



Communicating Food Sustainability to Consumers

Towards more effective labelling



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About the One Planet Network Consumer Information Programme

This document is an output of the Consumer Information Programme of the 10 Year Framework of Programmes on Sustainable Consumption and Production (known as the One Planet network). The Programme is a global platform supporting the provision of quality information on goods and services, to engage and assist consumers in sustainable consumption. It implements and supports projects, undertakes research, shares good practice and policies, and provides collaboration opportunities. The Programme is led by the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV), Germany; the Ministry of Environment and Forestry of Indonesia, and Consumers International; and brings together a network of public, private and third sector actors.

More information, and ways to participate, can be found at <http://www.oneplanetnetwork.org/consumer-information-scp/> or by contacting the Coordination Desk at contact_ciscp@un.org.



Acknowledgements

Under the umbrella of the One Planet network Consumer Information Programme, UNEP, WWF and Globescan collaborated on a research project to improve understanding of how the provision of sustainability information can influence consumers' food choices. This report was prepared by Joshua Bishop of WWF-Australia, with the assistance of Jack Thomas and Sharmi Ahmed, Dr. Sinead Boylan, and Dr. Vicki Andonopoulos, all of whom were affiliated with the University of Sydney when this work was carried out. Their early contributions were invaluable.



Additional advice and support is gratefully acknowledged from supporters and reviewers of this work, including Adrian Camilleri, Andrea Dreifke-Pieper, Andrea Griffin, Annika Lilliestam, Aysha Hussain, Bárbara Civit, Bethan Laughlin, Boris LeMontagner, Cécile Huertas, Cinta Azwiendasari, Claudia Peña, Clementine O'Connor, Cris Close, Daniela Liebetegger, Dedee Woodside, Denise Westerhout, Emily Grady, Eva Schneider, Garrette Clark, James Pittock, Joanne Trewern, Justin Woolford, Karen Luz, Kate Vanderbraak, Krista Singleton-Cabbage, Lesley Hughes, Lorena Jaramillo, Maja Catrin Riecher, Margaux Le Gallou, Mark Barthel, Melanie Levine, Michael Mulet, Monisha Mohandas, Morgan Everitt, Nicholas Hamilton, Nils Heuer, Quinta Warren, Rebecca Simons, Roberto Azofoifa, Samantha Putt Del Pino, Samy Porteron, Sarah Bekessy, Sarah Halevy, Saroja Sundaram, Sharon Bligh, Simone Pettigrew, Stella Höynälänmaa, Valérie TO, Véronique Tassigny, Victoria Mueller, Vinash Singh, Viviana López, Xin Yu, and YiMeng Chen.

The views expressed in this report do not necessarily reflect the positions of the One Planet network or its members, including UNEP and WWF. All errors and omissions remain the sole responsibility of the author.

Suggested citation:

Bishop, J., with Thomas, J., and Ahmed, S. 2022. Communicating Food Sustainability to Consumers: Towards more effective labelling. One Planet Network and WWF.

The development of the report was financed by the 10 Year Framework of Programmes (One Planet network) and the project “Advancing and measuring sustainable consumption and production (SCP) for a low-carbon economy in newly industrialized countries (Advance SCP)”. This project is part of the International Climate Initiative. The Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) support this initiative on the basis of a decision adopted by the German Bundestag.

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Foreword

Food is such a fundamental and intimate part of people's routine that many of us rarely reflect on how or why we eat the things we do. Historically, what people ate depended on what they could find or grow around them. People naturally prefer food that is tasty, nourishing and non-toxic, and easily prepared.

For many people today, food choices are extremely varied. In middle and higher income groups, what people eat reflects a complex mix of personal and impersonal drivers, ranging from what appeals in the moment to what is available at a given time.

Not everyone has autonomy over what they eat. People in vulnerable situations including children and others with restricted agency must eat what they are served, or not eat at all. People with lower incomes or living with food insecurity eat what they can afford or find.

Nevertheless, many people enjoy considerable freedom to choose their food. They can pick from an array of tasty, nutritious, affordable and safe foods in diverse settings, on supermarket shelves, in cafes and restaurants, or chosen online and delivered to their door. The fact that many people who can find and afford nutritious and whole foods often end up eating too much, or indulging in unhealthy 'snack' foods, is testament to the power of our biological instincts combined with the influence of commercial marketing.

No one's food choices are limitless. In a market economy, our choices are determined by many factors. Vendors offer foods they can produce or acquire at low cost and sell profitably. The food available reflects

what most or many of us are prepared to buy, which is a function of taste, culture, fashion, perceived value, cooking skill and available time, along with other individual and social factors.

In this complex interplay of food choice drivers, information about and knowledge of food is no less important. People get information about food from families, friends, food service staff, health and lifestyle advisers, media sources, as well as marketing by brands and retailers. The information available includes diverging and sometimes conflicting facts and opinions about the risks or benefits of different foods, its cultural or ethical attributes, not to mention its social or environmental impacts.

It could be argued that consumers cannot be expected to inform themselves about which foods have less adverse social, environmental or health impacts. In other words, all food for sale should be healthy and sustainable because all major adverse impacts have been identified and minimised. This implies a need for rigorous food production standards or regulations, mechanisms to encourage or require producers to adhere to them, credible compliance mechanisms, and strong motivation for brands and retailers to source only products that meet those standards. A large literature addresses these questions, which lie outside the scope of this report.

The focus here is on how to influence consumers' preferences and choices at the end of the supply chain. This report examines the drivers of food choices, the role of sustainability information and how

it is communicated to consumers, with a focus on food labelling. The report draws on recent research to offer recommendations for more effective communication of food sustainability information, including opportunities for better labelling, the use of complementary communications and other behavioural methods. When used effectively, these methods can lead to lasting change in consumer behaviour, which should increase demand for environmentally and socially responsible ('sustainable') food products and drive improvements in production and sourcing practices upstream.

Of course, consumers vary in their ethical and environmental preferences and how they respond to information. Some people are willing to pay a bit more for products that meet their ethical or environmental expectations. Other people are not. Some people want to know where their food comes from and how it was produced. Others care less. Nevertheless, there will always be a need for sustainability information about food, even if not every person wants to know the details every time they decide what to eat. The challenge is to deliver the right message, in the right way, to the right people at the right time.

Can we influence peoples' choices – not only for food but for everything we produce and consume – sufficiently and quickly enough to avert ecological catastrophe? Human beings are the ultimate learning animal with admirable qualities. And yet we remain subject to selfish, short-sighted impulses and appetites that are not always good for us, individually or collectively. We don't know if the changes required are within our grasp, but we have to try.

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LIST OF ABBREVIATIONS

10YFP	10-Year Framework of Programmes on Sustainable Consumption and Production
CO₂	Carbon Dioxide
COVID-19	Corona Virus Disease 2019
FAO	Food and Agriculture Organisation of the United Nations
FIBL	Research Institute of Organic Agriculture
GDP	Gross Domestic Product
GHG	Greenhouse Gases
GMO	Genetically Modified Organism
HLPE	High Level Panel of Experts
IPCC	Intergovernmental Panel on Climate Change
IFIC	International Food Information Council
IISD	International Institute for Sustainable Development
ITC	International Trade Centre
LCA	Life Cycle Assessment
LEAP	Livestock, Environment and People
NGO	Non-governmental Organization
OECD	Organization for Economic and Co-operation Development
SDGs	Sustainable Development Goals
SFS	Sustainable Food System The UN Sustainable Development Goals
UK	United Kingdom
UNCTAD	UN Conference on Trade and Development
UNEP	United Nations Environment Programme
USA	United States of America
US	United States
VSS	Voluntary Sustainability Standards
WBCSD	World Business Council for Sustainable Development
WHO	World Health Organization
WTO	World Trade Organization
WTP	Willingness-to-pay
WWF	World Wide Fund for Nature

Executive Summary

Shifting demand for food towards more sustainable consumption is increasingly recognised as necessary to address the climate and biodiversity crises. More sustainable food consumption will deliver substantial benefits, given that food production is the leading cause of habitat loss, the largest user and a major polluter of freshwater, while food systems account for around one quarter of global greenhouse gas emissions.

Influencing consumer choices is not a total solution but an essential part of strategies to build sustainable food systems. Growing evidence reveals that both human health and the environment would benefit from adoption of more sustainable diets. This means not just encouraging consumers to choose particular food products that are credibly verified as having been produced with less adverse environmental and social impacts, but shifting people's overall diets towards lower impact consumption while also reducing food waste.

Sustainable diets must be tasty, nutritious, and affordable, while also having less adverse environmental and social impacts. Sustainable diets are not one-size-fits-all. People who consume so-called 'Western diets' need to increase the share of fresh whole fruit, vegetables, grains and pulses on their plates, as well as healthy fats, while moderating consumption of highly processed, sweetened and animal-source foods, especially red and processed meat. People who currently struggle to secure good nutrition, mainly but not exclusively in the Global South, need to increase their intake of calories and essential nutrients. In all cases, sustainable diets require assurance that food is produced, processed and distributed with care for the environment and for all stakeholders in food value chains.

Shifting people's diets towards sustainability starts with understanding the multiple drivers of food choices. Food choices reflect both individual

preferences as well as contextual or supply-side drivers. The latter include natural or environmental conditions, technology, markets and trade, and public policy, all of which are constantly evolving. Supply-side drivers determine what food is available in a given location and moment in time, and at what price. Such factors may be more influential in driving consumer food choices than concerns about sustainability.

Contextual and supply-side drivers are a double-edged sword, supporting sustainable consumption in some cases but undermining sustainability when knowledge is lacking, or where governance is weak. Globalisation of markets and finance, new technologies and public policy can either help or hinder the transition to sustainable consumption. A practical question is how proponents of sustainable diets can harness or navigate these and other contextual drivers when planning food sustainability interventions. For example, digital technology can be used to verify sustainability claims and confirm the provenance of food, making it easier for consumers to choose more sustainable products. Globalisation of food supply chains may reduce consumers' direct influence on producers, but can also help to spread sustainability messages and methods.

External shocks to food systems can have dramatic effects on consumer food choices. The Covid-19 pandemic disrupted supply chains and modified consumer preferences, while accelerating the growth of on-line food ordering and delivery. The war between Russia and Ukraine disrupted supplies of both food and fertilisers to countries around the world, while also driving up global food prices. Attempts to influence consumer food choices by communicating sustainability information can be overwhelmed by such shocks or other long-term trends.

Individual and demand-side drivers of food choice are equally diverse, ranging from human biology and social traditions to shifting public concerns

and preferences. At a fundamental level, most people enjoy sweet, salty and fatty foods. Manufacturers and retailers cater to these preferences, leading to overconsumption of certain foods. Public education, information campaigns, food labelling and responsible advertising can all help to promote more sustainable food choices, but are generally not sufficient to ensure widespread adoption of sustainable diets.

Culture is an important driver of food choices. Some religions have taboos against particular foods, while local and global traditions encourage the consumption of certain foods on special occasions (e.g., feast days). More generally, many communities have maintained historical associations with particular foods, such as wheat in the Middle East and Europe, rice in Southeast Asia, maize in Central America, or yams in coastal West Africa. Sustainable diets must be adapted to local food cultures in order to gain widespread support.

Rising per capita income enhances food security and consumer choice but is also associated with increased consumption of high-environmental impact foods, such as meat and dairy products. Food marketing could promote better diets but more often it simply encourages consumers to purchase more or more profitable foods, which may not be the most sustainable or healthy options. These and other adverse impacts and risks can be anticipated and mitigated through appropriate public education, regulation and other measures.

Consumer choices are influenced by the information they receive about food from many different sources. Consumers cannot easily verify certain important attributes of food, such as its nutritional value and sustainability performance; they rely on others to provide this information. An important factor in how consumers respond to food sustainability information is whether they trust the source.

Two key demand-side trends are consumer interest in how food affects their personal health, and increasing awareness of the links between food, animal welfare and the environment. Demand for organic, 'natural' and plant-based foods is increasing, especially in the Global North, even though the market shares of these foods remain modest. Consumer preference for alternative foods and/or diets is generally motivated by concerns about personal health and animal welfare, rather than environmental or social sustainability. Nevertheless, many people express awareness and concern about sustainability issues and there is often alignment between low impact food production methods, higher animal welfare and human health benefits.

Food sustainability labels and rating tools have proliferated in recent years, providing more information to consumers. Consumers typically spend mere seconds deciding whether to purchase a particular food item. They rarely have time or inclination to consider all the information provided on packaging or at point of sale, or to assess the credibility of different claims. Most labels focus on just one or a few sustainability issues, providing a partial picture. Nevertheless, many consumers rely on food labels to guide their purchasing decisions.

Consumers respond positively to familiar food sustainability labels that are easy to interpret. On average, young, female, well-educated, urban-resident, and medium to high-income groups are more responsive to food sustainability labels. Consumers who are 'value aligned' and have prior knowledge or interest in sustainability naturally respond more positively. Those who respond positively to food labels typically say they are willing to switch brands or pay slightly more for sustainable products.

Consumers often discount messages from food suppliers, who are assumed to be biased. Consumers put more weight on messages about the healthiness or sustainability of food that come from trusted sources of information, e.g., health professionals, scientific experts, government officials, non-governmental organisations. Sustainability messages from small-scale producers are also well-received but rarely heard, due to long-distance supply chains and a lack of effective and/or direct communication channels between food producers and consumers.

Consumers' stated preferences and intentions are not always borne out in practice. There is a gap between consumers' awareness of and stated response to food labels, as reported in surveys, and their actual behaviour. This intention-action gap may reflect a lack of knowledge, misperceptions, unconscious biases or simply a lack of real interest in food sustainability among certain consumer segments, despite what they say in response to surveys.

Various strategies can be used to bridge the gap between consumers' stated intentions and their actual response to food sustainability labels. Effective interventions draw on insights from behavioural science, which suggests that food labelling should be supplemented by separate communications that reinforce key messages, as well as behavioural 'nudges' that make it easy for consumers to make sustainable food choices.

Based on this review and accompanying consultations, several recommendations can be made. In general:

1. Food sustainability communication strategies should be informed by an understanding of the drivers of consumer choices, which vary among different regions and population segments, and at different times.

2. Consumer education about food sustainability is essential, ideally building on prior public understanding and beliefs where these are supported by science.

3. Sustainability messages and interventions should be adapted to different audiences, based on in-depth research to identify what resonates, while also being coordinated to avoid confusion and mixed messages.

4. More investment is needed in incentives, nudges and other non-coercive measures to encourage plant-rich and whole food choices and diets, especially in countries and population segments where current levels of consumption of animal-based and highly-processed foods are relatively high.

With respect to food sustainability labels and food businesses:

5. Labelling should be seen as part of a coherent package of communication methods, together with other forms of consumer engagement, using a range of media including digital.

6. Consumer-facing information on food sustainability should be visible/accessible, easy to understand, reliable, credible, holistic rather than single-issue, and comparable across different products and diets, in order to enable consumers to make more informed choices consistent with their values and preferences.

7. Messages used to accompany or promote food sustainability labels can leverage rational motivations as well as non-rational biases, e.g., appealing to emotion including positive sentiments about well-known brands or celebrities, offering micro-incentives, leveraging social norms or loss aversion.

8. Labels and partners should seek opportunities to highlight sustainable products that are less expensive than conventional alternatives, to counter public perceptions that sustainable products are too costly.

9. Labels and partners should encourage people who are predisposed to use sustainability information to guide their decisions, while drawing on lessons learned by working with these groups to strengthen social norms around food sustainability and to develop effective communications strategies for other groups.

10. Food businesses and marketing agencies should share information and collaborate on studies to determine which messages and media are most effective for encouraging sustainable food choices.

Recommendations to public authorities include:

11. Governments should support, regulate and incentivise credible food certifications or sustainability rating schemes, while encouraging continuous improvement and upholding multi-stakeholder governance.

12. Sustainability criteria should be integrated systematically and consistently in national dietary guidelines and policies along with all associated communications.

13. Governments should monitor food prices, support public education on how to choose affordable and sustainable foods and diets and provide targeted support to ensure everyone can access sustainable foods.

14. Governments should encourage food businesses to develop, test and roll out innovative methods for communicating food sustainability to their customers, and making sustainable food the default option.

In terms of data gaps, recommendations for further research include:

15. How to address over-consumption of highly-processed and discretionary foods, and enlist food companies to encourage more home preparation and

consumption of sustainably produced whole foods.

16. How to educate younger generations (consumers of the future) on interpreting food labels, identifying greenwashing, purposeful shopping, 'voting with their dollar', sticking to a budget, etc.

17. How food preferences are evolving in emerging economies and developing countries, how these changes are influenced by commercial marketing, and what policies are needed to encourage sustainable diets and food choices, rather than wholesale adoption of unhealthy and unsustainable 'Western' diets.

18. More field experiments that measure actual consumer behaviour 'in the wild'. This requires cooperation with food brands, service and retail outlets and market research companies. Moreover, interventions must be based on a good understanding of the psychology of target audiences and rigorous scientific methods.

19. Assessing the effectiveness of alternative messages and communications channels for bridging the intention-action gap and achieving long-term behaviour change, particularly in the Global South.

20. Exploring how to communicate food sustainability in ways that reflect differences in consumers' ability to pay, as well as differences between regions and other socio-economic variables.

21. Looking beyond information, what kind of food environments and infrastructure investments can support the provision of affordable and sustainable food, especially to food insecure populations.

22. Research and consensus building (where feasible) on the role of animal-based foods in sustainable diets.



1. Introduction

How can we help people make more sustainable food choices? Guidance is available on the general principles that government agencies, companies and sustainability standards bodies should follow when communicating about food to consumers (UNEP 2017). However, evidence on what forms of communication about food sustainability are most effective for influencing consumer behaviour, for different consumer segments and in diverse settings, is scattered. Most food sustainability communication initiatives today do not fully integrate lessons from experience.

This report is the result of a collaboration between the United Nations Environment Programme (UNEP) and the World Wide Fund for Nature (WWF), which joined forces to document best practices in communicating the social and environmental credentials of food to consumers, with the aim of supporting more effective communications about food sustainability.

The specific objectives of this report are to:

- Investigate the general drivers of consumer food choice, as well as specific drivers of sustainable choices;
- Identify the sources of information consumers rely on when choosing food, with a focus on the role of eco-labels and other tools intended to distinguish more sustainable foods;
- Explore how different consumer segments respond to sustainability information presented at different levels, in different formats, and across major markets or geographies, with particular attention to the impact of information on climate change (carbon emissions) and biodiversity impacts; and
- Examine how consumers' stated food sustainability preferences compare to their observed behaviours, what factors explain the gap between intentions and actions, and how to bridge that gap.

This report seeks to contribute to the 10-Year Framework of Programmes on Sustainable Consumption and Production (10YFP), adopted by the United Nations Conference on Sustainable Development (Rio+20) in 2012 (UNEP 2017b). The 10YFP is a global commitment to accelerate the shift towards sustainable consumption and production in both developed and developing countries. Under the UN Environment Programme, the One Planet network was established to implement the commitment of the 10YFP.

The One Planet Network's Consumer Information Programme serves as a global platform to support provision of quality information on a wide range of goods and services, and the identification and implementation of effective strategies to encourage more sustainable consumption (One Planet Network 2021). This report is particularly relevant to the One Planet Network's Sustainable Food Systems (SFS) Programme, which engages with actors across food value chains to share their experience, insights and practical guidance on how more and better consumer information can accelerate the transition to a sustainable food system.

The report also builds on insights from the One Planet Network's Sustainable Lifestyles & Education Programme, which has compiled evidence on how people make decisions, and how to harness this for sustainability (One Planet Network 2022). Food is one of the core lifestyle domains through which people meet their needs and live their aspirations.

1.1. Transitioning to sustainable food systems

Improving the sustainability of global food systems is no small task. It is however an essential part of delivering the UN Sustainable Development Goals (SDGs), adopted by almost every nation on earth. Core SDGs for this effort are numbers 2 (zero hunger), 12 (responsible consumption and production) and 13 (climate action), although all 17 SDGs are related in one way or the other to the systems that feed us (United Nations 2015). Concerted efforts at all levels are needed to reduce the adverse environmental impacts of food production, consumption and waste, while securing reliable access

to nutritious food for those who currently go hungry (HLPE 2020).

From an environmental perspective, transforming the food system is a necessary part of solving the climate and biodiversity crises, while also reducing pollution and waste (Poore and Nemecek 2018; Clark et al. 2020; WWF 2020; Global Alliance for the Future of Food 2021). Environmental impacts arise throughout the food value chain, but are mainly concentrated at the production stage (Notarnicola et al. 2017). Examples of environmental impacts of food production, consumption and waste are provided in Box 1.

From an environmental perspective, transforming the food system is a necessary part of solving the climate and biodiversity crises, while also reducing pollution and waste.



Box 1. The environmental impacts of food

- Food production, processing, distribution and consumption account for between one-quarter and one-third of anthropogenic emissions of greenhouse gases (GHG) (IPCC 2019; Crippa et al. 2021; Vermeulen, Campbell and Ingram 2012).
- Animal-based foods (i.e. meat, dairy, fish, and eggs) represent over half of total GHG emissions from the food system, including animal feed, with many cost-effective options to reduce emissions (Clune, Crossin and Verghese 2017; FAO 2014; Xu et al. 2021).
- Agriculture is the leading driver of deforestation and a major cause of biodiversity loss, especially in the tropics and mainly due to the production of beef, soya (most of which is grown for animal feed) and palm oil (WWF 2018; Ritchie 2021; Meijaard et al. 2020).
- Agriculture also accounts for about two-thirds of total freshwater use (FAO 2017; Mekonnen and Gerbens-Leenes 2020), much of which is used to produce feed for livestock (Heinke et al. 2020).
- Fishing and aquaculture are the main drivers of biodiversity decline in marine ecosystems (IPBES et al. 2019; FAO 2020; Cottrell et al. 2021; Ritchie and Roser 2021). The seafood industry is also a major source of marine plastic pollution (Haward 2018; Carney Almroth and Eggert 2019).
- The environmental impacts of food are amplified when we consider that at least 17 percent of all food produced for human consumption is wasted, due to food rotting in people's homes, spoiling at retailers or because of poor storage and transportation (Schanes, Dobernig and Gözet 2018; UNEP 2021). Additional losses occur in the food production stage (WWF-UK 2021).
- Levels of food waste are generally greater in high-income households, both in terms of the percentage of food wasted and the average amount wasted per capita (UNEP 2021). Studies suggest that around 35-40 percent of food is wasted in the UK and USA (ReFED 2016; Gunders and Bloom 2017; WWF-UK 2021).
- The environmental impacts of food waste are exacerbated by the fact that most of it ends up in landfill, where anaerobic decomposition generates substantial methane emissions (Ritchie 2020; US EPA 2016). For example, food waste in retail outlets and in the home accounts for 28% of the carbon footprint of the average US diet, one-third of which is due to beef consumption alone (Heller and Keoleian 2015).

Reducing the environmental impacts of food requires change throughout the entire food system and value chain, from input supply through production, processing, distribution, consumption, waste recovery and disposal. Different stakeholders in the food system have different responsibilities. For example, input suppliers need to offer more efficient production technologies that take into account environmental impacts, such as greenhouse gases (GHG) emissions, water pollution and biodiversity loss. More generally:

- Food producers must be involved in developing and deploying appropriate technologies, while also contributing constructively to food regulations and sustainability standards, both to ensure they use natural resources and other inputs more efficiently, while reducing pollution and waste, and also to meet rising consumer expectations (Bennett 2017; WFO-OMA 2020).
- Governments need to introduce targeted regulations, incentives and financing to motivate the adoption of sustainable food production and consumption, as well as more responsible food marketing (OECD 2019).
- Corporate financiers, traders, buyers, brands and retailers must support the transition to sustainable food production through their procurement practises, by investing in greater transparency and traceability along complex food supply chains, and by creating supplier assistance programs to share information and incentivise sustainable practice (Bové and Swartz 2016; UNCTAD 2021; WWF n.d.)
- Local governments, property managers, retailers and food service companies can reduce wasteful food consumption, while developing systems that enable easy separation, collection and diversion of food waste away from landfill and towards alternative uses (Champions 12.3 n.d.).
- Scientists must continue to develop reliable methods to monitor and evaluate the impacts of the food system on nature and people (Global Alliance for the Future of Food 2021).

- Citizens can inform themselves about food sustainability issues and express their preferences through political action to ensure that government and business leaders prioritise sustainability in food systems.
- In their role as consumers, individuals can encourage the businesses they patronise to adopt sustainable sourcing practices. Individual consumers can also reduce their own food waste, over-consumption and choose low impact foods (Clark et al. 2019). If widely adopted, such demand-side changes can not only reduce environmental harm but improve population health and well-being generally (Creutzig et al. 2022).
- Helping people make better choices by providing reliable information about the origins of food, how it is produced and the environmental impacts of different foods is an essential ingredient for more sustainable food systems (One Planet Network 2021).
- Collectively, all stakeholder groups need to cooperate better, so that policy-making and governance of food systems becomes more inclusive and transparent, particularly by ensuring the full participation of vulnerable and marginalised groups in multi-stakeholder mechanisms (Alliance of Bioversity & CIAT, UNEP and WWF 2021; United Nations 2021).

1.2. Why sustainable consumption is necessary

As in other industries, the combination of technological innovation, industrialisation and globalisation of the food system has delivered substantial economic benefits, including more reliable access to more diverse foods, for more people, and at lower cost. At the same time, globalisation has resulted in more complex, far-flung and concentrated networks of production, ownership and distribution, which can limit the accountability of the food system to local communities and exacerbate adverse social and environmental impacts (Lawrence 2017; IPBES Food 2017).

Unfortunately, the costs and benefits of the food system are not shared equitably. While many producers and consumers benefit from globalised food production and distribution through job creation, higher incomes and lower prices, other groups incur a disproportionate burden of social and environmental impact (FoodPrint 2021; Sligh and Mandelbaum 2002; Allen et al. 1991). Moreover, despite miraculous improvements in food security for an ever-growing global population, the scandal of malnutrition persists. Recent data reveals that one in every nine people in the world goes hungry, while one in every three people is considered to be overweight or obese (GNR 2020; FAO 2021b).

Evidence is mounting that without widespread changes in dietary patterns, it may be impossible to feed everyone and keep the food system on a low-GHG-emission, nature-positive trajectory (Poore and Nemecek 2018; Eker, Reese and Obersteiner 2019; Willett et al. 2019). The challenge is to encourage consumers to make sustainable food choices and engage in less wasteful behaviours, while also maximising choice and increasing access to those who currently do not get enough.

Food is one of life's pleasures. It is also part of everyone's daily routine and culture. Enhancing people's experience of food begins with ensuring freedom from hunger and reducing food-related non-communicable diseases, which are the leading cause of mortality. It also means expanding the freedom to choose what we eat.

Freedom to choose does not include the right to impose uncompensated costs ('externalities') on other people (Dragun 1983; Jones and Sugden 1982). For this reason, governments may be justified in introducing policies to influence consumer choices, including pollution taxes, waste disposal fees or other policies that 'internalise' the costs of food production and consumption in people's decisions (Claassen 2016).

Government action may include regulations or taxes to make 'unhealthy' foods and beverages more expensive or less accessible, or removal of harmful subsidies, when excessive consumption is known to impose high

risks or costs on others (e.g., taxes on alcohol or sugar). A challenge for policy-makers is crafting measures that effectively discourage harmful consumption without depriving or unfairly targeting certain groups of people by making food less affordable.

Providing information to support better choices is one way to limit the need for more coercive measures (Thaler and Sunstein 2008). Moreover, well-designed regulations can be complementary to the provision of information or labelling (Yokessa and Marette 2019). For example, regulations or taxes may be used to internalise the external costs of food - where the costs of regulation are not excessive or inequitable - while at the same time incentivising the provision of reliable information to consumers.

This report focuses on identifying effective ways to inform individual consumers about food sustainability, which enable them to adopt sustainable consumption behaviours by choice rather than necessity. This focus should not be seen as absolving other participants in the food system of their responsibility to reduce adverse impacts. It may be argued that emphasising consumer information and consumer choice puts disproportionate responsibility on private individuals to drive change. Nevertheless, the fact is that individuals can contribute to improving the sustainability of food systems. Better information about sustainability can empower individuals to help drive change. This in turn underscores the importance of ensuring that food sustainability information is reliable (UNEP 2017).

1.3. Defining sustainable food and diets

Before reviewing the drivers of consumer food choice and the experience of communicating food sustainability to consumers, we need to define key terms, starting with 'sustainable food consumption' or 'sustainable diets'. The Food and Agriculture Organisation of the United Nations (FAO) and many other organisations tend to define a sustainable food system in terms of the pillars of sustainable development: environmental, social and economic.

In other words, sustainable food should have a positive or neutral impact on the environment, result in equitable and beneficial outcomes to society generally, and be economically viable over the long-term and throughout the entire value chain (FAO 2021a). Fundamentally, a sustainable food system must ensure that food security and human nutrition are not compromised for future generations. Additional definitions are provided in Box 2.

Box 2. Definitions of sustainable food

Food sustainability has been an evolving concept for many years. One early and still dominant perspective focuses on ensuring food security, mainly by increasing production, labour productivity and resource efficiency (Lang and Barling 2012), while more recent discussions have expanded the mission of the food system to encompass a wider range of objectives under the overarching concept of sustainability.

Contemporary definitions of sustainable food range from high-level visions of food systems that offer accessible nutrition to everyone while protecting the environment (HLPE 2017; FAO 2021; WWF 2021; Searchinger et al. 2019), to a focus on consumption (Nguyen 2018) or on particular categories of food (FAIRR 2021). Definitions of sustainable food or sustainable diets tend to reflect the mandate or mission of the organisations that publish them. Hence the term 'sustainable food' may be applied to human health and nutrition, climate change, biodiversity and water resources, the rights and working conditions of food workers, respecting Indigenous traditional knowledge, poverty reduction and economic development, etc. Mainstream expressions of food sustainability are even more varied and include the endorsement of particular food sources by voluntary certification schemes, as well as the promotion of specific food products and ingredients by businesses, celebrities and other social influencers.

Because sustainability is such a broad concept, interpreted variously by different people, there is no universally accepted definition of sustainable food consumption or sustainable diets. This may reflect the fact that people's dietary habits and preferences are diverse, as well as the evolving science of human nutrition and the environment, not to mention the varying circumstances in which people live. For this report we draw on definitions provided by international agencies and researchers, as well as the WWF network:

- A sustainable food system (SFS) is a food system that delivers food security and nutrition for all in such a way that the economic, social and environmental bases to generate food security and nutrition for future generations are not compromised" (HLPE 2014).
- "Diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations" (Burlingame and Dernini 2012).
- "Planet-based diets ... comprise healthy and sustainable ingredients produced within planetary boundaries and adaptable to local contexts. These diets discourage over-consumption of any food, to the extent that over-consumption negatively impacts biodiversity, the environment and human health" (WWF 2020).
- "The world must feed many more people, more nutritiously, and ensure that agriculture contributes to poverty reduction through inclusive economic and social development, all while reducing greenhouse gas (GHG) emissions, loss of habitat, freshwater depletion and pollution, and other environmental impacts of farming" (Searchinger et al. 2019).

This report assumes that sustainable food consumption does not imply zero adverse impact on the environment or on vulnerable groups. However, sustainable food consumption does imply that individual consumers, on average, choose, or are provided with, food products that use fewer natural resources and have less adverse impacts on the environment (per unit of nutritional value) than is generally the case today.

More ambitious definitions suggest that consumer choices should reinforce the transition to food systems (and other production systems) with a net positive impact on nature, rather than simply minimising adverse impacts (BSR 2019; WEF 2021; WWF 2022). This will also entail less per capita consumption of animal-based foods, at least by those who currently consume relatively large amounts (WWF 2020).

Similarly, improving the social sustainability of food implies that individual consumers generally favour (or are provided with) food that is produced, processed and distributed in ways that meet or exceed global minimum social standards including good working conditions and community welfare. Note that the literature reviewed in this report may use different definitions of sustainable consumption; we highlight these differences where relevant.

In addition to defining sustainable food, other key terms used in this report include:

- Consumers – the focus is on individuals in their role as consumers of food, rather than other ways of participating in food systems, or the role of organisations as consumers. It is understood that many people have a larger role in food systems than simply buying and consuming food, depending on the degree of their involvement in policy formulation and implementation, food production, processing, distribution, preparation, and waste management. Nevertheless, following the convention of economics, the term ‘consumer’ is used here to describe how individuals identify, choose, purchase and consume food, either for themselves and/or for their immediate family.

- Communication – just as information can take many different forms, communication relies on various media including speech and writing (e.g., handwritten, printed, displayed on electronic devices), as well as more subtle means of communication, such as positioning of food items relative to each other.
- Information – this report considers information in a broad sense, including verbal and textual data as well as other sensory stimuli (e.g., sounds, smells, touch, images) that may influence consumers’ food choices.
- Animal-based (or animal-source) foods – all foods of animal origin, including milk and milk products, eggs, meats, poultry, and fish, whether wild caught or domesticated (Kurpad 2013).
- (Eco-)labels – this report focuses on the effectiveness of labels as a means of communicating information about food sustainability to consumers. Labels can take many forms, from mandatory information about the country of origin or nutritional content of food, to voluntary information about qualities and attributes that may be printed on packaging, web-pages or alongside food products in stores and markets. The latter includes marketing and promotional information that may or may not be independently verified. The term eco-label is used here to refer to a subset of food labels which seek to convey information about the environmental impacts of food production, processing, distribution and packaging. Eco-labels may be independent or wholly-owned by other organisations, which may include food brands and retailers that create their own in-house eco-labels. Labelling organisations or business units may audit food producers directly or arrange for third parties (often professional auditing firms) to do this work.



1.4. Scope and methodology

This report focuses on the effectiveness of food sustainability information initiatives for influencing consumers' food choices, with an emphasis on the role and influence of eco-labels. The first step is to situate sustainability information and its influence on consumer behaviour within the broader context of food systems.

As noted above, the environmental and social impacts of food systems are concentrated at the production stage, although we do not discount impacts that arise in processing, distribution and consumption (e.g., food waste). A full assessment of best practice communication of food sustainability information would therefore need to analyse whether the information provided to consumers about the sustainability of different foods is accurate or credible.

This implies an assessment of the truthfulness of food sustainability claims, which in turn requires an examination of actual food production practices, processing and distribution. Such ambition lies beyond the scope of this report. However, considerable guidance is available to ensure that the sustainability information consumers receive is reliable (Box 3). This report also does not assess consumer-facing interventions to reduce food waste, although some relevant references are provided above and many additional resources are available¹.

¹ For example: <https://www.lovefoodhatewaste.com>; <https://supplychain.edf.org/resources/consumer-food-waste-solutions>; <https://wrap.org.uk/taking-action/citizen-behaviour-change>; <https://www.fda.gov/food/consumers/tips-reduce-food-waste>

Box 3: Guidelines for communicating sustainability information to consumers

Claims about food sustainability by independent eco-labels and other consumer information tools, or claims made by businesses directly, must be reliable, relevant, clear, transparent, and accessible must be reliable, relevant, clear, transparent, and accessible as outlined by the five fundamental principles of the UNEP Guidelines for Providing Product Sustainability Information (UNEP 2017b). The reason is simple: if we consider only what kind of communication is most influential, we may end up defining best practice to include misinformation or 'greenwashing'.



The risk of misinformation is not hypothetical. In a global analysis of almost 500 websites promoting products and services across multiple sectors, including clothes, cosmetics and food, members of the International Consumer Protection Enforcement Network – a coalition of law enforcement agencies – discovered that around 40% of the websites they reviewed appeared to use tactics that could be misleading or illegal, including (Competition and Markets Authority 2021):

- “Vague claims and unclear language including terms such as ‘eco’ or ‘sustainable’ or reference to ‘natural products’ without adequate explanation or evidence of the claims;
- “Own brand eco logos and labels not associated with an accredited organisation; and
- “Hiding or omitting certain information, such as a product’s pollution levels, to appear more eco-friendly.”

A more insidious problem is when vested interests – mainly industry but also advocacy groups – seek to influence public debate and policy by sponsoring scientific research that supports their particular aims or interests. Food companies and industry bodies, in particular, have long sought to influence the scientific process and consensus on the health impacts of various foods, with well-documented perverse outcomes in some cases (Moodie 2016; Sacks et al. 2018; Mialon et al. 2021).

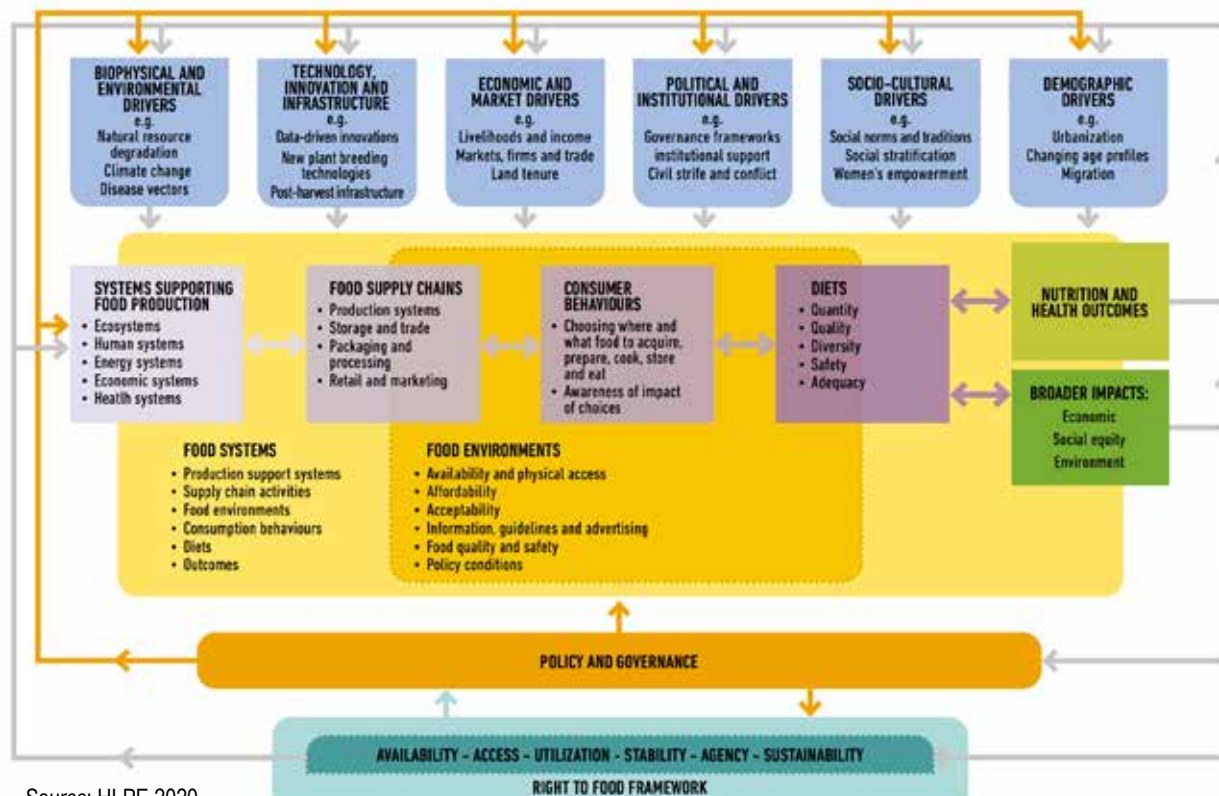
Assessing the credibility of sustainability information provided to consumers, either in terms of provenance or the social and environmental outcomes of production and processing practices, is far beyond the scope of this report. Fortunately, there are other existing resources and guidelines to advise labels/tools, businesses, governments and consumers on topics such as:

- how to develop robust food production standards;
- how to persuade producers to adhere to them;
- how to ensure credible assurance of compliance; and
- how to motivate brands and retailers to source products that meet those standards.

Key references for organisations seeking to ensure that their sustainability claims are credible include: (UNEP 2017b; The VIA Initiative 2018; Petrokofsky and Jennings 2018; Jennings, McCormack and Sheane 2020; ISEAL Alliance 2019; FAO and EBRD 2019). Similar guidelines are available for policy-makers at a regional and country levels (Consumers International 2021).

From a consumer perspective, it can be difficult to assess if specific claims are credible. Case studies are available (One Planet Network 2017) and independent evaluations of both sourcing and claims are regularly published for particular commodities and companies (WWF 2021; Greenpeace 2020; Oxfam 2016). Broader evaluations of the quality and credibility of sustainability claims reflect a range of viewpoints, from vociferous criticism to committed support (Greenpeace 2021; Changing Markets Foundation 2018; Evidensia 2021; ISEAL 2021). In the absence of clear consensus or effective regulation of claims, consumers must ultimately make their own judgments. Although no sustainability claim is perfectly reliable or covers all sustainability criteria, the presence of a claim nevertheless provides an indication of issues to consider, as well as opportunities for improving production practices.

Figure 1. Sustainable food systems framework



Source: HLPE 2020.

Although the scope of this report is limited to the impact of food sustainability information on consumer behaviour, it is important to situate this focus within the broader agenda of sustainable food systems. Various frameworks are available for analysing and contextualising consumer food behaviours (Ericksen 2008; Chen and Antonelli 2020; Downs et al. 2020). This report adopts a framework developed by the High Level Panel of Experts on Food Security and Nutrition, which constitutes the science-policy interface of the United Nations Committee on World Food Security (HLPE 2020). As illustrated in Figure 1, this report focuses on consumer behaviours and specifically on how consumers choose where and what food to acquire, prepare, cook, store and eat, as well as their awareness of the impact of their choices.

This report draws from publicly available literature on the drivers of food choice, including the drivers of more sustainable food choices, the role of consumer information and how it influences food choice. We adopt here an economic perspective, grouping drivers

broadly into supply-side and demand-side factors. The report draws on thematic analysis of publicly available articles, web-data, reports and other online sources, with an emphasis on meta-analyses, systematic reviews and syntheses, supplemented by summaries of one-off case studies where the findings are particularly relevant.

Separate reports prepared by GlobeScan summarise 12 case studies (Box 4). The case studies include:

- Six food labels (or other food sustainability information tools), exploring how they communicate with consumers, what methods are used to gain and retain consumer loyalty, and what impacts they have on consumer food choices; and
- Six companies with high consumer visibility (i.e. food brand owners and retailers), focusing on their insights into consumer concerns and responses to the provision of food sustainability information, and how such information is integrated in companies' food marketing campaigns.

Box 4. Case studies of labels/tools and businesses (GlobeScan 2022)

As part of the larger project to which this report contributes, a set of case studies were developed by GlobeScan in collaboration with WWF and UNEP. A set of selection criteria was agreed and a long list of potential participants and interview questions was developed jointly. Selection criteria for labels/tools included:

- Track record of engaging and influencing consumers, as well as new or emerging approaches;
- On-product labels and/or online information tools;
- At least two label case studies to include carbon emissions data;
- At least one label based in the Global South; and
- Certifications as well as sustainability ratings/scores.

For business case studies, the selection criteria included:

- Both multinational and smaller companies;
- From at least three different continents (including the Global South);
- At least one company has their own sustainability label (at least for some products); and
- At least one e-commerce grocery platform.

The initial list of potential case studies was prioritised to ensure representative coverage of both businesses and eco-labels (or similar food sustainability information services). Organisations were contacted and, based on their responses and the available time and budget, a final list of 12 case studies was agreed, as below.

BUSINESSES	LABELS/TOOLS
 John West Australia (a subsidiary of Simplot)	 Evocco
 Lidl (International)	 Fairtrade Foundation
 Oatly	 Foundation Earth
 Rakuten	 Marine Stewardship Council
 Unilever	 Rainforest Alliance
 Woolworth South Africa (a subsidiary of Woolworths Holdings Limited)	 South African Sustainable Seafood Initiative (led by WWF)

For each case study, at least one interview by telephone or tele-conference was conducted by GlobeScan during November-December 2021. Interview questions for labels and businesses varied slightly but touched on:

- Their experience communicating with consumers about food sustainability;
- Reflections on what has worked well and challenges in communicating with consumers;
- Reflections on trends in consumer demand and interests regarding food sustainability; and
- How they ensure that consumer communications are reliable, relevant, clear, transparent and accessible.

Reports of the interviews were written up by GlobeScan and reviewed by UNEP and WWF before being sent back to each case study organisation for review and approval before publication. The views expressed in the case studies do not necessarily reflect the positions of the One Planet network or its members, including UNEP and WWF. The final case studies are available [here](#). More information about the selection process, interview questions and results is available on request.

In addition to the case studies, the project involved consultations with experts from around the world, including detailed review of earlier versions of this report. The consultations culminated in two virtual workshops in late January 2022, which were organised and facilitated by WWF and UNEP. The workshop objectives were to:

- Seek expert advice on how to communicate food sustainability to consumers; and
- Seek feedback on the draft literature review and case study findings.

The workshops included plenary presentations and discussions, as well as facilitated breakout groups using 'Jamboard' software to record participants' comments. A total of 35 people participated in the two workshops, not including members of the project team. Observations from the expert workshops are provided throughout this report where relevant.

1.5. Outline of the report

The remainder of this report is divided into three parts:

- **Section 2** briefly reviews the broader context of consumer food choices, with its many layers of influence or 'drivers'. These include natural constraints and endowments, socio-cultural and policy contexts, economic drivers such as technology, marketing and trade policy, food settings (e.g., formal and informal markets), as well as individual characteristics such as people's age, education and income, not to mention the physical attributes of food itself.
- **Section 3** turns to the role of information in consumer food choice, with a focus on information about food sustainability. Just as personal characteristics, such as age and education, can influence people's food choices, the same variables may affect how people respond to food sustainability information. We consider the various channels through which food sustainability information is communicated to the public (e.g.,

government agencies, advocacy groups, media, packaging, word-of-mouth, eco-labels). We review evidence of the effectiveness of food eco-labels and other sustainability information tools for influencing consumer food choice, note the gap between individual consumers' stated intentions and their actual behaviours, and consider efforts to bridge this 'intention-action' gap. This section also highlights selected findings from the case studies.

- **Section 4** provides general conclusions and recommendations. This includes key lessons from the literature and selected findings from the consultation workshops, with a focus on opportunities to promote wider, faster and more lasting adoption of sustainable food choices by consumers through the provision of product-level information.

A bibliography completes this report. The 12 case studies listed above have been published separately. Reports from the expert consultation workshops are available on request from UNEP or WWF.





2. What Drives Consumer Food Choices?

This section of the report examines the major drivers of consumer food choice, outlining key influences on food consumption and behavioural patterns. This section also considers how food choices and behaviours have evolved over time, including the impact of rising income on dietary preferences, growing public awareness of the health, environmental and social impacts of food production and consumption, and the COVID-19 pandemic.

The literature on food choice identifies multiple and evolving influences or drivers. These range from biophysical and environmental conditions to technology and infrastructure, economics and marketing, politics and institutions, culture and demographics, not to mention social and individual differences and the characteristics of food itself (Shepherd 2005; Bellisle 2006).

Peoples' decisions about what to eat may be routine, habitual or even unconscious. Understanding consumers' food behaviours therefore requires analysis of (Blake et al. 2021):

- what people eat from the options available and accessible in their environment;
- how people interact with their social and physical environments to acquire, prepare, distribute, and consume food; and
- why people decide to acquire, prepare, distribute, and consume the particular foods they do.

One review of the factors that influence decisions about sustainable food by producers and consumers concluded that such decisions “are influenced by the characteristics of the person, in interaction with the characteristics of the more sustainable practice or product, which interacts with a particular context that includes the immediate environment (e.g., household, farm), the indirect environment (e.g., community) and macro-environment factors (e.g., political, financial and economic contexts)” (Hoek et al. 2021). Table 1 shows how the drivers of consumer food choice can be grouped into the attributes of food itself, differences between consumers, as well as broader societal factors (Chen and Antonelli 2020).

Table 1. Major influences on consumer food choice

Five Main Factors in Three Categories		Sub-Factors Under Five Main Factors
Food-related features	Food-internal factor	Sensory features (flavor, taste, smell, and texture) and perceptual features (color, portion size, nutrition and health value, and quality)
	Food-external factor	Information (nutritional labels, health claims, packaging, aesthetics, and ethics of production history, brand, advertisement)
		Social environment (intrapersonal factor and social norms from family, peers, and media including ethical concern, social context when food choice is made)
		Physical environment (availability and accessibility of food products, food retail environments, time)
Individual differences	Personal-state factor	Biological features (genetic factors, personal dietary patterns and metabolism, physical condition such as health)
		Physiological needs (hunger, appetite, and weight status)
		Psychological components (emotion, motivation, and personality)
		Habits and experiences
	Cognitive factor	Knowledge and skills
		Attitude, liking and preference
		Anticipated consequences
		Personal identity (demographic features such as age, gender, ethnic identity, and education, and personal value and belief)
Society-related features	Sociocultural factor	Culture (norms and values)
		Economic variables (income, socioeconomic status, and price)
		Political elements (agricultural and food policy and regulations)

Source: Chen and Antonelli 2020.

This report is informed by an economic perspective, which implies consideration of supply-side and demand-side drivers. In simple terms, supply determines what foods are provided to consumers by food systems, and at what cost, while demand describes what individual consumers prefer and how much they are willing to pay for it. The interaction of supply and demand drives food prices, which are key signals and determinants of the behaviour of producers and consumers and the distribution of costs and benefits.

Food supply, demand and prices are also influenced by public policy and market features, including the allocation of land and water resources to different uses, the distribution of property rights and liabilities, the degree of competition in markets, the magnitude of any uncompensated ‘externalities’ (positive or negative), taxes and subsidies on agricultural and fisheries producers, trade, health and competition policy, etc.

The economic approach sketched out above is inevitably reductive and assumes generally rational behaviour by producers and consumers. This assumption must be relaxed to account for unconscious, emotional and irrational drivers of food choices (Blake et al. 2021). Understanding consumer food choice more fully requires consideration of insights from other theories of human behaviour, including sociology, psychology, marketing, nutritional and behavioural science. This section therefore uses an extended economic framework and groups the major drivers of food choice into two broad categories:

- Supply-side/macro/contextual factors, such as:
 - natural conditions (e.g., climate and soils, weather, pests and disease);
 - urbanisation (offering more people access to a wider range of food options);

- local, regional and global trade (driven by liberalisation and declining transport costs);
 - production and processing technology (e.g., improved crop varieties, irrigation, novel foods);
 - marketing and promotion (e.g., television advertising, social media influence);
 - market power (e.g., farm and corporate consolidation; labour union strength); and
 - governance and institutions (e.g., corporate sustainability initiatives, government policy).
- Demand-side/micro/individual factors, such as:
 - cultural traditions (e.g., reliance on maize in central America, versus rice across much of Asia);
 - rising average incomes;
 - ageing populations;
 - higher educational attainment;
 - public awareness and concern about the environment;
 - shifting tastes and dietary preferences (e.g., vegetarianism);
 - consumer technologies (e.g., online shopping); and
 - short-term disruptions (e.g., Covid-related restrictions).

Some analysts use the term ‘food environments’, which refers to “the interface where people interact with the wider food system to acquire and consume foods” (Lartey et al. 2016). Although food environments vary widely they share common features in all countries (Constantinides et al. 2021). However, the impacts of changes in the food environment on consumer behaviour and dietary outcomes (including health and sustainability) is still poorly understood, especially in low and middle-income countries (Turner et al. 2020)

Almost all food production takes place in the ‘natural’ food environment, which includes both wild and cultivated foods, whereas most consumption takes place in the built environment (Downs et al. 2020). The built environment can be further divided into formal (regulated) and informal food markets (Figure 2). Cultivated and formal food environments account for

larger shares of production and consumption in urban or developed settings.

The built food environment influences consumer choices in particular ways. For example, in a typical supermarket, consumers rely on information provided on packaging or at the point of sale, whereas in most informal markets consumers can inspect products directly and question vendors about its provenance and other attributes, or haggle over prices. Similar differences can be seen across food service outlets: in cafeterias and restaurants, consumers are mainly influenced by the options presented to them on menus or by employees, whereas in informal street kiosks, consumers can watch food being prepared and discuss it with the cooks.

Figure 2. Formal and informal food environments



Source: Downs et al. 2020.

2.1. Contextual and supply-side drivers

Over many years, food production and processing has become increasingly industrialised, while the distribution system has become more globalised (FAO 2004). Combined with rising per capita incomes in many parts of the world, these changes have resulted in increased access to new foods, flavours and ingredients for many people. They have also led to changes in people’s diets, including increased consumption of animal-based and processed foods. The impact of these changes on consumer food choices, health and food sustainability more generally has attracted much attention.

One global study sought to measure the statistical correlations between 12 key drivers of change and four major dimensions of food system sustainability (Béné et al. 2020). The authors identified three driver categories which are further broken down into twelve specific drivers:

- **Demand/consumer** - including population demographic transition; rise in consumers' income; urbanisation and associated changes in lifestyle; growing attention paid to diet;
- **Production/supply** - including technological innovation; intensification of agriculture; improved access to infrastructure; general degradation in agro-ecological conditions; climate change; and
- **Trade/distribution** - including policies facilitating/mitigating trade; internationalization of private investments; growing concerns for food safety.

For each driver the authors specified one or more quantitative indicators, which were correlated with four major dimensions of food system sustainability (environment, social, economic and food/nutrition), as measured by 20 separate indicators. Based on data availability, the analysis ultimately covered 97 nations, including low, middle and high-income countries (Béné et al. 2020).

Examination of these drivers and their interactions with food sustainability revealed some negative associations, in particular for increasing population growth, urbanisation, and per capita GDP, as well as increased fertiliser use and expansion of agricultural area (Béné et al. 2020). Positive associations with food sustainability included increased merchandise and services trade per capita (especially in middle income countries) and, to a lesser degree, increased cereal yield and increased foreign direct investment. These and other relationships are explored further below, with a particular focus on how they affect consumers' food choices.

2.1.1. Natural conditions

The foundations of our food systems are biophysical. A diverse biology ('biodiversity') exploits solar energy, water and other naturally-occurring chemicals, guided by evolution, climate conditions and ecological interactions. These natural forces determine what is food for humans as well as other organisms.

People eat what our bodies find nutritious, what we can digest and our taste buds have evolved to appreciate. The combination of biology and history may lead to conservative dietary instincts and a preference for 'natural' foods, which is sometimes conflated with sustainability. We generally try to avoid toxic substances, guided by tradition, science and government regulators (not always reliably).

A prerequisite of sustainable human food systems and food choices is to maintain the integrity and resilience of the natural systems that support them. That means maintaining a stable climate, healthy ecosystems and sufficient genetic diversity to sustain species health and evolution.

Climate change is a growing threat to food production everywhere. Rising temperatures on land and the frequency and intensity of extreme weather events are increasingly attributed to climate change. Changing weather patterns are expected to have severe impacts on agricultural production globally (IPCC 2019). Similarly, rising ocean temperatures and sea levels due to climate change are likely to have major impacts on the migration of important seafood species, as well as the marine habitats they rely on for reproduction (Last et al. 2011; Campana et al. 2020; Palacios-Abrantes et al. 2021). Biodiversity loss and the decline of ecosystem services are also likely to pose risks to the food system, even if the linkages are not as well studied (FAO 2019; Potts et al. 2016).

Climate change is a growing threat to food production everywhere. Rising temperatures on land and the frequency and intensity of extreme weather events are increasingly attributed to climate change.

2.1.2. Technology

Human societies have developed an array of food technologies that are evolving at a rapid pace. Although most people eat plants and animals that occur naturally, many food species have been modified by selective breeding over many generations, as well as recent innovations such as hybridisation or direct genetic modification.

Food technology is a driver of food choice insofar as it influences what we can catch, harvest, grow, process, preserve and transport. Advances in production technology have allowed more food to be grown in more regions all year round, while increasing yields and other desired characteristics (e.g., drought tolerance). Examples include long-established methods (e.g., selection and breeding of crops and livestock), more recent innovations (e.g., climate-controlled greenhouses and hydroponics), as well as emerging technologies such as genetic engineering. Similar innovations have transformed food processing and preservation. In some countries, technology-intensive production and processing now dominate. In the US, for example, over 90% of all maize ('corn') and soybeans grown are genetically modified varieties (USDA ERS 2020).

Continuous improvement and development of technology (e.g., food loss reduction, agroforestry, hydroponics, biotechnology) is likely to be a critical

enabler of future food security and food choices (Premanandh 2011). At the same time, new food technologies may be controversial, due to concerns about adverse environmental, health or economic impacts. This is particularly evident from widespread consumer suspicion of genetically engineered foods (Lefebvre, Cook and Griffiths 2019; Wunderlich and Gatto 2015). Similar concerns have been expressed about some other novel food technologies.

2.1.3. Markets and trade

Food markets determine choices through the interaction of supply and demand. Food producers provide what they can produce and deliver profitably, even if they may tolerate losses for a period of time. Producers generally supply foods that a critical mass of people want and can afford (or be persuaded) to buy. Markets and trade have enormous influence on what foods are available but this may diverge from what is socially or environmentally sustainable.

Affordability is a major constraint and driver of food choice for most people. Fresh produce and natural protein options are essential for healthy diets (FAO and WHO 2019; Lonnie and Johnstone 2020), hence affordability is key. Relative to average household budgets for food and personal care products, consumers in the Asia-Pacific region were reported to spend as much as 60% on fresh foods, including fruit, vegetables and meat, compared to 53% in Europe, 30% in the US and 25% in Latin America (The Nielsen Company 2013).

Although expenditure on food typically accounts for a smaller share of consumer spending as average per capita incomes rise, certain food categories become more prominent with rising incomes. For example, surveys show wide variation in consumption of animal-source foods, ranging from 120 g/day/capita on average across all age groups in South Asia (about one standard serving) up to 372 g/day/capita on average in high-income countries (Miller et al. 2022). The latter study reported increased consumption of animal-source foods between 1990 and 2018, reflecting higher

consumption of unprocessed red meat in Southeast and East Asia, Latin America and the Caribbean. Globally, more educated adults and urban residents tend to consume more animal-source foods, as well as more discretionary foods. Many people who currently lack adequate access to protein and micronutrients would likely choose to consume more animal-source foods, given the means and opportunity.

Growing demand for animal-source foods is reflected in rising prices. Global prices of beef, pork and poultry, in particular, have increased since 2001, with greater volatility recently due to short-term supply-side shocks (Trading Economics 2022). The long-term trend shows continued growth in demand for animal-source foods, driven by an emerging middle class with more disposable income in prosperous segments of Asia-Pacific economies (OECD 2020; Foster Seachrist 2021). This trend is likely to be only partly offset by the growing demand for plant-based protein substitutes in many countries, including some emerging Asian economies (Campbell 2021).

Increased international trade in food products (and globalisation more generally) can either moderate or exacerbate food price shocks. This in turn affects food affordability and consumer choices. Between 1962 and 2000, the value of food exports has declined as a share of total merchandise exports (Esteban Ortiz-Ospina and Beltekian 2018), although since 2000 this trend has reversed for several major exporting nations (WITS 2017). Supply-side shocks can have dramatic impacts on the availability and prices of staple foods, especially when major food exporters are affected (Weersink and Massow 2022).

The impacts of trade on food sustainability are mixed. On the one hand, international trade and globalisation have increased access to food for billions of people (Qaim 2017). At the same time, there are concerns that increasing reliance on imports and the globalisation of food systems may undermine local food production systems, damage or limit access to land and water resources, encourage the adoption of less diverse and nutritious diets, while increasing dependency on foreign food supplies and distant decision-makers (Kummu et al. 2020; Gephart et al. 2016; Scheelbeek et al. 2020).

In addition to affordability and trade, another major influence on consumer demand is marketing and advertising. Responsible advertising can reinforce sustainable consumption behaviours if campaigns are designed with this in mind (Rohwedder 2020). However, examples of responsible advertising are not easy to find. Most marketing today encourages people to seek fulfilment in consumption – which often results in adverse environmental and/or health impacts – and implicitly promotes paid work (to earn money to buy things) over unpaid leisure time (Kasser 2020).

For example, the adverse effects of alcohol and tobacco advertising on consumer behaviour and health outcomes are well documented, leading to strict regulations in some countries that limit when, where and how such products can be marketed. Advertising can also stimulate demand for food products that are known to be associated with environmental damage, as well as adverse health impacts. However, the regulation of food advertising on this basis is uncommon, partly due to opposition from the food industry (Sievert et al. 2021).

This highlights another aspect of markets and trade with potential adverse impacts on sustainability, namely the growing market concentration in parts of food supply chains, particularly retail distribution (Deconinck 2021; Nes, Colen and Ciaian 2021). Although in principle high market concentration and vertical integration could facilitate the spread of more sustainable practices, it may also act as a barrier or reduce consumer choice if incumbents use their influence to limit competition, manipulate prices or obstruct public policy reforms (IPBES Food 2017).

2.1.4. Public policy

Government policy has a major impact on food systems, which in turn affects consumer food choices. A mix of local, regional, national and multilateral policies influence how food is produced, processed, packaged, distributed, traded and sold. Major targets of government food policy include safety, security, nutrition and, more recently, social and environmental outcomes. Nevertheless, the impact of policy on individual consumers' food choices, relative to other drivers, is not well-documented (Symmank et al. 2017).

Figure 3. The intervention ladder



Source: Nuffield Council on Bioethics 2007

In some parts of the Global South, poor food safety is a major barrier to sustainable food consumption. Inadequate infrastructure for hygienic transfer and processing of perishable foods can impose risks of disease and illness. The World Health Organization (WHO) reported that around 400,000 people die annually from consuming contaminated foods, mainly in the Global South (World Health Organisation 2015), with much higher prevalence of debilitating food poisoning.

Food security is another key target of government food policy. The FAO defined food security as “when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (FAO 2006). Sadly, recent reports suggest that almost ten percent of the global population remains undernourished, or around 768 million people (FAO and IFAD 2021). Most of these people reside in the Global South, with more than half of the world's undernourished peoples in Asia (418 million) and about one-third in Africa (282 million). Lack of food security

obviously affects food choices but, more importantly, food security is a basic human right and an essential feature of more sustainable food systems.

A third component of food policy seeks to improve human nutrition and resulting health outcomes. Even as many people around the world remain undernourished, others consume too much or unhealthy combinations of food, resulting in increased prevalence of obesity, non-communicable diseases and poor health outcomes. In response, governments have sought to promote more healthy and nutritious diets, as well as more active lifestyles. They can deploy a range of levers to achieve such outcomes, from simply providing information, through various measures intended to guide consumer choices, to restricting or even eliminating certain choices altogether (Figure 3).

Another example is the NOURISH framework for nutritious diets, which provides a menu of options to promote healthy eating and prevent obesity and non-communicable diseases (WCRF 2021). These include non-coercive communications to influence consumer behaviour (e.g. education, advice and counselling, public awareness campaigns), as well as interventions targeting the food environment (e.g. restrictions on advertising, incentives to increase the affordability of certain foods, nutrition labelling standards or regulation of claims about food).

At the coercive end of the intervention ladder, some countries have introduced taxes on sugar, in particular for sugar-sweetened beverages. Evidence suggests that sugar taxes can have positive effects in reducing chronic health diseases, such as obesity, cardiovascular disease and diabetes (Rippe and Angelopoulos 2016; Goiana-da-Silva et al. 2020). Other studies show that, as consumers become aware of the health risks of consuming sugars, they are more likely to shift their purchasing behaviours (Acton and Hammond 2020).

A few governments have linked their nutritional interventions to other dimensions of food sustainability. For example, several governments have developed food policy or dietary guidelines including sustainability criteria, following the pioneering example of Brazil and Canada (Ministry of Health of Brazil 2015; Canada and Agriculture and Agri-Food Canada 2019). Similarly, some governments have sought to broaden stakeholder involvement in food systems governance, by including environmental and consumer groups that were traditionally less engaged, using participatory/deliberative processes and multi-stakeholder mechanisms (Fischer-Møller, Persson and Skylare 2018; Alliance of Bioversity & CIAT, UNEP and WWF 2021; Agriculture and Agri-Food Canada 2022).

2.1. Individual and demand-side drivers

In addition to contextual and supply-side drivers outlined above, various demand-side drivers of food choice can be identified. These relate to the needs of the individual or community and are often driven by basic biological factors such as hunger, appetite and taste.

The appeal of sweetness and a dislike for bitter tasting foods are considered innate human traits, and are evident from very early stages of feeding (Forestell and Mennella 2017; Schwartz et al. 2011; Wooding 2022). However, most adults are not slaves to their appetites and there is growing interest in healthier and more sustainable foods, particularly as the adverse health impacts of excessive consumption of sugar, salt and certain fatty processed foods are more widely understood (Aertsens et al. 2009). Nevertheless, despite growing public awareness (and partly due to continuous marketing and promotion), sugars and unhealthy fats continue to make up a large part of people's diets globally, contributing to obesity, diabetes, heart disease and other ailments (Seidell and Halberstadt 2015).

In addition to taste, many other drivers of individual food choice can be identified. Table 2 lists some consumer food behaviours, preferences and trends, according to the World Business Council for Sustainable Development (WBCSD) (Cairns et al. 2018). The authors argue that some food trends and behaviours must be accelerated to support a transition to "healthy and sustainable diets within planetary boundaries", whereas other trends "need to be decelerated and eventually reversed."

Despite growing public awareness, sugars and unhealthy fats continue to make up a large part of people's diets globally, contributing to obesity, diabetes, heart disease and other ailments.

Table 2. Major food consumption behaviours, preferences and trends (Cairns et al. 2018)

Food Relevance Heat Map	Explanation
Behaviours	
Convenience and on-the- go	Speed and ease as a key purchase factor
Food as a treat Food as self-expression	Food as a reward or stress relief towards instant satisfaction
Food as an experience	Desire to discover new products or features and add them to one's diet
Search for healthier eating	Demand for natural, organic, simple, and less processed foods; strongly driven by the Millennial generation
Food preferences and selection	
Simple, real, natural	Search for minimally processed and more natural or organic foods
Low in sugar, fat, lactose, etc	Low in sugar, fat, caffeine, and components leading to intolerances
Ethical	Ethical attributes in foods such as fair trade, organic, portion control, and fortification certifications
Flexitarian	Adoption of a flexitarian diet, one that is plant-based with the occasional inclusion of meat
Smaller portions	Consumption of smaller portions of food in general and of indulgence treats in particular
Processed foods	Desire for convenient processed foods as a result of an urban lifestyle
Animal protein	High animal protein consumption, mainly meat
Trends	
Tradition	Maintenance and celebration of traditional food habits
Adventure	Search for unique food experiences, new ingredients, and flavours
Plant-based	Desire to eat natural, simple, and flexible diets, downsizing meat protein consumption
Food waste elimination	Industry and individual efforts towards food waste elimination
Hyper-convenience	Time and ease of access as a key factor in product choice
Health awareness increase	Desire for healthy and sustainable food as a means of achieving well-being and quality of life
Accessible nutrition	Increased demand for safe, affordable, and nutritious foods. More people expecting to find affordable options in the marketplace that are also healthy

Note: the original table included 3 'barriers' and 5 'influencers', not shown here.

The authors highlight the rapid growth of convenience and 'on-the-go' foods, 'foodie-ism', the search for healthier eating, and food as a treat. They argue that supporting people "to make better food choices for themselves is not about telling them what they should eat but instead ... making it really easy and appetising for them to make good food choices, removing the cost and access barriers and ensuring that the food taste appeal is enhanced and never compromised" (Cairns et al. 2018).

The list of individual food behaviours, preferences and trends in Table 2 may seem comprehensive but it largely ignores the recent broad shift towards 'Western diets' in many developing countries (Kopp 2019). It is also not clear which trends are most influential in any particular context or population.

For example, one Australian study reported survey results showing that 88% of respondents considered taste before price, and that females and people on higher incomes were more likely to say so (Ward et

al. 2012). About half of respondents considered the price of food before health and nutritional benefits, with males, younger people and people with lower educational qualifications more likely to say so. In contrast, another study, also in Australia but focusing on English-speaking young adults (18-30 years), reported that nutritional content was the most important influence on meal choices, followed by cost, taste, familiarity and preparation time (Livingstone et al. 2020).

Looking further afield, a review of studies of food choice determinants among Chinese mainlanders and Chinese immigrants living in Western countries identified four major drivers: (1) the principles of traditional Chinese medicine, (2) perceptions of a healthy diet in Chinese culture, (3) desire for harmony in families/communities, and (4) physical, social and environmental factors (Wang-Chen, Kellow and Choi 2022). Meanwhile, a recent survey of Italian consumers suggested that the strongest determinants of food choices were environmental factors and health considerations (Wongprawmas et al. 2021). In short, there appears to be wide variation in the drivers of individual food choices². Cross-country comparisons of the relative importance of different factors on individual demand or food choice have been hampered by lack of consistent methodology (Cunha et al. 2018).

2.3. Regional variation and trends in consumer food choices

People eat what is considered acceptable as food in their family or community. They may favour traditional recipes or preparations, to which they may become accustomed as children. Consumers' food choices are also influenced by food marketing and distribution channels, which vary within and between countries.

2 This project asked participants in the expert consultation workshops to list the top three drivers of consumer food choices. Food quality (especially taste) and price were listed most frequently, followed by availability and health considerations (including food safety and nutrition). Other drivers mentioned less frequently included tradition, marketing, sustainability, provenance, awareness and aspiration.

Informal food markets, restaurants, specialist vendors and direct purchasing from producers are common in most countries but concentrated in urban areas. In the Global North, consumers enjoy access to additional distribution channels, including food brands, supermarket chains, online shopping and home delivery. In 2016, for example, 47% of Millennials in the US purchased food online (Macke 2016).

Tradition is an important driver of food choice in all regions. Food is a means of remembrance and coming together socially (Monterrosa et al. 2020). However, traditional recipes may require access to ingredients that are not widely or constantly available or that require considerable time to prepare.

Growing consumer demand for convenience means that cooking traditional recipes from scratch is increasingly replaced by take-away meals or kits. For example, one survey found that 41% of US consumers felt that planning and preparing healthy meals was too time-consuming (Mintel Food and Drink and Johnson 2017).

Meanwhile, consumers in many developing countries are also adopting new food behaviours. This includes increased consumption of animal protein but also diets that include highly-refined, nutrient-poor and energy-dense foods, which are associated with poor health outcomes (Popkin 2004; Kopp 2019; Fernández 2020). Nevertheless, evidence of global dietary convergence is mixed, with evidence suggesting long-term shifts both towards and away from 'Western diets', underscoring the importance of food policy for influencing dietary behaviours (Azzam 2021).

As well as variation in the importance of different food choice drivers across countries, we also see differences at a sub-national level. Individual food consumption drivers and behaviours vary between large, high-density cities, less dense suburban areas and rural landscapes. The implications for environmental sustainability are not always clear but there is evidence that less affluent areas have less access to diverse food options.

For example, one study of the Sydney suburbs in Australia showed that food basket prices and the availability and quality of fruit varied significantly by store type and the socioeconomic status of the suburb (Crawford et al. 2017). Suburbs characterised by greater affluence offered higher quality and more diverse produce at higher prices, whilst in less affluent areas the range and quality of foods was less but products were relatively expensive. Similarly, studies of Australia's rural communities have documented limited nutritional options, which are correlated with relatively high levels of obesity (Malatzky and Glenister 2019). Comparable findings are reported in rural areas of other high-income countries (Whelan et al. 2018).

2.4. Ethical and environmental consumerism

The links between diet and human health are a long-standing focus of consumer concern, as people try to avoid unsafe foods or to choose diets they believe are healthier (FAO and IFAD 2021; WHO 2020). And while health concerns appear to dominate consumers' motivations to modify their diets (Hoek et al. 2017), other issues such as animal welfare, social justice or environmental concern are rising up the agenda (Hopwood et al. 2020).

Sustainability issues in particular have led some people to become (or wish to be) more conscious consumers. According to one survey, 57% of people in upper and middle-income countries expressed a willingness to change their purchasing habits to help reduce their environmental footprint (Haller, Lee and Cheung 2020). This trend goes beyond food choices, with concern about environmental and social sustainability beginning to influence consumer preferences and business offerings for energy supply, clothing, cosmetics, tourism, and financial services, among other things (Banhalmi-Zakar and Parker 2022; White, Hardisty and Habib 2019).

Climate change is the preeminent environmental issue today but public awareness and concern about biodiversity loss and other environmental issues are not far behind (Frost 2022; Hamilton 2018). One recent survey of over one thousand people in the

USA, sponsored by the food industry, identified several environmental issues of importance to consumers, including (International Food Information Council 2021):

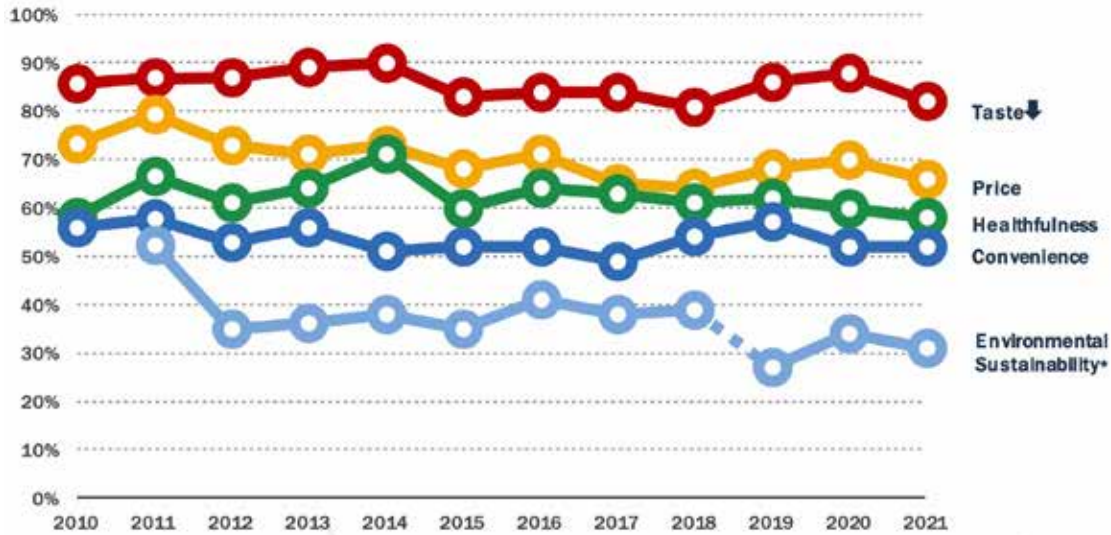
- “Knowing that the food was produced with animal welfare in mind;
- Knowing whether the food is a bioengineered food or contains bioengineered ingredients;
- Knowing the food was produced using farming technologies that seek to reduce the impact on natural resources; and
- Knowing that the food manufacturer has a commitment to reducing their carbon footprint.”

Around 40% of all respondents to the International Food Information Council (IFIC) survey reported these factors as ‘very important’ or ‘somewhat important’ in their decision to purchase a particular food or beverage product. For comparison, ‘fair and equitable treatment of workers’ was seen as important by almost 60% of respondents to the IFIC survey, suggesting that social issues had more resonance than environmental performance.

The extent to which these statements were reflected in consumers' actual purchasing behaviour is unclear. However, the same study reported that US consumers have consistently rated sustainability below taste, price, healthfulness and convenience, as key drivers of their food purchase decisions (Figure 4).

Among those consumers responding to the IFIC survey who said that sustainable production was important, the leading indicators used to assess overall product sustainability were recyclable or reusable packaging, as well as sustainably sourced labels. Another study reported similar expressions of concern about the environmental impact of product packaging in both the Global North and Global South (Feber et al. 2020). Nevertheless, even though respondents to the latter survey said they were ‘very’ or ‘extremely’ concerned about the environmental impacts of packaging – 55% of respondents in the US, for example – they still rated environmental impacts among the least important

Figure 4. Drivers of consumer food purchase decisions in the US (2010-2021)



Source: International Food Information Council 2021.

factors in their consideration of packaging, compared to food hygiene and safety, shelf life, ease of use, durability and information provided on the label.³ In short, sustainability concerns are rarely uppermost in most consumers' minds (Rejman et al. 2019).

Alongside growing public awareness and concern about the social and environmental impacts of food, we also see shifts in consumer food choices. On the one hand, there is growing interest in 'organic', 'plant-rich' or 'free-from' diets, especially among consumers in the Global North (Table 3). Other dietary preferences that have emerged in recent years include preferences for 'seasonal' and 'local' foods. At the same time, there is also more consumption of highly-processed foods and meat and dairy products in many emerging economies.

Table 3. Ethical and environmentally-motivated food preferences⁴

Food preference	Description
Organic	Food from a production system that sustains the health of soils, ecosystems and people, usually by limiting fertiliser, pesticides and other modern inputs (IFOAM 2008).
Vegan	Excludes animal products such as meat, milk or eggs
Vegetarian	Excludes meat or fish, as well as some animal products
Pescatarian	Excludes meat but includes seafood
Flexitarian	Primarily vegetarian, but sometimes includes meat or fish
Clean meat	Cultured animal cells
Low-carbon/ carbon neutral	Below average GHG emissions, or products for which GHG emissions are 'neutralised' using carbon offsets
Non-GMO	Low risk of containing organisms whose genetic makeup was modified using lab-based genetic engineering or transgenic technology (The Non-GMO Project 2020).
Localism	Food produced within a certain distance of the location of final consumption.

3 Surveys conducted in August 2020 in Brazil, China, France, Germany, India, Indonesia, Italy, Japan, UK and USA (Feber et al. 2020).

4 The dietary preferences listed in Table 3 are not all new; some have been followed by people around the world for many years, including for religious or cultural reasons, or simply due to lack of access to modern food production technologies.

2.4.1. The rise of organic foods

The organic food movement was one of the first organised attempts to define and promote sustainable agriculture. Developed during the first decades of the twentieth century across the Global North, organic farming was defined in opposition to industrialised and input-intensive agriculture (Conford 2001; Heckman 2006; Lockeretz (Ed) 2007; Barton 2018). Many organic practices would be familiar to farmers throughout human history, who did not have access to fossil-fueled machinery, synthetic chemistry or bio-engineering.

Organic farmers generally subscribe to a set of internationally agreed principles (health, ecology, fairness and care) which seek to minimise the use of fertilisers, pesticides, animal drugs and food additives that may have adverse health effects (IFOAM 2008). Some definitions of organic agriculture also limit the use of genetic engineering and genetically-modified organisms (GMO) (IFOAM 2020). As of 2019, more than three million organic producers around the world were managing 1.5% of all agricultural land following organic principles (Willer et al. (Eds) 2021).

Organic products are widely available to consumers, especially in the Global North. The global market for organic food and beverages was worth over 106 billion euros in 2019, roughly double the value in 2008 (Willer et al. (Eds) 2021). Retail sales in 2019 were concentrated in the US (with 42% of global organic sales), followed by Germany and France (11% each), then China (8%). Latin America and Africa taken together accounted for less than 1% of global sales of organic foods.

The share of organic products in the overall market for food and drinks also varies widely. Denmark had the largest market share (12.1% organic in 2019), followed by Switzerland (10.4%) and Austria (9.3%)⁵. In contrast, organics accounted for 5.8% of total retail sales of food and drink in the US in 2019 (Willer et al. (Eds) 2021). Eggs, fruit and vegetables had the largest market shares across all food categories in Europe, while fruit and vegetables led in the US. Organic dairy

products also achieved relatively high market shares in some countries.

One online survey of over 15,000 people in France, Germany, Italy, Norway, Poland, Spain and the UK looked more closely at consumer preferences for organic foods (Vittersø et al. 2019). The survey focused on consumer concerns about 'contentious inputs' in organic agriculture but also covered issues related to consumption and purchases of organic and other foods, use and recognition of organic food labels and trust in food system actors⁶. Among other findings, the authors report that:

- 16% of respondents said they ate organic foods frequently ('daily' or '4-6 times a week'), 14% claimed they never ate organic foods, and 8% didn't know how frequently they ate organic foods. Reported frequencies varied widely across the seven countries surveyed;
- The frequency of consumption of organic food generally increased with education, declined with age, and was higher in 'big cities' and 'rural areas' compared to small towns and cities. There was no clear difference in the frequency of consumption between men and women surveyed;
- Compared to food in general, consumers were less likely to purchase organic foods from supermarkets and more likely to buy organic from specialty shops, open-air markets, online or direct from producers;
- Across all countries, 12% of respondents reported that they 'always' ask for organic food when eating out, versus 25% who said they 'never' ask for organic food. This also varied widely across countries.

5 The share of organics in the UK national food and drink market was reportedly much lower, growing from 1.5% of total sales in 2018 (Vittersø et al. 2019) to 1.6% in 2020 and 1.8% in 2021 (Bio Eco Actual 2022). This may reflect different measurement methods.

6 'Contentious inputs' considered by the study included: mineral oil and copper fungicides for plant protection, non-organic straw for livestock bedding, fossil fuels for farm equipment, peat, plastic food packaging, plastic sheeting to suppress weeds, antibiotics and synthetic vitamins for animal husbandry. Other contentious issues included the seasonality of products, the need for vegan options, preference for locally-sourced livestock feed, and a preference for small-scale production.

2.4.2. Growing interest in plant-rich diets

As well as increasing demand for organic foods, attention has focused recently on the environmental and health impacts of different foods. One expression of such concerns, particularly in the Global North, is the growing popularity of diets that limit consumption of animal-source foods (Gammoudy 2021; Malochleb 2020). Red and processed meats are a particular focus, not only due to their reported adverse health impacts but also their relatively large environmental footprint (Clune, Crossin and Verghese 2017; Springmann et al. 2018; Clark et al. 2019).

Although per capita consumption of animal-source foods is growing in the Global South (see section 2.1 above), vegetarian or vegan diets are also commonplace. A survey from a few years ago suggested that up to 9% of people in the Asia-Pacific region followed a vegan diet in 2016, compared to 6% in Africa and the Middle East and 4% in Latin America, and around 2% in both Europe and North America (Statista 2016). More recent data for some countries in the Global North shows increasing numbers of people who say they follow vegetarian, vegan or plant-rich diets, despite relatively high average incomes (Ferrari et al. 2020). As with organic food, this may be a case of relatively privileged consumers rediscovering, by choice and conviction, diets that people in the Global South have followed for ages, by tradition and necessity.

Plant-based foods and diets have achieved comparable levels of market penetration to organic foods, again in the Global North, but much more quickly. For example, the share of people in Sweden claiming they were vegetarian increased from 3% in 2007 to 10% in 2014, while the percentage of self-proclaimed vegetarians in Germany rose from 9% in 2009 to 11% in 2017 (Vou 2019). In the US, about 10% (+/- 2%) of adults over the age of 18 described themselves as vegan or vegetarian as of January 2022, up from around 5% in 2017-18 (Norwood and Bir 2022).

Growing adherence to plant-based diets implies less consumption of animal-source foods. In the UK, for example, average meat consumption per capita per

day is reported to have decreased by 17% between 2008 to 2019, with larger shifts from red meat to poultry, while seafood consumption remained relatively stable (Stewart et al. 2021). Meanwhile, the number of people in Great Britain who said they followed a stringent vegan diet rose from 0.25% in 2014 to 1.21% in 2019, and over 3% by December 2021 (The Vegan Society 2019; Johnson 2022).

What drives the growing popularity of plant-based diets in the Global North? Some observers have attributed the trend to increased penetration of social media, particularly among younger generations (Jallinoja, Vinnari and Niva 2019). Others highlight environmental concerns, notably direct and indirect GHG emissions, water pollution, and habitat disturbance, including impacts from growing crops used to feed livestock (Clune, Crossin and Verghese 2017; WWF 2020). Nevertheless, the available evidence suggests that consumer concerns about pain and suffering experienced by livestock (animal rights or welfare), as well as the perceived benefits of plant-based diets for their personal health (Box 5), are more influential motivations (Plohl and Stern 2020; Duckett et al. 2021; Hopwood et al. 2020; Radnitz, Beezhold and DiMatteo 2015; Leiserowitz et al. 2020; Miki et al. 2020).



Box 5. Health and environmental impacts of plant-rich diets

A review of dietary health impacts is beyond the scope of this report. There is however a large literature that explores the potential health and environmental impacts of different diets (Springmann et al. 2018; Friel et al. 2009; Willett et al. 2019; WWF 2020).

The widely-cited EAT Lancet Commission on Food, Planet and Health has proposed a 'healthy reference diet' designed to reduce both the burden of diet-related ill-health and the environmental footprint of the food system globally (Willett et al. 2019). The Commission recommended increasing intakes of foods such as vegetables, fruits, wholegrains, legumes and nuts, and limiting intakes of red meat to a maximum of 28g of red meat a day.

However, there is evidence that healthy foods are not necessarily or always environmentally sustainable, and vice versa (Béné et al. 2019; Willett et al. 2019). The health impacts of animal-source foods are a particular concern, based on evidence that high levels of consumption of such foods, especially red and processed meat products, are associated with increased risk of certain non-communicable diseases (Chan et al. 2011; Micha, Michas and Mozaffarian 2012; Wang and Beydoun 2009; Zhong et al. 2020).

There is also evidence that highly-processed, energy-dense and discretionary ("junk") foods have both large environmental footprints (Hendrie et al. 2014, 2016) and that heavy consumption of these foods contributes to human health risks (Afshin et al. 2019; Ntarladima et al. 2022; Sarkar, Webster and Gallacher 2018). In short, the relationship between healthy and sustainable diets is complex, leading to confusion among consumers about what foods are best to eat and why (Lusk 2019; Riccardi et al. 2022).

An online survey of 1,200 people in the US found that a majority of those following a plant-based diet (79%) as well as omnivores (83%) identified disease prevention or 'wellness' as their top dietary motivations (Miki et al. 2019). At the same time, those who followed plant-based diets were more likely to flag 'helping the environment' (17% vs. 4%) and 'supporting animal welfare' (28% vs. 1%) as part of their motivation. Omnivores were more likely to identify food enjoyment and a desire to address specific health concerns. The authors concluded that consumers who follow plant-based diets had more diverse and more explicit motives, compared to 'omnivores'.

Whatever the motivations for reducing consumption of animal-source foods, there remain significant barriers, including consumer perceptions of taste, price and convenience (Bryant 2019). Interestingly, consumers in some emerging markets may be more amenable to meat substitutes. For example, there is some evidence suggesting that urban, well-educated and high income consumers in India and China are more likely to purchase 'clean meat' and plant-based meat substitutes, compared to consumers in the US (Bryant et al. 2019).

Food producers both respond to and influence shifting consumer preferences. Between 2012-2016, across 86 global markets, there was a 13% increase in launches of new vegetarian food and drink products and a 257% increase in vegan product launches (Mintel 2017). In the UK alone, total spending on chilled vegetarian foods tripled between 2012-2020 (Trenda 2021). Markets with the highest rate of new vegan product launches in 2018 were Germany, the UK and the US (Vou 2019). One recent area of innovation and growth is meat and dairy substitutes, with food producers and retailers increasingly catering for growing demand (Capritto 2019). From 2013-2017, for example, sales of meat substitutes in Europe increased four-fold (University of Hohenheim 2018).

The question of what drives vegetarianism, not to mention whether and how animal-based foods fit in sustainable diets, remains a focus of on-going debate. Compelling arguments can be found from across the spectrum, including appeals to cease animal agriculture and stop consuming animal-source foods altogether, to calls for moderation of consumption by people who currently consume relatively large quantities of such foods, while encouraging lower impact production

practices (“less and better”). Certain forms of animal production (e.g. “regenerative” grazing, shellfish aquaculture) are promoted on the grounds that they supply essential nutrients from areas unsuitable for other forms of food production (Vliet, Provenza and Kronberg 2021). There is also growing interest and investment in the development of cultured meat and dairy substitutes (“clean meat”). While this report cannot resolve the issue, there is clearly a need for further research and consensus building on this sensitive topic.

2.5. External shocks: Covid-19 and war in Ukraine

Food systems are prone to both supply-side and demand-side shocks, which can result in severe food insecurity as well as shifting dietary preferences. Two recent examples are the Covid-19 pandemic and the war in Ukraine.

2.5.1. Impacts of Covid-19 on food choices

The Covid-19 virus emerged in late 2019 and was classed as a global pandemic by the World Health Organisation (WHO) in March 2020. As a result, day-to-day life changed for billions of people, with city-wide and regional lockdowns, reduced travel and movements, as well as changes in the way consumers access food. The pandemic caused disruptions in food supply chains, while the economic recession resulting from lockdowns and other public health measures, and an uneven economic recovery as new variants of the virus circulated, has resulted in lower incomes and higher and more volatile food prices, reducing access to food for many people (HLPE 2021; Béné et al. 2021).

The Covid-19 pandemic also influenced food preferences, behaviours and consumption patterns. In the early stages of the pandemic, many countries saw spikes in demand for shelf-stable foods, with stockpiling of non-perishable foods and increased reliance on food delivery and pick-up services (Lempert 2020; Chenarides et al. 2021). Lockdowns and other restrictions on people’s ability or willingness to leave their homes resulted in measurable changes in food

preferences. In the UK, for example, almost a quarter of consumers reported buying more local produce, and nearly one in five reported an increase in buying seasonal produce (Deloitte 2021).

Similarly, an online survey of 411 households during lockdowns in Nigeria, Turkey, Europe and the US found that demand for fresh fruit and vegetables increased, while demand for meat and bread declined (Celik and Dane 2020). In contrast, an online survey of 2,680 consumers in Denmark, Germany and Slovenia, during the early stages of the pandemic, found an overall reduction in shopping frequency and consumption of fresh foods (Janssen et al. 2021).

Different households responded differently to the Covid-19 lockdowns. For example, a study in Spain reported that larger households were significantly more likely to purchase foods with sustainable attributes (organic, local, animal welfare or fair-trade) than single-member households, compared to the situation before the Covid-19 lockdown, whereas consumers rated as ‘risk-averse’ were less likely to purchase sustainable foods (Li et al. 2021).

Despite the temporary spike in demand for certain products and other Covid-related changes, it is unclear to what extent consumers’ long-term food preferences may have changed (Bentall et al. 2021). Some behavioural shifts may have been related to spending more time at home during lockdowns, which offered opportunities for people to try new recipes and ingredients (Roy et al. 2021). A more recent survey of 1,014 people in the US found that food consumption behaviours were reverting to pre-Covid patterns, although the growth of online shopping continued, alongside increasing consumer interest in and awareness of the links between diet and health (International Food Information Council 2021; Jensen et al. 2021).

Long-term impacts of the Covid-19 pandemic on food sustainability remain unclear. However, the acceleration of online shopping is widespread, for both food and other consumer products (Roy Morgan Australia 2021; KPMG 2021). This in turn raises questions about the social and environmental impacts

of online shopping. For example, reports from the US during the early stages of the Covid-19 pandemic highlighted the precarious employment conditions and risk of infection among workers involved in food processing, food service (including so-called 'ghost kitchens') and food delivery (Saxena 2020). The rise of online shopping also has implications for the way that food sustainability information is communicated to consumers, as discussed in the following section.

2.5.2. The war in Ukraine and food security

In contrast to Covid-19, which affected food supply and demand, the Russia-Ukraine war has mainly disrupted food supply and undermined food security in countries that rely on exports from these two countries. In 2019, Ukraine and Russia together accounted for one-quarter of global wheat exports, one-fifth of global maize and barley, and nearly two-thirds of traded sunflower oil (Kim 2022; Ritchie 2022). Russia was also one of the world's largest exporters of crop fertilisers, including nitrogen, potassium and phosphorus (Mustafa 2022).

In response to the outbreak of war, global crop prices spiked, although they have retreated slightly (BBC 2022; Smith 2022; Weersink and Massow 2022). Major importers affected by the supply disruptions and price hikes include countries in Africa, the Middle East and further afield, not to mention millions of Ukrainians who have suffered food shortages directly due to the conflict (Leiva 2022).







3. Sustainability Information and Consumer Food Choice

The previous section of this report explored the overlapping drivers of consumer food choice, which range from individual and demand-side to contextual and supply-side factors. This section explores how information about the sustainability of food can help guide consumer choices. Most organisations working to create and disseminate food sustainability information – whether governments, businesses, labelling organisations or NGOs – aim to stimulate long-lasting behaviour change by large numbers of consumers. But how can they best achieve this outcome?

The section begins by reviewing the role of information in consumer behaviour generally, particularly non-price information. Because so much of the food we eat is processed or prepared out of sight, food producers, brands and retailers often use food packaging and descriptions (e.g., on pack, shopping websites and

restaurant menus) to persuade consumers to buy. We outline the main sources of information used by consumers to make decisions about food in different settings, and which sources consumers trust most (rightly or wrongly).

The rest of this section focuses on eco-labels, how they are used to influence consumer behaviour, empirical evidence of their effectiveness and limitations, and how they can be reinforced by other forms of communication. As previous reports have shown, consumer behaviour change campaigns have evolved from the idea that increased knowledge changes attitudes and attitudes change behaviour, to more reliance on negative emotional appeals and guilt messaging, to growing emphasis on promoting new social and moral norms to trigger behavioural change (UNEP 2019). We explore how different forms of communication about

food sustainability can enhance the influence of eco-labels, and how insights from behavioural science and consumer marketing are being used to improve the communication and influence of food sustainability information. This can include, for example, the introduction of micro-incentives, visual cues and modifications in the decision context (e.g., ‘nudges’), to shift consumer behaviour (Mertens et al. 2022).

3.1. The role of information in consumer behaviour

The role of information in consumer behaviour has been a focus of scientific inquiry for over half a century and a practical preoccupation of brands and retailers for much longer. Information about food that may be of interest to consumers includes its price but also taste appeal, ingredients (e.g., gluten-free), freshness, nutritional value or ‘healthiness’ (perceived or real), provenance, social and environmental impact, animal welfare (e.g., ‘free-range’), legality, or cultural acceptability (e.g., Halal), among other things.

One fundamental insight from early research into consumer information is that shoppers find it more difficult to assess some product attributes than others (Nelson 1970, 1974). Prices for example are often clearly marked and easily compared, especially for similar products where prices per unit weight or volume are stated explicitly. This is not the case for many other product attributes, which may not be displayed or directly observable even upon consumption, for example how a product was produced.

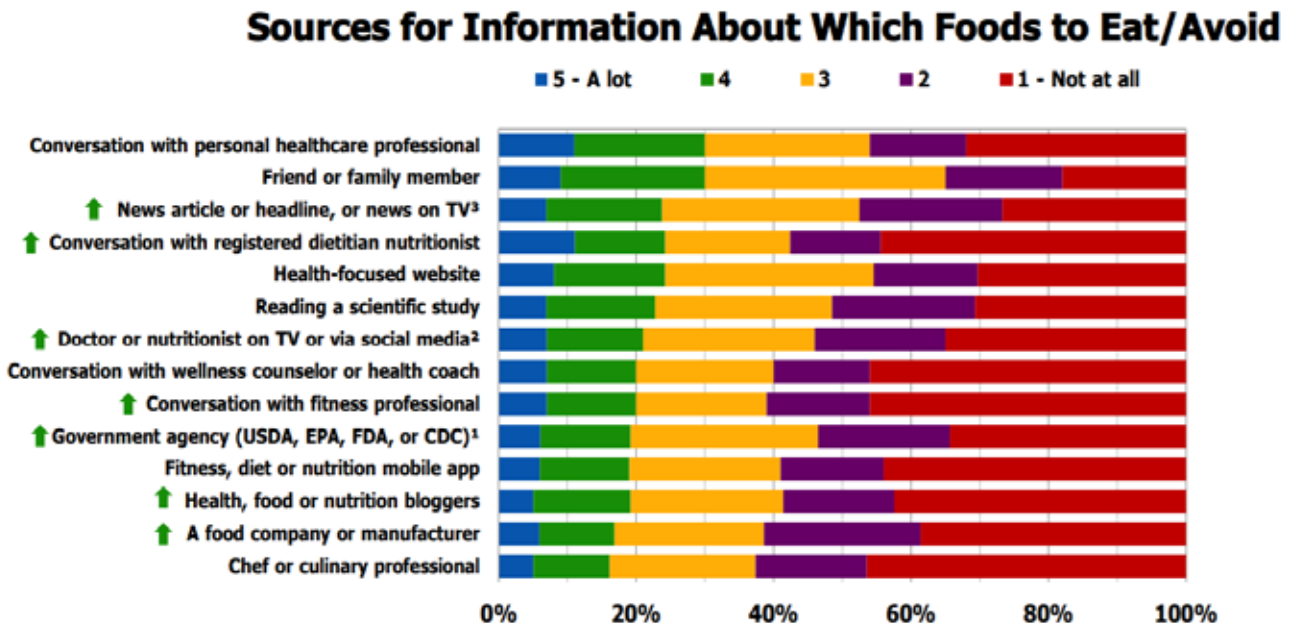
As a result, consumers may be sceptical about claims they cannot verify directly. They may perceive sellers’ claims about their products as a kind of evidence, but of course this is not always reliable (Calfee and Ford 1988; Michail 2016). Note also that while consumers say they value accurate information about product attributes they cannot verify directly, they may be unwilling to invest a great deal of time or effort (i.e. incur costs) to obtain and process this information (Sexton 1979; Piguet and Bougherara 2008; Kiesel and Villas-Boas 2013).

Although consumers’ choices are constrained by many factors, as discussed in the preceding section, it is also true that consumers have considerable power, both individually and collectively. Through their choices, consumers can drive industry to improve transparency and adopt more sustainable practices (Spaargaren and Oosterveer 2010). If businesses fail to respond to consumer expectations, they can lose their customers. In one recent consumer survey, for example, over one-quarter of UK respondents reported they had stopped purchasing certain brands or products because of ethical or sustainability-related concerns (Deloitte 2021).

In addition to seeking, requesting and purchasing foods with lower social and environmental impacts, consumers can also reduce their personal environmental footprint by reducing food waste at home or when eating out. In order to do these things, however, people need reliable information on the comparative impact of different foods, as well as practical tips on how to reduce food waste.

Unfortunately, consumers’ perceptions about environmental or health impacts of different foods or diets are not always well-informed (Nestle 2012; Provencher and Jacob 2016). Moreover, even accurate knowledge does not always lead to sustained behaviour change. For example, while people are increasingly aware of environmental change, only a small minority make the link to food production and consumption and even fewer change their behaviours as a result (Campari 2019; WWF 2019). Simplistic solutions abound, such as the fashion for ‘local’ foods and shopping at ‘farmers markets’ rather than in large supermarket chains (Smith Taillie and Jaacks 2015). On a more optimistic note, consumers who are relatively well-informed about the environmental impacts of food seem better able to compose menus with a lower environmental footprint (Hartmann et al. 2021).

Figure 5. Common sources of consumer information about food and health in the US



Source: International Food Information Council 2018.

3.2. Sources of information about food

Consumers get their information from a large number of sources of varying authority and trustworthiness. These include their personal experience but also family and friends, health advisors (e.g., medical doctors or coaches), government agencies, educators, mass media (e.g. news services), advertisers, social influencers (e.g., celebrity chefs, scientists, NGOs, social media), as well as directly from food producers, brands and retailers (Figure 5).

Information about food can be communicated via multiple channels, including word-of-mouth, in media (print, broadcast or digital/social), in educational settings, on food packaging and labels, and on menus and point of sale displays. A survey of over 15,000 consumers in seven European countries found that the sources of information about food relied upon most often were “the product itself” (i.e. what is displayed on the packaging), followed by labels and logos (Vittersø et al. 2019). Personal communications by family and friends

and information obtained directly from food producers were ranked lower but still important. Relatively few respondents said they relied on information provided in food advertising, commercials and promotions on TV or in periodicals.

A more subtle form of communication is where and how food is displayed, e.g., at the entrance to a store or the front of a food service counter, or further back and out-of-sight. Images of food, whether part of advertising or taken by and shared among consumers themselves, can also have an impact on consumers’ choices (Andersen, Byrne and Wang 2021). All of these different communication channels vary in terms of the number of people that can be reached, the longevity of influence and their cost-effectiveness.

3.3. Which sources of information do consumers trust?

With so many sources of information about food, offering often conflicting views, and in situations where there may be little time to make decisions, it is not surprising that consumers often express confusion or scepticism about different claims or report difficulty in choosing more sustainable foods (Deloitte 2021). Consumers want sources of information they can trust, ideally free from bias or 'greenwash' (noting however that many people favour media that aligns with their world views).

Insights can be gleaned from studies of how consumers rate different sources of information on the health impacts of different foods or diets. For example, a study commissioned by the International Food Information Council (a US-based organisation supported by the food, beverage, and agricultural industries), surveyed 1,009 Americans between the ages of 18-80 and reported the following consumer perceptions of food and health (International Food Information Council 2018):

- 80% of respondents reported being confused by conflicting information about food and health;
- Dieticians and healthcare professionals were most trusted for advice about which foods to eat or avoid;
- The least trusted sources of information about food and health were friends and family, stories in the media, and food companies;
- 54% of respondents reported a conversation about their diet with a 'personal healthcare professional' and 78% of these people (42% of the total survey sample) claimed they had changed their diets as a result; and
- Young adults expressed greater trust in technology-based information sources, such as fitness apps, bloggers and people on TV, than older consumers.

With so many sources of information about food, offering often conflicting views, and in situations where there may be little time to make decisions, it is not surprising that consumers often express confusion or scepticism about different claims or report difficulty in choosing more sustainable foods.

One might expect food producers to be another important source of information about food sustainability. There is evidence that consumers are receptive to some producer voices, especially small-scale producers (Weber et al. 2021). However, the perspectives of food producers (in contrast to food brands and retailers) are rarely represented in consumer communications about food, in part due to the physical distance between most food producers and their ultimate customers (Šūmane et al. 2018). This gap is recognised and efforts are being made to strengthen the representation and voice of small-scale producers, in particular, including through their participation in the development of food sustainability standards (Bennett 2017; Berger and Blackmore 2021). One example is the work of the Fairtrade Foundation, which is described in a case study prepared as part of this project.

At the same time, there is also scepticism about the credibility of sustainability information provided by food suppliers, given their interest in presenting their products and performance in a positive light (Moodie 2016). For the same reason, sustainability standards that are wholly owned or governed by producers, manufacturers or retailers, as well as research commissioned by them, may be less trusted than independent standards, especially those that are

governed by different stakeholder groups representing diverse perspectives on sustainability. For example, a survey of over 15,000 consumers in seven European countries found that, when asked who they would trust to tell the truth in the event of a meat contamination scandal, consumers generally expressed more trust in independent experts and consumer organisations, and less trust in politicians, the food processing industry and supermarket chains (Vittersø et al. 2019).

One study focusing on consumer trust in organic olive oil products explored 'what to say, how to say it and who should say it' (Vega-Zamora, Torres-Ruiz and Parras-Rosa 2019). Based on experiments with 800 participants in six Spanish cities, the authors found that message content, form of appeal and source of information all influence consumer trust. They further conclude that the most effective combinations for building consumer trust in organic olive oil included an argument about health put forward by an expert (e.g. a medical doctor), an argument around 'authenticity' transmitted by an olive oil producers' union, an 'elitist' argument from a celebrity chef, and a 'social' argument transmitted by a public authority. In all cases, an emotional form of appeal was seen as more effective.

The studies outlined above show that the food industry plays a key role in providing information about food, either directly through advertising or indirectly through support for research and communication about food, health and sustainability. This underscores the importance of ensuring that industry involvement is balanced by input from other stakeholders, who may hold very different views on the sustainability of particular foods.

3.4. Building consumer trust and awareness using labels

One method to communicate information to consumers is through the use of labels printed on food packaging or displayed alongside the product, either physically or on a web-page. This is a common strategy to influence food choices for health reasons, alongside nutrition education (Perez-Cueto 2019). The effectiveness of a label, apart from any accompanying communication,

depends partly on the extent to which consumers are aware of the label and understand what it means, as well as their trust in its credibility, all of which influence their purchase decisions (Grunert, Hieke and Wills 2014).

Labels are typically used to provide information about product attributes that people cannot observe directly (Bougherara and Grolleau 2005). Labels may be outcome-based or practice-based labels. Outcome-based labels report a particular product's environmental impact, typically for a given volume or mass. Carbon footprinting is an example, e.g. grams of CO₂-equivalent per kg of product. Practice-based labels tend to be more holistic and certify that a product has been produced in accordance with recognised standards or practices (e.g. organic, Fair Trade).

Labelling is common for packaged foods and in formal markets, where they may be integrated into promotional messages or set apart for greater visibility and to give the impression of independence from marketing content. Labels are less commonly used in informal food markets, where consumers can often see, smell, feel or even taste products themselves, or interrogate vendors if they desire additional information before they buy.



Box 6. Overview of food sustainability standards, labels and related information tools

A growing number of eco-labels and other food sustainability information tools have been developed to guide consumers' purchasing decisions. These tools are not restricted to consumer information but also offer incentives to producers to improve their production practices. They can help financiers, processors, traders and retailers meet their corporate sustainability goals, provide a benchmark for policy-makers to consider in making regulatory reforms, and a basis for advocacy by non-governmental organisations (NGOs) and others.

Over 450 ecolabels globally cover a wide range of sustainability related concerns, including organic production, animal welfare and farmer income (Ecolabel Index 2021). One of the largest publicly available databases on voluntary sustainability standards (VSS) is maintained by the International Trade Centre (ITC), a joint venture of the World Trade Organization (WTO) and the UN Conference on Trade and Development (UNCTAD).

The ITC on-line database or 'Standards Map' currently identifies 311 independent labels "for environmental protection, worker and labour rights, economic development, quality and food safety, as well as business ethics" (ITC 2021). Of these, 129 standards offer a consumer-facing label. Among food-related categories, agriculture is the most well-represented sector (154 standards), followed by livestock (86) and fisheries including both farmed and wild-caught (65)⁷. It is interesting to note the dominance of agricultural standards, especially considering that manufacturing and service industries account for a larger share of economic activity in most countries.

The ITC Standards Map is the tip of the iceberg, when compared to the much greater number of sustainability claims about food products made by brands, retailers, apps and independent influencers. Unfortunately, there is no comparable database covering all different sources of information about food sustainability. Some other sources of information on sustainability standards include:

- Ecolabel Index (<http://www.ecolabelindex.com>)
- IISD State of Sustainability Initiatives (<https://www.iisd.org/ssi/>)
- UN Forum on Sustainability Standards (<https://unfss.org>)
- UNECE Forest Products Annual Market Review (<https://unece.org/info/publications/pub/361907>)

The ITC also publishes jointly, with the Research Institute of Organic Agriculture (FiBL) and the International Institute of Sustainable Development (IISD), an annual report of statistics and trends for selected voluntary sustainability standards (FiBL 2021). Their 2021 report focuses on 14 standards for eight agricultural sectors plus forestry, and includes coverage of seven food products: bananas, cocoa, coffee, oil palm, soy, sugarcane and tea (ITC 2021). The authors state that 'organic' was the biggest sustainability standard in terms of total area and product variety, covering 72.1 million hectares, although this accounted for only 1.5% of all farmland worldwide.

New standards and consumer-facing labels are constantly being introduced in different markets. Novel labels may address health or social impacts, carbon or water footprints, or any number of attributes of food products (Kateman 2020; Wartella, Lichtenstein and Boon (Eds) 2010; Bossuyt et al. 2021). However, relatively few standards address several sustainability issues in an integrated way, forcing food brands and retailers to print multiple labels on their products and making it more difficult for consumers to find products that meet their requirements.

⁷ Some standards cover multiple sectors, hence these numbers may include double counting.

Food labels are mandatory in some countries, as in the case of ingredient lists, nutritional ratings, food safety or provenance (i.e. where ingredients were produced or the product was manufactured). Nevertheless, many labels are voluntary (Box 6). Some labels are created by food manufacturers and retailers and applied to packaging as they see fit. These labels can be considered part of product marketing and may be designed to replace independent labels, which companies cannot easily control. However, even voluntary or proprietary labels may be regulated by law to prevent misleading claims, and/or subject to formal verification by the company or its agents.

Many well-known labels are owned and controlled by independent organisations, which grant permission to apply their label to a product only after the producer, manufacturer or retailer meets certain conditions. This is the case for most food sustainability labels, which are intended to communicate that products carrying the label have been independently verified as meeting a specified standard of social and environmental performance. Labels may take the form of a simple iconic affirmation that a product meets a certain standard, or they may offer a scorecard or ranking (e.g., using 'traffic light' ratings from red to green, or varying numbers of stars) to indicate how well the product meets the standard.

Ensuring that eco-labels and other sustainability information tools can discriminate accurately between products is considered essential to gain and maintain consumer trust. Trust can easily be lost, for example if a label is subject to negative attention in the media (Hildenbrand, Kühl and Piper 2016). Eco-labels are therefore often encouraged to strengthen their audit and governance arrangements, in order to increase confidence that their certifications are well-deserved and that labelled products are reliably traced through supply chains (Jahn, Schramm and Spiller 2005; WWF 2018).

Many existing sustainability labels rely on elaborate technical standards, independent audits, public consultation, appeals mechanisms and impact monitoring and reporting to ensure the credibility of

their certifications (ISEAL Alliance 2022). However, few consumers have the time or expertise required to assess these systems. As noted above, consumers may be more responsive to the source of food sustainability claims and how they are expressed, rather than the procedures and institutions that underpin such claims. The following section explores how consumers respond to eco-labels, based on the empirical literature.

3.5. How do consumers respond to eco-labels?

Numerous studies have attempted to determine the impact of eco-labels on consumers' intentions and behaviours. While the literature is not unanimous, many survey articles and case study evidence suggest that the presence of an eco-label has a measurable and positive influence on consumer choices. There is evidence that consumers are willing to pay slightly more for labelled products than for conventional products (Yokessa and Marette 2019). Experience with food rating schemes and other emerging sustainability information tools (e.g. smartphone apps and QR codes that link to product stories) is probably too recent to draw firm conclusions, but there is reason to suppose they will learn from the successes and failures of eco-labels and deliver even better results.

Alongside evidence of consumers' positive response to sustainability labels, experience has revealed challenges faced by many if not all labels. Common issues include questions about the credibility of labels, the difficulty of distilling complex information into a simple yes/no claim or index/rating, and the proliferation of labels, each providing slightly different information (Yokessa and Marette 2019). A more fundamental challenge is that what consumers say in response to surveys about their preferences and purchasing intentions may not align with their behaviour. These and other issues are discussed further below.

3.5.1. Empirical evidence of consumers' responses

One recent survey of evidence on consumers' responses to all types of eco-labels (not just for food) screened 4,875 papers for relevance, selecting ten systematic reviews for further analysis (Kaufman et al. 2020). Most reviews focused on the impacts of labelling on consumer purchasing behaviour. According to the authors, three of the selected systematic reviews "had a high risk of bias" while "only two rated moderately to good quality." On a more encouraging note, the authors stated that the papers they examined reported 'converging' results, which lends confidence to their summary of findings (Kaufman et al. 2020), including:

- The importance of trust for successful labelling, which in turn depends on 'impartial, consistent and effective' administration of labelling schemes.
- Positive correlation between consumers' knowledge and awareness of a label, its visibility, and trust.
- Consumers with 'aligned values and beliefs' are more likely to purchase products carrying eco-labels.
- The need for complementary marketing and educational initiatives to raise consumer awareness and promote sales of labelled products, drawing on insights from behavioural science.

These conclusions are echoed by the WBCSD, which reviewed how food labelling can support adoption of healthy and sustainable diets, where labelling falls short, and what can be done to increase the efficacy of food labelling systems for more sustainable food choices (WBCSD 2021). The WBCSD focused on scoring or rating labels and included a 'benchmarking' of eight environmental scoring labels and six nutritional scoring labels⁸. On the impact of scoring labels on food choice, the WBCSD noted that:

8 The environmental scoring labels considered in the WBCSD report were: Eco-Score, Beelong Ecoscore, Foundation Earth Eco-Impact (UK) and EnviroScore (EU), M-Check, Cool Food Meals, Eaternity Score, and Planet-Score. Nutritional scoring labels considered were: Nutri-Score, Guiding Stars, Health Star Rating, UK Traffic Light Label, Healthier Choice Label, and MINSAL Warning Label.

- "Awareness in a target consumer group (e.g., consumers with unhealthy diets or diets that have high environmental impacts) is an important precondition for that target group to change behaviour in response to a label."
- "Well-designed labels convey something meaningful to consumers – something most people can understand quickly, without having to study the label, which can rapidly inspire or motivate the intended behaviour."
- "[There is a] tendency of consumers to perceive labelled products to be 'better' than non-labelled products on even more criteria than a label is intended for."
- "When a food product has both a nutrition and environmental score, the nutrition score primarily drives behaviour change."

A different review of empirical studies of the effects of eco-labels on consumer demand for more sustainable food products, in both actual and hypothetical contexts, found that 60 out of 76 interventions reported a positive effect of eco-labels on the selection, purchase or consumption of environmentally sustainable food and drink products (Potter et al. 2021). Yet another article reported that labels which are 'attention-grabbing, easily understandable, and consistent across categories' can help consumers to make better informed decisions – assuming of course that such labels also accurately reflect product sustainability (White, Habib and Hardisty 2019).

Turning to case study evidence, one study of Swiss consumers confirmed that eco-labels and especially detailed guidelines marginally increased consumers' accuracy in selecting environmentally friendly foods (Lazzarini, Visschers and Siegrist 2018). Similarly, a study of Polish city-dwellers found that labels were more likely to elicit a positive response when consumers were familiar with and understood their meaning (Kaczorowska et al. 2019).

3.5.2. Consumer concern and willingness to pay

One test of consumer sentiment is whether people are willing to pay more for products that claim to address their stated concerns. Surveys conducted around the world suggest that more and more consumers say they are willing to pay extra for ethical, sustainable or environmentally-friendly products (KPMG 2021). Even where sustainable options are not more expensive, another test is whether consumers will switch brands and suppliers.

One meta-analysis of 35 valuation experiments involving over 35,000 participants from countries around the world, in both the Global North and Global South, reported that consumers were willing-to-pay an average premium of 3.79 \$/kg more for eco-labelled or organic foods, across all product categories (Potter et al. 2021)⁹.

In the UK, almost one third of consumers surveyed claimed they had ceased purchasing certain brands due to ethical and sustainability concerns (Deloitte 2021). Waste reduction, sustainable packaging, lower carbon footprint and commitment to ethical practices, human rights and biodiversity were among the top reasons given for more ethical and sustainable food purchasing practices, while cost and lack of interest and information were reported to be the main barriers to adoption (Deloitte 2021).

Studies further suggest that willingness-to-pay (WTP) increases with familiarity and environmental stringency. A survey of 2,441 European consumers reported higher WTP for well-known organic food logos that were perceived to have stricter standards and controls (Janssen and Hamm 2012). Similar findings were reported from an even larger survey of consumers in seven European countries, which found a strong positive correlation between WTP and the stated frequency of consumption of organic foods, especially for foods produced without the use of antibiotics,

copper fungicides or plastics (Vittersø et al. 2019). Nevertheless, the same study also reported that 69 percent of respondents agreed or fully agreed with the statement that organic food is 'too expensive'.

Interestingly, consumers appear to respond more intensely to negative than positive information about products. For example, an experiment conducted among 458 German consumers found that WTP (for a non-food item) declined more in response to a negative deviation below the industry average carbon footprint than it rose in response to an equivalent deviation above the average (Petersen, Hörisch and Jacobs 2021). This may be an example of loss aversion, i.e. the observation that people tend to place more weight on costs than benefits.

Note that most WTP surveys involve virtual or hypothetical scenarios, rather than actual purchasing data. A more realistic example comes from an experiment conducted at one large 'convenience' store in Australia, where 37 high-turnover food products were labelled to indicate their embodied carbon emissions and sales were tracked over a 3-month period (Vanclay et al. 2011). The overall change in sales turnover following the introduction of labelling was found to be small: sales of products with above-average carbon footprints fell by 6% while sales of products with below-average carbon footprints rose by 4%.

A similar field experiment was conducted in 17 retail outlets in Sweden, where customers were presented with qualitative information about the carbon impact of climate-certified milk (Elofsson et al. 2016). In this case, the authors reported that the presence of the sign boosted demand for climate-certified milk by around 6–8%, although the effect was short-lived. Both this study and Vanclay et al. (2011) illustrate the benefits of field experiments for assessing the impact of labelling on actual consumer behaviour.

⁹ Willingness-to-pay was expressed in 2018 US Dollars adjusted for Purchasing Power Parity (PPP). Estimated premiums ranged from 0.72 PPP\$/kg for fruits, vegetables and nuts, 2.71 PPP\$/kg for seafood, up to 9.24 PPP\$/kg for meat and dairy products.

3.5.3. Variation in response by consumer characteristics

Evidence suggests that eco-labels are more appreciated by women and younger people, while the effects of income, education and age are less clear, according to the meta-analysis cited above (Potter et al. 2021). Similarly, a study of co-branding, in which the WWF panda logo was displayed alongside different eco-labels on grocery packaging, found the strongest and most positive effect among women and younger shoppers (18-34 years), with somewhat less positive effects for shoppers between 35-49 years, and little to no significant impact on people over 50 years old (Heinl et al. 2021). Another survey of 675 people in France, conducted in 2010, reported significantly greater preference for certified seafood products among consumers under 45 years old (Salladarré et al. 2013).

More generally, the IFIC reported that US consumers with relatively higher incomes were more likely to “pay attention to the labels on food and beverage packaging when shopping online” (International Food Information Council 2021). Similar differences were reported for in-person shopping, with college-educated consumers and those with children under 18 years of age also more likely to pay attention to food labels.

3.5.4. Variation in response by consumers' knowledge and attitudes

Consumers who notice eco-labels and respond positively tend to exhibit positive attitudes or predispositions towards sustainable behaviour generally (Vandenbroele et al. 2020). One Swiss study found that consumers were generally able to choose food products with lower environmental impact even in the absence of sustainability information, e.g. labels or guidelines (Lazzarini, Visschers and Siegrist 2018). In other words, some consumers already have prior understanding of how sustainability varies across different foods.

When people lack knowledge about the environmental impacts of food, well-designed labels can help. A

survey in the US found that consumers consistently underestimated the GHG emissions of different foods (Camilleri et al. 2019). The authors also tested a carbon footprint label (colour-coded and expressed in terms of equivalent minutes of illumination by one light bulb), finding that consumers who saw the label were more likely to choose low-GHG foods and had more accurate perceptions of the emissions of what they chose.

People's values and attitudes matter. In the co-branding study cited above (Heinl et al. 2021), customers who expressed a strong 'affinity for sustainability' were more likely to exhibit a positive reaction to WWF co-branding. Similarly, another study reported that consumers' personal involvement with sustainability initiatives and positive perceptions of the effectiveness of consumer action had significant positive impact on their inclination to buy sustainable dairy products, which in turn correlated strongly with the intention to buy (Vermeir and Verbeke 2006). A study of adult city-dwellers in Poland reported that consumers were willing to pay more for foods carrying various eco-labels but only if they already had positive attitudes towards sustainability (Kaczorowska et al. 2019).

Similar findings are reported by other studies, which suggest that consumers who preferentially purchase organic foods have different values and are more 'involved' in food than consumers of conventional (non-organic) foods. Specifically, consumers of organic food place more importance on values related to 'health, quality, authenticity and environment', and they view organic products as bearers of these attributes (Vega-Zamora, Parras-Rosa and Torres-Ruiz 2020). There is also evidence that consumers of organic and 'local' foods exhibit similar values and motivations (Annunziata and Mariani 2018; Scalvedi and Saba 2018).

In general, consumers may be grouped into categories on the basis of their cognitive, behavioural and attitudinal differences (Gazdecki et al. 2021). These authors suggest that around two-thirds of consumers will be receptive to eco-labelling, while the remaining third are generally more reluctant:

'Doers'

Roughly one-third of food consumers exhibit positive attitudes to sustainability and this is reflected in their behaviour, sometimes without them being aware of it. This segment tends to be older than other groups and more often resides in rural areas. They are well-established and financially secure.

'Conscious'

Generally knowledgeable and receptive to sustainability information, although this is not always reflected in their shopping behaviour. This group accounted for another third of all consumers with a high representation of women and young people with greater levels of educational attainment, which underpins awareness. Labelling foods as healthy and organic may be more effective for this group.

'Reluctant'

The remaining third of consumers expressed low awareness and negative attitudes towards sustainability. Men and women are nearly equally represented in this group, which is characterised by lower levels of educational attainment (which may explain low awareness). Members of this group tend to have lower incomes, poorer quality of life and lower levels of satisfaction overall.

3.5.5. Variation in response by food category and attributes

Consumers' responses to eco-labels and other information may vary across both food categories and sustainability attributes. For example, using an online survey, 1,055 German-speaking Swiss adults were presented with a series of alternative paired food choices within broad categories (proteins, fruits or vegetables) and asked to choose, for each pair, which product they believed had a lower environmental

impact (Lazzarini, Visschers and Siegrist 2018).¹⁰

The authors reported that the presence of an eco-label or provision of guidelines had a small positive impact on the accuracy of respondents' food choices (Lazzarini, Visschers and Siegrist 2018). However, respondents were less likely to be influenced by labels or guidelines when choosing protein products, and they exhibited a preference for foods produced in Switzerland over imports, even when this implied greater environmental impact.¹¹ The authors attributed this to public 'misconceptions' about the environmental impacts of beef compared to pork, conventional cheese versus plant-based substitutes, and foods produced in Switzerland versus imports.

Similarly, a case study in Belgium found that around 90 percent of consumers expressed greater WTP for meat products carrying a free-range claim, which reflects higher animal welfare, whereas their WTP was lower for meat products carrying only carbon footprinting or organic labels (Van Loo et al. 2014). These differences may reflect the relative importance of animal welfare among consumers' concerns, compared to environmental impacts.

There is evidence that consumers may conflate different sustainability benefits or misinterpret labels. For example, consumers may make assumptions about the sustainability of food ingredients based on the materials used for product packaging (Steenis et al. 2017). Similarly, the survey of European consumers cited above found that 55-65% of respondents agreed

¹⁰ Sub-groups of respondents were presented with varying levels of sustainability information: a control group had to choose between products without being provided any sustainability information, while other sub-groups were informed whether a product was organic or conventional, whether it carried an eco-label or not, or was provided with simple guidelines to help them choose more environmentally friendly products (Lazzarini, Visschers and Siegrist 2018).

¹¹ Other studies suggest that information about country-of-origin has limited impact on consumer preferences for non-food eco-labelled products, with no significant effect where the country of origin has a favourable ecological image and only slight negative impact where the country of origin has an unfavourable ecological image (Dekhili and Achabou 2015).

that organic food was not only better for the environment but also better for the health of both consumers and producers, for the climate and animal welfare, and that it has better taste and quality (Vittersø et al. 2019). While this may be the case, it could also be wishful thinking.

The association between environmental sustainability and personal health is common. In their 2018 report, the IFIC noted that US consumers attributed health benefits to foods labelled as 'non-GMO' or 'environmentally sustainable', even when the nutritional content was identical to other products lacking these characteristics (International Food Information Council 2018). More recently, the IFIC reported similar consumer perceptions that foods containing 'artificial ingredients', 'bioengineered food/ingredients', ingredients with a 'chemical-sounding name', or simply displaying a longer list of ingredients, were less likely to be perceived as healthy, even when two products had identical nutritional content (International Food Information Council 2021). Conversely, food products described as 'plant-based', 'clean', 'natural', or with low-carbon footprints, were more likely to be considered healthy. These associations suggest that consumers may take a broader view of the healthiness of food than nutrient content, or simply that they conflate low environmental impact with personal health benefits.

The fact that consumers interpret food sustainability labels as an indicator of healthiness is not necessarily a bad thing, given that consumers also generally rate healthiness above sustainability as a driver of food choice (Figure 4 above). There is evidence that communicating multiple benefits can increase public support for policies that aim to reduce consumption of energy dense foods, meat, and alcohol (Mantzari et al. 2022). On the other hand, there is also evidence that consumers may trade-off environmental outcomes against personal health benefits when asked to express their willingness to pay (Macdiarmid et al. 2021).

One meta-analysis of 60 studies in eleven countries found that nutritional and health labels on food products led consumers to reduce their calories intake by 6.6%, total fat by 10.6% and other 'unhealthy' food options by 13% (Shangguan et al. 2019).

3.5.6. Lessons from health and nutritional labels

The association between population and planetary health suggests the potential to learn from experience with food nutrition and health labels and ratings, which are used in many countries. The effectiveness of these tools has been the focus of numerous studies, offering insights and lessons for food sustainability labels.

One meta-analysis of 60 studies in eleven countries found that nutritional and health labels on food products led consumers to reduce their calories intake by 6.6%, total fat by 10.6% and other 'unhealthy' food options by 13% (Shangguan et al. 2019). In contrast to some studies cited above, the authors found no evidence of differential impacts based on the type of label (e.g. traffic light or nutrient content), label placement (e.g. on menus, packaging or other point-of-sale), or whether the label was voluntary or mandatory. This may be a result of methodological differences or other factors in the studies reviewed. In any case, the authors argue that what mattered was simply the presence or absence of information to enable consumers to make more informed choices. The authors further note that mandatory labelling of 'unhealthy' ingredients led some manufacturers to reformulate their products.

Labels can take a long time to influence consumer behaviour and require significant investment to promote awareness and uptake. One case study examined the effects of front-of-pack nutritional labelling (using the Australasian Health Star Rating) on consumer choice of breakfast cereals in New Zealand over several years (Hamlin and McNeill 2018). An initial study conducted shortly after the (voluntary) introduction of Health Star labelling reported no effect on consumer choice, while a follow-up study using the same methodology two years later – after heavy promotion of the label – found evidence that it was “beginning to influence consumer choice.” However, the authors note that the impact of the label remained small and statistically insignificant, relative to other influences on consumer decisions.

Labels that are easy to interpret support more accurate consumer assessments. One study examined consumers’ reactions to the European Nutri-Score front-of-pack label (WHO 2021), and how these interacted with existing mandatory Nutrition Facts labels (Bossuyt et al. 2021)¹². Using an in-person eye-tracking experiment, 398 people living in a Dutch-speaking area of Belgium were asked to rate the healthfulness of 20 branded food and beverage products. The authors found that the presence of the Nutri-Score label, which uses a colour-coded rating system to communicate nutritional information, had a positive impact on the accuracy of participants’ responses, whereas the Nutrition Facts labels had no effect or a negative effect. Based on the eye-tracking data, the authors concluded that consumers found it easier to interpret the Nutri-Score rating label, whereas the Nutrition Facts label resulted in information overload.

A separate survey of around 1,000 people in each of twelve European countries (12,000 in total) likewise found that the Nutri-Score label was the most effective label for helping consumers identify the nutritional quality of different foods and slightly out-performed several other front-of-pack labels, although all labels performed better than no label at all (Egnell et al. 2020). In contrast, a study in the Netherlands, albeit based

on a much smaller online survey, found that the Nutri-Score label had no effect on consumer’s attitudes, taste perception or purchase intention (Folkvord, Bergmans and Pabian 2021).

3.5.7. The gap between awareness, understanding, intention and behaviour

Many of the studies cited above suggest that labels can have a modest positive impact on consumer choice, but also that consumers’ responses are varied and mediated by a range of other drivers. These include demographic and socio-economic variables, as well as consumers’ pre-existing knowledge, attitude towards sustainability and trust in a label, as well as their beliefs about the environmental impacts of different foods. As noted in one review of food labelling by the WBCSD, cited above:

“Many things beyond the information provided on a package, website or menu influence people’s food choices. Food decisions tend to be automatic decisions, governed by impulse and habit. Factors such as convenience, price, taste, culture and nostalgia weigh heavily in rapidly made choices in the supermarket aisle or at the restaurant counter. While labelling is a promising and important intervention to support changes in consumer behaviour towards healthier and more sustainable eating patterns, it will not shift habits or preferences immediately and it will inevitably have different effects on different people, or even the same person at different moments in time” (2021).

Almost 20 years earlier, a review of Nordic research on consumer perceptions, understanding and use of product-related environmental information found that consumers’ behaviour did not always align with their awareness of eco-labels, even when labels are trusted (Leire and Thidell 2005). A similar caveat emerged from a study based on an online survey of 4,408 consumers in the UK, France, Germany, Spain, Sweden, and Poland (Grunert, Hieke and Wills 2014). In the latter study, the authors reported a disconnect between consumer awareness of labels and shopping

12 See: https://ec.europa.eu/food/safety/labelling-and-nutrition/food-information-consumers-legislation/nutrition-labelling_en

behaviour, noting that consumers were more likely to use food sustainability information when shopping if they both understood the label and were motivated by the concept of sustainability.

Grunert et al. (2014) also reported low levels of consumer understanding and concern about food sustainability, and low reliance on eco-labels overall. The authors found that consumer motivation, understanding and reliance on labels were strongly influenced by other factors, including demographic characteristics, personal values and country of residence (a proxy for cultural differences). Note that this study did not assess consumers' trust in labels, which may be part of the explanation of the observed gap between awareness and action.

Some researchers recommend de-prioritising environmental labels altogether and relying instead on other methods of communication to influence consumer behaviour. For example, the authors of one widely-cited study stated:

"We strongly doubt that introducing a sustainability label is the most efficient method of increasing consumers' ability to choose an environmentally friendly food product. Sustainability labels are costly, their effect on judgement is limited and their impact on actual purchases is questionable. This study shows that simple guidelines mostly outperformed labels, and such rules are easy to communicate" (Lazzarini, Visschers and Siegrist 2018).

Others take a more nuanced view. The WBCSD acknowledged in their review that: "research conducted to date has not borne out the assumption that 'providing information' will significantly change behaviour at scale" (WBCSD 2021). However, the WBCSD also called for more research "to better understand the circumstances in which scores or labels are most and least effective in driving consumer behaviour change". The authors emphasised the need for research into how nutritional and/or environmental scoring labels interact with the food environment, including product promotions and pricing and other drivers of food choice. The next

section explores in more detail how to bridge the gap between consumers' intentions and their actions.¹³

3.6. Bridging the gap between consumer awareness, intention and action

Marketing professionals have known for years that information is necessary but not sufficient to win consumer trust and loyalty. People's choices are not always or entirely rational but may be impulsive, influenced by their emotional state, by psychological biases of various kinds, as well as social norms, incentives, previous information and how choices are presented. In this context, it is unsurprising that consumers' awareness of eco-labels and their expressions of support or intention to purchase sustainable products are not always aligned with their behaviour (Vermeir and Verbeke 2006; UNEP 2017).

Turning consumers' stated preference and willingness to buy sustainable or labelled products into actual purchase behaviour remains a challenge but also an area of intense innovation (White, Hardisty and Habib 2019). Some eco-labels and other food sustainability initiatives have successfully applied insights from behavioural science to increase the likelihood that consumers will respond positively to sustainability information. Innovation in methods to communicate food sustainability information includes the use of co-branding, emotional appeals and narrative stories, incentives and efforts to create or strengthen social norms around sustainable food, 'nudges' that modify the decision context, so that consumers make sustainable choices almost unconsciously, as well as many other psychological tactics (Thaler and Sunstein 2008; Carfora, Cicia and Conner 2021).

3.6.1. Combining eco-labels with other forms of communication

Increasingly, sustainability labels are supplemented and reinforced by other forms of communication.

¹³ The impact of labels on corporate procurement and food production practices is another important area of research, beyond the scope of this report.



Brands and retailers may incorporate sustainability information and highlight labels as part of their regular product marketing, using broadcast, print and/or social media to reach large audiences. The organisations that develop and maintain sustainability labels may likewise conduct their own education and promotion campaigns.

Several examples of how food labels and businesses combine story-telling and other communications with labelling are described in a set of case studies prepared as part of this project. The case studies are available [here](#).

One way to persuade consumers to pay attention to a label or certified product is to associate the label and/or product with a well-known celebrity or brand. Even if the brand behind the labelled product is already known and trusted by consumers, there may be greater influence on consumer choice from adding a third party face or name alongside the label. This approach has been used in general consumer marketing for many years.

The approach is illustrated by a recent collaboration between WWF and EDEKA, a German supermarket chain, in which the WWF panda logo was placed alongside eco-labels across a range of grocery products (WWF-Germany 2019). The results of co-branding were evaluated on the basis of 10 minute online panel interviews with 927 EDEKA customers (Heinl et al. 2021). The authors reported that co-branding had a weakly positive impact on respondents' preferences for certain product categories and on their perceptions of the sustainability of EDEKA overall. The strongest positive impacts of co-branding were observed for processed foods and non-food items. Recognition of the WWF logo by survey respondents was high, comparable to the Forest Stewardship Council but more than the Marine Stewardship Council or organic logos. Nevertheless, the authors also reported that consumer purchasing decisions were more likely to be influenced by an organic label than the presence of the WWF logo.

Aside from co-branding or asking celebrities to promote labelled products, there are many other ways to enrich consumers' experience and understanding of food sustainability. For example, the Livestock, Environment and People (LEAP) project, based at Oxford University, focuses on understanding why people buy and eat meat and which combination of interventions will encourage people to adopt more sustainable and healthy diets (Adams 2018). While experimenting with labels that rank the sustainability of different foods on a uniform scale (from A to E), the LEAP researchers found that building a narrative about food can foster positive emotions and help connect consumers to food producers. As noted by one team member: "if we can show consumers who makes their foods and what processes are involved, that's more information on which to base their decisions" (Long 2021). Similarly, a study of consumers' responses to multi-level labelling (star ratings) for meat products in Germany found that the provision of explanatory information to consumers helped reduce information overload and increased consumers' willingness to pay extra for meat products with higher levels of animal welfare (Weinrich, Franz and Spiller 2016).

The LEAP project also explored using digital technology to make it easier for consumers to learn about products before or after purchase. This included displaying QR codes on packaging, so that consumers who want to learn more about a product can easily find the information they seek (Long 2021). An example of this approach being used at a commercial scale is provided by Austral Fisheries, which includes QR codes on all of their 'Glacier 51' toothfish packaging (Austral Fisheries 2022). If the code on a product is scanned using a smartphone or similar device, the viewer is connected to online content and stories about the producers, the product itself and its journey through the supply chain, based on technology provided by a sustainability service provider (OpenSC 2021). This approach is still relatively novel and more experimentation is needed to assess how consumers respond.

3.6.2. *Applying insights from behavioural science*

Overcoming the gap between consumers' stated attitudes towards food sustainability, their intentions and their actions has been a focus of recent innovation. Recent research has built on earlier work by health professionals seeking to understand consumers' food choices and identify effective interventions to motivate healthier food choices (McDermott et al. 2015).

One influential review of green consumerism drew on over 300 academic articles from marketing and behavioural science and concluded that consumers will be more inclined to engage in pro-environmental behaviours when the message or context builds on key psychological insights, namely: Social influence, Habit formation, Individual self, Feelings and cognition, and Tangibility (or 'SHIFT') (White, Habib and Hardisty 2019). Another key resource identifies potential behavioural interventions based on analysis of people's 'capability', 'opportunity', 'motivation' and 'behaviour' (or 'COM-B') (Michie, Atkins and West 2014).

Appeals to emotion are often part of the behavioural toolbox. Environmentalists have long debated what kind of appeals are more effective for inspiring behaviour change: communications that evoke negative/pessimistic feelings in the audience or those that are more positive/optimistic (Kidd, Bekessy and Garrard 2019). Some studies suggest that either approach can be effective and that what matters most is to understand your audience and target messages accordingly (Kidd et al. 2019). Other studies suggest that positive emotions (e.g., pride, hope, optimism and love) are generally more influential than negative emotions like guilt or fear (Moss 2021).

One systematic review commissioned by the WWF 'Eat4Change' project identified 142 studies that tested a range of behavioural interventions to reduce meat consumption in Europe, North-America or Oceania between 2010 and 2020 (Vos et al. 2021). The authors found that messages about animal welfare impacts (e.g. increasing empathy and disgust) were particularly effective at reducing meat consumption, although the effects were generally short-lived. Other effective

Table 4. Most effective sustainability messages on restaurant menus for encouraging vegetarian orders

Theme (short-hand title)	Full message as shown on simulated menus
Small changes, big impact	Each of us can make a positive difference for the planet. Swapping just one meat dish for a plant-based one saves greenhouse gas emissions that are equivalent to the energy used to charge your phone for two years. Your small change can make a big difference.
Joining a movement	90% of Americans are making the change to eat less meat. Join this growing movement and choose plant-based dishes that have less impact on the climate and are kinder to the planet.
Health and environment	You will be surprised how much positive impact plant-based food can have on both the planet and your health. Choose plant-based dishes to lower your carbon footprint and improve nutrition. It's about goodness for you and the planet.
Taste benefits	Plant-based dishes are stacked with fresh vegetables and flavorful herbs and spices, making them a delicious meal that is also kinder to the climate than meat-based dishes. Savour food that saves the planet.
A sustainable future	Choosing plant-based food is the best way to feed a growing population while protecting our planet's climate for generations to come. A greener future for our children starts on your plate.

Source: adapted from (Blondin et al. 2022).

Note: messages are listed in descending order of effectiveness, according to the authors.

interventions involved individual self-monitoring and goal-setting, such as prompting people to keep a food diary and set personal dietary goals, sending daily text messages to remind them of their intentions and encourage on-going self-monitoring (Vos et al. 2021). The authors noted however that most of the studies reviewed relied on participants' self-reported or intended behaviour change, rather than actual (verified) behaviours.

Another meta-review that focused on behavioural interventions to reduce (or increase) meat consumption found that simply providing information on the environmental impact of meat can reduce consumption (Grundy et al. 2022). Providing information on health consequences, emphasising social norms, and reducing the size of meat portions offered in food service were described as 'promising' but with less conclusive evidence.

Key messages may be framed to match the audience, in terms of how issues are described or which aspects are emphasised. Important considerations for communicators include: identifying and emphasising what matters to a particular audience, evoking helpful

social norms, reducing psychological distance, leveraging useful biases, and testing messages before rolling out communications at scale (Kusmanoff et al. 2020).

An example of message framing is a study that assessed what kind of sustainability messages were most effective in persuading people to choose plant-based options from restaurant menus (Blondin et al. 2022). The authors used an online survey and simulated scenarios to assess people's responses to alternative messages, each of which communicated a unique benefit or combination of food-related benefits, including taste/flavour, environmental impact, health/performance, and generosity/altruism. Based on the responses obtained during an initial phase, the five top performing messages (Table 4) were selected for further analysis.

After receiving these messages, survey participants were invited to select one dish from each of two hypothetical restaurant menus, each featuring eight dishes (six meat based, two plant based). The authors reported that the two best-performing messages ('Small changes, big impact' and 'Joining a movement') roughly doubled the share of vegetarian orders, from around 12% of orders by the control group to 22.5-25.4% for the experimental group (Blondin et al. 2022). Interestingly, the authors also reported that the impact of sustainability messages on menu ordering behaviour did not differ by race, gender, age, or education. They cautioned however that their results are based on simulated, hypothetical trials and need to be confirmed in a real-world setting.

3.6.3. Nudging consumers towards sustainable food

A key concept in behavioural science is the use of 'nudges', which consist of making small changes in the choice setting or 'choice architecture' that people confront, in an effort to influence their decisions (Thaler and Sunstein 2008). Often the changes are so subtle that they are not noticed by consumers (Vandenbroele et al. 2020). Practical guidance for using nudges to influence behaviour in diverse settings is increasingly available (UNEP 2017c; UNEP, GRID-Arendal and Behavioural Insights Team 2020). For example, the review of behavioural interventions to reduce meat consumption, cited above, found that the strongest effects were obtained using behavioural nudges, such as offering meat-free meals in university canteens, increasing the availability and visibility of vegetarian choices in restaurants, or altering portion sizes in restaurants and supermarkets (Vos et al. 2021).

A recent meta-analysis of over 200 applications of 'nudge' theory reported that such interventions can be an effective way to promote behaviour change, "comparable to more traditional intervention approaches like education campaigns or financial incentives" (Mertens et al. 2022). The authors further reported that nudges are particularly effective in the food domain and that:

"Decision structure interventions that modify decision environments to address decision makers' limited capacity to evaluate and compare choice options are consistently more effective in changing behaviour than decision information interventions that address decision makers' limited access to decision-relevant information or decision assistance interventions that address decision makers' limited attention and self-control" (Mertens et al. 2022).

The authors suggest that interventions focusing on choice architecture or the structure of available options are more effective in part because they impose less of a cognitive burden on decision makers (consumers) than interventions which require people to process new information. Food related nudges are particularly effective because they bear relatively low costs and few, if any, perceived adverse consequences for the consumer. Finally, the authors reported that nudges appear to work well among diverse populations and geographies and are readily combined with other behavioural interventions "such as taxes or financial incentives", reinforcing the broad applicability and flexibility of this approach (Mertens et al. 2022).

A simple example of nudging is changing the position of foods. Retailers realised long ago that positioning affects purchasing. Products placed in front or in line of sight attract the eye, the attention and the disposable dollar. The same insight applies to positioning more and less sustainable foods, although subtle changes may not be enough. For example, one controlled intervention removed seasonal confectionery from prominent locations within 34 supermarket stores in the UK and reported significant reductions in purchasing, even though the same products were available elsewhere in the stores (Piernas, Harmer and Jebb 2022a). More subtle modifications of product positioning and promotions were less conclusive (Piernas, Harmer and Jebb 2022b).

Box 7. Unilever and Knorr Meal Kits: Helping people eat more vegetables

Challenge	Dutch consumers have a diet high in carbohydrates and animal proteins. Although they are willing to make healthy and sustainable food choices, they lack the skills, time and motivation to eat more vegetables. To assist Dutch consumers, who have the lowest level of vegetable intake in Europe, Knorr Meal Kits changed their marketing strategy to help people eat more plant-based foods.
Nudge Tactic	<p>The Knorr Meal Kits developed novel strategies to help consumers to eat better and eat less meat. The altered packaging involved images of vegetables and links to suggestions of two different ways of cooking the recipe:</p> <ol style="list-style-type: none">1. With the minimum recommended amount of vegetables; or2. A fully vegetarian approach to cooking the recipe. <p>The new pack educates and informs consumers, as well as providing additional resources to support better diets. This has been achieved by redesigning the choice architecture, with the vegetarian recipe being more prominent and detailed. The campaign is activated using QR codes, social media and the Knorr website, as well as in-store promotions.</p>
Outcome	Knorr redesigned 40 different meal kits and as a result sold 23 million packs in one year, and over 50-75 million meals across the Netherlands. Over 50% of consumers tried the new recipes and retailers embraced the nudge campaign by creating bundle offers with the meal kits and accompanying vegetables. This case study illustrates how businesses can use simple nudging tactics to promote behaviour change and sustainability.

Source: Nudging For Good 2019

Another example of a combined approach shows how shoppers at a supermarket chain in the UK were encouraged to reduce the frequency of meat consumption, increase consumption of plant-based foods, reduce food waste in the home and prepare more meals 'from scratch' (Trewern, Chenoweth and Christie 2022; Trewern 2022; Marks & Spencer 2021). These behaviours were encouraged using multiple interventions, including making plant-based products more affordable and easier for shoppers to see and find, point of sale information, product samples and vouchers, tailored advice, webinars and 'cook-alongs', as well as a private Facebook group for the participants.

Behaviours were tracked over a three-month period, revealing that the online community, 'ask the expert' videos and product samples were the most impactful interventions, while recipes and cook-alongs were less effective. Interestingly, the lead author reported that even three months after the store environment returned to its 'normal state', plant-based sales were 15% higher than the baseline, demonstrating persistent behavioural shifts. Although the study reported no significant

reduction in meat sales and no major rebalancing of protein sales overall, there was some evidence of a replacement effect at stores in higher income areas, where sales of plant-based products increased by 57% and meat sales dropped by 0.06% (Trewern 2022).

Another example of a combined approach is provided in Box 7, which describes how minor changes in the order and prominence of different menu options shown on product packaging by Knorr (a subsidiary of Unilever) was combined with supplementary information and financial incentives to encourage people in the Netherlands to eat more vegetables. This example illustrates the scale of impact – in the millions – that is possible when a large food company gets involved.



4. Conclusions and Recommendations

This report aimed to review the literature on the drivers of consumer food choice, with a focus on the role of food sustainability information. The objective was to identify both theoretical and empirical evidence on the impact of eco-labels and other sustainability information tools on consumer food choice, with a view to informing existing and future initiatives to promote more sustainable food consumption. A summary of findings from the literature review, as well as selected insights from the case studies and expert consultation workshops is provided below, followed by a set of recommendations to major stakeholder groups in section 4.2.

4.1. Summary of findings

This report aims to document best practices in communicating the social and environmental credentials of food to consumers, with a view to identifying the most effective ways to influence food consumption choices. It does not attempt to assess the effectiveness or credibility of sustainability labels and information tools in terms of 'upstream' environmental, social or economic impacts.

Better consumer information is necessary but not sufficient for more sustainable food systems:

- The environmental impacts of the food system are concentrated at the production stage. Reducing those impacts requires action by stakeholders along the entire food value chain, especially by food producers. Consumers play an important role by choosing (or accepting) foods with lower adverse impacts and thus influencing the decisions of producers and others further up the supply chain.
- Providing reliable and accessible information about the sustainability of food products can help inform consumers and enhance our experience of food, without eroding the freedom to choose what we eat. The UNEP Guidelines for Providing Product Sustainability Information are a key resource for food producers, as well as eco-labels and other stakeholders (UNEP 2017b).

- Consumer information is not a substitute for corporate action or government regulation. Well-designed labels and other information tools can mobilise consumer demand and reinforce corporate responsible sourcing policies, alongside government fiscal and regulatory measures that reduce adverse impacts and support public health.
- In addition to better information about the origin and sustainability of specific food products and diets, changes are required in the governance of food systems, the incentives facing producers and processors, the food choices presented and promoted to consumers, not to mention the norms, technology and infrastructure for managing food waste, among many other changes.

Sustainability is one of many drivers of food choice and not the most important:

- People's food choices are the result of a dynamic mix of individual and contextual drivers. Consumer food choices are not always conscious or rational.
- Major drivers of consumer food choice include affordability (i.e. price or cost), taste, convenience, accessibility, habit and tradition/culture.
- Additional drivers include consumers' desire to explore new cuisines, increased demand for healthy, 'natural' or organic foods, growing interest in plant-rich diets, stress relief (e.g., snacking) and, in the Global North, the emergence of 'new wave' foods (e.g., online shopping, meal kits, food delivery).
- Sustainability issues (i.e. environmental and social impacts in food production, processing, packaging and waste) are generally less influential than other drivers of consumer food choices.
- Food choice drivers vary with context and constraints affecting different consumer segments:
- Constraints on consumer food choice include availability, affordability and food safety. These constraints are more binding in the Global South,

although economic development is reducing barriers to choice.

- Rising per capita income, as well as more efficient production, better packaging, transport and storage, urbanisation and lower barriers to trade, mean that more people today can find and afford foods that would have once been considered treats, including animal-based foods (meat and dairy products), and consume them more frequently.
- More efficient production and distribution can reduce adverse environmental impacts, on a per unit basis. However, this advantage may be overwhelmed by the simultaneous growth of per capita consumption, notably of animal-based foods, which are characterised by large environmental impacts, on average.

Consumer preferences are constantly evolving:

- On the demand-side, taste, food prices and perceived value are consistently ranked the most important factors that consumers say they consider when buying food items. Social or environmental issues ('sustainability') are typically ranked lower but are becoming more important over time.
- Consumers have diverse and evolving interpretations of what makes food 'sustainable'. People often have an intuitive understanding of the environmental impacts of different foods but they tend to underestimate the magnitude of those impacts (e.g., GHG emissions).
- Ethical values and health concerns underpin certain dietary preferences. Concern about animal welfare is a major driver of vegetarianism, while growing demand for organic foods is often based on perceived personal health benefits. Environmental impact is less often cited as the basis of dietary preference.
- Plant-based and organic diets are common in the Global South for reasons of affordability,

food traditions, and the persistence of low-input production methods. At the same time, increasing per capita income and urbanisation are driving higher consumption of animal-based and highly-processed foods.

- Plant-based and organic foods are becoming more popular with consumers in the Global North, albeit from a small base, mainly due to ethical or health concerns. Food suppliers are updating their product offerings accordingly.
- Younger consumers appear to be more adventurous in their food choices and are more likely to purchase food on-line than their elders. This distinction should be studied further and may provide a basis for future food sustainability communication initiatives.
- The drivers of consumer food choice are not fixed but are constantly evolving. The Covid-19 pandemic is an example of a major external shock that accelerated pre-existing trends, such as consumers' stated preference for more sustainable foods and their use of on-line shopping platforms.

When designing food sustainability communication strategies, it will be easier to work with the grain of major food choice drivers, rather than against. For example:

- Leverage local food traditions and culture when communicating sustainability information, e.g., focus on seafood sustainability at Easter in communities that observe this annual holiday.
- Acknowledge people's aspiration to enjoy certain foods on special occasions, such as animal-source products on feast days, and adapt alternative products and sustainability messages accordingly, e.g., promote plant-based meat and dairy substitutes with comparable attributes.
- Design food sustainability messages that respond to consumers' hierarchy of preferences, e.g., highlight how tasty sustainable foods can be, or their 'naturalness' and health benefits.

- Segment and target key consumer segments with appropriate messages, e.g., highlight environmental, animal welfare and health benefits for those who express a preference for plant-based diets, or showcase the power of technology to verify, trace and 'footprint' food for those who are keen on gadgets and data.
- Adapt messaging to emerging trends and current events, e.g., provide more sustainability options and information for on-line food shoppers.

Food sustainability labels and related information tools have multiplied in recent years:

- Hundreds of food sustainability labels and information tools are used in different industries and regions, with only a few labels enjoying global recognition.
- While guidance is available on best practice for sustainability labelling, there is limited harmonisation of methods and governance among different labels.
- Not all labels and tools are consumer-facing but there are enough in the market to create confusion among consumers about which labels are most credible and how to compare different claims.
- Claims about sustainability are part of a torrent of information available to consumers. Sustainability labels compete for consumers' attention and consideration with other information, including product prices, ingredients, nutritional content, provenance, suggested method of preparation, etc.
- Organisations involved in food sustainability standards, eco-labelling and related food information tools have historically focused on ensuring that sustainability claims are credible, emphasising the verification of production practices and assuring reliable product traceability through supply chains.
- Recently more attention has been paid to assessing how consumers respond to different

ways of communicating food sustainability information.

- The most credible eco-labels or standards still have a relatively small market share, in part because it can be very difficult or costly for producers to meet those standards.
- Influencers (NGOs, businesses, media) offer varying and evolving messages about which foods products are more sustainable and why. Those who successfully persuade consumers to prefer their label/tool or products through superior marketing will gain market share. Whether labels/tools and products with greater market share are objectively better from a sustainability perspective is a different question.
- This report did not seek to determine whether sustainability information provided by labels/tools or by food companies is accurate. Nevertheless, a key element of 'best practice' communication is ensuring that messages are credible and easy to verify.
- It is incumbent on all sustainability information labels and tools, and all businesses making sustainability claims about the products they sell, to ensure they inform themselves and follow the principles of credible consumer communications, as set out for example by the UN Environment Programme (UNEP 2017b).
- Different eco-labels have varying effects with different people, at different times, for different products. This can make it difficult to draw general conclusions about their effectiveness.
- Nevertheless, multiple studies show that labels are generally effective at helping consumers make more accurate judgements about the environmental impact or nutritional value of different food products.
- Some consumer segments respond more positively to eco-labels, with the strongest response seen among younger, better educated, higher income, urban, and female shoppers.
- Food sustainability information will get more traction with consumers whose values are aligned with the label, e.g., due to pre-existing ethical and/or health concerns. A consistent barrier to uptake is consumers' perception that sustainable products are more expensive.
- People tend to conflate the sustainability benefits of labelled foods, for example attributing health benefits to food produced with less environmental impact or assuming that foods wrapped in 'green' packaging are themselves sustainably produced.
- Outcome-based labels (e.g., carbon footprints or scorecards) do not appear to be more effective than practice-based labels (e.g., certification against a multi-criteria standard). Both types of labels elicit positive responses from people who are predisposed to favour sustainably labelled products.

How we communicate food sustainability, and to whom, is just as important as what we communicate:

- Food sustainability standards and eco-labels have historically focused on increasing consumer awareness and building positive reputations. However, awareness does not always translate into behaviour change.
- Labels and other sustainability information is often combined on packaging with legal notices (e.g., mandatory nutritional information) as well as marketing content, which can confuse consumers.
- Nevertheless, an iconic label or 'traffic light' rating can be an effective method to inform time-poor consumers about food sustainability at the point of sale. In other settings, consumers will respond positively to detailed information about the origins or ingredients of food, such as nutritional labels.
- Some manufacturers print machine-readable codes (e.g., Quick Response) on their packaging,

which when scanned with a digital device links to online content about the product and/or producer, sometimes including sustainability information. This approach is relatively new and it is yet not clear how many consumers take the time to view the additional information or how this affects their purchase decisions.

- Most published studies of the impact of labels and other consumer information interventions provide snapshots or, at best, measure short-term effects over a few weeks or months. Long-term monitoring is essential to assess whether behaviour change can be sustained.

Behavioural methods and incentives can complement information to shift consumer behaviour

- Participants in the expert consultation workshops convened as part of this project were asked to identify initiatives that had, in their view, successfully influenced consumer food choices. Out of 55 responses, almost one-third referred to labelling initiatives, followed by tax and other financial incentives, advertising and other promotions, use of nudges or other behavioural interventions.
- Shifts in consumer behaviour can be achieved by combining emotional and factual appeals to modify or reinforce social norms, particularly if messages come from trusted sources.
- Behavioural nudges that subtly modify the decision context in which people make food choices are particularly effective.
- Nudges work best when they focus on choice architecture or the structure of available options, e.g., positioning sustainable foods towards the front of a display, at eye-level or alongside conventional foods, rather than decision information or assistance, which impose greater cognitive burden on consumers.

- Shifts in consumer behaviour can also be achieved through regulation, education and price incentives, e.g., reducing demand for tobacco products using a combination of bans on advertising, mandating plain-paper packaging, disseminating images of tobacco-related illnesses, as well as punitive taxation.
- Fiscal and trade measures (e.g., taxes and subsidies) have mainly focused on food production, trade and food security. However, they can be used to shift demand away from certain food categories and towards preferred alternatives, e.g., taxation of sugar-sweetened beverages.
- Efforts to introduce mandatory policy incentives for sustainable food consumption often face stiff resistance from industry, hence strong public and political support is a necessary prerequisite.

4.2. Recommendations for communicating food sustainability to consumers

The literature on how to make food systems and diets more sustainable is vast; this report has only skimmed the surface (see especially sections 1.1 and 1.2). Similarly, there is ample guidance available on how to ensure that communications about food sustainability are credible and meaningful (see especially Boxes 3 and 6).

As in the rest of this report, the focus below is on recommendations for communicating food sustainability to consumers, including but not limited to the role of eco-labels. These recommendations are intended to support more effective communications, in terms of their impact on consumers' food knowledge, awareness, preferences, intentions and, ultimately, their behaviours. Key knowledge and data gaps are identified, in the hope of informing future research efforts. These recommendations reflect the authors' knowledge and interpretation of the literature, as well as feedback received from reviewers and expert workshops held in January 2022 (Box 8).

In general, this report recommends that:

1. Food sustainability communication strategies should be informed by understanding of the drivers of consumer choices, which vary among different regions and population segments, and at different times.
2. Consumer education about food sustainability is essential, ideally building on prior public understanding and beliefs where these are supported by science.
3. Sustainability messages and interventions should be adapted to different audiences, based on in-depth research to identify what resonates, while also being coordinated to avoid confusion and mixed messages. Communications should be repeated and reinforced to ensure sustained impacts on behaviour.
4. More investment is needed in incentives, nudges and other non-coercive measures to encourage plant-rich and whole food choices and diets, especially in countries and population segments where current levels of consumption of animal-based and highly-processed foods are relatively high.

With respect to food sustainability labels and food businesses:

5. Labelling should be seen as part of a coherent package of communication methods, together with other forms of consumer engagement, using a range of media including digital.
6. Consumer-facing information on food sustainability should be visible/accessible, easy to understand, reliable, credible, holistic rather than single-issue, and comparable across different products and diets, in order to enable consumers to make more informed choices consistent with their values and preferences.
7. Messages used to accompany or promote food sustainability labels can leverage rational

motivations as well as non-rational biases, e.g., appealing to emotion including positive sentiments about well-known brands or celebrities, offering micro-incentives, leveraging social norms or loss aversion.

8. Labels and partners should seek opportunities to highlight sustainable products that are less expensive than conventional alternatives, to counter public perceptions that sustainable products are too costly.
9. Labels and partners should encourage people who are predisposed to use sustainability information (e.g., young, female, more educated, higher income, urban, and/or value-aligned consumers) to guide their decisions, while drawing on lessons learned by working with these groups to strengthen social norms around food sustainability and to develop effective communications strategies for other groups.
10. Food businesses and marketing agencies should be encouraged to share information and collaborate on studies to determine which messages and media are most effective for encouraging sustainable food choices among different consumer segments (governments can assist by brokering industry agreements and waiving prosecution under anti-competitive behaviour laws).

Recommendations to governments include:

11. Governments should provide support, regulate and incentivise credible, high-quality food certifications or sustainability rating labels, while encouraging continuous improvement and upholding the principle of multi-stakeholder governance of food sustainability standards.
12. Sustainability criteria should be integrated systematically and consistently in national dietary guidelines and policies along with all associated communications.

13. Governments should monitor food prices, including the differences between sustainable and conventional foods, support public education on how to choose affordable and sustainable foods and diets and, where appropriate, provide targeted support to ensure vulnerable populations can access sustainable foods.

14. Governments should provide targeted incentives to encourage food businesses to develop, test and roll out innovative methods for communicating food sustainability to their customers, and making sustainable food the default option.

Finally, it is clear that not all questions about the effective communication of food sustainability information to consumers can be answered based on the available research. To address key information and data gaps, several additional recommendations are offered below:

15. How to address over-consumption of highly-processed and discretionary foods, and enlist food companies to encourage more home preparation and consumption of sustainably produced whole foods.

16. How to educate younger generations (consumers of the future) on interpreting food labels, identifying greenwashing, purposeful shopping, 'voting with their dollar', sticking to a budget, etc.

17. How food preferences are evolving in emerging economies and developing countries, how these changes are influenced by commercial marketing, and what policies are needed to encourage sustainable diets and food choices, rather than wholesale adoption of unhealthy and unsustainable 'western diets'.

18. More field experiments that measure actual rather than hypothetical consumer behaviour. This requires cooperation with food brands, service and retail outlets and market research companies willing to share their existing marketing data and insights, or to conduct new high quality experiments at scale. Moreover, any experimental interventions must be underpinned by good

scientific methodology, including:

- Clear objectives (e.g., shift consumption towards certified sustainable X);
- Well-defined target audience(s), outcome indicators and measurement protocols;
- Assessment of the target audience's beliefs, constraints and motivations;
- Good experimental design (e.g., randomised controlled trials among representative samples of sufficient size to generate statistically meaningful results, after allowing for attrition);
- Repeat testing and refinement of the intervention;
- Best practice monitoring and evaluation to ensure results are reliable; and
- Wide dissemination of findings via reputable communication outlets.

19. Assessing the effectiveness of alternative sustainability messages and communications channels for bridging the intention-action gap and achieving long-term behaviour change, particularly in emerging and middle-income economies and the Global South.

20. Exploring how to communicate food sustainability in ways that reflect differences in consumers' ability to pay, as well as differences between regions and other socio-economic variables.

21. Looking beyond information, what kind of food environments and infrastructure investments are needed to support the provision of affordable and sustainable food, especially to food insecure populations.

22. Research and consensus building (where feasible) on the role of animal-based foods in sustainable diets in different contexts.

Box 8. Recommendations from the expert consultation workshops

In addition to the literature consulted for this project and feedback from reviewers, another important source of recommendations was expert consultation workshops held in January 2022. Five breakout groups across the two workshops were each asked, firstly, to identify promising opportunities to influence consumers to choose more sustainable food products and diets, and secondly, to provide recommendations for effective consumer information about food sustainability for implementation by businesses, labelling organisations, and governments

Participants' responses were recorded, compiled and grouped into general themes. In response to the first question, the most frequently mentioned opportunities related to consumer communications, including social media and education campaigns. This was followed by opportunities for government action, notably regulations, incentives and fiscal policy (taxes). More innovative labelling and behavioural interventions (especially nudges and 'default' options) came next, followed in declining order of frequency by mentions of food pricing and promotions, innovative technology, (re-)connecting consumers to producers, targeting of messages to different consumer segments, improved traceability and other opportunities.

In response to the second question, which asked for recommendations targeting businesses, labelling organisations and governments, participants' responses were not limited to consumer information but addressed broader concerns about the sustainability of food systems. Nevertheless, many of the recommendations put forward were related to improving the communication of food sustainability to consumers. In particular:

Businesses should:

- Provide (more, quantified) sustainability information about food products to their customers, while avoiding greenwash and ensuring that sustainable products are affordable;
- Involve consumers in food sustainability campaigns, target communications to diverse consumer segments, using digital media and behavioural methods (nudges) where appropriate; and
- Analyse and share successful experiences and strengthen the business case for communicating food sustainability to consumers.

Eco-labels and other food sustainability information tools should:

- Provide visible/accessible and easily understandable information; be concise using only relevant/salient information;
- Use star ratings, ABCDE or traffic light colour coding; ensure that sustainability ratings are expressed relative to known benchmarks or apply to all foods not just a single category;
- Insist on third-party audits for credibility, use LCA or other science-based metrics, reflect the full complexity of food systems, integrate biodiversity and social impacts;
- Link sustainability labels to consumer education initiatives and integrate labelling with other communication methods; and
- Explore opportunities to harmonise sustainability criteria and ratings across different labels; avoid creating more new labels if possible.

Governments should:

- Regulate sustainability claims by food producers, manufacturers and retailers (as well as by independent labels);
- Make the use of LCA, labelling and provision of sustainability information mandatory; assist consumers to navigate the 'jungle' of eco-labels;
- Educate children about food sustainability; offer public benefits or incentives to people who adopt more sustainable food choices; integrate sustainability in dietary guidelines; and
- Support research and development on effective consumer information and behaviour change initiatives, including the establishment of inter-departmental behaviour change units.

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