



Food labelling can help consumers to make healthier food choices.

IAN WALDIE/BLOOMBERG VIA GETTY

Changing diets at scale

Researchers are working out how to achieve a widespread change in eating behaviour. **By Benjamin Plackett**

If everyone ate a balanced diet featuring more plant-based and sustainable animal-sourced food, up to eight billion tonnes of carbon dioxide emissions might be avoided globally each year by 2050, according to the 2019 special report on climate change and land by the Intergovernmental Panel on Climate Change (IPCC).

Modifying diet on a global scale is a major opportunity to combat climate change, argues the report.

Naoko Ishii, an economist at the University of Tokyo's Institute for Future Initiatives, agrees. "One of the biggest risk factors for the planet's health is our food system," she says. "The way we eat needs to change."

That opinion might be gaining widespread

acceptance, but scientists don't know how to bring about the reforms needed, on the scale required.

Much of the world's population, even in relatively rich nations, cannot afford the kind of sustainable plant-based diet that scientists favour. As the IPCC special report notes, mitigating climate change through dietary modification relies on consumers altering their choices and preferences. These, in turn, are guided by "social, cultural, environmental and traditional factors, as well as income growth", the report says, all of which are hard to shift.

Studies on which levers for changing food behaviours work best are surprisingly scant. Most research concentrates on richer and Western countries, which is where the majority

of behavioural changes are needed. By comparison, data on what needs to happen in poorer and subsistence-farming communities are almost non-existent. Because the food behaviours of these communities are thought to be much more sustainable than those of industrialized economies, the focus for these societies is less on pushing urgent changes and more on managing social changes to ensure unsustainable behaviours aren't introduced.

The IPCC report lists school food procurement, health-insurance initiatives and public-awareness campaigns as examples of policies that can potentially change demand. But research to quantify the effects of various interventions, such as taxes, labelling or changing in-store food displays, suggests that

achieving behavioural change is not straightforward. The interactions between the factors that determine food production and consumption are complex, and the risk of unintended consequences from interventions can't be ignored.

According to the World Health Organization, a sustainable diet means a large proportion of the global population, particularly in wealthy countries, will need to eat fewer processed foods and reduce waste (see 'Waste not, want not'). Food producers around the world will also need to cut down on plastic packaging and use fewer antibiotics and hormones in livestock.

One 2019 review¹ concluded that a sustainable diet would budget for just 14 grams of red meat per day, which is roughly one steak per person, per month. Data from the Organisation for Economic Co-operation and Development (OECD) show that achieving such goals will be a more daunting task in some countries than in others. For example, Argentinians eat an average of 106.7g of red meat per day, whereas Nigerians consume just 8.3g.

"It's not about being anti-meat, it's just that the ratio of meat to plant-based food is off-kilter for a lot of us," says Mark Lawrence, a public-health economist at Deakin University in Burwood, Australia. "It's also about being better with what we have. Up to a third of food is wasted and that's terrible given the environmental cost of making it."

Cash is king

The data consistently show that one of the best ways to influence food behaviour is through price. If sustainable food were reliably cheaper than environmentally damaging products, market forces could often take care of the problem. But achieving that is no small task – sustainable food is often considerably more expensive than its conventional rival products.

One study² estimated that the cost of a sustainable weekly food basket in Australia is up to 30% more than that of a standard one. That's partly because sustainable practices often carry additional expenses. For example, reducing antibiotic use in animal husbandry means that welfare standards need to improve to keep infections low. That doesn't come cheap, and the cost is passed down the supply chain.

Once a customer becomes accustomed to a price point, it can be tough to convince them to pay more. A survey of 600 city dwellers in Poland³ found that higher prices were the main barrier to them making more sustainable food choices, a pattern that held true even among respondents who were already interested in sustainability.

Although fatty foods might be cheap at the

Waste not, want not

Between 2010 and 2016, food waste was responsible for 8–10% of human-caused greenhouse-gas emissions, according to the 2019 special report on climate change and land by the Intergovernmental Panel on Climate Change (IPCC). In a 2017 literature review of food-waste research⁹, which pooled the findings of 202 studies, the authors complained that researchers are often forced to fall back on old data because there is no up-to-date alternative.

The review found that the majority of research papers focused on Western countries. Switzerland, for example, wastes about one-third of the food it produces; Finnish consumers throw away around 30% of the food they buy; and the Danish discard 23%. The United Kingdom, with 52 mentions, was the most studied country, followed by the United States with 51. By comparison, lower-income countries or

countries experiencing rapid development are rarely investigated. India, for example, was mentioned in just 12 (6%) studies, despite it being home to almost one-fifth of the world's population.

A lack of data is hampering the search for a solution, but, as the IPCC report states, there is no panacea. Approaches are likely to differ depending on the country. In middle- and low-income countries, improving food-supply-chain logistics to ensure consistent access to refrigeration would go a long way to decreasing waste. But in high-income countries, more inventive solutions will be needed, the report says. For example, replacing 10–19% of animal feed with protein produced by recycling microbial protein from sewage, for instance, would reduce greenhouse-gas emissions associated with pastoral farming by 6–7%.

point of purchase, their true cost is reflected in lost productivity and the disease burden associated with obesity. The OECD estimates that in the future the gross domestic product (GDP) of a country will be 3.3% lower, on average, as a result of obesity. Similarly, the full cost of unsustainable food is not reflected in its price; the hit to a country's GDP could be at least as big as that of obesity, Lawrence speculates. "There are a lot of distortions in the market where the true cost, environmental and economic, is not felt at the cashier," he says.

"It can't be just about making polite nudges here and there on price."

So, what needs to be done to help sustainable products compete with their conventional or cheaper counterparts? Tax is the obvious answer. In the past ten years, tariffs have been levied on sugary drinks in many countries, including Barbados, Peru and the United Kingdom. A systematic review⁴ evaluating their effectiveness collected the findings of 15 studies, and concluded that, on average, for every 1% bump in price, there's a corresponding 1% fall in consumption.

"Most existing sugar-sweetened beverage taxes are between 10% and 20%, so the effect on consumption is not trivial," says Franco Sassi, a

health economist at Imperial College London. "It actually makes me optimistic because back in 2010 we couldn't have imagined that governments would ever tax sugar."

And taxes might go beyond just sugar. In a 2017 study⁵, Lawrence and his colleagues asked 944 people who bought household groceries to choose between sustainable products and more conventional foods. In one of the scenarios, participants were told that brown rice had a lower carbon footprint than white rice. They were then asked to pick between the two. Under normal market conditions, in which white rice is cheaper, 61% opted for white rice. But when brown rice was presented as 9% cheaper than white, 57% instead chose the more sustainable option. That's encouraging, says Lawrence, because it shows that a small price change can nudge enough consumers to give sustainable products the majority market share.

This pattern does not necessarily hold true for all products, however. The same experiment was conducted for beef steak and sustainable alternative, kangaroo steak. Under normal market conditions, people preferred beef. And although some people drifted towards kangaroo meat when it was the cheaper option, beef remained first choice by a significant margin – even with a price difference of 33%. Price, therefore, is only one of a number of factors influencing whether consumers buy sustainable alternatives. "It can't be just about making polite nudges here and there on price – that

outlook



Kangaroo meat is a sustainable alternative to beef, but consumers can be reluctant to switch.

won't be enough," says Lawrence.

Most of the evidence on changing food behaviours comes from work on tackling obesity. Findings from dietary studies with a focus on health are being examined for their applicability to the younger field of food sustainability.

One of the methods routinely deployed to encourage healthy diets uses labels designed to inform consumers about the nutritional value of food. The traffic-light system in the United Kingdom, for example, gives shoppers an idea of how healthy a product is or isn't at a glance. The evidence of the effectiveness of this sort of intervention is encouraging.

The OECD estimates that between 50% and 60% of shoppers check nutritional labels at least some of the time. Research established that labels indicating a product's health credentials – or lack thereof – are linked to an 18% increase in people buying healthier food⁶.

Labelling on health grounds influences food behaviour, says one of the authors of the study, Michele Cecchini, a health-policy analyst at the OECD's health division in Paris. "I don't see why the same wouldn't also apply to other issues that consumers care about, like sustainability," he says.

Ishii says that only a proportion of consumers need to change their behaviour for labelling information to have an impact. "A relatively small number can influence the brand to change, and therefore they can influence the wider supply chain," she says.

Cultural matters

A 2020 survey⁷ of close to 1,200 people across 12 European countries and Uganda, highlighted the influence that culture can have on food behaviours. For example, the majority

of people surveyed in each of the European countries disagreed with statements such as "a particular food is chosen because it makes me look good in front of others". In Uganda, however, more participants agreed with such statements.

"I don't think we'll be able to address food behaviour on a global level in a uniform way," says Suzanne Kapelari, an educational scientist at the University of Innsbruck, Austria, and an author of the study. "The more we know about the cultural attitudes to food and behaviours, the better, but there's quite a bit of work to be done on that."

"I don't think we'll be able to address food behaviour on a global level in a uniform way."

Food behaviours in higher-income countries such as many OECD member states are different from those in middle- and low-income countries. Consumers in wealthy countries buy more meat, and packaged and processed foods. "It's been like this for decades in high-income countries," says Lawrence.

People in low-income countries, by comparison, often eat less meat and opt for locally produced products with less packaging.

The emphasis in high-income countries is, therefore, on correcting unsustainable behaviours, whereas in low- and middle-income countries, it's on preventing unsustainable behaviours becoming the norm.

"We have to be careful here because we don't want to be sitting in ivory towers telling

middle-income countries that they can't have access to convenience foods," says Lawrence. The answer, he explains, is often to fix the macroeconomics. For example, in some Pacific island nations, tinned and imported foods are now cheaper than fresh fish from local waters. "This is often because international trade deals have effectively subsidized processed food," he says. "It requires political will to correct this for an entire economy, but it doesn't mean banning these products. It's just about making sure the economics of the system isn't skewed."

Unintended consequences

Although eliminating or significantly reducing meat consumption would help the environment, evidence suggests this is unlikely to happen at scale because many meat-eaters are reluctant to change their eating habits. A better strategy, some researchers argue, is to shift consumer preferences from high carbon-producing meats, such as lamb and beef, towards meats with a lower environmental impact, such as chicken and pork.

In a 2019 study⁸, marketing experts in Belgium reorganized a butcher's counter, increasing the space given to poultry and decreasing the space for red meat. This led to a 13% increase in chicken sales in 4 weeks. The only trouble is that sales of red meat didn't fall in tandem, so the net result was a greater amount of meat sold, albeit not significantly.

Although this was one small study, it demonstrates a broader point: there is no single solution to the problem of how to change consumers' behaviour. "The common feature in all these areas is their limited effectiveness," says Sassi.

The hope is that applying a range of methods in a coordinated way will have a cumulative effect. But that hope lacks a solid evidence base. Researchers are even unsure whether different groups respond to different methods. "The truth is that we don't really know," says Sassi. "It's a gap in our evidence."

Benjamin Plackett is a freelance science writer based in London.

1. Willett, W. et al. *Lancet* **393**, 447–492 (2019).
2. Barosh, L., Friel, S., Engelhardt, K. & Chan, L. *Aust. N. Z. J. Public Health* **38**, 7–12 (2014).
3. Rejman, K., Kaczorowska, J., Halicka, E. & Laskowski, W. *Public Health Nutr.* **22**, 1330–1339 (2019).
4. Teng, A. M. et al. *Obes. Rev.* **20**, 1187–1204 (2019).
5. Hoek, A. C., Pearson, D., James, S. W., Lawrence, M. A. & Friel, S. *Food Qual. Pref.* **58**, 94–106 (2017).
6. Cecchini, M. & Warin, L. *Obes. Rev.* **17**, 201–210 (2016).
7. Kapelari, S. et al. *Sustainability* **12**, 1509 (2020).
8. Coucke, N., Vermeir, I., Slabbinck, H. & Van Kerckhove, A. *Foods* **8**, 186 (2019).
9. Xue, L. et al. *Environ. Sci. Technol.* **51**, 6618–6633 (2017).