination of meat consumption. This one-size-fits-all approach is not helpful. As noted by Gebregziabher Gebreyohannes (2019), Minister of Agriculture of Ethiopia, “in the developing world, milk, meat and eggs are necessary ingredients of the sustainable healthy diets we all strive for” and support the livelihoods of millions of people across Africa and Asia.

We must be very careful to identify the different interests behind such proposals. Many of these groups are financed by those who aim to distract our attention from other GHG emissions. While there is undoubtedly room to reduce the climate impact of food production, attempts to blame agriculture for all of these emissions is often a way to divert attention from the damage caused by the use of fossil fuels, which generate 64 percent of the total GHG emissions, as opposed to the 10.3 percent of the entire farming sector.

Why nobody is calling the attention to the fact that at any given moment there are roughly one million planes flying, each of them burning more than 150 t of fuel at any flight? It has been estimated that the quantity of GHGs emitted by a single person flying from Rome to Brussels is higher than emissions linked to the consumption of beef of one person for one year. Probably it is just a coincidence that the sponsors of these anti-traditional agriculture groups are entities closely linked to fossil fuels.

Nobody says also that some sponsors of anti-meat movements are those developing fake meat surrogates. Are we sure that eating a fake hamburger made up of 16 different ingredients which underwent chemical treatments or a molecular cultivation in a lab inside an antibiotics broth, is a healthier choice?

Do we really believe that the issue of food sustainability can be solved destroying the global agricultural production chain made up of billions of farmers, eliminating centuries old traditions, cultures and excellences while substituting all of this with a few chemical multinational or lab and pharma companies? Because this is the direction we risk going.

Improving the food system and making it more sustainable is a priority for all of us. However, the way to proceed must be based on solid scientific evidence and not on ideological dictates. Information campaigns are the main tool to educate citizens, while we discourage all forms of indoctrination, which impose on consumers what they have to buy. For this reason in Italy, all stakeholders – authorities, producers and consumers – strongly oppose all labelling systems based on nutrient profiles, such as traffic lights, black warnings or different nutri-scores tailor made for some companies or chemical ingredients. We will never be convinced by a labelling system that penalize quality products as Parmigiano Reggiano or olive oil and give green light to zero cola or other beverage or foods rich in synthetic sweeteners and chemical ingredients. This is not the future that we want.

In addition, it is clear that these systems do not lead to an improvement in public health. None of the countries which had adopted these labelling systems showed any decrease in obesity. Indeed, since the application of the black warnings, according to OECD data, obesity in Chile has increased at an even faster rate than before

and traffic lights have already been in force for six years in the UK and for five in Ecuador, but in none of these countries any improvement in public health was recorded.

It is quite easy to make up simplistic solutions to complex problems. However, simplistic solutions such as taxes or warning labels do not work against obesity or NCDs. A balanced diet does. A balanced diet is composed of different products and different ingredients: again the balance must be found in the whole diet, not in the single products. All foods should be part of a healthy diet if each one is consumed in its appropriate amount.

In conclusion, we all are perfectly aware of how much is at stake and that business as usual is no longer an option. But we must be cautious and not opt for simplistic or instrumental solutions which in the end might turn out to be worse than the issue itself. On this challenge, we cannot afford any mistake.

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Bela Gil, chef, author, TV show host and food activist

One of the biggest side effects of the modernization of the food system is the divorce of humans from nature. Most people in urbanized areas have lost their connection with soil, plants and ultimately food. Some people do not even know where their food is coming from, who is growing or processing it and what the major impacts of their food choices on the environment are. Clearly, we have a food system that contributes to global warming, to food waste, to the depletion of natural resources, to the concentration of power, to poverty, to hunger and to the obesity epidemic. The driving force of the modern food system is profit, where the benefits of growing, distributing, selling and buying food must outweigh the costs of doing so, despite the ecological, social and economic consequences. Building a resilient, fair and sustainable food system, in which good-quality food in sufficient quantity is available for all people, requires a fundamental change in the production, distribution and consumption of food. There are many players involved in the construction of a healthy food system, from private to public sectors, from government to society, and from farmers to consumers; chefs are a critical group that can help bring about change to the food system.

In order to transform the food system for better, the food must be better. To get healthy food out of the ground, the soil and the producers must remain healthy. Only through a holistic approach to food that considers the health of the consumers, producers and the environment can we can achieve a healthy food system. Food is a crucial tool to change the world for the better and the change can start on our plate. Today, chefs have achieved an influential position in society that allows them to use their skills, techniques and voices to change people's choices and behaviours. Eating has become a political act, and cooking a revolutionary act. Chefs can support or destroy the construction of a resilient, fair and clean food system depending on how much, how and what they choose to cook.

Biodiversity

Chefs are connected to the production, distribution and consumption of food and therefore they can directly influence each one of these aspects. The fundamental tool for the work of a chef is the ingredient. The better the ingredient, the better the food. Chefs who care about the quality of their food must care about how it is produced. The most brilliant chefs worldwide either have their own organic gardens or develop a strong and long relationship with the local farmers who provide the ingredients for them. This direct relationship with farmers is mutually important in order to sustain the supply and demand for quality ingredients. One movement that has been growing and benefits farmers are the community-supported agriculture systems in which chefs and consumers in general can purchase a share of the farmer's production, helping both parties avoid material and financial loss.

Chefs also have a great importance in promoting and supporting local biodiversity. The innovation in the kitchen is to rethink what is food. The planet provides us with 30 000 species of edible plants and yet we eat only 200 of them. This lack of biodiversity on the consumer's plate is reflected in the advance of monoculture crops and consequently in the degradation of the environment. To protect biodiversity, we need to eat biodiversity. That is

why chefs, farmers and consumers must come closer and work together to improve the whole food system and fight its standardization. Diversifying the diet is one of the most efficient ways to preserve biodiversity. By cooking with ancient grains, wild edible plants and local indigenous ingredients, chefs can improve the nutritive value of their food, preserve the environment and support traditional communities.

Food waste

Another great flaw of the current food system is the amount of food going to waste. One-third of the food produced worldwide is lost and wasted on farms, during transportation, at restaurants and at home. Therefore, chefs and consumers have a huge responsibility when it comes to reducing food waste to combat hunger, malnutrition and climate change. Food waste that ends up in the landfill creates GHGs that provoke global warming. Innovation is the key word to change food culture, agriculture, production and consumption of food. For instance, many of us know and consume watermelon, bananas and coconuts but very few see see potential food in their peels. The stalks of collard greens, watercress, arugula, cilantro and parsley have spectacular flavour and texture but often will simply be thrown away. Seeds of papaya, pumpkin and jackfruit can be used in incredible recipes that many people even doubt exist. Radish, cauliflower, broccoli, beetroot and carrot leaves are hardly sold in the markets but are very nutritious and make delicious recipes. If we are to make healthy eating more democratic, it is very important to make the ingredients popular first. The purpose of chefs is to show that the melon peel has the culinary potential of a chayote, the papaya seed of a black pepper and that the broccoli leaf can perfectly replace a collard green.

Activism

With the influential work of chefs and an innovative approach in their kitchens, it is possible to achieve a social demand for good, clean and fair food. Chefs can directly support local farmers and indigenous communities, protect the environment, reduce food waste, influence people's demand for better-quality food and raise awareness about the flaws of the current food system that interferes with our human development. The democratization of healthy food and the fight against food waste and hunger will occur with the transformation of agriculture and food culture. Chefs can put information into practice and make dishes that create transformation in the world.

Alison Cairns, Director, Food Systems Transformation, Food and Nature Program, World Business Council for Sustainable Development

Our future depends on our ability to create a food system that supports healthy people and a healthy planet. Current food systems are outstripping the resources of the planet while current diets are resulting in global health crises of both over- and undernutrition. All this will be amplified by a continuing growth in population and changes in dietary habits.

Food systems – all the processes involved in feeding the global population – are key to supporting good health and well-being and are a critical part of the biosphere underpinning prosperous societies and economies. Yet current food systems are not providing for people or the planet. Despite progress on improving nutrition, the burden of malnutrition remains stubbornly high: 821 million people are hungry, 2 billion are deficient in critical micronutrients, and 2.1 billion adults are overweight or obese, contributing to the upsurge in diet-related diseases. Beyond nutritional outcomes, food systems are also a main contributor to environmental damage, responsible for 19–29 percent of GHG emission and agriculture being responsible for 70 percent of available global fresh-water use and driving deforestation, biodiversity loss and land degradation. Businesses are a crucial element of food systems as nearly all food consumed around the world is produced, processed or supplied by them, whether large agribusinesses, smallholders or SMEs. This puts large and small businesses at the heart of the food-system transformation.

Achieving this vision of healthy people and a healthy planet will require unprecedented global collaboration, which must urgently move several levers of system transformation at the same time through a four-part transformation to address challenges facing nutrition and health, biodiversity and ecosystems, climate resilience and GHG mitigation and livelihoods and human rights.

The role of business

Business leadership is required across the value chain to achieve food-systems transformation. It must do this by developing and implementing ambitious science-based solutions that reflect regional and cultural preferences.

Publications such as the EAT-Lancet Commission report, *Our food in the Anthropocene: Healthy diets from sustainable food systems* (Willett *et al.*, 2019), outline scientific targets that will continue to be contested as we build towards consensus, intertwined with the SDGs and the Paris Climate Agreement, to establish boundaries to achieve healthy diets from sustainable food systems.

Ambitious science- and evidence-based business solutions will transform food systems within those boundaries through innovation, valuation and collaboration, keeping people at the centre in ways that are equitable and responsible because only a just transition will deliver this promise.

Innovation

Innovative solutions are required to help shift towards healthy diets and address food loss and waste, as are technology and management-related changes in sustainable and healthy agriculture and food production. The Sustainable Rice Landscapes Initiative, for example, is a partnership between FAO, the World Business Council for Sustainable Development (WBCSD), the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), the International Rice Research Institute (IRRI), Sustainable Rice Platform and United Nations Environment which is working with governments and across the value chain at landscape and policy levels to drive adoption of proven climate-smart best practices and innovative technologies to reduce the environmental footprint of rice, as well as link farmers to markets.

Valuation

Understanding how we value food is an essential part of the transition and has been an important step for other transitions. WBCSD led the development of the Greenhouse Gas Protocol with the World Resources Institute (WRI) in 2001 (WBCSD and WRI, n.d.), the Natural Capital Protocol in 2016 (NCC, n.d.), Social & Human Capital Protocol in 2018 (WBCSD, 2019) and the COSO-WBCSD Enterprise Risk Management Guidelines (2018). WBCSD's work on the true value of food strives to advance how we measure and value the impacts generated by agri-food companies, the dependencies of companies on natural, social and human capital, and the risks of continuing business as usual. We aim to help inform decisions today to mitigate risk in the future. We see impact valuation and risk assessment as levers to drive the food-system transformation forward, advancing the SDGs and the Paris Climate Agreement through corporate leadership by the agri-food sector.

Ever deeper collaborations

Participate in key global policy mechanisms and platforms, such as Food Systems Dialogues (FSD; <https://foodsystemsdialogues.org/>), public-private partnership and strategic dialogues to drive development of science-based targets for food systems and better define business solutions.

In 2018, FReSH (Food Reform for Sustainability and Health) together with EAT and facilitated by Convene held a series of three Science to Solutions Dialogues that brought together business scientists, academic scientists and civil society to discuss specific rub issues and scope out business solutions. The discussions have helped sensitize and socialize the science with the business community, which is an important precursor to action on the ground.

WBCSD is a founding member of the FOLU which brings together science, modelling, business- and country-led action and the FSD, curated by World Food Prize winner David Nabarro, which encourages dialogue, understanding and agreement in order to more rapidly bring about transformation of the food systems both local and global.

In summary, business leadership and action are essential ingredients of what it will take to transform the food system.

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David Salt, Director Future Food Beacon of Excellence, University of Nottingham, UK

Local food, global systems, and community innovations: How a transdisciplinary research platform functions to create future food solutions

In 2014, José Graziano da Silva, the Director-General of FAO, reminded us that “To ensure food security you cannot simply give a person bread” (FAO, 2014). He urged researchers and development specialists to see food and nutrition security as something inextricably tied to production, management, and culture and rights. Working on all three themes together is essential in order to sustainably develop solutions for and with communities that take into consideration both local and global knowledge systems. Here, we argue for transdisciplinary and community-focused research, using the activities of the Future Food (FF) Beacon of Excellence, a challenged-based research cluster at the University of Nottingham (United Kingdom of Great Britain and Northern Ireland), as a case study. As an open research platform, FF positions community members as knowledge keepers who have always practised food security. We present specific information about FF projects and activities that examine the three key themes of food culture for resilience, improved livelihoods through food and big data mining for enhanced nutrition as practical pathways to change food systems for enhancing food and nutritional security in a global context. These themes specifically focus on: (i) ways that a displaced community historically developed its own subsistence culture; (ii) the benefits of co-producing knowledge regarding post-harvest processing of crops such as cacao; and (iii) geonutrition – geographically-informed approaches to improve estimates of micronutrient deficiency risks. Drawing on these diverse research projects in FF, we highlight the importance of adopting methods that co-develop knowledge in partnership with communities. In positioning the local within the global, we bring to the fore community innovations that have the potential to shape the future of food.

Food culture for resilience

Geographies of Black Protest is a networking grant funded by the British Arts and Humanities Research Council tied to the United Nations International Decade for People of African Descent 2015–2024. This collaborative project, led by Karen Salt (University of Nottingham) has assembled archival information, worked with community organizations, trained youth leaders and begun cataloguing the strategies of survival within various sites in the African diaspora. The network asks, “what forms have protest, justice, survival and resistance taken across the African diaspora?” and “what can be learned by sharing them with others?” Research for Geographies of Black Protest has made clear the centrality of power, environmental racism, food sovereignty and civil rights within the communities that we have encountered – something that is vividly apparent in the tangled history of Africville, Nova Scotia.

Africville was an African-Canadian village located just north of Halifax on the southern shore of the Bedford Basin. It was founded in the mid-eighteenth century and the inhabitants of this village came from various places and situations, including runaway enslaved people, Black Loyalists from the War of 1812 and Jamaican Maroons. The rural community was self-sufficient (as fisherfolk and smallholders), culturally rich and had strong community ties;

however, the constant economic exploitation of the residents by the City of Halifax, which also dumped toxic and dangerous by-products around the community, resulted in the systematic oppression of the Black community. After years of neglect and ill-treatment, by 1967 municipal officials had demolished the seaside community and dispersed the residents throughout the city. The story of Africville, although not well known outside of Canada, is typically told as a tale of oppression, environmental racism and governmental neglect. Our research suggests an important and new avenue that needs to be told: the centrality of food to the community's survival. Descendants of Africville residents and others who are keeping the history and traditions of Africville alive, including the Black Cultural Centre for Nova Scotia, the Africville Heritage Trust, the Africville Museum and the Africville Genealogy Society, are helping to tell and shape Africville food stories. We are planning a series of educational and cultural workshops around food and food cultures in Africville that will form the core material, along with Africville reunion festivities, around a series of films: *Justice through food: A tale of Africville*. Our partners in Nova Scotia are keen to screen the films and to help co-develop the content. We see this work as instrumental to helping us change the narrative of marginalized people from one of dispossession to one of adaptation and knowledge. Co-produced workshops and activities with the local community will include:

- planting a plot in the form of a typical Africville smallholding, using archival material as sources and knowledge from elders; this workshop will focus on educating young people about food, agricultural practices and subsistence within Africville;
- gathering recipes, food stories and agricultural practices with elders through conversations, writing and photography; and
- filming food preparation, archival materials and ancillary workshops in conjunction with the Africville Reunion.

Improved livelihoods through food

The cocoa market is segmented into bulk (95 percent) and fine/flavour (5 percent) sectors. Fine/flavour offers a range of fruity and floral tastes, in addition to the typical cocoa flavour, fetches a premium price over bulk cocoa and is used by boutique bean-to-bar chocolate producers. Colombia is known for its fine/flavour cocoa and connecting smallholder female cocoa entrepreneurs in Colombia to bean-to-bar boutique chocolate makers and consumers offers an opportunity to improve these farmers' livelihoods.

Fermentation carried out on farms not only removes the pulp from cocoa beans but also converts cocoa beans into the good-tasting and full-flavoured beans used for chocolate. The challenge is the inability of small farms to produce high-quality cocoa beans due to the largely uncontrolled fermentation carried out on-farm. Because fermentation happens naturally by microbes from the environment, uncontrolled fermentation can vary widely, giving rise to big differences in the quality of the cocoa beans. Enhancing fermentation offers new opportunities to improve the flavour and quality of chocolate. A project funded by Innovate UK Agri-tech Catalyst and led by David Salt (University of Nottingham) is increasing our understanding the nature of this fermentation using cutting-edge real-time in-field genomics technologies, coupled with chocolate making and taste panels. This partnership is working to optimize on-farm fermentation using appropriate practices to improve the fermentation process to yield high-quality cocoa beans to produce chocolate with enhanced flavour and quality. Linking Colombian female smallholder cacao growers with bean-to-bar businesses in the United Kingdom of Great Britain and Northern Ireland allows smallholder growers to sell cocoa beans directly to international chocolate makers, obtaining a significant price premium for their beans and presenting a unique business opportunity for the premium chocolate makers. This offers a real financial opportunity for both the Colombian farmers and premium chocolate maker as the premium chocolate market is expected to expand at 7–10 percent over the next 5 years.

Working with the National Federation of Cacao Growers, Colombia (FEDECACAO) we have identified the three key premium cacao growing regions in Colombia – Santander, south of Antioquia and Huila – and are actively working with female smallholder cacao growers from these areas. FEDECACAO employees work directly with these smallholders to co-create appropriate on-farm practices for optimization of cocoa fermentation for enhanced chocolate flavour and quality. The adoption of innovations in on-farm cocoa fermentation by smallholder growers to drive enhanced chocolate flavour and quality will be facilitated by working directly with Vegan Chocolates by Luisa Limited (VCBL), a bean-to-bar premium chocolate maker, through direct visits with smallholder cacao farmers in Colombia. VCBL is an SME based in the United Kingdom of Great Britain and Northern Ireland with a

strong policy of working with women-only businesses. VCBL is working closely with the Colombian cacao growers to evaluate their raw cocoa beans and produce consistent chocolate samples for taste and market testing. These visits by VCBL are allowing exchange of product development and marketing ideas with the female farmers and building new supply chains connecting Colombian smallholder cacao growers directly with an innovative bean-to-bar premium chocolate maker and the consumer. Adoption of innovation in cocoa fermentation will be scaled through train-the-trainer knowledge exchange events at the International Fine Cocoa Innovation Centre (IFCIC) in Trinidad and Tobago. The IFCIC has an established programme of cocoa-sector-facing knowledge transfer and is ideally situated within the Latin America and Caribbean region to deliver culturally appropriate knowledge transfer events for the project.

Big data mining for enhanced nutrition

Dietary micronutrient deficiencies (MNDs) are widespread in SSA. Micronutrient deficiencies impair growth, cognitive development and immune function, especially in women and infants. Our team has pioneered data-dense geographically-informed approaches to improve estimates of micronutrient deficiency risks along the agriculture–nutrition–public health axis. The GeoNutrition project, funded by the Bill & Melinda Gates Foundation and led by Martin Broadley (University of Nottingham), is working to support policy decisions that seek to reduce MNDs by the governments of Ethiopia, Malawi and the wider region through (i) mapping soil–crop–human micronutrient linkages and uncertainties for Ethiopian and Malawian cropland areas; (ii) testing the efficacy of eating flour (teff in Ethiopia and maize in Malawi) enriched with zinc and selenium from fertilizers (agronomic biofortification) in areas with a high prevalence of MNDs; (iii) mapping the socio-economic and ethical dimensions of agronomic biofortification and wider public health policies to address MNDs; and (iv) facilitating and sustaining government engagement in research and development by strengthening existing training networks.

The primary project output is multidisciplinary evidence to support policy decisions across the agriculture–nutrition–public health axis. Evidence includes maps of baseline soil and food composition and micronutrient status and linked health metrics, together with estimates of associated uncertainties. Expected outcomes are policy changes to stimulate improved nutrition, especially among the most disadvantaged groups. In the short term, these are likely to include costed modifications to national micronutrient surveys, food composition/ consumption surveys and data sharing practices for improved statistical and logistic efficiency. In the medium term, policy reviews of fertilizer recommendations, information provision and dialogue with farmers and stimulation of interactions with the private sector are expected. The longer-term impact of policy changes is to contribute to reducing the health, social and economic costs of MNDs. Good nutrition underpins all of the SDGs. This multisectoral initiative brings to the fore government agencies, universities and extension services in Ethiopia and Malawi, including the University of Malawi and Lilongwe University of Agriculture & Natural Resources. To ensure high-quality outputs are delivered to policymakers, including effective data management and communication pathways, this project is also supporting high-level policy-relevant research training opportunities in national universities and research institutes.

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Boyd Swinburn, Professor of Population Nutrition and Global Health, University of Auckland, New Zealand

There are three key issues around what we have ahead of us.

First, the great intergenerational food transformation: how is this generation (our generation) going to transform the food systems within one generation for future generations? Although we have the power to do so, this transformation is very difficult. For this to happen we have to start looking at things in a systems way, and only then one can realize why we have the food system that we have. We cannot blame the food system; the food system is not broken, it is producing exactly the outcomes that it is designed for. Furthermore, one can also see

why we must change it given the damage that it is producing to the ecological environment and humans.

The reasons why it is so hard to make changes in food systems include:

- industry pushback
- government reluctance
- lack of demand for action and pressure from civil society.

A lot has been said about demand when we talk about food systems but the demand that we have got to create is the demand for policy action to redesign food systems.

Second, with reference to Kate Raworth and her *Doughnut economics* (Raworth, 2017), we need a model that gives purpose to economics above and beyond what currently seems to be the drive, which is to increase profits and GDP. In Raworth's model, used by the EAT-Lancet Commission, the doughnut is the zone where we want to be; the middle – the hole – is where we have people who are undernourished, who are obese, who are getting NCDs – people who are being failed by the food system. On the outside of the doughnut is where we are exploiting and overshooting our environmental boundaries. According to Raworth, the purpose of economics is to pull us up to achieve our human potential and to prevent us from going beyond planetary boundaries. Keeping within the doughnut is good for the food system and good for us.

Third, many people use a socio-ecological model where people are in the centre, embedded in the food environment that they interact, with the wider food systems outside that and then the governance systems. Using this approach, we try to understand why a person has diabetes or obesity and to do this we start by looking inside the individual to find the answers. However, to transform our food systems we have to turn this model inside out and put power, governance and the levers of governance – economics, rules, policies and sitting norms – at the centre. By turning the socio-ecological model inside out like an onion ring allows us to start addressing the issues that are important to us while enabling a transformation.

These mental models (the great intergenerational food transformation, doughnut economics and onion rings) provide a start point for addressing the food-system transformation that is needed. But to make that change happen will require activism from CSOs; you cannot expect the food system to move beyond the economic incentives and disincentives, rules and policies they have to operate under or for governments to move unless they are pressured to move. It is through activism that pressure can be created.

Even in New Zealand, where 50 percent of the GHGs we produce come from food production and where food is the biggest cause of health-related issues and a lot of inequalities, we do not have a food agency that can regulate the food sector. Clearly, we have a lot of work to do and that starts with these mental models.

To answer the question regarding what it takes to transform food systems: We need to do one thing and that is everything.

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Symposium closing session

Closing remarks

José Graziano da Silva, FAO Director-General

This is just the beginning of a long way forward. My vision is that we have been looking to end hunger since our beginning, our founders linked the war with hunger. The production side was devastated by war, the main focus was Europe. The Green Revolution changed FAO's life, hunger decreased, but then came back again due to conflicts, climate change and reduction in economic performance by developing countries. Malnutrition was growing, micronutrient deficiencies, overweight and obesity. We agreed to eradicate hunger through the SDGs; the global commitment to end hunger was made in 2008 – the first time ever that we agreed to end hunger (instead of just halving it, which was the commitment of the Millennium Development Goals). In 2015 we changed it to eradicating hunger, yet the number of people who are hungry is going up again after 20 years of decline. On top of this, obesity is growing even faster than hunger. Soon we will see more obese people than hungry people. We realize that the problem is not only lack of food but malnutrition – from hunger to obesity we are talking about malnutrition. This informs the work we do in FAO, not only to improve production but to consider food systems and the impact of urbanization, the entire life, incorporating more elements in our analysis.

We are faced with more and more new challenges. One of the biggest challenges we face is ultra-processed foods. They are not foods but imitations made of artificial components, and form the base of this global epidemic of obesity. No one disagrees with the zero hunger initiative – but I doubt that we would have the same support for a zero obesity initiative.

We must change the costs of food – making local food and nutritious food less expensive and making processed foods more expensive by applying taxes and limiting propaganda. The World Bank is analysing all programmes combating malnutrition and the results at country level. The same projects have different impacts in different cultures. It is not easy to find a solution. We are just beginning this effort. We have some evidence, enough to act; we need urgent action. We are talking about an epidemic issue. This will compromise the future of all generations, women, men developed countries, developing countries. To promote healthy food and healthy diets, we need healthy soils and healthy seeds and sustainable agricultural practices.

It is not a government issue; it is society that decides to eradicate hunger, and it is the same for malnutrition. If we do not have CSOs on board with governments, we will not achieve much. Private sector, civil society, academia, young and old people should be on board if we want to achieve great results. We believe academics can do a great job in providing the scientific evidence we need to implement policy measures. Thank you all for being here with us these two days. We look forward to continuing our work with you. We cannot do it alone. We know this very clearly, thank you.

ANNEXES

Annex 1. Symposium programme

Day 1

10 June 2019

| Time | Agenda |
|-------------|---|
| 9:00–10:30 | FAO Director-General's roundtable with partner academia representatives (by invitation only) |
| 11:00–11:05 | Chair: Roberto Ridolfi, Assistant Director-General, Programme Support and Technical Cooperation Department, FAO |
| 11:05–11:15 | Opening Welcome Statement José Graziano da Silva, FAO Director-General |
| 11:15–12:00 | Remarks <ul style="list-style-type: none">• Hilal Elver, Special Rapporteur to the Right to Food, Office of the United Nations High Commissioner for Human Rights• Tedros Adhanom Ghebreyesus, WHO Director-General (video message)• Sandy Thomas OBE, Director, Global Panel on Agriculture and Food Systems for Nutrition• David J. Lane, President of the Annenberg Foundation Trust• Mario Arvelo Caamaño, Chairperson, Committee on World Food Security |
| 12:00–14:00 | Lunch break * |
| 14:00–14:05 | Chair: David Nabarro, 2018 World Food Prize Laureate, Curator Food Systems Dialogues, London |
| 14:05–14:35 | PANEL 1: Research, Knowledge Gaps and Needs for Sustainable Food Systems and Healthy Diets Keynote: Corinna Hawkes; Director of the Centre for Food Policy, City, University of London |
| 14:35–15:25 | Panelists <ul style="list-style-type: none">• Marcela Villarreal, Director, Partnerships Division, FAO• Rob Knight, Professor of Pediatrics, Bioengineering, Computer Science and Engineering, University of California, San Diego, USA• Carlos Monteiro, Professor of Nutrition and Public Health, University of São Paulo• Sara Roversi, Founder, Future of Food Institute• Grace Marquis, Associate Professor, School of Human Nutrition, McGill University |
| 15:25–15:55 | Q&A Session |
| 15:55–16:10 | Summary by the Chair |
| 16:10–17:10 | Signature of MoUs with academia partners |

Day 2

| Time | Agenda |
|-------------|---|
| 09:00–09:05 | Welcome Statement: Máximo Torero Cullen, Assistant Director-General, Economic and Social Development Department, FAO |
| 09:05–09:10 | Moderator: Paul Amuna, Subject Matter Expert in Research, Primary Health Care Corporation, Qatar |
| 09:10–09:40 | PANEL 2: Governance of Food Systems for Healthy Diets Keynote: Senator Guido Girardi, author of the Chilean Nutritional Labelling and Advertising Law, Senate of the Republic of Chile |
| 09:40–10:30 | Panelists <ul style="list-style-type: none"> • Patrick Mink, Co-Chair of the Multistakeholder Advisory Committee of the One Planet (10YFP) Sustainable Food Systems Programme, Switzerland • Mariam Harib Sultan Al Yousuf, Executive Director of the Abu Dhabi Food Control Authority • Rickard Bjerselius, Head of Team Risk-Benefit Management And Environment, Swedish National Food Agency • Visith Chavasit, Professor, Institute of Nutrition, Mahidol University, Thailand • Stefano Prato, Managing Director and Editor, Society for International Development |
| 10:30–11:00 | Q&A Session |
| 11:00–11:10 | Summary by the Moderator |
| 11:10–11:25 | Break |
| 11:25–11:30 | Moderator: Catherine Geissler, International Union of Nutritional Sciences, Secretary General, Professor Emerita of Human Nutrition, King's College London |
| 11:30–12:00 | PANEL 3: Building Consumer Confidence in Food Systems Keynote: Marion Nestle, Paulette Goddard Professor of Nutrition, Food Studies, and Public Health at New York University and author of "Food Politics" |
| 12:00–12:50 | Panelists <ul style="list-style-type: none"> • Tim Lobstein, Director of Policy, World Obesity Federation • Simona Castaldi, Research Project Manager, Barilla Center for Food and Nutrition • Amos Laar, Senior Lecturer, University of Ghana • Justin Macmullan, Advocacy Director, Management Team Member, Consumers International • Sharada Keats, Senior Associate – Policy and Advocacy, Global Alliance for Improved Nutrition |
| 12:50–13:20 | Q&A Session |
| 13:20–13:30 | Summary by the Moderator |
| 13:30–14:00 | Lunch break |

| Time | Agenda |
|---------------|---|
| 14:00–15:00 * | <p align="center">High Level Event on the Mediterranean Diet with the Directors-General of FAO, CIHEAM and UNESCO *</p> |
| | <p align="center">Introduction: José Graziano da Silva, FAO Director-General</p> <p align="center">Opening Statements:</p> <ul style="list-style-type: none"> • Plácido Plaza, Secretary General of CIHEAM • Audrey Azoulay, UNESCO Director-General (video message) • Gaetana Ferri, Director General for Food Hygiene, Safety and Nutrition, Ministry of Health, Italy <p align="center">Keynote: Adherence to the Mediterranean Diet: from Analysis to Food Systems Intervention – Farah Naja, Associate Professor, Department of Nutrition and Food Sciences, American University of Beirut</p> <p align="center">Moderator: Anna Lartey, Director, Nutrition and Food Systems Division, FAO</p> |
| | <p align="center">Q&A Session</p> |
| | <p align="center">Concluding remarks: Marcela Villarreal, Director, Partnerships Division, FAO</p> |
| 15:00–15:05 | <p align="center">Moderator: Patrick Webb, Alexander McFarlane Professor, Friedman School of Nutrition Science and Policy, Tufts University</p> |
| 15:05–15:35 | <p align="center">PANEL 4: Transforming Food Systems: What does it take?</p> <p align="center">Keynote: Jessica Fanzo, Bloomberg Distinguished Associate Professor, Director of Global Food Ethics and Policy Program, John Hopkins University</p> |
| 15:35–16:35 | <p align="center">Panelists</p> <ul style="list-style-type: none"> • Tom Arnold, Chair of Task Force on Rural Africa established by the European Commission • Luigi Scordamaglia, Managing Director of INALCA and President of Fileria Italia • Bela Gil, Chef, Author, TV show host and Food Activist • Alison Cairns, Director, Food Systems Transformation, World Business Council for Sustainable Development • David Salt, Professor of Genome Enabled Biology, University of Nottingham • Boyd Swinburn, Professor of Population Nutrition and Global Health, University of Auckland |
| 16:35–17:05 | <p align="center">Q&A Session</p> |
| 17:05–17:15 | <p align="center">Summary by the Moderator</p> |
| 17:15–17:25 | <p align="center">Closing Remarks: José Graziano da Silva, FAO Director-General</p> |

* A light lunch will be provided behind the Sheikh Zayed Centre to participants attending the High Level Event on the Mediterranean Diet, from 13:30 to 14:00

ANNEX 2.

Academia Perspective Round Table dialogue

The Academia Perspectives Round Table was organized to set the stage for addressing one of today's most pressing challenges, i.e. to ensure healthy and sustainable diets by 2030 and, most importantly, the role of academia, as scientific, independent and critical thinkers, in setting the course to meet this goal. More than 40 representatives from universities and research institutions across the globe, many of them FAO partners, gathered at the Academia Perspectives Round Table.

The Director-General of FAO, José Graziano da Silva, opened the Round Table, stating that academia has a key role in generating the scientific evidence that is key for establishing policies that support sustainable food systems. He recognized that food systems must be based on sustainable, safe and nutritious foods and that current societal diet choices based on ultra-processed foods are the number one contributor to rising obesity and related NCDs. The Director-General noted that earlier in June 2019, the United Nations celebrated its first World Food Safety Day, which highlighted the fact that food safety is everyone's business and that without food safety there is no food security.

Roberto Ridolfi, Assistant Director-General, Programme Support and Technical Cooperation Department of FAO, spoke on the need for research and knowledge to fill gaps and needs for sustainable food systems. He noted that innovations can be the solution for a new sustainable food system that fulfils human needs and takes into consideration environmental impacts. Mr Ridolfi highlighted that universities and research centres have a key role in generating research for interdisciplinary approaches and solutions that can facilitate uptake to overcome challenges linked to food systems.

Six pre-selected academia representatives were asked to present the regional challenges in achieving healthy food systems and the role of academia to ensure healthy and sustainable diets by 2030.

Florence Nakayiwa, Deputy Executive Secretary, Planning Resources Mobilization and Management Director of the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM), emphasized that Africa is a predominantly youthful continent with increasing urbanization, changing food production and consumption patterns and lifestyles. She emphasized that technology, policies and access to market systems must be scaled up to improve smallholder productivity and that women need greater empowerment to achieve food security in Africa in a sustainable manner. Evidence-based policy interventions and capacity-building will be key to achieving the 2030 Agenda, she said.

Matthew Morrell, Director General, IRRI, the Philippines, told participants that rice is the most important crop in Asia and that rice, which is embedded in socio-economic, political and cultural lives, is being adversely affected by climate change. Research, innovations and technologies are improving rice productivity, resilience and sustainability but knowledge gaps are limiting their uptake and collaborations to develop capacities and pooling of resources are needed for achieving food and nutrition security by 2030.

Seta Tutundjian, Director of Programs, International Center for Biosaline Agriculture, Dubai, United Arab Emirates, informed the Round Table that the Near East and North Africa region is witnessing an increase in hungry and undernourished people. This rise of food insecurity is driven by climate change and armed conflict and is exacerbated by the high reliance of many countries in the region on imported food. Further, dietary patterns are changing, largely due to rapid urbanization, which is contributing to the rise of overweight, obesity and malnutrition. To overcome these challenges, significant changes are needed which must be based on data, innovative and resilient food systems and policy interventions.

Carlos Monteiro, Professor of Nutrition and Public Health, University of São Paulo, Brazil, emphasized that academia has a special role in generating key evidence on which to base sound policies and key actions to preserve, protect and promote sustainable food systems and diets. Mr Monteiro provided one example of studies on the influence of food processing on the quality of human diets and its impact on health and disease through the NOVA food system. Under these studies, NOVA was applied to national dietary studies across Latin

America and beyond which resulted in four national dietary guidelines being established and further contributing to the PAHO Nutrient Profile Model. This helped reinforce policies and strategies to prevent, reduce and control overweight and obesity for healthier lives.

Michael Roberts, Executive Director for Resnick Center for Food Law and Policy, University of California, Los Angeles, United States of America, spoke on the need for legal tools (policies, regulations, frameworks) for good governance for addressing hunger, malnutrition and sustainability as a means to achieving food equity and food justice. Comprehensive laws can fill knowledge gaps to create good governance in four ways, he stated, including delivery of accurate scientific evidence and information; establishment of rules for healthy diets; accountability of stakeholders; and standardizing norms related to food such as human rights and equality.

Ruerd Ruben, Research Coordinator, Wageningen University & Research, the Netherlands, focused on Europe's four challenges and priorities for sustainable and healthy food and farming systems. These include economic considerations such as making a living through farming; transitioning to healthy and balanced diets; establishing circular food economies such as through reducing food loss and waste and energy efficiencies; and integration of policy frameworks that support production to consumption.

The floor was then opened to all the delegates for interventions on achieving healthy food systems by 2030. The participants highlighted that sustainable and healthy diets will require multidisciplinary interventions across many fields, including gender parity; generation and uptake of innovations; holistic dietary pattern assessments; consideration of ecosystem perspectives; increasing public awareness and knowledge on sustainability of food and diet; transfer of knowledge across the value chain; youth empowerment; raising private-sector engagement; demands for statistical evidence; better consumer–diet–health methodologies; development of policies to enforce accountability; greater intellectual space; improved food-labelling laws; strengthening knowledge linkages to policy-setting; and increased and more responsible investments.

Marcela Villarreal, Director, Partnerships Division of FAO, closed the Round Table by presenting consolidated conclusions from the morning's dialogue. The main point highlighted was that a future with healthy and sustainable food must be addressed through a food-systems perspective, which is complex and interconnected. It will require creating an environment that supports governance mechanisms and incentives, which must further consider the food and health nexus, be based on sustainability of resources and will require sound policies.

The conclusions of the Academia Perspectives Round Table were presented by Ms Villarreal in Panel One of the Symposium on the Future of Food and are included in Chapter 2 of the Proceedings.

ANNEX 3.

Signature of MoUs with academia partners

This session was organized to sign seven new memoranda of understanding (MoUs) with academic institutions and thereby strengthen FAO's collaboration with academia to address the most pressing matters related to sustainable and healthy food systems.

In 2013, FAO developed its organization-wide strategy for partnerships. Since then, the Organization has developed more than 150 partnerships which contribute to the achievement of the common vision for a food-secure, sustainable and healthy future. FAO partnerships with academia play an important role in terms of strengthening knowledge and expertise exchange, generating research, innovative approaches and solutions to close existing knowledge gaps, and raising awareness on challenges linked to food systems.

At the opening of the signing ceremony, José Graziano da Silva, Director-General of FAO, stressed the importance of knowledge, experience and vision to address challenges for sustainable food systems and healthy diets and achieve the SDGs. He recalled that SDG 17 recognizes the need for partnerships at global, regional, national and local levels to implement Agenda 2030. He further noted that partnerships are at the heart of FAO's mission to build consensus for a world without hunger, and that through alliances with academia and other stakeholders, FAO aims to combine knowledge and resources and develop multidisciplinary approaches to food security and sustainability for our planet.

During the ceremony, the Director-General signed MoUs with the following academic institutions:

American University of Beirut, Lebanon, represented by Rabi Mohtar, Dean, Faculty of Agriculture and Food Sciences. Joint activities will focus on increasing capacities for sustainable management of natural resources and climate change adaptation in Lebanon and in the Near East and North African region in support of sustainable food and agriculture and sustainable food production systems for smallholder farmers.

Future of Food Institute, represented by Sara Roversi, Director and Founder. The collaboration will aim to improve agricultural education through uptake of e-learning products, promote multistakeholder engagement for the SDGs and raise awareness on food loss and waste issues.

Johns Hopkins University, United States of America, represented by Jessica Fanzo, Bloomberg Distinguished Associate Professor. Joint efforts will be made to raise awareness on food systems governance through interdisciplinary policy-focused research on nutrition, facilitate institutional knowledge exchange and develop communication materials.

Mediterranean Universities Union (UNIMED), represented by Francisco Matte Bon, President. The collaboration will improve agricultural education through enhanced uptake of e-learning products and access and training to research tools, and collaboration through UNIMED thematic subnetworks.

University of California, Los Angeles, United States of America, represented by Michael Roberts, Executive Director of the Resnick Center for Food Law and Policy. Proposed activities include development of legal policy and frameworks on food security and nutrition, food safety and quality laws, and laws on consumer-protection and food fraud.

University of Nottingham, United Kingdom of Great Britain and Northern Ireland, represented by David Salt, Professor. Joint activities will aim to improve policies for inclusive and efficient food systems in Latin America, scale up policies and practices on sustainable nutrition-sensitive agriculture, strengthen urban food agenda policies and develop capacities on nutrition.

University of the Philippines Los Baños, the Philippines, represented by Fernando Sanchez Jr., Chancellor. It is foreseen to work with the University to strengthen national policies and strategies on post-harvest waste reduction, develop tools and methodologies for rural communications for inclusive rural development and strategies for sustainable production and management of timber products.

ANNEX 4.

Secretariat

Anna Lartey, Director, Nutrition and Food Systems Division, ESN, FAO

Rodrigo Castañeda, Deputy Director, Partnerships Division, PSPD, FAO

Fatima Hachem, Senior Nutrition Officer, ESN, FAO

Dongxin Feng, Head of Capacity Development and Academia Partnerships Unit (PSP, FAO)

Lara Machuma, Partnership Officer, PSPS, FAO

Tomas Buendia, Nutrition and Food Systems Officer, ESN, FAO

Giuseppina Di Felice, Assistant in the Office of the Director, ESN, FAO

ANNEX 5.

Team members

Symposium leadership

Máximo Torero Cullen, Assistant Director-General, Economic and Social Development, ES, FAO

Roberto Ridolfi, Assistant Director-General, Programme Support and Technical Cooperation Department, PS, FAO

Anna Lartey, Director, Nutrition and Food Systems Division, ESN, FAO

Marcela Villareal, Director, Partnerships Division, PSPD, FAO

Symposium organizing committee

Anna Lartey, Director, Nutrition and Food Systems Division, ESN, FAO

Rodrigo Castañeda, Deputy Director, Partnerships Division, PSPD, FAO

Fatima Hachem, Senior Nutrition Officer, ESN, FAO

Symposium coordinating team

Fatima Hachem, Senior Nutrition Officer, ESN, FAO

Dongxin Feng, Head of Capacity Development and Academia Partnerships Unit, PSPA, FAO

Tomas Buendia, Nutrition and Food Systems Officer, ESN, FAO

Lara Machuma, Partnerships Officer, PSPS, FAO

Vanessa Passafaro, Academia and Research Institutions Partnerships Consultant, PSPA, FAO

Paulo DeLima, Personal Assistant to the Director-General, FAO

Yasaman Matinroshan, Attaché de Cabinet, ODG, FAO

Paola Dini, Chief of Protocol, CPAP, FAO

Giuseppina Di Felice, Assistant in the Office of the Director, ESN, FAO

Symposium support team

Ramani Wijesinha Bettoni, Nutrition and Food Systems Officer, ESN, FAO

Ana Islas, Nutrition and Food Systems Officer, ESN, FAO

Maria Antonia Tuazon, Nutrition and Food Systems Officer, ESN, FAO

Trudy Wijnhoven, Nutrition Officer, ESN, FAO

Stineke Oenema, Coordinator, United Nations System Standing Committee on Nutrition, UNSCN

Dalia Mattioni, Food Systems Consultant, ESN, FAO

Melissa Vargas, Consultant in Nutrition Education, ESN, FAO

Loreta Zdanovaite, Partnership Officer, PSPA, FAO

Ketevan Andguladze, Office Helper, PSPD, FAO

Eleonora Boni, Office Clerk, ES, FAO

Michele Rude, Office Assistant, ESN, FAO

Cristiana Fusconi, Office Assistant, ESN, FAO

Arine Valstar, Nutrition Consultant, ESN, FAO

Lauren Micaela Nelson, Gender Mainstreaming Intern, ESN, FAO

Jessica Meyer, Nutrition Mainstreaming Intern, ESN, FAO

Loloah Chamoun, Nutrition Decade Intern, ESN, FAO

Special event and communications support team

Yasmina Bouziane, Director *ad interim*, Office for Corporate Communication, OCC, FAO

Clara Velez Fraga, Senior Communication Officer, OCCO, FAO

Sabina Zaccaro, Senior Communication Coordinator, OCCD, FAO

Chiara Deligia, Communication Specialist, ESN, FAO

Raffaella Rucci, Outreach Specialist, OCCD, FAO

Catherine Clark, Communication Specialist, OCCD, FAO

Bianca Carlesi, Nutrition Mainstreaming Communication Consultant, ESN, FAO

Note-takers

Panel 1 session

Ramani Wijesinha Bettoni, Nutrition and Food Systems Officer, ESN, FAO

Palma Giulia, Nutrition Consultant, ESN, FAO

Panel 2 session

Darana Souza, Nutrition and Food Systems Officer, ESN, FAO

Glenda CabralCalzuola, Programme Officer, ESN, FAO

Francesca Gianfelici, Coordinator, Community of Practice on Food Loss Reduction, ESN, FAO

Panel 3 session

Diana Carter, Nutrition and Food Systems Officer, ESN, FAO

Melissa Vargas, Consultant in Nutrition Education, ESN, FAO

Panel 4 session

Maria Xipsiti, Nutrition Officer, ESN, FAO

Ryan Brown, Food, Nutrition and Climate Change Consultant, ESN, FAO

Lauren Micaela Nelson, Gender Mainstreaming Intern, ESN, FAO



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