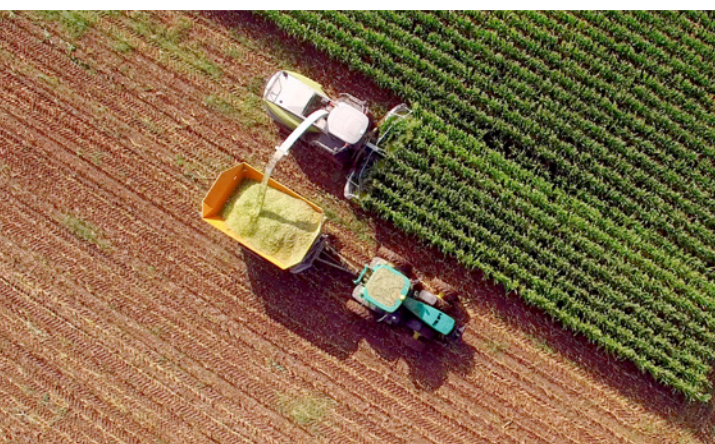




Barilla
Center
FOR FOOD
& NUTRITION

FIXING FOOD 2021:

An opportunity for G20 countries to lead the way



WRITTEN BY

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INTELLIGENCE
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ABOUT THIS REPORT

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Fixing Food 2021: An opportunity for G20 countries to lead the way investigates the opportunity for G20 countries to drive change on food sustainability and the challenges G20 countries face. The report uses the three pillars—food loss and waste, sustainable agriculture, and nutritional challenges—of the Food Sustainability Index (FSI), developed by The Economist Intelligence Unit with the Barilla Center for Food & Nutrition. Now in its fourth iteration, the FSI has been extended to 78 countries in 2021.

This report focuses on the G20 countries. Since the FSI focuses on individual members, we are considering actions of policymakers in these countries (as well as business and organised civil society organisations). However, due to the importance of the G20's own policy processes, we also highlight the importance of the G20 as a powerful collective group and therefore indirectly also address the G20 presidency. The full index will be launched in November 2021.

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EXECUTIVE SUMMARY

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With less than a decade to meet the **UN's Sustainable Development Goals (SDGs)** of eradicating hunger, reducing malnutrition and accelerating climate action, making our food systems more sustainable requires leadership and bold action. The G20 group of large and advanced economies has a crucial role to play. Together, the G20 members account for 60% of our population, 75% of our greenhouse gas (GHG) emissions, and 80% of our economic output.¹ This economic influence translates into an **environmental responsibility**. As G20 countries prepare to make commitments for the coming decades, they have an opportunity to set an example for other countries around the world.

The Food Sustainability Index (FSI), developed by The Economist Intelligence Unit with the Barilla Center for Food and Nutrition, seeks to examine how national food systems are performing across the FSI's three pillars— food loss and waste, sustainable agriculture, and nutritional challenges—in the context of the index's broader findings. In this report, we consider **how G20 countries are performing across these three pillars and how resilient their food systems are**. The Covid-19 pandemic has shone a light on the need to build food systems that are not just **sustainable**, but also healthy, inclusive and resilient.² During the Italian presidency of the G20, foreign ministers are focusing on food security and agriculture ministers are examining how to build the resilience and sustainability of agricultural sectors. The presidency will also feature the UN Food and Agriculture Organisation (FAO)-led global food coalition that has a mandate to improve access to food and build resilient and sustainable agri-food systems.³ This work should include the most generous definitions possible of these terms—not just rebuilding after Covid-19 and meeting emissions

targets, but building better systems that can provide **nutritious diets while healing the planet**.

The FSI's results correlate closely with progress towards the **SDGs** and the **Human Development Index**. G20 countries performing best in the FSI in 2021 include Canada, Japan, Australia, Germany and France. These countries combine strong outputs with robust policy responses, although there remains room for improvement. Action on food loss and waste is evident across the group, but more can be done to implement binding legislation that holds all stakeholders accountable. In sustainable agriculture, G20 countries are mostly equipped with **financing, research and innovation**, but many fall behind when it comes to integrating agriculture into their **nationally determined contributions (NDCs)** and incorporating the impacts of climate change into their **agricultural policies**. Finally, all G20 countries have policies or programmes in place to encourage healthy eating patterns, and the majority make nutrition a compulsory part of their national curriculum for schools. However, **few** have gone as far as incorporating **sustainability** into their **food-based dietary guidelines (FBDGs)**, and most continue to subsidise the **sugar industry**.

In the area of **food loss and waste**, the UN's framework of **target–measure–act** has provided a simple structure for countries to follow. Most G20 members are signed up to **ambitious goals**: around three-quarters seek to address food loss in a national strategy, and a similar share have set reduction targets for end-user-level food waste. But many countries are finding the process of **measuring** how much food is being lost or wasted much more difficult. The new United Nations Environment Programme (UNEP) Food Waste Index notes that

1 oecd.org/g20/topics/agenda-2030-development/G20-SDG-Report.pdf

2 ecologyandsociety.org/vol12/iss1/art23/table1.html

3 fao.org/food-coalition/contribution-to-g20/en/



“global food waste data availability is currently low” and “there is an uneven distribution of data between regions as well as country income groups”.⁴ Countries are not doing enough when it comes to the action phase, either. Although most G20 countries have well-established academic and private institutions working on food waste, **binding legislation** is needed. Only ten G20 countries have comprehensive national legislation to prevent food waste.

The pandemic has made the consequences of **unsustainable agricultural** practices clearer. Issues around **biodiversity, deforestation** and the **rearing conditions of livestock** have grown in importance, given the links shown between damage to the environment and the ability of zoonotic diseases to jump from animals to humans. But as countries gear up for **COP26 and COP15 on the UN Biodiversity Convention**, a significant challenge to making the sector sustainable remains **reducing GHG emissions**. The increasing consolidation of the agricultural sector in recent decades suggests that major progress could be made if emissions were lowered, even by a small fraction, by the sector’s largest producers.⁵

A consensus is gradually emerging around what we should eat, both for our personal well-being and for that of the planet. **Country-specific FBDGs** are helpful in getting basic nutritional messages across. All G20 countries have FBDGs, but too few consider the **environmental impact of their suggested diets**—only four countries explicitly incorporate sustainability. Moreover, a **healthy and sustainable diet remains out of reach for millions** of people living in the G20. The “planetary health diet”, for instance, is an attempt to take account of both nutritional and environmental requirements, but it can also be expensive. The FSI findings highlight the **disparities** between the G20’s higher-income and lower-income countries regarding the **affordability** of a healthy and sustainable diet. For many in low-income countries, the biggest **nutritional challenge** remains reducing malnourishment, with issues of sustainability relegated to lower down the list of priorities. However, by taking a holistic approach to food systems, these issues can be addressed jointly.

4 unep.org/resources/report/unep-food-waste-index-report-2021

5 science.sciencemag.org/content/360/6392/987; annualreviews.org/doi/abs/10.1146/annurev-resource-100517-023312?journalCode=resource

Increasing the **resilience** of the food system so that it continues to improve its ability to provide adequate food without depleting natural resources and straining ecosystems is as important as ever. The pandemic has suggested that there may be benefits to shortening food supply chains, but this is possible only in some economies. For the

majority, belonging to the global trading system will continue to bring huge benefits in terms of not just the price and choice of food, but also **access to food**. However, rebuilding after the pandemic needs to give full consideration to the likely impacts of **climate change and nature loss** if food systems are to avoid moving from one crisis to another.

FSI 2021 Results

G20 countries

FSI score

- Best-performing (4th) quartile
- 3rd quartile
- 2nd quartile
- Worst-performing (1st) quartile



Headline findings



Food loss & waste



Sustainable agriculture



Nutritional challenges

	Argentina	●	●	●	●
	Australia	●	●	●	●
	Brazil	●	●	●	●
	Canada	●	●	●	●
	China	●	●	●	●
	France	●	●	●	●
	Germany	●	●	●	●
	India	●	●	●	●
	Indonesia	●	●	●	●
	Italy	●	●	●	●
	Japan	●	●	●	●
	Mexico	●	●	●	●
	Russia	●	●	●	●
	Saudi Arabia	●	●	●	●
	South Africa	●	●	●	●
	South Korea	●	●	●	●
	Turkey	●	●	●	●
	UK	●	●	●	●
	US	●	●	●	●

Source: Economist Intelligence Unit, Food Sustainability Index 2021

INTRODUCTION: THE ROLE OF THE G20

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The world is not on track to achieve the UN's Sustainable Development Goals (SDGs) by 2030. Globally, there has been progress on some SDGs, most notably: no poverty (SDG1); industry, innovation and infrastructure (SDG9); and sustainable cities and communities (SDG11). But on others—including life on land (SDG15), and zero hunger (SDG2)—progress has been stagnating or even experiencing reversals since 2010.⁶ Food sustainability is crucial for all SDGs. However, driving change requires leadership. Among the SDGs are the sustainable management of forests, the cessation of biodiversity loss, and the reversal of land degradation (SDG15), and the conservation of marine life (SDG14). These goals must be achieved while another of the SDGs is also met: eradicating hunger worldwide. Gerda Verburg, former minister of agriculture, nature and food quality for the Netherlands and coordinator of the Scaling Up Nutrition (SUN) Movement, makes the point that “if we get food systems right, we get so many SDGs right because of the interconnection between our food systems, our people and the planet.” The three pillars—food loss and waste, sustainable agriculture, and nutritional challenges—are all connected with SDGs, highlighting the interconnectedness between our food systems and progress towards achieving these goals.

Even before the Covid-19 pandemic, progress towards meeting the SDGs had been uneven: incidence of non-communicable diseases (NCDs) had begun to fall and access to safe drinking water was rising, but ecosystems continued to be lost and food insecurity—

an issue particularly prevalent in places of violent conflict—was on the rise.^{7,8} Now, the pandemic has devastated communities across the world. Health systems have been driven to the brink of collapse and the livelihoods of half the global workforce have been put at risk.⁹ Globally, more than 1.6bn students have had their schooling disrupted, which has resulted in more than 370m children missing out on school meals. Tens of millions of people are being pushed back into extreme poverty and hunger, erasing the modest progress made in recent years.¹⁰ Governments have been diverted from their policy agendas towards halting public-health emergencies. As a consequence, the transformative changes to how economies function that are required to meet the SDGs have been delayed.¹¹

Against this backdrop, some countries are taking steps in the right direction and are emerging from the acute phase of the pandemic with new priorities. The Biden administration in the US is proposing legislation that would commit huge spending to green technology and education.¹² The EU has adopted more ambitious climate targets under a new Climate Law agreed in April 2021.¹³ Governments in the UK, South Korea and Japan have announced new, more stringent emissions targets.¹⁴ Even during the pandemic, tackling global climate change has remained at or near the top of global challenges that people want to see addressed with more urgency.¹⁵ Moreover, the pandemic is encouraging conversations on topics that were previously not a priority, such as biodiversity, land use and supply chains.

6 3.amazonaws.com/sustainabledevelopment.report/2020/2020_sustainable_development_report.pdf

7 unstats.un.org/sdgs/report/2020/The-Sustainable-Development-Goals-Report-2020.pdf

8 reliefweb.int/report/world/wfp-fact-sheet-hunger-conflict-june-2019

9 ilo.org/global/about-the-ilo/newsroom/news/WCMS_743036/lang-en/index.htm

10 unstats.un.org/sdgs/report/2020/The-Sustainable-Development-Goals-Report-2020.pdf

11 unstats.un.org/sdgs/report/2020/The-Sustainable-Development-Goals-Report-2020.pdf

12 nytimes.com/2021/03/22/business/biden-infrastructure-spending.html; whitehouse.gov/briefing-room/statements-releases/2021/03/31/fact-sheet-the-american-jobs-plan/; spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/biden-proposes-surge-in-climate-spending-in-1st-budget-request-63596365

13 bbc.co.uk/news/world-europe-56828383

14 sdg.iisd.org/news/75-leaders-announce-new-commitments-during-climate-ambition-summit/

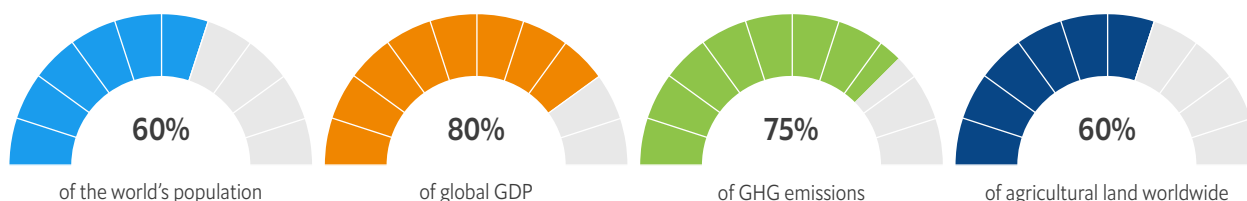
15 pewresearch.org/global/2020/09/09/despite-pandemic-many-europeans-still-see-climate-change-as-greatest-threat-to-their-countries/

Ultimately though, to meet the SDGs by 2030, food systems need transformational change which in turn requires leadership. The G20 group of the world's largest and most powerful countries has huge influence over global policymaking. It represents more than 60% of the world's population, 80% of total GDP, 75% of overall greenhouse gas (GHG) emissions, and about 60% of agricultural land worldwide.^{16,17,18,19} On a per-head basis, people living in the G20 consume three to five times the maximum optimal intake of 28g of meat per day,²⁰ and wasted 2,166kg of food in 2019²¹—which is greater than the weight of the average

large car.²² If all non-G20 countries adopted the food habits of G20 members, there would be not just higher environmental costs, but higher health costs too.

The challenge for G20 members is to set an example to other countries, especially those without the same resources, of how the SDGs can be met. At the current pace of progress, the world risks failing to meet many of its SDGs, a failure that would lie particularly heavily with the G20. G20 countries have both an opportunity and a responsibility to lead the way on making food systems more sustainable.

The G20's global contributions



Source: G20;¹⁷ GermanWatch¹⁸

Are G20 countries making food sustainability a priority?

In 2021 the G20 presidency is held by Italy, and its priorities are centred around three keywords: People, Planet, Prosperity.²³ Food sustainability is woven into all three of these priority areas. Everyone needs access to safe and nutritious food in order to live and work. Agricultural production relies on the planet's finite natural resources. And working within agriculture to create this food provides employment for around 1bn people.²⁴

As part of the G20 presidency, dedicated working groups and ministerial meetings are taking place

in the months leading up to the G20 summit in October 2021, including: foreign affairs and development; environment, climate and energy; innovation and research; agriculture; and trade.

These meetings are opportunities to delve into sector-specific issues in greater detail, and should see G20 ministers agree on sector targets and guidelines which are later endorsed by the G20 heads of state during the final summit. Due to its cross-cutting nature, food is at the centre of several working groups such as those of Agriculture, Development and Health.

Of particular relevance, agriculture ministers are focusing on how to build the resilience and

¹⁶ germanwatch.org/en/g20

¹⁷ g20.org/about-the-g20.html

¹⁸ germanwatch.org/en/g20

¹⁹ gbs2018.com/fileadmin/gbs2018/Downloads/g20_agriculture_declaration_final_2018.pdf

²⁰ eatforum.org/content/uploads/2020/07/Diets-for-a-Better-Future_G20_National-Dietary-Guidelines.pdf; bmj.com/content/370/bmj.m2322

²¹ Calculation based on data from the FSI.

²² mechanicbase.com/cars/car-weight/

²³ g20.org/italian-g20-presidency/priorities.html

²⁴ blog.resourcewatch.org/2019/05/30/map-of-the-month-how-many-people-work-in-agriculture



sustainability of agricultural sectors.²⁵ This should include the most generous definitions possible of these terms—not just rebuilding after Covid-19 and meeting emissions targets, but building better systems that can provide nutritious diets while healing the planet.²⁶ The pandemic has pushed the topic of resilience to the fore. It has exposed the weaknesses in our current approach towards food, of accepting environmental degradation in favour of lower costs, and relying on just-in-time production and a fleet of aeroplanes and ships to move goods around the world. Rebuilding and strengthening our supply chains post-pandemic will require innovation, collaboration, investment and expertise. The G20 group is rich in all of these attributes and is an appropriate body to lead the way.

G20 agriculture ministers are also focusing on the “G20 contribution to agriculture in countries lagging behind the zero hunger target”.²⁷ But the group must be careful not to focus too narrowly on increasing food production to solve food insecurity. As Gerda Verburg describes: “Food security is not good enough. It is only about food production, and focuses too much on having enough food and focusing on hunger, rather than malnutrition.” Instead, a more holistic approach is required. “We need to rethink the way of producing and bringing food security and nutrition into one production framework, and in this framework we need to think of the whole value chain”, she adds.

Moreover, the G20 Foreign Affairs and International Development ministers made global food security a central pillar of the Matera Declaration (named after the city in Italy where the meeting was held) that was issued on June 29th.²⁸ In addition to this, the G20 presidency features the UN Food and Agriculture Organisation (FAO)-led global Food Coalition, which aims to support the group in mobilising high-level political commitment, financial support and technical expertise in humanitarian responses, economic inclusion and social protection to reduce poverty and food loss and waste, and support the food systems transformation.²⁹

In July, Italy is also hosting the pre-summit to the UN Food Systems Summit (UNFSS), which takes place in September 2021. The Summit seeks to take a food systems approach to making progress towards the SDGs and has outlined five Action Tracks: ensuring access to safe and nutritious food for all; shifting to sustainable consumption patterns; boosting nature-positive production; advancing equitable livelihoods; and building resilience to vulnerabilities, shocks and stress.

Against this backdrop, the Food Sustainability Index (FSI) is an important tool to look across G20 food systems, learn from examples of best practice, consider where countries are falling short, and formulate policies to help G20 countries to lead the way.

25 politicheagricole.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/16569

26 ecologyandsociety.org/vol12/iss1/art23/table1.html

27 politicheagricole.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/16569

28 g20.org/wp-content/uploads/2021/06/Matera-Declaration.pdf

29 fao.org/food-coalition/contribution-to-g20/en/

FOOD LOSS & WASTE

Globally, enough food is produced to feed a population of 10bn.³⁰ Yet, among our global population of 7.8bn, there are more than 690m people who suffer from hunger, 149.2m children who suffer from stunting, and 45.4m children who suffer from wasting.^{31,32} It is estimated that Covid-19 will result in an additional 2.6m chronically malnourished children by 2022, adding to figures that have been gradually rising since 2014.^{33,34} One of the main reasons for the mismatch between the amount of food we grow and the number of people who go hungry is the volume of food that is lost or wasted, which stands at around one-third of all we produce, according to an estimate by the FAO.³⁵

There are two powerful incentives to reduce food loss and waste.³⁶ First, lost and wasted food is a huge contributor to global GHG emissions: if food loss and waste was a country, it would be the third-largest polluting in the world, after China and the US.³⁷ Food that is not consumed accounts for

8–10% of total annual GHG emissions, based on the amount of emissions required to grow the food and those released during its decomposition.³⁸

Second, our inefficient distribution of food has economic implications. According to the initial estimates of the Food Loss Index (FLI) prepared by the FAO, 14% of the world's food is lost from post-harvest up to, but excluding, the retail level,³⁹ and United Nations Environment Programme (UNEP) estimates from 2019 suggest that around 931m tonnes of food, or 17% of total food available to consumers, are wasted each year.⁴⁰ In addition, the FAO calculated the value of food wasted at US\$2.6trn annually in 2014⁴¹ (the latest year for which high-quality data is available), a sum roughly equivalent to the annual GDP of the UK. In short, there is no lack of reasons for why reducing food loss and waste was made an SDG. According to SDG target 12.3, signatories are to halve waste at the retail and consumer levels on a per-head basis by 2030 and minimise losses.⁴²

30 researchgate.net/publication/241746569_We_Already_Grow_Enough_Food_for_10_Billion_People_and_Still_Can%27t_End_Hunger

31 worldometers.info/world-population/

32 sdgs.un.org/goals/goal2

33 unitlife.org/impact-of-covid-19-on-malnutrition

34 sdgs.un.org/goals/goal2

35 fao.org/3/mb060e/mb060e.pdf

36 Food loss and food waste are two different things. Food loss refers to produce that is not consumed up to the point where it is put out for sale in shops, because, for example, it does not meet regulatory standards or it spoils along the supply chain. Food waste is food that is discarded either because it is unsold by retailers or is bought by the consumer but then not eaten.

37 India is the third-largest GHG emitter, and accounts for 6.8% of the global total.

38 unep.org/resources/report/unep-food-waste-index-report-2021

39 fao.org/food-loss-and-food-waste/flw-data

40 unep.org/news-and-stories/press-release/un-17-all-food-available-consumer-levels-wasted

41 fao.org/nr/sustainability/food-loss-and-waste/en/

42 fao.org/sustainable-development-goals/indicators/1231/en/



FSI 2021 Results - Food loss & waste

	Argentina	●
	Australia	●
	Brazil	●
	Canada	●
	China	●
	France	●
	Germany	●
	India	●
	Indonesia	●
	Italy	●
	Japan	●
	Mexico	●
	Russia	●
	Saudi Arabia	●
	South Africa	●
	South Korea	●
	Turkey	●
	UK	●
	US	●

Source: Economist Intelligence Unit, Food Sustainability Index 2021

Summary of results:

Canada, Italy, Germany, Japan and the US are among the countries performing particularly well on food loss and waste. Drivers of strong performance differ across countries. Though the levels of food loss and waste measured vary, all five countries generally demonstrate strong policy responses to the issue. In particular, all five have national legislation in place to reduce food waste. In contrast, countries such as Indonesia and Mexico are performing poorly as they have high levels of food loss and waste, and while they address food loss to some extent, there is little evidence of policies in place to address food waste.

The need for a target–measure–act approach

With less than a decade to go until the completion date for the SDGs, immediate action is required. The UN is pushing a “target–measure–act” approach, whereby a country or an individual company sets a target for the amount by which it wants to reduce its losses and waste, measures the situation along its supply chain, and takes action to make reductions.⁴³



According to the FSI, around three-quarters of G20 members have national strategies to reduce food loss, but only one-half of these address losses along each stage of the

supply chain. The most ambitious target among those with comprehensive plans is a reduction in food loss of 50% by 2030, which is shared by Argentina, Australia, Canada and the US and is in line with SDG target 12.3. Other economies, such as Turkey and Indonesia, have announced an intention to reduce food loss without setting a specific target, while another group, including Saudi Arabia and South Africa, lack detail as to how reductions will be made.

When it comes to food waste, three-quarters of the G20 countries have set reduction targets for end-user-level food waste. Across all countries there is a lack of information on how often progress against these targets will be assessed; not one of the G20 countries with a comprehensive plan that accounts for losses across the supply chain gave information of when or how it will monitor the success of its strategy. The Australian government, for example, admitted that the first step in its strategy, after announcing its 50% target, would be to commission research to establish a baseline. At the time the strategy was published in 2017, it had no idea how much food was being lost or wasted.⁴⁴

Measurement problems

As the Australian example illustrates, many countries have announced ambitious targets, but measurement is proving a difficult hurdle to clear. According to Dr Jean C. Buzby, food loss and waste liaison at the US Department of Agriculture, “estimating food loss and waste—which is needed in order to gauge effectiveness of policies—is inherently difficult.

Obtaining national data on food loss and waste is challenging for many reasons, including the need for continuous, high-quality annual data at different points of the farm-to-table food supply chain for the wide range of commodities of interest”, which in turn makes it an expensive undertaking. Felicitas Schneider, researcher at the Thünen-Institute of Market Analysis and coordinator of the Collaboration Initiative Food Loss and Waste agrees. Measuring food waste is “complex”, she says. At the farm level, there are different conditions each year, affected, for example, by rainfall, insects and pests. Therefore, for each individual farm, the value of food loss is constantly changing, making extrapolation very difficult. Moreover, it is often difficult to identify where the farmgate stops and where the next level of the supply chain starts, complicating measurement even further.

Dr Steven Lapidge, CEO of Fight Food Waste Ltd, echoes this, pointing to the hurdles businesses face in food waste measurement. “A vast majority of businesses don’t have a good handle on what and how much food they are wasting. Aggregating individual business measurements to the country level compounds the challenge, and needs to be done with caution.”

In September 2020, Champions 12.3, a coalition of the world’s largest food retailers and manufacturers (including Tesco, Walmart and Carrefour), showed that only a small group of countries around the world are measuring food loss and waste. Several G20 members, including India, Indonesia, Russia and Brazil, have no plans to do so.⁴⁵ The UNEP’s Food Waste Index, which is used to calculate food waste in the FSI, is the most thorough attempt to calculate food waste, but the organisation admits that “global food waste data availability is currently low” and that “few governments have robust data”, which means that it includes several estimates with low confidence levels.⁴⁶ Bearing this out, the UNEP notes that 75% of the global population reside in countries

44 environment.gov.au/system/files/resources/4683826b-5d9f-4e65-9344-a900060915b1/files/national-food-waste-strategy.pdf, p. 18

45 champions123.org/sites/default/files/2020-09/champions-12-3-2020-progress-report.pdf, p. 6

46 unep.org/resources/report/unep-food-waste-index-report-2021, p. 7



with some estimates for household food waste, but that proportion falls to 14% for retail waste.

The UNEP further notes that “there is an uneven distribution of data between regions as well as country income groups.”⁴⁷ On a regional basis, it is advanced economies in Northern and Western Europe, North America and Australasia that have made the most progress in data collection across the household, food service and retail sectors. By contrast, data barely exists for many emerging economies in Africa, Latin America and the Caribbean. That said, the UNEP’s data has undermined the traditional narrative that food waste is a problem limited to high-income, developed countries, and instead highlights it as a global issue. As a result, understanding the scale of the problem remains the most important task in reducing food waste and loss. According to Clara Cicatiello, a PhD researcher at the University of Tuscia, “measuring is the first way to act: it is a form of prevention, as actors will be aware of how much they waste, and in turn might pay more attention to the way food is used.”

The EU has taken reporting and measuring seriously, but progress has been slow. The Waste Framework Directive (2008/98/EC) amended in 2019 makes member states’ annual reporting on food waste obligatory, as of reference year 2020.⁴⁸ A directive

passed in 2018 requires all member states to establish food waste prevention programmes and instructs the European Commission to set an EU-wide food waste reduction target for 2030 by end-2023. It is hoped that EU member states will begin reporting their levels of food waste by mid-2022.⁴⁹ Additionally, in 2016 the EU launched the EU Platform on Food Loss and Waste. In 2019 it established a common methodology to measure food loss and waste in the bloc, followed by guidelines on food donations in 2020.⁵⁰

The start of the action phase

Although the UNEP admits that some of its data is thin, information is richer for more advanced economies, which means it still offers important insights for the FSI. Of the three food waste categories, household waste is typically larger than both food service and retail waste combined (the US is a notable exception because of the stronger cultural preference for eating out). The countries that fare well across all three categories include Japan, which is ranked in the top six for all three categories, Italy, the UK and Germany, although the latter two have work to do on reducing their household waste. At the other end of the index, Saudi Arabia is especially weak on household and retail waste and so too, surprisingly (see below), is France. Mexico and Turkey also rank poorly.

47 unep.org/resources/report/unep-food-waste-index-report-2021

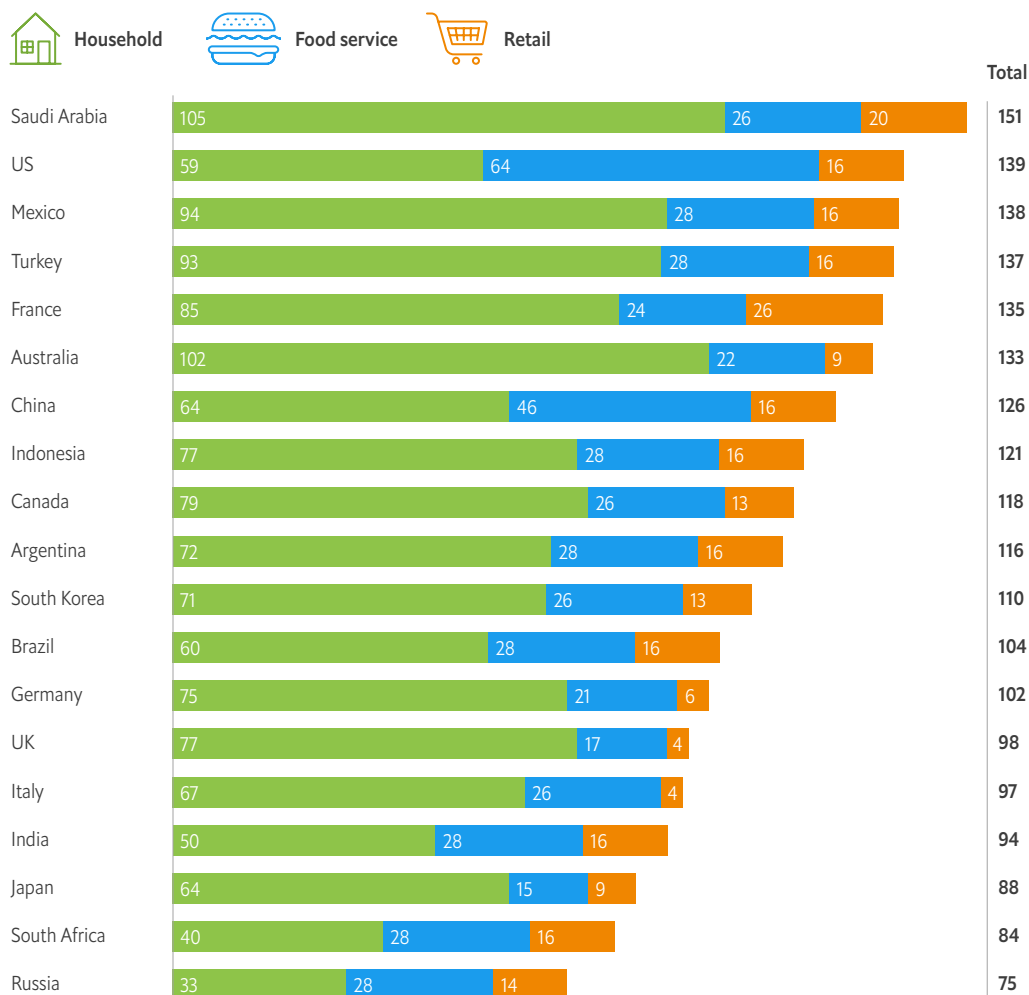
48 ec.europa.eu/eurostat/documents/342366/351811/Guidance+on+food+waste+reporting/5581b0a2-b09e-adc0-4e0a-b20062dfe564

49 ec.europa.eu/food/safety/food_waste/eu_actions/food-waste-measurement_en

50 ec.europa.eu/food/food/food-waste/eu-actions-against-food-waste/eu-platform-food-losses-and-food-waste_en

Food for thought

Food waste, 2021 (kg/head/year)

Source: Economist Intelligence Unit, Food Sustainability Index 2021; UNEP Food Waste Index⁹

That France ranks bottom on the index for retail waste is eye-opening because the French government has been among the most active on the topic. In 2016 it passed legislation that compelled retailers above a certain size to partner with an organisation to distribute unsold food for free or face a fine. It is possible that France's legislation resulted in more accurate measurement of food waste from supermarkets. Experts interviewed for this report noted that food waste tends to be

underreported—hence a law like this may result in a more accurate picture that some other countries do not have. Japan introduced fines for food companies violating reuse and recycling laws only in 2020, while there is no such legislation in the UK.

Dr Schneider claims that specific cultural and religious factors can play a crucial role in food waste. Hospitality—and being a good host in particular—in many cultures is often associated with providing large amounts of food. Changing mindsets and

awareness towards reducing food waste can be challenging in this context. Governments can take steps in that direction by providing clearer legal frameworks as one option. Dr Schneider points to the new comprehensive law in China aimed at discouraging food waste at the household, out-of-home consumption, and retail levels (see box on Comparative approaches: The UK and China).

Governments are thinking more broadly about ways to reduce food waste. Ten G20 countries have passed so-called “Good Samaritan Laws” to encourage retailers, most obviously supermarkets, to donate excess or unsold food to charities by ensuring that they have no liability if, for example, some of the food is spoiled and results in cases of food poisoning. Several governments, including those in France and Canada, have also looked beyond the limits of their legislation to work with stakeholders such as retailers to curtail food waste. One initiative to emerge from these consultations was the “Inglorious Fruits and Vegetables” campaign run by French supermarket chain, Intermarché, in which it bought up “ugly” but perfectly edible food at discounted prices.⁵² Other government moves in the US, Germany and Japan include revisions to labels on food packaging to dissuade consumers from throwing away food prematurely.⁵³

The Turkish government collaborated with the FAO in 2020 on the “Save Your Food” campaign that helped to raise awareness of the difference between the sell-by and best-before dates on food labels. Turkey’s food waste regulations also come with clear binding criteria, where businesses are awarded zero-waste certificates depending on the size of their business and, most importantly, the rate of their waste reduction. Turkey is one of the few G20 countries, however, to have this. In that sense, clear binding targets could represent one of the ways in which G20 countries can strengthen their actions to reduce food waste.

Most G20 members also have non-governmental organisations (NGOs), such as food banks or consumer cooperatives, which operate at a national level and redistribute food, some of which would otherwise be wasted, to vulnerable members of society. Italy’s Gadda Law,⁵⁴ for instance, has empowered charities and food banks to become key actors in food surplus redistribution efforts by creating a national regulatory framework for food donations that clarifies tax concession rules, civil liabilities, and health and safety provisions, and allows municipalities to award reductions in waste taxes for NGOs.

In the private sector, the Champions 12.3 coalition has committed itself to the 10x20x30 initiative, which brings together at least 10 of the world’s largest food retailers and providers, each engaging at least 20 of their suppliers to reduce food loss and waste by 50% by 2030.⁵⁵ So far, around 200 suppliers have been recruited. More specifically, Tesco was able to reduce food waste in its Central European operation by almost 50% between 2016 and 2019 through buying less from its suppliers and increasing the amount of food sent to animal-feed manufacturers and donated to charities.⁵⁶ Clara Cicatiello at the University of Tuscia believes that government incentivising retailers is “crucial, as retailers are ultimately businessmen, so when economic incentives are in place, they will be much more motivated to take part in the fight against food waste”.

On a smaller scale, start-ups in the UK and the US have created apps that connect shops and restaurants with excess food with charities and social organisations that can use it.⁵⁷ Websites and even an entire supermarket have been created that sell food that is beyond its best-before date but is still edible.⁵⁸ An alternative approach in Indonesia has seen shops join forces with a social enterprise, Garda Pangan, to try to reduce food waste at the retail stage. Firms with food approaching its expiry

52 eu-fusions.org/phocadownload/Reports/FRANCE%20FULL%20pdf.pdf

53 champions123.org/sites/default/files/2020-09/champions-12-3-2019-progress-report.pdf

54 gazzettaufficiale.it/eli/id/2016/08/30/16G00179/sg

55 champions123.org/10-20-30

56 champions123.org/sites/default/files/2020-09/champions-12-3-2019-progress-report.pdf, p. 14

57 food.cloud/; foodcowboy.com/

58 danchurchaid.org/join-us/wefood

date pay the enterprise to distribute the produce to people in need through its food bank. According to Eva Bachtar, founder and CEO of Garda Pangan, the organisation guarantees the food will be consumed within a safe period, removing the liability from the retailer. It also collects “ugly” produce from distributors and farmers and sells it to customers at lower prices.

Although there is a great deal to learn from case studies of NGOs and the private sector, there is generally a limit to voluntary action.⁵⁹ Policymakers need to introduce incentives through taxes and regulations in order to ensure that changed

behaviours are widely adopted among all businesses and consumers.⁶⁰ According to Andrew Parry, programme manager at WRAP, such regulations need to be specific and targeted. Food security is the focus of the G20 Foreign Affairs and Development Ministers’ meeting, and an informal briefing in April 2021 stressed the role that the FAO Food Coalition will play in this context.⁶¹ This presents G20 ministers with an opportunity to properly integrate food loss and waste objectives, legislations and interventions into policy discussions around the broader food systems transformation across ministerial sectors.

Comparative approaches: The UK and China



UK: Among G20 members the UK has become the poster child for food loss and waste reduction, with the country recording a reduction of 27% in 2018, relative to its baseline of 2007.⁶² That the UK has been able to measure its reduction in waste effectively is because it funded a domestic NGO, the Waste and Resources Action Programme (WRAP), to establish a way to measure loss and waste. It then commissioned WRAP to update its findings. Andrew Parry from WRAP outlines that the UK has been able to achieve these measurement goals by spending money on primary bespoke research to understand sector estimates, combined with scaling up ongoing data collection processes by working with local authorities and businesses.

Alongside understanding the importance of measurement, the UK government took three further steps to enable the reduction. First, it launched a voluntary scheme to help firms reduce the waste in their supply chain, supported by information and materials from WRAP. Second, it launched a public information campaign—“Love

Food Hate Waste”—which offers recipes and food-storage recommendations, and explains food labelling to improve consumer awareness. Third, it pushed retailers and manufacturers to improve their food packaging design to make it easier for consumers to use their food for longer.⁶³ As a result of these steps, the UK is the first (and so far only) G20 member to have reached the halfway mark in meeting the SDG target.



China: Food waste has become an issue of increasing importance in the G20’s emerging economies, in China in particular. However, the government has implemented legislation. In April 2021 it passed a comprehensive Anti-Food-Waste Law that addresses food waste at the food services and household level. It takes a different approach to the Good Samaritan Laws seen elsewhere by fining food service providers that encourage consumers to order excessive food and vloggers who make or distribute binge-eating videos online.⁶⁴ It is still too early to observe the impacts of China’s new law, cautions Dr Schneider, but—as for any law—it would be beneficial to monitor its effects on the country’s food waste reduction levels.

⁵⁹ lordslibrary.parliament.uk/food-waste-in-the-uk/

⁶⁰ lordslibrary.parliament.uk/food-waste-in-the-uk/

⁶¹ esteri.it/mae/en/sala_stampa/archivionotizie/eventi/2021/04/sereni-fao-contributo-della-food-coalition-in-ambito-g20.html

⁶² champions123.org/sites/default/files/2020-09/champions-12-3-2020-progress-report.pdf

⁶³ champions123.org/sites/default/files/2020-09/champions-12-3-2020-progress-report.pdf, p. 7

⁶⁴ news.cgtn.com/news/2021-04-29/China-passes-anti-food-waste-law-ZQGMk1FYME/index.html;

npc.gov.cn/englishnpc/c23934/202104/7942cbdf80044d89615e9df198berfo.shtml; news.cgtn.com/news/2021-04-29/China-passes-anti-food-waste-law-ZQGMk1FYME/index.html



Key action points to consider



Governments

- Assess current data on food loss and waste and, if inadequate, recruit a third party to assist. For those already collecting data, add momentum to the process by monitoring progress regularly.
- Examine where the country sits on the target–measure–act spectrum and outline a strategy for how to make it to the next step.
- Develop binding legislation to commit to food loss and waste targets, following best practices and lessons learnt from other G20 countries.
- Explore partnerships with major food service companies or restaurants to create initiatives that go beyond mere compliance with the target.
- Consider ways in which households can be encouraged to recycle their wasted food. Look at studies of behaviour in countries where the government provides free bins and collection.
- Invest in education campaigns to inform the public about how much food is being lost and wasted in the country at the household, food services and retail level. Explain the options available to them to address this (e.g. how to find local food donation NGOs, how to reduce food waste at home, and how to access surplus food donations).

- Ensure that food loss and waste targets and strategies are integrated into policy commitments and declarations to a food systems transformation.



Business

- Seek out interested parties in local, regional or national government to form new schemes to reduce loss and waste, as far up the supply chain as possible.
- Consider whether company marketing reflects a belief in the importance of reducing waste and, where possible, tweak the message.
- Join apps and other initiatives that provide excess food to charities and social organisations.



Civil society

- Commission surveys to gauge public support for reducing food loss and waste and target areas where interest or compliance is weakest.
- Engage public figures sympathetic to the cause to promote positive behaviours.
- Launch public information campaigns or support government efforts to raise awareness about the scale of the food loss and waste problem, and empower and educate civil society to take action.
- Look for charities operating in the loss and waste space and see if they can be linked up with public- or private-sector funding to scale up their operations.

SUSTAINABLE AGRICULTURE

Among the SDGs, SDG 13 demands urgent action to combat climate change and its impacts, SDG 14 focuses on the conservation of marine life, while SDG 15 calls for forests to be managed sustainably, land degradation to be reversed and biodiversity loss to be halted. Each of these must be accomplished at the same time as SDG 2 targets zero hunger.⁶⁵ The challenge for the agricultural sectors in G20 countries is to make their production processes more efficient so that they are growing sufficient food for their populations and their exporters, but doing so in a way that is decoupled from resource use,⁶⁶ repairs the damage that has already been done to the planet, helps to raise nutritional standards, and in the

wake of the pandemic, rebuilds our resilience to the emergence of diseases. Action track 3 of the UNFSS, which seeks to boost nature-positive production, is intended to help achieve these changes.⁶⁷



Sustainable agriculture

	Argentina	●
	Australia	●
	Brazil	●
	Canada	●
	China	●
	France	●
	Germany	●
	India	●
	Indonesia	●
	Italy	●
	Japan	●
	Mexico	●
	Russia	●
	Saudi Arabia	●
	South Africa	●
	South Korea	●
	Turkey	●
	UK	●
	US	●

Source: Economist Intelligence Unit, Food Sustainability Index 2021

Summary of results:

South Korea, Germany, Australia, Canada and Japan all perform particularly well on the sustainable agriculture pillar. With the exception of Canada, these countries achieve high scores for their water and land use—with policies in place to encourage sustainable water management, laws to protect smallholders, and financial access protection for land-users. Canada, meanwhile, stands out on its measures to reduce emissions, particularly its climate change adaptation and mitigation policies. Countries performing least well include Saudi Arabia, Russia and Turkey. Reasons for poor performance differ across countries—with Saudi Arabia, for instance, ranking last on agricultural water withdrawal as a percentage of total renewable water resources, Russia on deforestation, and Turkey ranking close to last on opportunities for private-sector investment in sustainable agriculture.

⁶⁵ sdgs.un.org/goals

⁶⁶ ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en#:~:text=To%20overcome%20these%20challenges%2C%20the,and%20no%20place%20left%20behind

⁶⁷ un.org/en/food-systems-summit/action-tracks

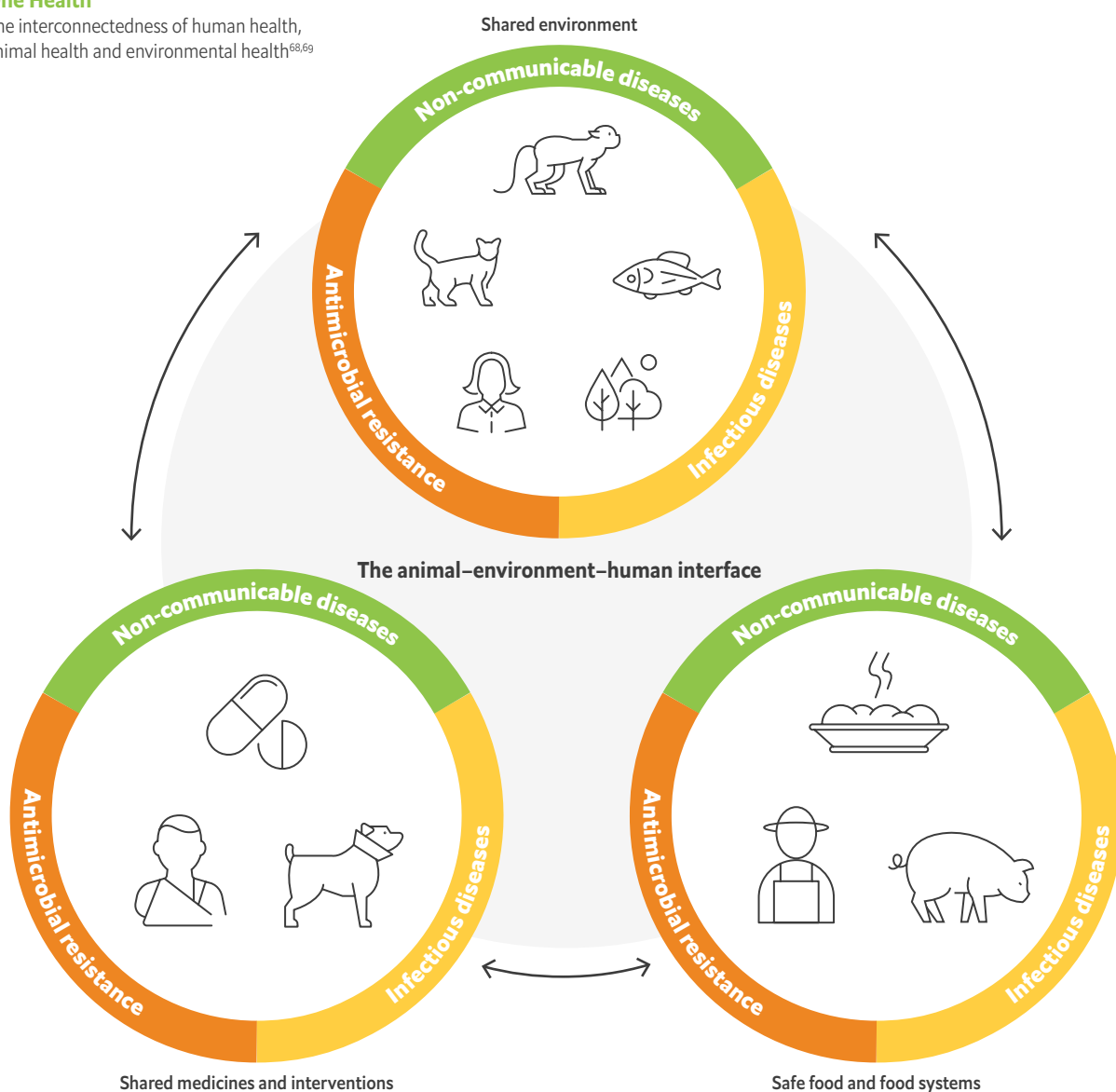
Public health and food safety within sustainable agriculture

The Covid-19 pandemic has demonstrated the need for sustainable agriculture to consider the interconnected relationships between people, animals and the environment. For decades, scientists have been aware that growing food that is safe to eat requires knowledge of subjects as diverse as slowing antimicrobial resistance and

preventing the spread of zoonotic diseases. This has necessitated input from stakeholders with a wide variety of expertise. The One Health approach is a banner term for programmes, policies, research and recommendations into these areas, led by the tripartite group of the World Health Organisation (WHO), the FAO and the World Organisation for Animal Health (OIE). The One Health approach is the focus of the G20 meeting of health ministers in 2021.

One Health

The interconnectedness of human health, animal health and environmental health^{68,69}



Source: The Lancet

68 [oie.int/en/what-we-do/global-initiatives/one-health/](https://www.who.int/en/what-we-do/global-initiatives/one-health/)

69 [thelancet.com/journals/lancet/article/PIIS0140-6736\(20\)31027-8/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)31027-8/fulltext)

That the specific coronavirus behind the pandemic is thought to be a zoonotic pathogen has concentrated minds on how to minimise the unsafe agricultural practices that enable such pathogens to jump from animals to humans more easily, such as deforestation, changing land use, and the loss of biodiversity. The trend is already going in the wrong direction: research has shown that there were three times as many outbreaks of zoonotic pathogens in the 1990s as in the 1940s. A paper by Policy Exchange has highlighted three major reasons why:

- more “ecological disruption”, such as deforestation, wildlife trade and changing land use, which results in more contact between humans and animals;
- more industrial agriculture, especially without appropriate sanitation; and
- more global travel, which enables infections to spread further and faster.⁷⁰

Echoing this, a paper by WWF emphasises the role of unsustainable food production and the large-scale land conversion for agriculture purposes, as well as poor standards in the sourcing, handling and processing of wild meats that put humans at greater risk from animal pathogens.⁷¹

The FSI highlights some worrying developments relating to the causes of zoonotic diseases, as follows.

Deforestation: The countries clearing the largest absolute areas of forest every year are Russia, Brazil and Canada. However, if we look at the deforested areas as a proportion of total land area, then the most extensive clearing is taking place in Indonesia (15% of total land area per year), followed by Brazil (7%) and Canada (5%). At the other end of the scale, clearing is negligible in Saudi Arabia and less than 1% of total land area in India and Turkey. Of course, whether deforestation rates are sustainable depends on the extent of tree planting, the species of trees being felled, and the

abundance of forest cover. The FSI shows that Japan, South Korea and Brazil have the highest levels of forest as a proportion of total land, and that Saudi Arabia, Argentina and the UK have the least.

Land-use change: Meanwhile, the proportion of land diverted to growing animal feed and biofuels—one proxy for changing land use⁷²—is very high in several G20 countries, notably Brazil and the US. Land-use change can result in lower levels of biodiversity and weaker resistance within agricultural systems to pests and disease, especially in countries like Brazil, where legislation to protect property rights and the rights of smallholders is suboptimal.

Livestock: Another indicator that can be suggestive of greater vulnerability to zoonotic transmission is a high level of livestock density, inasmuch as it suggests that farming is being practised intensively. The economies with the highest density levels are South Korea (with 4.1 units of livestock per hectare of arable land), Japan (2), and Germany (1.2). Those with the lowest densities (excluding Saudi Arabia, where the industry is very small) are Australia (0.08), Russia (0.11), and South Africa (0.14).

Biodiversity: We also note the role of maintaining biodiversity and natural habitats in keeping ecosystems safe and functional.⁷³ Here, scores vary widely according to the IUCN’s Red List Index on endangered species, with Germany, Canada and the UK achieving near-perfect ratings, but India and Mexico faring particularly poorly.⁷⁴ There was a similarly wide range of scores for the quality of animal welfare regulations. According to the most recent Animal Protection Index, which captures animal welfare policies and legislation and was created by the World Animal Protection NGO, no country received the highest rating, and the UK was the only jurisdiction to receive the second-tier rating.⁷⁵ Argentina, China, Indonesia, Japan, Saudi Arabia and South Africa fared poorly.

⁷⁰ policyexchange.org.uk/wp-content/uploads/Outbreaks-and-Spillovers.pdf

⁷¹ c402277.ssl.cf1.rackcdn.com/publications/1348/files/original/FINAL_REPORT_EK-Rev_2X.pdf?1592404724





⁷² This is not the only measure of land-use change, which can occur for a number of reasons such as food production (especially applicable to intensive agriculture and monocultures).

⁷³ assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/962785/The_Economics_of_Biodiversity_The_Dasgupta_Review_Full_Report.pdf

⁷⁴ unstats.un.org/sdgs/metadata/files/Metadata-15-05-01.pdf; iucnredlist.org/assessment/red-list-index

⁷⁵ api.worldanimalprotection.org/about

Agriculture for public health

				
	Deforestation (hectare/year)	Land diverted to animal feed and biofuels (%)	Livestock density (livestock unit/hectare)	Environmental biodiversity and protection of natural habitats
Top performers	Saudi Arabia 4 South Korea 285,049 Italy 401,871	Australia 0.13 Turkey 0.17 Germany 0.21	Saudi Arabia 0.02 Australia 0.08 Russia 0.11	Germany 98.18 Canada 96.38 UK 96.17
Bottom performers	Canada 45,909,074 Brazil 61,709,265 Russia 76,963,919	US 22.59 Argentina 41.63 Brazil 62.37	Germany 1.16 Japan 2.03 South Korea 4.11	South Korea 69.66 Mexico 67.51 India 67.15

Source: Economist Intelligence Unit, Food Sustainability Index 2021

Policy responses

Despite the concerns highlighted, there have been some encouraging policy responses to agriculture and public health since the start of the pandemic. China banned trade in wildlife for consumption soon after the Covid-19 outbreak was linked to the market in Wuhan. Yet the legislation is not comprehensive and media reports have presented anecdotal evidence of weak compliance.⁷⁶ The EU's Biodiversity Strategy for 2030 is a core part of both the EU's green deal and Covid-19 recovery plans. It outlines clear targets relating to protected areas and nature restoration, and is a step forward in potentially elevating the bloc's performance on maintaining biodiversity.⁷⁷

The EU has announced that it will propose legislation among its members later in 2021 to reduce the bloc's contribution to global deforestation. WWF estimates

that the EU is the second-largest "importer" of tropical deforestation in the world, after China, as a result of the importing of goods such as beef products, cosmetics and household products, which require vast amounts of soybeans, palm oil and other commodities that are often cultivated on deforested land in countries such as Brazil and Indonesia.⁷⁸

A government-level focus on the environmental impact of trade would be welcome, according to Professor Joseph Holden of Leeds University. "G20 countries need to look at sustainable agriculture and embedded water, carbon and pollution in the products that they are importing as well as exporting. If you're in a water-scarce location, you don't want to be exporting embedded water to a water-rich location. It is only if you take a global view of trade that you get a better sense of how sustainable we really are."

⁷⁶ [dw.com/en/biodiversity-wet-markets-life-animals-covid-19-beijing-guangzhou/a-54183831](https://www.dw.com/en/biodiversity-wet-markets-life-animals-covid-19-beijing-guangzhou/a-54183831)

⁷⁷ ec.europa.eu/environment/strategy/biodiversity-strategy-2030_en

⁷⁸ [euronews.com/green/2021/04/14/eu-is-the-world-s-second-biggest-importer-of-tropical-deforestation-says-wwf](https://www.euronews.com/green/2021/04/14/eu-is-the-world-s-second-biggest-importer-of-tropical-deforestation-says-wwf)

The private sector is also taking action. A group of large firms, including Amazon, Bayer and Nestlé, have signed up to the LEAF (Lowering Emissions by Accelerating Forest finance) coalition, alongside the UK, US and Norwegian governments, to spend US\$1bn on preserving tropical forests at risk of deforestation. The explicit goal is to maintain the forests' capabilities as carbon sinks, while keeping forests intact also prevents biodiversity loss and strengthens resistance to zoonotic transmission.⁷⁹ Involving different stakeholders in improving the sustainability of agriculture is key, according to Bram Govaerts of the International Maize and Wheat Improvement Center (CIMMYT). "You need to make sure that somebody creates an equal playing field when different actors come together to discuss."

Public health has been the focus of policymaking in 2021 so far. However, other important sustainability issues in the agricultural sector also have to be addressed. According to Sean de Cleene, head of the Food System Initiative and member of the executive committee at the World Economic Forum, "the pandemic has exposed the structural risks and the frailty of the food systems, which cannot be addressed in silos." As a result, G20 countries still need to improve the livelihoods of farmers, protect water and reduce emissions as the climate crisis intensifies.

Ensuring livelihoods of farmers

According to the FSI, which draws on the Global Rights Index assembled by the International Trade Union Confederation (ITUC), there are major improvements that should be made to the rights of agricultural workers. More G20 members received the bottom score in the most recent index (seven) than received the top score (two). The index looks at rights infringements such as the inability to form unions, bargain collectively, strike and work in safe environments. Three G20 countries—Brazil, India and Turkey—were named among the ten worst places

to be an employee by the ITUC.⁸⁰ Among other FSI indicators that assess worker livelihoods, advanced economies such as the UK, the US, Germany and Japan score well for financial provisions for farmers, such as access to insurance and digital payment processes, while Indonesia and Saudi Arabia struggle.

The FSI shows that G20 agricultural sectors are not particularly diverse and inclusive. When it comes to measuring the proportion of women who own the title to agricultural land, even in South Africa, which performs best on this measure, the level is only around one-third. Agriculture remains a profession of older men: the average age of workers across all countries is 54 and the spread is fairly narrow, from 46 in Turkey and Brazil to 68 in South Korea. Hidemi Takimoto of Japan's National Institute of Health and Nutrition says that young people in Japan are reluctant to work in agriculture, forestry or fisheries. Clara Cicatiello at the University of Tuscia is more hopeful. She argues that a more sustainable approach to agriculture "might make it seem more like 'cool work' to younger Italians."

Protecting water

Agricultural production is heavily reliant on water; accounting for around 44% of water use in the EU, and 70% globally.^{81,82} Protecting water resources will therefore be critical in ensuring stable and sustainable supplies of food. The FSI's range of indicators on water usage demonstrate the very different challenges facing agricultural sectors across the G20. For some countries, such as Germany, water remains abundant. Germany uses less than 0.2% of its total renewable water resources in its agricultural sector and abundant rains mean that less than 2% of its cultivated land is irrigated. Canada, Russia and Brazil also fare quite well in this context. However, there are several other G20 members in a very different position. India uses as much as 36% of its renewable water resources on agriculture and has irrigated 24% of its arable land. The corresponding figures for China are 14% and 8%.

⁷⁹ edie.net/news/9/Amazon-and-Unilever-among-businesses-teaming-with-UK-and-US-governments-on-1bn-deforestation-pledge/

⁸⁰ ituc-csi.org/IMG/pdf/ituc_globalrightsindex_2020_en.pdf

⁸¹ ec.europa.eu/info/news/sustainable-usage-water-agriculture_en

⁸² worldbank.org/en/topic/water-in-agriculture

Both of these countries, along with Australia, Saudi Arabia and Mexico, receive higher-than-average ratings for overall water stress from the World Resources Institute. Turkey is the G20 member with the highest baseline water stress level that does not currently have a government initiative in place to promote sustainable water management or the use of recycled water in agriculture. In this respect Turkey is an outlier, given that it also uses a high proportion of its renewable water in its agricultural sector.

Climate change will likely result in greater water scarcity in many regions.^{83,84} To add to this, agricultural activities are also a major source of water pollution, further undermining the availability of water resources. The EU plays a major role in global water pollution.⁸⁵ Germany, for instance—despite enjoying a steady supply of water in the Index—was fined by the EU for excessive water pollution from fertilisers.⁸⁶ As a result, even countries scoring well on water indicators have incentives to protect water in the long-run.

Reducing agricultural GHG emissions

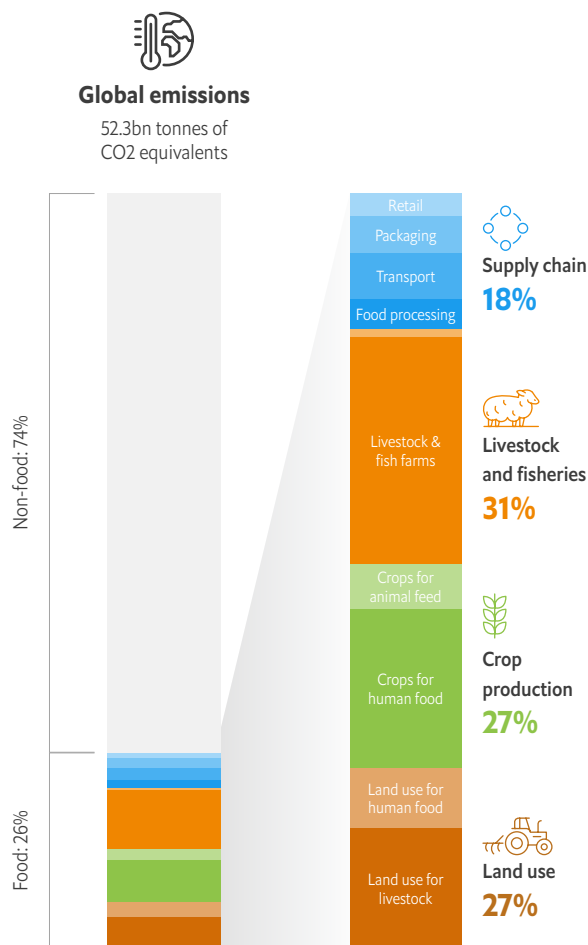
Making agriculture sustainable requires the sector to become less emissions-intensive. The food system, which includes pre- and post-production, accounts for between 21% and 37% of total net anthropogenic GHG emissions, according to the 2019 Intergovernmental Panel on Climate Change's special report on climate change and land.⁸⁷ Within the agricultural total, emissions are generated from four main sources, which all supply relatively similar volumes of GHG emissions:

- land use, which reduces ability of land to absorb carbon;
- crop production, which includes irrigation and fertilisation of soils to produce food for human consumption and animal feed;

- livestock and fisheries, which includes methane from enteric fermentation, fuel use from fisheries; and
- supply chains, which include the transport, packaging and selling of products.⁸⁸

The environmental cost of food production

Global GHG emissions by source, 2010



Source: Our World in Data, Joseph Poore and Thomas Nemecek 2018

83 [fao.org/3/cb2392en/cb2392en.pdf](https://www.fao.org/3/cb2392en/cb2392en.pdf)

84 [ipcc.ch/site/assets/uploads/sites/4/2020/07/03_Technical-Summary-TS_V2.pdf](https://www.ipcc.ch/site/assets/uploads/sites/4/2020/07/03_Technical-Summary-TS_V2.pdf)

85 [waterfootprint.org/media/downloads/EUs_vulnerability_to_water_scarcity_and_drought.pdf](https://www.waterfootprint.org/media/downloads/EUs_vulnerability_to_water_scarcity_and_drought.pdf)

86 ec.europa.eu/commission/presscorner/detail/HU/IP_16_1453

87 [ipcc.ch/srccl/chapter/summary-for-policymakers/](https://www.ipcc.ch/srccl/chapter/summary-for-policymakers/)

88 ourworldindata.org/food-ghg-emissions

The FSI maps some major sources of carbon emissions from the agricultural sector. In absolute terms, the agricultural sectors in China and India are responsible for a remarkably similar volume of emissions, each at around 640,000 gigatonnes of CO₂ equivalent each year, the highest level in the G20. However, the amount of land under cultivation is much larger in China, resulting in a lower level of emissions per hectare (1.2, compared with 3.6 in India). Of major producers, the average level of emissions per hectare in Australia is the lowest, at 0.4, with Russia (0.4), Mexico (0.8) and the US (0.9) also posting low levels. South Korea (7.8) and Japan (4.4) are the most emissions-intensive and both are economies where total emissions are relatively low because agriculture is a fairly small industry.

Some problems are intractable. Cows require large amounts of feed due to their low conversion efficiency and low rates of growth and reproduction.⁸⁹ As such, animal feed production accounts for 12% of land-use change and 6% of total GHG emissions from food.⁹⁰ The environmental repercussions of eating red meat are some of the driving reasons behind recommendations to reduce its consumption, particularly in high-income countries.⁹¹ Other sources of emissions are necessary to prevent more emissions. For example, transporting food in refrigerated vehicles results in less food wastage.

On top of that, use of natural refrigerants and energy-efficient technologies can be used for lowering the environmental footprint of the cold chain.⁹² But there are still major reductions to be made. Poore and Nemecek, found that for some foods, emissions are highly concentrated among major producers. For example, the highest-emitting 25% of beef herds contributed 56% of the total emissions from cows. And beef is not an outlier. Across all foodstuffs, 25% of producers were responsible for 53% of each food's

total environmental impact.⁹³ This suggests that there could be major gains to be made from making small tweaks to the operations of the largest producers.

That said, there is also no one-size-fits-all model when trying to reduce emissions at the farm stage. Climate, geography, scale, budget and customer preferences all determine how farms operate and governments need to offer producers a range of options and trust their expertise to know which strategies will suit them best. Emanuele Blasi, PhD researcher at the University of Tuscia, argues that there are different types of sustainable agricultural interventions, and each system should find its own, tailored solutions. "In Italy, for instance, the south has more agricultural land managed under organic agriculture rules compared to the north. However, in the north, there are more farmers linked with the agro-industry, and here we can find sustainable practices such as integrated pest management and more technical aspects like precision agriculture. Ultimately, each type of farm needs to find its own solutions to sustainability."

Further up the value chain there are other potential innovations that could cut agriculture's carbon footprint, from greater use of electric vehicles that rely on renewable energy for moving goods to packaging that keeps food fresh for longer, and labelling that gives information about the emissions generated by its production.⁹⁴ Improved data measurement can play a role here too. The CIMMYT researches maize and wheat production systems in the developing world to improve productivity and the livelihood of farmers sustainably. One of its projects, MasAgro, works in collaboration with the Mexican government and utilises a data system that monitors over 150,000 farmers and 500 variables during the growing cycle for each farming plot.

89 wri.org/insights/6-pressing-questions-about-beef-and-climate-change-answered

90 ourworldindata.org/food-ghg-emissions

91 eatforum.org/content/uploads/2019/01/EAT-Lancet_Commission_Summary_Report.pdf

92 nationalgeographic.com/science/article/150122-food-waste-climate-change-hunger

93 science.sciencemag.org/content/360/6392/987

94 ourworldindata.org/food-ghg-emissions

Farmers can then access data analysis via an app which provides them with a range of information to help them improve productivity, use more sustainable practices and access markets.⁹⁵ According to Bram Govaerts, director of CIMMYT, this helps to “show farmers what the sustainable practices are that work in their respective agroecosystems”, thereby promoting context-specific sustainable solutions.

Consumers have an important role to play too, and can be guided by advice from governments and civil society to choose products that have a smaller footprint. To support this, Action Track 2 of the UNFSS, on shifting to sustainable consumption patterns, focuses on building consumer demand for more sustainable products while strengthening local value chains.⁹⁶ Social innovations can support sustainability by enabling consumers to club together to buy produce from farmers. By connecting farmers and consumers more directly, farmers can then appreciate consumer sustainability preferences. For example, Zolle is an initiative in Italy where consumers pay for a box and then receive food directly from the farm. The initiative claims that in supporting its activities, consumers help to “develop an agricultural system that respects people, the territory and the environment”.⁹⁷

Climate change mitigation policies: The need to address agriculture

There have been some recent encouraging moves on climate change mitigation at the government level. As part of the landmark Paris Agreement on climate change that was signed in 2016, countries committed to nationally determined contributions (NDCs) in order to help the planet achieve the overall goal of limiting global warming. Of the G20 countries, 13 have submitted new, more stringent targets since the start of 2020 and a further three have announced their intention to do so shortly. The outliers—India, Indonesia, Saudi Arabia and Turkey—have just months to act before the COP26 summit in November.

However, only Indonesia and Canada have outlined specific targets or roadmaps for the agricultural sector within these plans. Most other G20 countries simply recognise that lowering the sector’s emissions is necessary to meet their national goals.⁹⁸ That said, Germany’s supreme constitutional court recently ruled that current climate commitments do not do enough to protect future generations. The court ordered the government to revise its Climate Protection Act of 2019—which details upper limits for agricultural emissions—and deemed it unconstitutional for GHG emission reduction targets to be delayed for this long. This may set the stage for more stringent domestic targets and emission reduction efforts beyond NDCs and agricultural policies.⁹⁹

⁹⁵ cimmyt.org/news/international-analytics-award-goes-to-cgiar-centers-for-sustainable-agriculture-tools/

⁹⁶ un.org/en/food-systems-summit/action-tracks

⁹⁷ zolle.it/

⁹⁸ unfccc.int/sites/ndcstaging/PublishedDocuments/United%20Kingdom%20of%20Great%20Britain%20and%20Northern%20Ireland%20First/UK%20Nationally%20Determined%20Contribution.pdf and unfccc.int/sites/ndcstaging/PublishedDocuments/United%20States%20of%20America%20First/United%20States%20NDC%20April%202021%202021%20Final.pdf

⁹⁹ theguardian.com/world/2021/apr/29/historic-german-ruling-says-climate-goals-not-tough-enough

Indonesia's NDCs

 Indonesia is one of only two G20 countries whose NDC under the Paris Agreement addresses the agricultural sector specifically, together with industry targets and a roadmap for action.¹⁰⁰

The government identifies increasing agricultural productivity as one of the ways in which it plans to achieve a reduction of 29% of its GHG emissions by 2030. It is targeting a reduction in agriculture-related CO₂ emissions from 119.66 Mton in its business-as-usual scenario to 110.39 Mton. This means that it is expecting to achieve larger reductions in other sectors to achieve its

economy-wide target, but the country nonetheless stands out for its sector-level goals.

Indonesia's NDC also mentions a commitment to enhancing sustainable agriculture and plantations, and slowing the rate of deforestation and forest degradation. The primary mitigation strategies listed under agriculture include: the use of low-emission crops (with a target of 926,000 hectares in 2030); more efficient water management; slowing the pace of changing land use for agriculture; and tighter oversight of managing manure and cattle feed.

Key action points to consider



Governments

- Re-evaluate regulatory processes that permit land-use changes and consider tightening requirements where changes would lead to biodiversity loss or increased GHG emissions.
- Research implications of adding emissions data to food labels and consider passing legislation making such information mandatory, and consider best-practice examples from elsewhere.
- Implement mandatory disclosure of investment data across the financial sector. Channel public finances through impact investing to support the private sector in developing innovative solutions in sustainable agriculture.
- Support projects that are helping to develop “true cost accounting” methods which consider environmental and social costs of agricultural practices.
- Introduce sectoral targets within NDCs, including for agriculture.



Business

- Commit to improving the sustainability of the entire business supply chain by ensuring

products are sourced and processed sustainably. Ensure that sustainability targets are measured against standardised indicators or metrics and disclosed transparently.

- Private investors to demand strict reporting on sustainability indicators and to invest in businesses that perform well on such indicators, while educating companies on the material and financial impacts of environmental damage.
- Introduce labelling that demonstrates emissions generated through product creation where labels are currently absent, and promote transparency via labels or through frequent reporting and disclosure.
- Join organisations working to preserve forests.



Civil society

- Raise awareness of the interconnectedness of nature loss, agriculture and food-production systems and the outbreak of diseases, and put pressure on policymakers and businesses to ensure that this nexus is captured in policy priorities and business models.
- Encourage governments to provide sector-specific detail on how they will meet NDCs.
- Call for transparency over labels and emission disclosures from businesses and their products.

¹⁰⁰ unfccc.int/sites/ndcstaging/PublishedDocuments/Indonesia%20First/First%20NDC%20Indonesia_submitted%20to%20UNFCCC%20Set_November%20%202016.pdf

NUTRITIONAL CHALLENGES

As many as 3bn people around the world cannot afford a healthy diet, according to the FAO. Of these, more than 1.5bn live in the G20 group of the world's largest economies.^{101,102} This fact has broad and far-reaching consequences: a poor-quality diet—the consumption of an insufficient amount of nutritious foods and excessive amounts of unhealthy foods—is the single-largest cause of morbidity and mortality.¹⁰³ In addition, many millions of others can afford to eat whatever they like, but their choices are not environmentally sustainable. According to Gerda Verburg, “our food system is bankrupting our health system while at the same time exhausting our planet”.

An improvement in the quality and quantity of what we eat in order to reduce malnutrition and the incidence of non-communicable diseases, such as cardiovascular disease, cancer and diabetes, would improve the health outcomes and extend the life expectancies of hundreds of millions of people. This will be crucial if we are to meet SDG target 3.4 of reducing by one-third premature mortality from non-communicable diseases and promoting mental health and well-being, and SDG target 2.2, which seeks to end all forms of malnutrition.

In 2020 the FAO estimated that a global switch to healthy diets that encompass sufficient energy, nutrients and food varieties from a range of groups,

could save governments and consumers almost all of the health costs associated with unhealthy eating. It put that figure at US\$1.3trn by 2030.¹⁰⁴ The FAO believes that almost half of the savings associated with healthy eating would come in high-income countries, the category to which most G20 members belong, because of their greater existing healthcare spending.¹⁰⁵ Findings from our index reveal that one form of malnutrition—undernourishment—is a significant issue in India, where 14% of the population is undernourished, and to a lesser extent in Indonesia and Mexico, with 9% and 7.1%, respectively. However, the proportion of people who are overweight is a major issue for the G20, with 14 countries reporting that more than 50% of their adult populations are overweight.

A structural shift in the composition of our diets could have a significant impact on global efforts to limit climate change. The FAO's latest estimate is that diet-related GHG emissions, such as those generated by the use of land, energy and water for livestock, could also be reduced by between 40% and 75% by 2030 if existing diets were made healthier.¹⁰⁶ The EU's “Farm to Fork Strategy” acknowledges that “if European diets were in line with dietary recommendations, the environmental footprint of food systems would be significantly reduced”.¹⁰⁷

¹⁰¹ Figure calculated using the populations and percentages in the FAO's State of Food Security Report 2020.

¹⁰² [fao.org/3/ca9692en/ca9692en.pdf](https://www.fao.org/3/ca9692en/ca9692en.pdf) (However, it does not include people living in the EU whose countries are not individual members of the G20—i.e. Spain).

¹⁰³ [fao.org/3/ca9692en/online/ca9692en.html#chapter-a2_1](https://www.fao.org/3/ca9692en/online/ca9692en.html#chapter-a2_1)

¹⁰⁴ [thelancet.com/journals/langlo/article/PIIS2214-109X\(19\)30447-4/fulltext#supplementaryMaterial](https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(19)30447-4/fulltext#supplementaryMaterial)

¹⁰⁵ [fao.org/3/ca9692en/ca9692en.pdf](https://www.fao.org/3/ca9692en/ca9692en.pdf), p. 101

¹⁰⁶ [fao.org/3/ca9692en/ca9692en.pdf](https://www.fao.org/3/ca9692en/ca9692en.pdf), p. 101

¹⁰⁷ [fao.org/3/ca9692en/ca9692en.pdf](https://www.fao.org/3/ca9692en/ca9692en.pdf), p. 109

¹⁰⁷ ec.europa.eu/food/system/files/2020-05/fzf_action-plan_2020_strategy-info_en.pdf

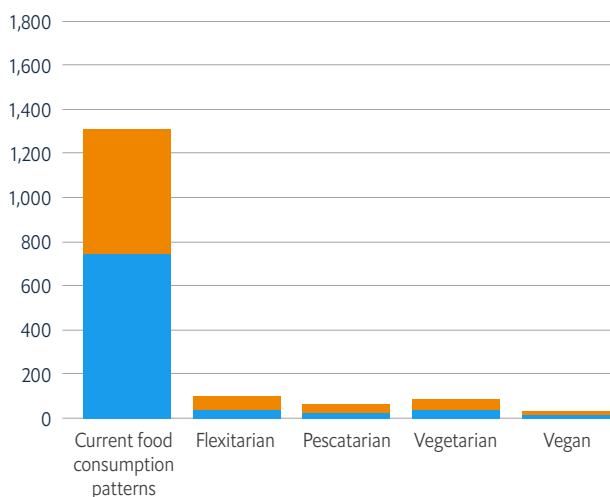
Cutting costs with alternative healthy dietary patterns



Global diet-related health costs

Cost in US\$ bn

■ Direct ■ Indirect



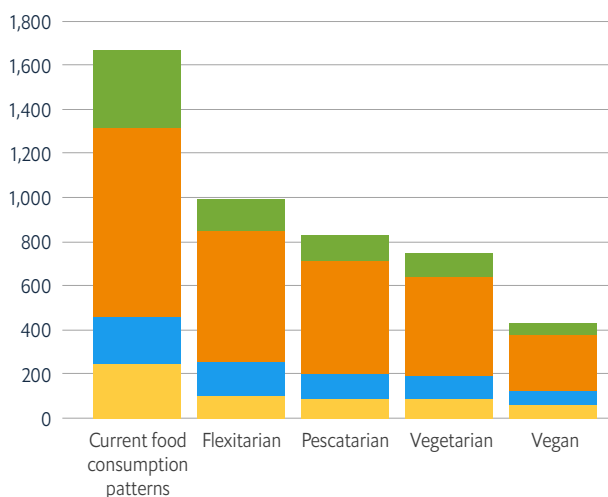
Note: The global estimate considers 157 countries. Direct costs include direct medical and healthcare costs associated with treating a specific disease. Indirect costs include loss of productivity per working days and the costs of informal care associated with a specific disease. Health costs refer to four diet-related diseases included in the analysis: coronary heart disease, stroke, cancer and type-2 diabetes mellitus.

Source: FAO¹⁰⁸; BMJ 2020¹⁰⁹

Global social costs of GHG emissions

Cost in US\$ bn

■ High-income countries ■ Upper-middle-income countries
 ■ Lower-middle-income countries ■ Low-income countries



The Covid-19 pandemic has brought an extra layer of complexity to this debate. It is too early to discern with any confidence what the short- and long-term effects on the pandemic on global diets will be. Its initial phase resulted in short-term spikes in prices for some food products as supply chains were disrupted, but these were restored relatively quickly. But prolonged loss of income as a result of labour market distress has the potential to undo recent progress towards reducing the number of people unable to afford a healthy diet. Getting this right will be a crucial component of Action Track 1 of the UNFSS, of “ensuring access to safe and nutritious food for all”. UNICEF has

anticipated that an increase in child malnutrition, exacerbated by the pandemic, would result in more than 10,000 additional child deaths per month.¹¹⁰

The pandemic was exacerbated by what Walter C. Willett, professor of epidemiology and nutrition at Harvard University, describes as “the dismal status of the metabolic state of Americans, and generally people across the world”. He notes that clinical illness is caused by the virus itself, but “the prevalence of diseases like diabetes and obesity make people much more vulnerable. We could have prevented a lot of deaths if societies had been in a better metabolic state.”

108 [fao.org/3/ca9692en/ca9692en.pdf](https://www.fao.org/3/ca9692en/ca9692en.pdf)109 [bmj.com/content/370/bmj.m2322](https://www.bmj.com/content/370/bmj.m2322)110 [unicef.org/press-releases/unicef-additional-67-million-children-under-5-could-suffer-wasting-year-due-covid-19](https://www.unicef.org/press-releases/unicef-additional-67-million-children-under-5-could-suffer-wasting-year-due-covid-19)

Summary of results:

Japan, France, the UK, Australia and Canada are among the top-performing G20 countries in the nutritional challenges pillar. They all enjoy high scores for life quality, doing particularly well in terms of maintaining low levels of malnourishment and micronutrient deficiencies. They also perform well on life expectancy, but overnourishment and insufficient physical activity are issues that most of these high-performing countries face.

A healthy and sustainable diet is affordable in all five countries, but diet compositions can be improved. Countries performing less well on this pillar include India, Indonesia and South Africa, which, despite having adequate iodine intakes and healthy eating programmes and dietary guidelines in place, still have gains to be made when it comes to prevalence of malnourishment, micronutrient deficiency, life expectancy, and affordability of a healthy and sustainable diet.



Nutritional challenges

	Argentina	
	Australia	
	Brazil	
	Canada	
	China	
	France	
	Germany	
	India	
	Indonesia	
	Italy	
	Japan	
	Mexico	
	Russia	
	Saudi Arabia	
	South Africa	
	South Korea	
	Turkey	
	UK	
	US	

Source: Economist Intelligence Unit, Food Sustainability Index 2021

What should we eat?

Although there is a consensus that more people eating higher-quality diets would have positive effects on the health of society and the planet, there is less agreement on what constitutes an acceptable and sustainable diet for G20 populations. The “planetary health diet” is one attempt to settle this debate. In 2019 the EAT-Lancet Commission, a group of 37 scientists from 16 countries, devised a standard for what people should eat to meet their own needs and remain within the planet’s environmental limits. The applicability of such a diet is limited given the cultural diversity of diets globally. For the majority of people living in the G20, particularly in the higher-income countries, the planetary health diet necessitates an increase in consumption of fruit and vegetables, whole grains and nuts, and a fall in consumption of red meat, refined products and sugar.¹¹¹ That said, undernourishment remains an issue in some, albeit few, G20 countries, and in these instances, recommendations vary. The Mediterranean Diet and the New Nordic Diet have also been referred to as territorial diets—diets linked with specific geographical resources, cultures and ecologies—with health and sustainability benefits.¹¹²

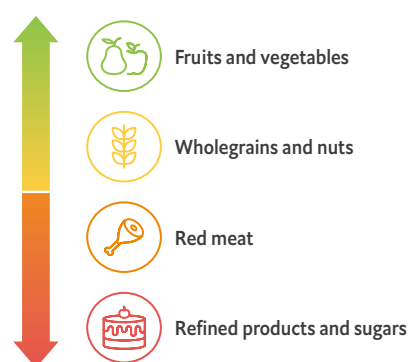
Adopting healthy and sustainable diets like the planetary health diet correlates with eating large amounts of fruit and vegetables. The WHO/FAO recommended minimum intake is 400g of fruit and

¹¹¹ [thelancet.com/journals/lancet/article/PIIS0140-6736\(18\)33179-9/fulltext?utm_campaign=tlead9&utm_source=hub_page;foodsustainability.eiu.com/lancet-report/](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(18)33179-9/fulltext?utm_campaign=tlead9&utm_source=hub_page;foodsustainability.eiu.com/lancet-report/)

¹¹² [fao.org/3/ca6640en/ca6640en.pdf](https://www.fao.org/3/ca6640en/ca6640en.pdf)

vegetables per person per day.¹¹³ The FSI measures consumption using supply data as a proxy for consumption - more national data is needed to improve consumption estimates. China (1.3kg per person per day) and Turkey (1kg) fare best in the FSI, well above the G20 average of 525g/day. Those at the bottom end include South Africa (171g) and Indonesia (303g). Meat consumption levels—again measured by looking at supply as a proxy—are also suggestive of which G20 countries are more aligned with environmentally sustainable diets. Here, meat consumption is led by the US where supply is 247g per person per day more than the recommended consumption quantity, followed by Argentina (229g) and Australia (220g).¹¹⁴ Rankings are clearly distinguished between advanced economies and emerging markets, but also by cultural preference. For Turkey and Saudi Arabia the average supply above the suggested consumption quantity is just 18g and 35g per head per day, respectively.

Adopting a planetary health diet



This holds for the majority of people living in the G20 countries.

From a global perspective, our findings on the US are probably of greatest concern. Shifting US eating habits closer to the planetary health diet would extend life expectancies, cut the incidence of non-communicable diseases, and reduce the pressure on water resources. The country's large population eats the most meat

(on a per-head basis) and the highest proportion of sugar, scores poorly on physical activity and levels of childhood obesity, and has by far the highest dietary water footprint. "Even before the coronavirus pandemic, the US has already been suffering from a pandemic: the obesity pandemic", says Barbara Schneeman, professor emerita at University of California, Davis, and former director of the Office of Nutrition, Labeling, and Dietary Supplements in the Center for Food Safety and Applied Nutrition at the US Food and Drug Administration (FDA).

Are people advised to eat the right things?

The healthy eating recommendations issued by the EAT-Lancet Commission are not the first time that scientists and policymakers have tried to influence what people eat. All of the G20 governments have food-based dietary guidelines (FBDGs) in place, and three-quarters of them have updated these in the past five years. FBDGs are a vital source of public information on what nutritionists recommend we eat. They are "intended to establish a basis for public food and nutrition, health and agricultural policies and nutrition education programmes to foster healthy eating habits and lifestyles".¹¹⁵

However, efforts to amplify and promote FBDGs often fall short, resulting in a mismatch between how they should be used and how they are actually used. Amanda Lee, professor in Public Health Policy at The University of Queensland, says that this is where the planetary health diet stood out. "Many people know about it because significant resources were invested into effective publicity ... and this shows what is needed to get the message out there."

Professor Schneeman, who chaired the 2020 Dietary Guidelines Advisory Committee in the US, claims that FBDGs are particularly powerful in the educational system, where school lunch guidelines can be tailored based on evidence-based recommendations. The US, which is ranked 19th out of the G20 countries for

¹¹³ fao.org/3/cb2395en/CB2395EN.pdf; eatforum.org/content/uploads/2019/07/EAT-Lancet_Commission_Summary_Report.pdf;

euro.who.int/en/health-topics/disease-prevention/nutrition/activities/technical-support-to-member-states/promoting-fruit-and-vegetable-consumption

¹¹⁴ The recommended intake for meat is defined as 90g per head per day; pubmed.ncbi.nlm.nih.gov/17868818/

¹¹⁵ fao.org/nutrition/education/food-dietary-guidelines/en/



dietary patterns in the FSI, needs to focus more on these overall eating patterns rather than individual foods, acknowledges Professor Schneeman. There is underconsumption of vegetables, fruits, wholegrains and dairy in the US, coupled with overconsumption for refined grains and added sugars. Individual choice plays an important role in this pattern, she says, and a shift towards healthier choices is emerging. “Though taste, cost and convenience are always part of the equation, health and wellness are a growing concern for consumers. Food industry players are masters of taste, cost, and convenience, so the question now is how they will link in with health and wellness.”

One way to improve consumer education, and also align the food industry with healthier dietary patterns, is the introduction of nutrition labelling. “Using labelling to help consumers understand how a food product can fit into dietary patterns will be important for the future”, states Professor Schneeman.

In the UK, which is ranked among the highest in the FSI’s subcategory on policy response to dietary patterns, national guidelines recommend the amount of each of five food groups that should be eaten daily. But where the UK really excels is in these recommendations taking into account the sustainability of the planet.¹¹⁶ Only three other sets of guidelines issued by G20 governments (Australia,

France and Italy) take account of the effects of human diets on the environment. Five countries—Brazil, Indonesia, Mexico, Saudi Arabia and South Africa—received the bottom score in this category, reflecting the lack of recent updates to their FBDGs and their failure to incorporate sustainability. Yet none of the countries’ FBDGs are as strong as they could be. A recent study of FBDGs in 85 countries published in the British Medical Journal found that most were not compatible with a set of six global health and environmental targets, including those set by the Paris Agreement and others associated with biodiversity, land and freshwater use, nitrogen and phosphorus pollution, and the SDG of cutting premature deaths from non-communicable diseases by one-third.¹¹⁷

More specifically, if governments were able to ensure that their populations met the recommendations of the FBDGs, the study estimated that premature mortality would fall by 15% and that food-related GHG emissions would decline by 13% (there was no overall effect on demand for freshwater.)¹¹⁸ This is progress of sorts, but is nowhere near enough. The same study modelled the adoption of FBDGs against Paris Agreement targets and found that projected food-related GHG emissions would exceed those permitted under the Agreement by an average of 140%. Only nine of the 85 FBDGs fulfilled four of the targets, and only two met all six.

116 nhs.uk/live-well/eat-well/the-eatwell-guide/

117 [bmj.com/content/bmj/370/bmj.m2322.full.pdf](https://www.bmj.com/content/bmj/370/bmj.m2322.full.pdf)

118 [bmj.com/content/bmj/370/bmj.m2322.full.pdf](https://www.bmj.com/content/bmj/370/bmj.m2322.full.pdf)

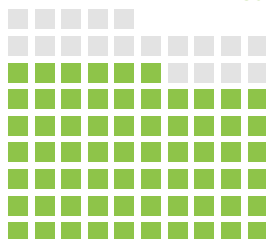
Alignment of FBDGs with health and environmental goals

An assessment of 85 national FBDGs

Proportion of 85 country FBDGs in line with or met the target for:

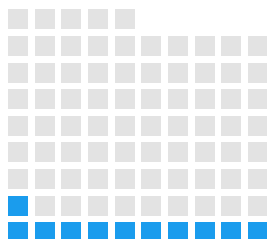
Non-communicable diseases of reducing premature mortality from such diseases by a third

56



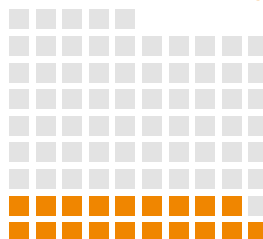
Food-related emissions pathway of limiting global warming to below 2°C in line with the Paris Agreement

11



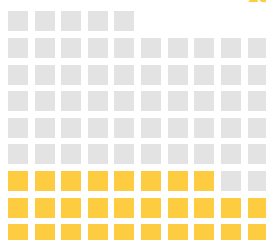
Global land use

19



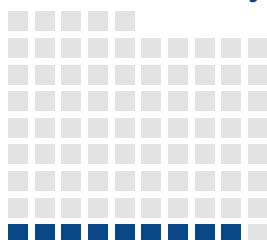
Freshwater

28



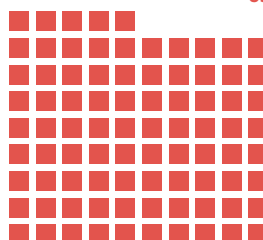
Nitrogen

9



Phosphorus

85



Source: BMJ¹¹⁹



Australia: Eating well for people and planet

Australia is one of only four G20 countries with national guidelines on healthy eating that take into account environmental sustainability. Its FBDGs are outlined in the Australian Dietary Guidelines, developed by the National Health and Medical Research Council and published in 2013.¹²⁰ The Guidelines provide recommendations for how to maintain good health and reduce the risks of chronic health problems across all age groups. Crucially, the appendices state that the aim of the FBDGs is to “encourage people to review their dietary patterns with a primary focus on improving their health, while allowing them to consider ways to reduce environmental consequences”.¹²¹

On sustainability specifically, the document recommends: avoiding over-consumption; reducing food waste by ensuring appropriate product storage; consuming locally grown and seasonal products; focusing on nutritional value (eating “imperfect” fruits and vegetables); and preparing meals in an energy-efficient way. The next step is to put these recommendations in a more prominent position within the Guidelines. An important lesson from Australia’s process, according to Professor Lee, chair of the Australia Dietary Guidelines Working Committee, is “getting sign-off on the scope of the guidelines and the inclusion of sustainability as a pillar early on, because otherwise, no matter how great a job you do, that aspect may end up being buried or excluded”.

¹¹⁹ [bmj.com/content/bmj/370/bmj.m2322.full.pdf](https://www.bmj.com/content/bmj/370/bmj.m2322.full.pdf)

¹²⁰ [health.gov.au/sites/default/files/australian-dietary-guidelines.pdf](https://www.health.gov.au/sites/default/files/australian-dietary-guidelines.pdf)

¹²¹ [health.gov.au/sites/default/files/australian-dietary-guidelines.pdf](https://www.health.gov.au/sites/default/files/australian-dietary-guidelines.pdf)

The affordability of a healthy and sustainable diet

Affordability will be a key part of the equation for Action Track 4 of the UNFSS to advance equitable livelihoods across the value chain and ensure that food systems do not exclude anyone.¹²² The challenge of shifting G20 populations to a healthy and sustainable diet is enormous, and a major barrier is affordability. The EAT-Lancet Commission itself has estimated that the planetary health diet is too expensive for 1.6bn people around the world.¹²³ The findings of the FSI are in agreement: a healthy diet costs almost 20% of daily per-head gross national income in India, the highest in the index (the average among all other countries is just under 5%). Partly because of the cost of eating healthily relative to income, India is by some distance the worst-performing country in the nutritional challenges sub-index. More than one in eight of its population is undernourished; a third of its under-fives are categorised as having stunted growth; and almost one-quarter of adults are underweight.

But the problem of affordability is not confined to India. Affordability is also an issue in Indonesia, Argentina and South Africa. Limited affordability ties closely to undernourishment, and in each of these countries the proportion of people not eating enough is more than 3%.¹²⁴ These economies also see a higher-than-average incidence of micronutrient deficiencies and stunting in children. Sheryl L. Hendriks at the University of Pretoria notes that for those on low incomes, price volatility in other essentials such as electricity can lead to big reductions in food budgets: “People have three main costs: transport, fuel and food. So when the fuel price rises they can only cut back on food.” For governments in these countries, the challenge is to identify the primary drivers of rising costs of nutritious foods—be it lower levels of productivity, weak and fragmented supply chains, inadequate access, changing consumer demand, or an uncondusive policy environment—and craft their responses accordingly.

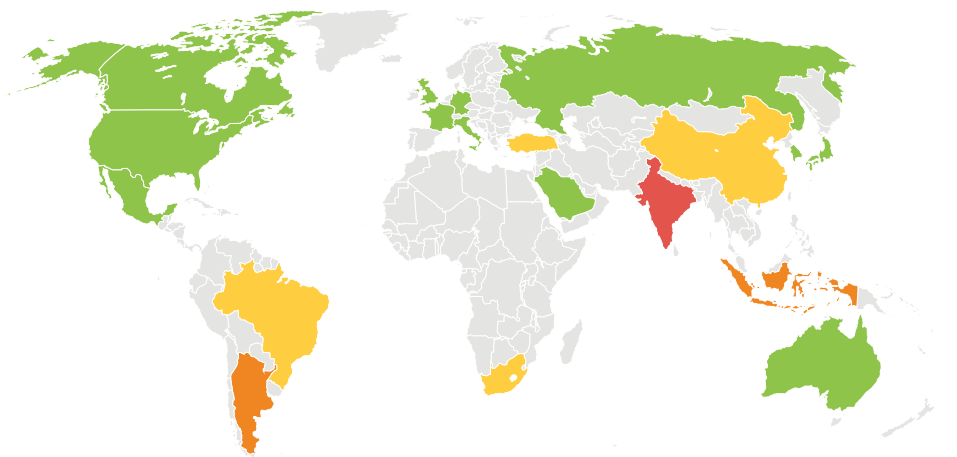
Affordability of a healthy and sustainable diet

The daily cost of the EAT-Lancet reference diet relative to daily per-head gross national income, 2011

Top performers

0.02	Australia
0.02	Canada
0.02	France
0.02	Germany
0.02	Italy
0.02	Saudi Arabia
0.02	UK
0.02	US
0.04	Russia
0.05	Japan
0.05	Mexico
0.05	South Korea
0.06	Brazil
0.06	Turkey
0.08	China
0.10	South Africa
0.11	Argentina
0.12	Indonesia
0.19	India

Bottom performers



Sources: Food Sustainability Index 2021; Hirvonen, K., Bai, Y., Headey, D. and Masters, W.A., 2019. Affordability of the EAT–Lancet reference diet: a global analysis. The Lancet Global Health

¹²² un.org/en/food-systems-summit/action-tracks

¹²³ A breakdown to estimate the number of people living in G20 countries for whom the diet is too expensive was not available.

¹²⁴ fao.org/3/ca9692en/ca9692en.pdf, figure 25

It is important to acknowledge that this task has been made more complicated by the Covid-19 pandemic. The pandemic has affected multiple elements of the right to food—a concept coined by the Committee on Economic, Social and Cultural Rights—which establishes that the right to food is realised based on food being available, accessible, adequate and sustainable.¹²⁵ The pandemic has reduced (or eliminated) income for hundreds of millions of people, impinging on their ability to buy the food that they want to eat, especially in countries where social safety nets are not comprehensive. It has also disrupted food supplies, through harvests not being completed, more food rotting owing to problems on transport networks, and imported shipments not arriving. This means that in some cases food price inflation has accelerated. Other sources of food have also been curtailed—for example, those children whose only complete meal of the day is provided by school had this nourishment denied when schools were closed on public health grounds.¹²⁶ Professor Hendriks paints a gloomy picture of the impact of the pandemic on diets in South Africa, especially for children. She believes that spending more time at home has meant more consumption of unhealthy food and less exercise—and at the same time, health clinics that might monitor children's nutrition and growth and provide dietary advice and monitor essential health indicators, such as blood sugar for diabetics, have been closed or overwhelmed.

Affordability is also important in the developed-market context. For example, in the US, “affordability is a key factor”, says Professor Schneeman, recalling the importance of taste, cost and convenience in food choices. Here, food processing can actually help by making foods more shelf-stable. Freezing or canning can preserve nutrients and taste, while also reducing cost and waste, she explains. Government

tax policy can be an effective lever, according to Professor Lee: “In Australia the most common reason people give for not eating a healthy diet is that it’s expensive. But we are one of the few countries with no goods and services tax on healthy foods, which actually makes a healthy diet less expensive than our current unhealthy diet. This suggests that, as well as choosing foods and drinks based on price or for health, people are choosing due to availability and convenience, and due to advertising and promotion.”

How to achieve transformational dietary change

Across the G20, but particularly among the group’s lower-income members, more urbanised and wealthier societies are generating greater demand for food. This trend is putting upward pressure on agricultural sectors to increase their output but without creating the demand-pull inflation that pushes up prices. It is at this point that governments can intervene to set a policy framework that encourages the supply of healthier foods.¹²⁷ This means incentives to encourage the growing of fruit and vegetables, nuts and seeds, legumes and grains, but also targeting this support at producers operating in areas capable of this cultivation without further depleting soil and water supplies. Measures could include:

- disseminating knowledge of green production methods to boost productivity;
- promoting urban agriculture and investments in storage, processing and transport to reduce losses between grower and consumer;
- food fortification;
- reviewing trade policies to strengthen the competitiveness of healthy foods; and
- studying the whole value chain to see where efficiencies can be improved.¹²⁸

¹²⁵ ohchr.org/En/Issues/ESCR/Pages/food.aspx

¹²⁶ unsctn.org/19?idnews=2040

¹²⁷ fao.org/3/ca9692en/ca9692en.pdf

¹²⁸ fao.org/3/ca9692en/ca9692en.pdf, pp. 143–151

Carrot



Public information campaigns to promote consumption of more nutritious foods



Shift subsidies for meat and dairy to fruit and vegetables, nuts and seeds and legumes



Stick



Regulations on food standards



Regulations on food advertising and marketing



Direct taxes on unhealthy products

Experts believe that the most effective way to encourage adoption of healthier diets is through a carrot-and-stick approach.¹²⁹ The “carrots” are strategies like public information campaigns to promote consumption of more nutritious foods. The UK government’s “5 A Day” campaign, which has been in place for almost two decades, is widely recognised and understood by the public. Academic research suggests that in its first four years of operation, it achieved a 10% increase in fruit and vegetable consumption.¹³⁰ Other carrots include subsidies for growers of healthy food. At present, Professor Willett of Harvard University points out that the US subsidises meat and dairy production, and advises that these subsidies should be shifted to fruit and vegetables, nuts, seeds and legumes.

The “sticks” include regulating food standards, advertising and marketing and, more recently, direct taxes on unhealthy products. Sugar taxes are especially in vogue at present, partly because of high-profile success in Mexico, which scores particularly poorly in the FSI for the proportion of sugar in the diet. The tax pushed up prices of these goods for consumers by around 10%, triggering a fall in sales of such products of around 7.5%, with a larger fall among low-income households. Encouragingly, sales of drinks that were not subject to the tax, such as bottled water, rose.¹³¹ However, sugar taxes themselves need to be carefully designed. According

to Professor Hendriks of the University of Pretoria, soft drink manufacturers are able to get around the country’s sugar tax by “substituting sucrose with cheaper sugars (such as fructose and high fructose corn syrup) and non-nutritive alternatives, that may be far worse for your health”. More effective policies are required in the G20: 15 countries continue to offer subsidies to sugar producers and only five countries have sugar taxes in place.

Given the scale of transformation required—the average American would have to reduce their red meat consumption by more than 80% and increase their consumption of nuts by 400% to comply with a healthy and sustainable diet—governments ought to consider the full range of policy levers at their disposal and to recruit as much support from civil society and industry as possible.¹³² At the soft end, for governments this means making available as much information about healthy eating as possible; at the hard end, it means restricting the availability of unhealthy products. For industry, the same spectrum runs from promoting healthier products within existing ranges to ending production of unhealthy goods. And for civil society, options vary from campaigning for healthy alternatives to turning the tide of public opinion against unhealthy goods.¹³³ As time progresses and the depletion of the planet’s resources continues, the need for stronger interventions will grow.

129 horizon.scienceblog.com/1269/qa-covid-19-pandemic-highlights-urgent-need-to-change-europes-food-system/

130 researchgate.net/publication/49656578_Five-a-day_a_price_to_pay_An_evaluation_of_the_UK_program_impact_accounting_for_market_forces

131 apps.who.int/iris/bitstream/handle/10665/260253/WHO-NMH-PND-16.5Rev.1-eng.pdf;jsessionid=1261548083B04C00DF5D8600E28CCDC1?sequence=1

132 [thelancet.com/action/showPdf?pii=S0140-6736%2818%2931788-4](https://www.thelancet.com/action/showPdf?pii=S0140-6736%2818%2931788-4), p. 460

133 [thelancet.com/action/showPdf?pii=S0140-6736%2818%2931788-4](https://www.thelancet.com/action/showPdf?pii=S0140-6736%2818%2931788-4), p. 478



Key action points to consider



Governments

- Make access to healthy and sustainable diets a policy priority by making use of recent analysis on the affordability of the planetary health diet for groups across the population.
- Review the FBDGs to ensure that recommended diets are sustainable for the planet and culturally acceptable, and invest in amplification plans to increase awareness and knowledge.
- Introduce and standardise nutrition labelling to help consumers make more informed choices.
- Redirect subsidies away from sugar and ultra-processed foods¹³⁴ and towards foods that are essential components of a healthy and sustainable diet, such as fruit and vegetables, nuts and seeds, wholegrain and low-glycemic cereals and legumes.



Business

- Re-evaluate products and services offered in the market to ensure that production and marketing are aligned with healthy and

sustainable food consumption patterns that sit within planetary boundaries.

- Broaden the portfolio of products offered to include a greater range of healthy and sustainable products and services.
- Embrace health, wellness and sustainability criteria in product offerings in addition to taste, cost and convenience.



Civil society

- Promote public information and education campaigns that make a clear link between diet and environmental depletion, create healthy and sustainable food environments, detail what a sustainable and healthy diet is in the specific context within which the campaign is operating in, and push for policies and accountability.
- Support regular research on affordability to ensure that governments make access to healthy and sustainable diets a policy priority. Push for policies to be up to date and reflective of current trends, particularly among lower-income households.

¹³⁴ Foods such as sausages and breakfast cereals that usually contain ingredients—often chemicals, colourings, sweeteners and preservatives—that would be unlikely to be added when cooking homemade food. [bbc.co.uk/food/articles/what_is_ultra-processed_food](https://www.bbc.co.uk/food/articles/what_is_ultra-processed_food)

RESILIENT FOOD SYSTEMS

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So far, our discussion of the FSI has focused on its three pillars. We have considered reducing the amount of food that is lost and wasted, lowering the impact of food production on the planet, and raising the nutritional content of the food we eat. Making substantial changes in these areas would improve the quality of lives of millions of people in the G20. However, following the disruption of the Covid-19 pandemic, we must also explore how to make our food systems more resilient. While the concept of resilience is not one of the pillars of the FSI, issues related to resilience are considered throughout its indicators. The issue of resilience also features in the fifth Action Track for the UNFSS, which focuses on building up the resilience of food systems to natural disasters, conflicts and pandemics.¹³⁵

In this chapter we adopt the definition of resilience introduced by the OECD and FAO, and used by the G20's agriculture ministers, which encompasses "the capacity to prevent, anticipate, adapt to and recover from shocks", as well as "the capacity to transform and rebuild better without compromising long-term prospects for sustainable development".¹³⁶ At a meeting in Rome in April 2021, the G20 deputy agriculture ministers settled on four policy directions to encourage resilience:

- redirecting distorting agricultural support so that farmers are not disincentivised to manage risks;
- building risk management policies to cope with catastrophic events;
- developing risk governance; and
- focusing on the overall policy environment, in areas such as water management and free trade.¹³⁷

In practical terms, this might mean taking a proactive approach to risks by: learning from previous shocks and developing stronger structures after such events enabling stakeholders to take responsibility for their own resilience; outlining clear governance so that all stakeholders are aware of their roles in the event of a crisis; and gathering as much accurate and reliable data as possible to guide decision-making.¹³⁸ Further details of the G20's response to the challenge posed to agricultural sectors by the pandemic will be made public after the ministers meet in Florence in September.¹³⁹

Withstanding shocks and building back better

The agricultural sector is dealing with two simultaneous problems, each with very different characteristics. The Covid-19 pandemic has been an acute shock. In its early days, it halted trade and supply chains, forcing governments and institutions to run down their stocks. Now, with stocks needing to be replenished, shortages are emerging. The FAO's food price inflation index reached its highest level in seven years in mid-2021.¹⁴⁰ Prior to the pandemic, long, efficient supply chains lowered the cost of food around the world, enabling more varied diets. While this has been a success story in recent decades, the pandemic has unmasked one major weakness: agri-food systems were too dependent on the smooth functioning of the global trading system.¹⁴¹ Meanwhile, climate change is more of a chronic condition that is steadily worsening, affecting an increasing number of agricultural workers. Without immediate action, more agricultural land will become unsuitable for growing crops, water resources will be diminished further, and livelihoods will be wrecked. One study has estimated

¹³⁵ un.org/en/food-systems-summit/action-tracks

¹³⁶ politicheagricole.it/flex/cm/pages/ServeAttachment.php/L/IT/D/6%252F6%252Fd%252FD.79b58bc4a11f7a50b3a5/P/BLOB%3AID%3D16825/E/pdf

¹³⁷ politicheagricole.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/16825

¹³⁸ politicheagricole.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/16825

¹³⁹ politicheagricole.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/16569

¹⁴⁰ fao.org/worldfoodsituation/foodpricesindex/en/

¹⁴¹ nytimes.com/2021/03/31/opinion/suez-canal-container-ship.html

that, across an average of climatic scenarios, 175m people could lose access to food by 2050 because of the impact of climate change on water availability.¹⁴²

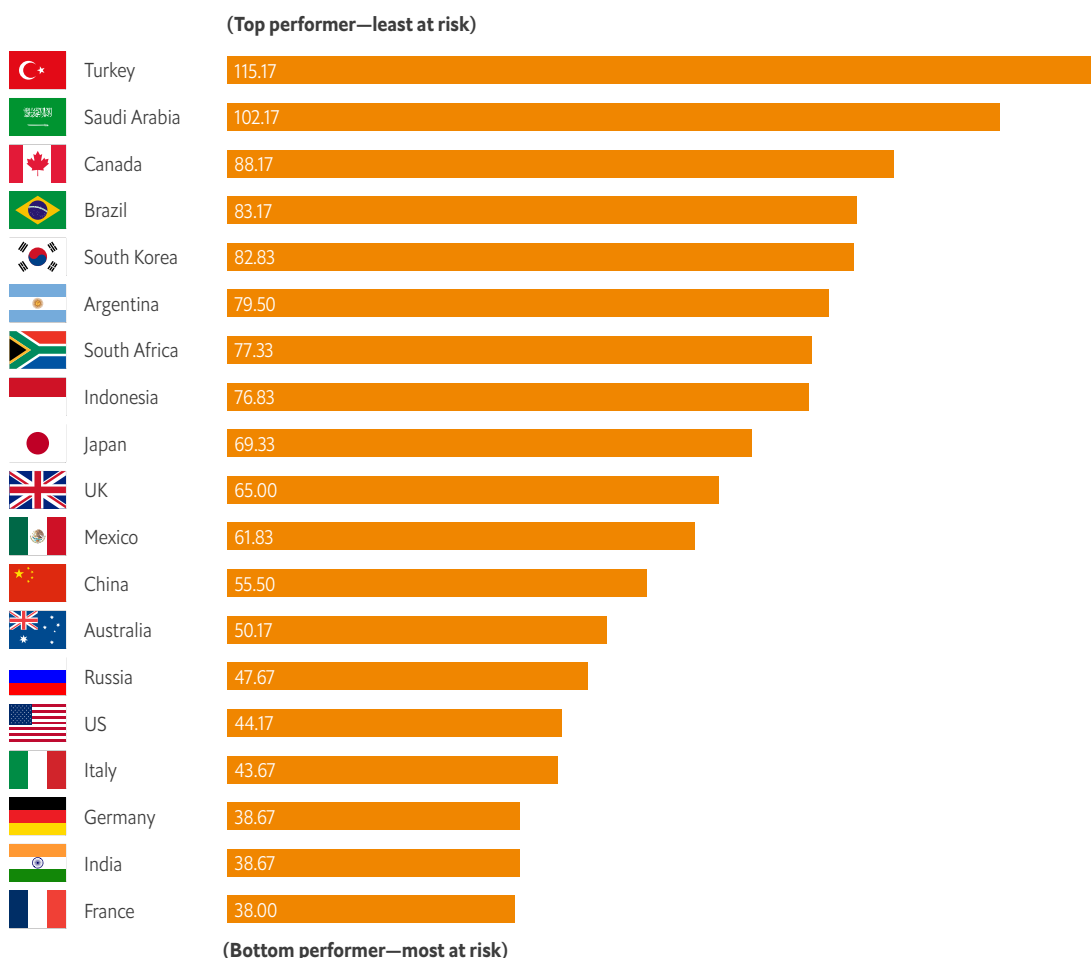
As with the Covid-19 pandemic, no country is immune to the impending climate crisis, although some are more exposed than others. Therefore, the FSI takes account of a country's vulnerability to extreme weather events, which scientists believe are occurring more frequently because of climate change. According to Germanwatch's Global Climate Risk Index, which takes into account factors such

as climatic conditions and physical geography, the countries with the least risk include Saudi Arabia, Brazil and Turkey, while Japan, India and the US are assessed as particularly vulnerable.

When thinking about how to rebuild and strengthen agricultural sectors in the post-pandemic world, governments will need to consider not only how supply chains can be made more durable to sudden shocks, but also how they can be adapted to cope in a hotter world with more people but fewer natural resources.

Climate risk

Level of exposure and vulnerability to extreme weather events, 1999-2018



Source: Food Sustainability Index 2021; Climate Risk Index 2020¹⁴³

142 [sciencedirect.com/science/article/pii/S0959378018307489](https://www.sciencedirect.com/science/article/pii/S0959378018307489)

143 [germanwatch.org/sites/germanwatch.org/files/Global%20Climate%20Risk%20Index%202021_1.pdf](https://www.germanwatch.org/sites/germanwatch.org/files/Global%20Climate%20Risk%20Index%202021_1.pdf)

Trade dependence and crop diversity: A dichotomy

The FSI contains several proxies for the current level of resilience of agricultural sectors to crises. These include the size of domestic agricultural output relative to total agricultural imports (to reflect the reliance of an economy on trade), and the share of total agricultural output represented by the three crops grown most abundantly (to illustrate local agricultural diversity). It is difficult for any economy to perform strongly across both measures. The intensification of global agriculture in recent decades has encouraged producers to focus on those crops where they have comparative advantage and to trade surpluses in world markets.¹⁴⁴ For example, an OECD study has shown that more than two-thirds of total beef and wheat exports come from the five largest exporting countries.¹⁴⁵ Among the consequences of this trend is that large producers are likely to be less diverse, and more diverse producers to be more reliant on imports.

Accordingly, the G20 economy with the largest domestic output relative to imports is Canada, which produces food equivalent to more than 150% of its imports; however, it is average when it comes to the diversity of its crops. The country where the main crops represent the smallest share of total output is China (at 33%), but its domestic output relative to import ratio is towards the bottom of the rankings. Saudi Arabia also has to import the vast majority of its food, but its local produce is fairly diverse, while Australia is an even more extreme version of Canada in that it produces enormous amounts of a small number of crops. The UK is the only country in the bottom quartile for both measures.

The pandemic is challenging existing thought on supply chains

The Covid-19 pandemic has been challenging for agricultural sectors across the G20, but the nature of the challenge has been different for emerging markets and advanced economies. For the former, agricultural production is typically more labour-intensive. This means that the availability of workers is crucial across the supply chain. Major outbreaks of Covid-19 among farmers in these economies “could not only compromise every step in the production process, but also jeopardise their food security”, according to the FAO.¹⁴⁶

But for the majority of the G20 countries, agriculture is not conducted on a subsistence basis, but on a large, mechanised and industrial level.¹⁴⁷ Rather than the continued availability of labour, agricultural sectors in these countries rely on the ongoing supply of fixed capital and intermediate inputs. As the FAO notes, disruption to domestic and international transport systems and delays at customs are likely to prove more critical, especially where the globalisation of agriculture has encouraged inputs such as fertiliser, fuel and machine parts to be ordered and shipped on an efficient, “just-in-time” basis.¹⁴⁸

Since the pandemic began, G20 governments have become more aware of the limitations of globalised agriculture and its complicated supply chains that snake around the world. In February 2021 the US president, Joe Biden, signed an executive order requesting research on how US supply chains could be strengthened against not just pandemics, but also cyberattacks, extreme weather, terrorist attacks, and stiffer geopolitical competition. Inevitably, this means a focus on doing more at home. Finance

¹⁴⁴ oecd.org/agriculture/understanding-the-global-food-system/how-we-feed-the-world-today/

¹⁴⁵ oecd.org/agriculture/understanding-the-global-food-system/how-we-feed-the-world-today/

¹⁴⁶ fao.org/3/ca8430en/CA8430EN.pdf, p. 29

¹⁴⁷ oecd.org/agriculture/understanding-the-global-food-system/how-we-feed-the-world-today/

¹⁴⁸ fao.org/3/ca8430en/CA8430EN.pdf, p. 28

will play an important role in supporting resilient supply chains; “enhancing access to financing” is among the possible policy recommendations cited in the executive order. Part of Mr Biden’s rationale is that greater domestic output will bolster domestic manufacturing industries and create jobs.¹⁴⁹

Even prior to the pandemic, there was governmental interest in promoting shorter supply chains. The EU’s overarching agricultural strategy, the Farm to Fork Strategy (referred to in the nutritional challenges chapter), aims for a greater proportion of locally produced food, not just to ensure more resilient supply, but also to cut the emissions generated by hauling food long distances and because of stronger emerging consumer preferences.¹⁵⁰ A greater value being applied to the nutritional content of food means that consumers want to know more about where their food is grown and under what conditions. This information is impossible to know with any certainty if supply chains are long and complex. And it is possible that local production could benefit from a positive feedback loop once the pandemic is over. If supermarkets had empty shelves but local fruit and vegetable markets maintained their stocks during lockdowns, consumers may reward local growers with repeat business.

However, we should not become too misty-eyed about the potential of local produce to displace just-in-time global supply chains. A 2020 study published in *Nature* assessed the potential minimum distance between food production and consumption for six staple crops, including rice, maize and pulses.¹⁵¹ It found that, at best, only one-quarter of the world’s population could fulfil their demand for the crops within a 100-km radius. The research argued that there could be benefits towards greater local production in some emerging markets, but was emphatic in its conclusion that global supply chains

are required for maintaining adequate food supply. Dr Robert Paarlberg of Harvard Kennedy School concurs: “If the US had somehow gone back to a more localised food system before the pandemic it would not have improved dietary health. If the US had terminated all food imports, eating fruit and vegetables and fish would have become too expensive. It would have been a dietary disaster.”

Likewise, the OECD has concluded that existing food supply chains proved to be remarkably robust during the early days of the pandemic. It attributes this success to: the existence of stocks of staples held along supply chains that were drawn down; the flexibility of labour markets that enabled suppliers to increase production quickly; previous investments in making supply chains more visible so that new sources could be found easily; and lessons learned from previous shocks, such as natural disasters.¹⁵² The OECD believes that the biggest areas of vulnerability on the supply side that have been revealed by the pandemic are the labour intensity of harvesting fruit and vegetables and processing meat, and our over-reliance on air transport to ship perishable goods.¹⁵³ It recommends reforms to our existing systems, rather than overhauling them entirely in favour of a local-first approach.

Climate change adaptation: Preparing for the next crisis

If there is any benefit to shocks, it is that they create opportunities to strengthen. The pandemic has put government budgets under extreme pressure. Some G20 members, such as Indonesia, were forced to amend existing budgetary rules to enable governments to spend as extensively as they needed to in order to combat the disease. In the coming years more attention will be paid to narrowing budget deficits, yet we do not expect

¹⁴⁹ [whitehouse.gov/briefing-room/presidential-actions/2021/02/24/executive-order-on-americas-supply-chains/](https://www.whitehouse.gov/briefing-room/presidential-actions/2021/02/24/executive-order-on-americas-supply-chains/)

¹⁵⁰ ec.europa.eu/food/system/files/2020-05/fzf_action-plan_2020_strategy-info_en.pdf

¹⁵¹ [nature.com/articles/s43016-020-0060-7](https://www.nature.com/articles/s43016-020-0060-7)

¹⁵² oecd.org/coronavirus/policy-responses/food-supply-chains-and-covid-19-impacts-and-policy-lessons-71b57aea/, section 2

¹⁵³ oecd.org/coronavirus/policy-responses/food-supply-chains-and-covid-19-impacts-and-policy-lessons-71b57aea/, section 3



this to result in a rush towards austerity measures. This will create opportunities for governments to reorient their spending priorities.¹⁵⁴

The pandemic has ushered in a new consensus on the role of government in the economy. In the US, for example, President Biden is aiming to follow up the country's US\$1.9trn pandemic stimulus package with two more bills, one centred on infrastructure and the other on education, worth a combined US\$3trn.¹⁵⁵ Among the aims that cut across both packages is a need to bolster green technology and reduce the US's emissions, while also providing the education and training required to build a workforce that can thrive in a warming world. More governments are likely to follow suit, albeit on a less ambitious scale, given the opportunity of very low interest rates and the pandemic-driven need for higher spending to support economies. In this respect the pandemic has opened up a window to reconsider how to approach the challenge of climate change.

Some agricultural regions within the G20 have already been forced to confront the effects of a warming planet on their operations and make plans to adapt. For example, researchers at MIT have identified the Mediterranean Basin, which includes G20 members France, Italy and Turkey, as the region in the world

that will see the greatest decline in future rainfall as a result of climate change.¹⁵⁶ Meanwhile in India, studies have shown that total rainfall has remained fairly constant over the past 40 years, but the number of rainy days has fallen and the onset of the monsoon now tends to be later in the year.¹⁵⁷ These changing conditions have compelled farmers to grow less rice and maize and more millet in order to maintain yield.

Across the G20, agricultural workers will be forced to make similar choices in the coming years. However, the FAO is conscious that climate change should not result in further homogeneity of agriculture.¹⁵⁸ Already, two-thirds of global crop production comes from just nine species, and 97% of meat production from eight species.¹⁵⁹ A headlong rush into global production of the same small number of heat-resistant crops, for example, would weaken biodiversity and thus create a new source of vulnerability. As G. V. Ramanjaneyulu of India's Centre for Sustainable Agriculture notes as regards a dramatic reduction in the number of rice varieties grown in India, "if there is a pest outbreak in one area it rapidly spreads across the country due to monoculture of varieties." Instead, the FAO assistant director-general in its Agriculture and Consumer Protection Department, Bukar Tijani, believes that "farmers

¹⁵⁴ [bloomberg.com/news/articles/2021-04-29/indonesia-s-budget-deficit-to-reach-as-high-as-4-85-next-year](https://www.bloomberg.com/news/articles/2021-04-29/indonesia-s-budget-deficit-to-reach-as-high-as-4-85-next-year)

¹⁵⁵ [nytimes.com/2021/03/22/business/biden-infrastructure-spending.html](https://www.nytimes.com/2021/03/22/business/biden-infrastructure-spending.html)

¹⁵⁶ news.mit.edu/2020/why-mediterranean-climate-change-hotspot-0617

¹⁵⁷ wri.org/insights/what-farmers-need-survive-changing-climate-transformative-adaptation

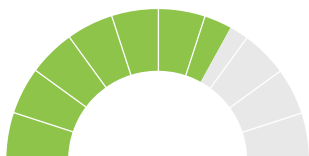
¹⁵⁸ fao.org/news/story/en/item/1250890/icode/

¹⁵⁹ fao.org/3/cb1785en/cb1785en.pdf, p. 7

Limited diversity in food production

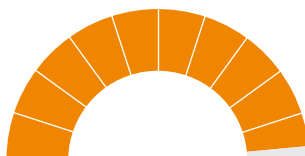
66%

of global crop production from 9 crops



97%

of meat from 8 species

Source: FAO¹⁶⁰

must grow the most genetically diverse set of crops and varieties that are suited to their agroecologies, production systems and end-users' preferences."¹⁶¹

Preserving local varieties of crops means embracing the range of emerging technologies to make agriculture more resilient. These include robots and sensors to monitor and manage soil and water quality, GPS imagery, and more sophisticated long-term climate forecasting.^{162,163} According to Robert Paarlberg of Harvard Kennedy School, in the US, "the use of all agricultural inputs, including pesticides and fertilisers, will become increasingly precise. Farmers will save money, use fewer inputs and fewer will fall out in the environment."

But introducing new technology requires a predictable policy environment—something that Eugenia Serova of the HSE University believes is holding back Russia: "Policy is so changeable that companies can only plan three years ahead, but it takes at least ten years to plan new technology, prepare the land and train workers." It also requires financing, and the FSI shows a spread in the opportunities for firms and funds to invest in sustainable agriculture. Around

half of G20 members have national strategies for sustainable agriculture that incorporate specific measures to promote private-sector investment, according to the FSI. In South Korea the government unveiled funding for digital agriculture earlier in 2021, with the goal of incorporating more drones and autonomous vehicles into crop production.

But not all of the measures need to be at the forefront of our technological capability. According to the FAO, only 16% of the world's cropland is irrigated, yet even a simple flood irrigation system, where water from streams and rivers is allowed to wash over crops, doubles the average yield of a field fed only by precipitation.^{164,165} More advanced systems, which are drip-fed according to soil conditions, are capable of much more efficient outcomes, but at greater cost. Mexico is typical among emerging markets. According to Bram Govaerts, director of the International Maize and Wheat Improvement Center, "There's a lot of irrigated agriculture, but the systems are not all that efficient. Incentives need to be put in place for this to happen." In conclusion, using what water supplies we have efficiently should form one of the main planks of our adaptation measures against climate change.

¹⁶⁰ fao.org/3/CA3129EN/CA3129EN.pdf

¹⁶¹ fao.org/news/story/en/item/1250890/icode/

¹⁶² nifa.usda.gov/topic/agriculture-technology

¹⁶³ med-gold.eu/project/#description

¹⁶⁴ fao.org/3/x0262e/x0262e01.htm

¹⁶⁵ worldbank.org/en/topic/water-in-agriculture

CONCLUSION

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The findings of the FSI show that **progress** is being made across the three pillars towards more sustainable food systems. However, the pandemic has demonstrated that these **improvements are fragile**. Even the countries leading the way on the FSI (Canada, Japan, Australia, Germany and France) still have much to do to improve the sustainability of their food systems. There are steps that can be taken by governments, industry and civil society that can protect the measures already taken and ensure that momentum continues to build towards the SDG deadline of 2030.

For **G20 governments**, investing in ways to **measure food loss and waste**, including commissioning third-party experts, would help to focus efforts on the reduction of food waste at the consumer level and make farming sectors more **efficient**. Directing **investment** towards the points where food supply chains were subjected to the greatest stress during the acute phase of the pandemic would help to build **resilience**, as would considering how imports of goods contribute to risk factors such as **deforestation**. Upgrading food **labelling** to show the **environmental cost** of each product, and reviewing **FBDGs** to incorporate **sustainability** would empower consumers to make purchasing decisions that bring the planet's needs more into alignment with their own, as well as inform the

behaviour of a number of other actors including those directing **school food programmes**.

For business, the risk that **environmental crises** hold for them must be considered and they must make sure they are meeting key sustainability indicators to reduce that risk. Steps such as sourcing products and inputs from countries committed to maintaining **biodiversity**, aligning production and marketing with healthy and sustainable food consumption patterns, and embracing **health, wellness and sustainability** criteria in product offerings, all carry extra costs and the potential loss of competitiveness. Eventually, sustainability will become a crucial factor for many more consumers, and being ahead of the game could bring **reputational advantages**.

For joined-up thinking, countries need to **break down their siloed thinking** and take a **system-level approach** to achieving the **SDGs**. By looking at food systems holistically, faster and much-needed progress can be made. The **UNFSS**, which has this system-level approach at its heart, is a good place to start. The G20 has an opportunity to lead the way in making food systems more sustainable. However, it must make sure that it does not just make commitments, but takes action, and ensures that **everyone has a seat at the table**.