Ultra-processed foods

The case for re-balancing the UK diet

Soil Association

Introduction

A 2017 paper published in the journal Public Health Nutrition found the UK to have the most 'ultra-processed' diet in Europe, as measured by family food purchases.

"A significant positive association was found between national household availability of ultra-processed foods and national prevalence of obesity," the authors said. The paper's conclusions were not universally accepted. "The fact that the finished dish has been through processing in an industrial environment – or indeed that other ingredients or additives have been used in the process – does not make the finished products less nutritious or inherently 'bad for you'," a spokesperson for the Institute of Food Science and Technology said, rejecting 'ultra-processed' as a framing.

In the intervening years, the case against ultra-processed foods has grown stronger. More precisely, the case for re-balancing the UK diet away from ultra-processed foods has grown stronger. A robust body of evidence says that we should be eating more fresh and natural foods. Ultra-processed foods have been associated with obesity and chronic disease, and crucially, this association extends beyond the nutritional composition of these foods. It is not simply that ultra-processed foods are high in salt, fat and sugar (though they often are); research is revealing a more complex picture. We know from randomised control trials that ultra-processed foods make us more likely to overeat, perhaps due to their interaction with the endocrine system. A growing body of epidemiological evidence is revealing the damaging effect that industrial additives and processing techniques have on the gut microbiome. The evidence is now so compelling that ultra-processed foods have become an issue of international concern, with leading academic journals, the FAO, and national governments adopting 'ultra-processed' as a framing to shape dietary policy.

This briefing outlines the latest evidence on ultra-processed foods, including their consumption in the UK. It proposes that the UK diet should be re-balanced, and it suggests that the National Food Strategy should lead this re-balancing. Precedents are found in the national dietary guidelines in Brazil, Uruguay and Canada, which recommend a shift away from ultra-processed foods, and in France, where the government has introduced a reduction target in the national public health strategy. The science is still evolving but has now reached a critical mass, legitimising an ambitious policy response. If the UK is serious about turning the tide on obesity, type 2 diabetes and metabolic disease, it will need to translate science into policy, re-balancing the UK diet towards fresh, natural and less heavily processed foods, and away from the ultra-processed foods that take up too much space in our shopping baskets.

What are ultra-processed foods?

All the food that we eat has been processed to some degree, whether by chopping, slicing, biting or chewing. Grain is dried and milled to be turned into flour. Vegetables are washed and packed and might be frozen. Fish is tinned and beans are canned. Many processing techniques have been used for centuries to preserve and transform food, making it taste better and last longer. Food processing can support food security and improved nutrition, extending the shelf life of a product, meaning it can be stored or transported more easily. It can make food safer, and many processing techniques (such as cooking) enhance rather than diminish the nutritional quality of foods when eaten.

In the past half century, novel industrial processing techniques have been developed. The concept of 'ultra-processing' was introduced by a team

at the University of São Paulo and proposed in a Public Health Nutrition commentary in 2009. The thesis was this: that the nature, extent and purpose of food processing shape the relationship between food, health and disease. While there have been previous attempts to classify food types according to their processing level, the NOVA system of categorisation, which introduces 'ultra-processed' as a food category, has been widely employed within the research community, and is increasingly used by national governments and international organisations (Elizabeth et al., 2020; FAO, 2019; Moubarac et al., 2014).

The NOVA system categorises food into four groups:

1. Minimally processed

2. Culinary ingredients

3. Processed foods

4. Ultra-processed foods.

Identifying ultra-processed foods

(Monteiro et al., 2019)

The food manufacturing industry is not obliged to state on food labels the processes used in its products and even less the purposes of these processes. In some cases, this can make confident identification of ultra-processed foods difficult for consumers, health professionals, policy makers and even for researchers.

There is of course no need to examine every food to know whether or not it belongs to the ultra-processed food group. As stated above, and to take a few examples, fresh vegetables, fruits, and starchy roots and tubers are obviously not ultra-processed; nor are pasteurized milk and chilled meat. Plant oils, sugar and salt, typically used in culinary preparations in combination with unprocessed or minimally processed foods, are also not ultra-processed.

It is however not always immediately clear when some specific food products are ultra-processed or not. Examples include breads and breakfast cereals. Here the solution is to examine the ingredients labels that by law must be included on pre-packaged food and drink products.

Industrial breads made only from wheat flour, water, salt and yeast are processed foods, while those whose lists of ingredients also include emulsifiers or colours are ultra-processed. Plain steel-cut oats, plain corn flakes and shredded wheat are minimally processed foods, while the same foods are processed when they also contain sugar, and ultra-processed if they also contain flavours or colours.

Generally, the practical way to identify if a product is ultra-processed is to check to see if its list of ingredients contains at least one item characteristic of the ultra-processed food group, which is to say, either food substances never or rarely used in kitchens, or classes of additives whose function is to make the final product palatable or more appealing ('cosmetic additives').

NOVA categories, definitions and examples

(abbreviated from FAO, 2019)

	Definition	Examples
NOVA 1	**Minimally processed and natural foods** These include whole fruits and vegetables, whole grains, meat and animal products. Also included are fruits, vegetables, meat and animal products that have been processed using techniques common in household kitchens, such as drying, crushing, grinding, steaming, boiling, roasting, chilling, and freezing.	Single ingredient: Fresh or dried fruit, rice and grains, legumes, leafy greens, starchy roots and tubers, fungi, herbs and spices, pasteurised plain yoghurt, fresh or pasteurised milk, tea, water Multi-ingredient: Pasta, granola (cereals, nuts and dried fruit with no additives including sweeteners or salt added by the manufacturer), cous cous
NOVA 2	**Culinary ingredients** Substances obtained directly from group 1 foods or from nature by industrial processes such as pressing, centrifuging, refining, extracting or mining. These are used to prepare, season and cook group 1 foods.	Single ingredient: Pressed vegetable oils, butter, sugar and molasses obtained from cane or beet; honey extracted from combs and syrup from maple trees, salt, corn starch Multi-ingredient: Salted butter, iodised salt
NOVA 3	**Processed foods** Products made by adding group 2 ingredients to group 1 foods. Processes are used to increase shelf life or modify sensory qualities such as taste or form. For example, canning, bottling, and, in the case of breads and cheeses, using non-alcoholic fermentation.	Canned or bottled vegetables and legumes in brine; salted or sugared nuts and seeds; salted, dried, cured, or smoked meats and fish; canned fish (with or without added preservatives); fresh bread; fruit in syrup (with or without added anti-oxidants); freshly made unpackaged breads and cheeses.
NOVA 4	**Ultra-processed foods** Formulations of ingredients made by a series of industrial processes, many requiring sophisticated equipment and technology. They typically contain little or no whole foods, are ready-to-consume or heat up, and are fatty, salty or sugary and depleted in dietary fibre, and made using industrial additives and processes that wouldn't be found in a household kitchen.	Fizzy drinks (sugary or sweetened); crisps and packaged snacks; chocolate, confectionery; ice-cream; mass-produced packaged breads and buns; margarines and other spreads; biscuits, pastries, cakes; breakfast 'cereals', 'cereal' and 'energy' bars; milk drinks, 'fruit' yoghurts and drinks; 'instant' sauces. Many pre-prepared ready-to-heat products including pies and pasta and pizza dishes; poultry and fish 'nuggets' and 'sticks', sausages, burgers, hot dogs, and other reconstituted meat products; and powdered and packaged 'instant' soups, noodles and desserts. Infant formulas, follow-on milks, other baby products.

Ultra-processed foods in the UK

A 2017 study into 19 European countries found the purchasing of ultra-processed foods in the UK is the highest in Europe.

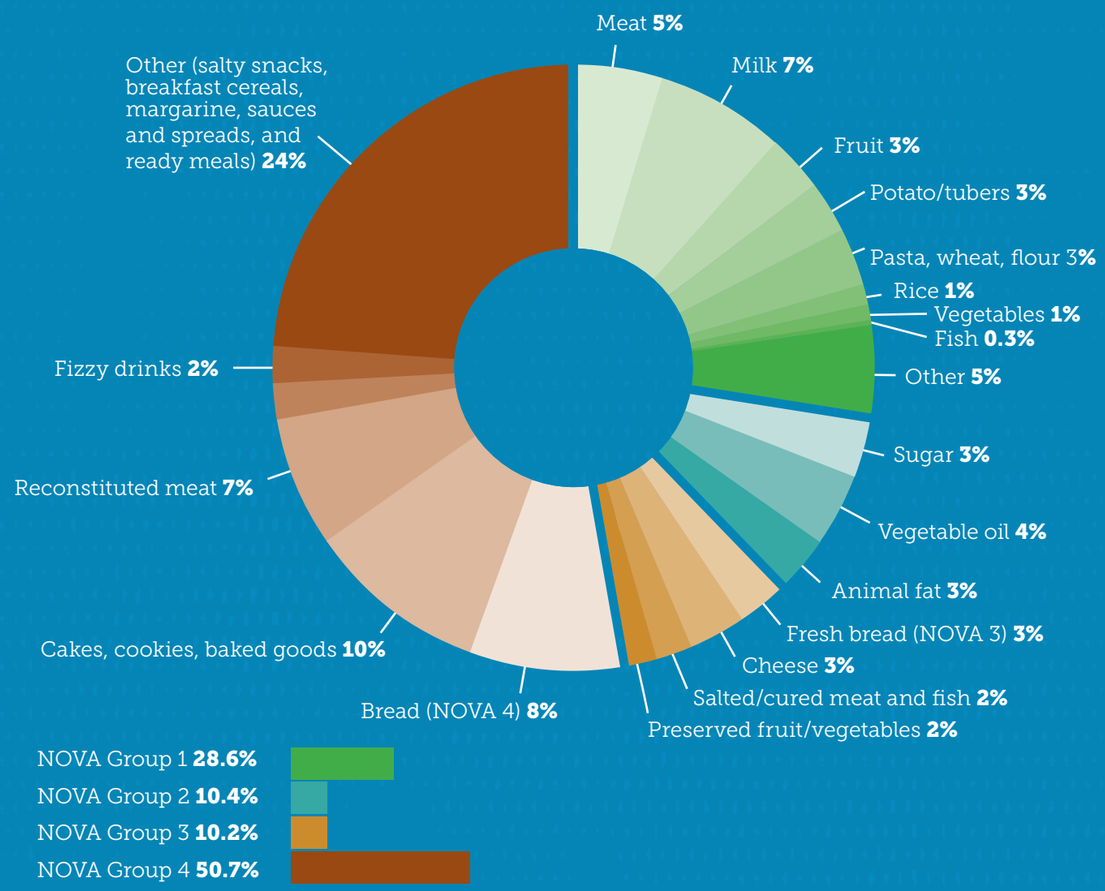
50.7% of the UK shopping basket was ultra-processed foods, compared to 14.2% in France, 13.4% in Italy and the lowest, 10.2% in Portugal (Monteiro et al., 2017). A second study that looked at consumption rather than the average supermarket shop, found that actual consumption could be even higher at 54.3% of the total food consumed (Rauber et al., 2020).

A look across other European countries shows that the UK eats differently to its neighbours. While healthy 'processed' foods such as tinned fish and frozen peas are an important part of our national diet, we eat an excess of ultra-processed foods. Ultra-processed cakes and baked goods, including biscuits, make up 10% of the UK shopping basket, but only 1% in France. Overall, we consume less fresh produce than our neighbours in France. Fresh fruit and vegetables only constitute 3.8% of our basket compared to 6% in France and as much as 9.2% in Greece. We consume less fresh bread than in France – while the UK shopping basket is 3% fresh bread and 8% ultra-processed bread, the French shopping basket is 14% fresh bread, with a mere 3% ultra-processed. Cheese can fall either into NOVA categories 3 or 4, and the French shopping basket includes more high-quality cheese than the UK basket. The UK has a large appetite for ultra-processed breakfast cereals, crisps, fizzy drinks, and ready meals, with these foods making up almost a quarter of food purchased.

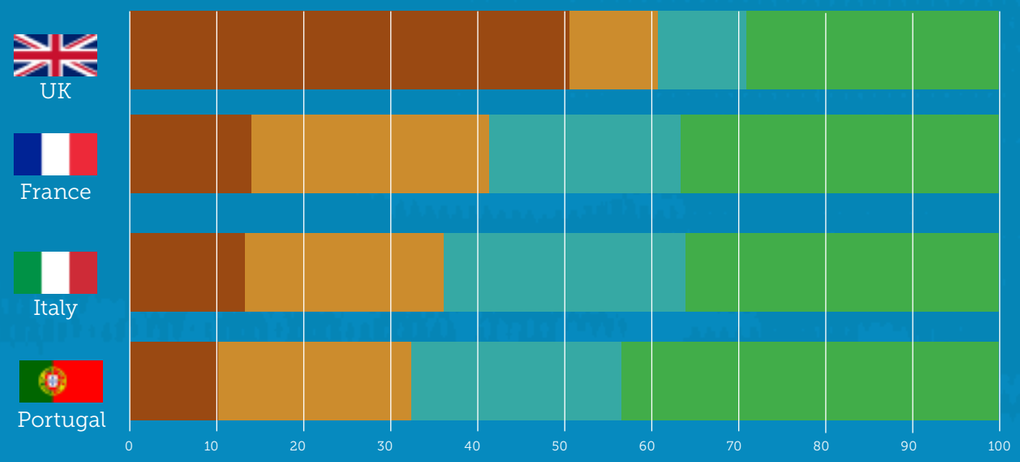
The drivers of consumption of ultra-processed foods are complex and multifaceted. The largest grossing food brands in the UK have strong marketing campaigns and are all major manufacturers of ultra-processed foods. The top 5 includes Cadbury's, Coca-Cola, Nestlé, Walkers and Warburtons (The Grocer, 2020). Marketing of ultra-processed foods has often been aimed at children, including through breakfast cereal characters such as Tony the Tiger or Coco the Monkey on Frosties and Coco Pops respectively. But it's not all down to marketing and advertisements. Changes in lifestyles have also led to an increase in consumption. Many people don't have the time, skills or equipment to cook, with 2 in 5 adults now eating a ready meal at least once a week (Eating Better, 2020; Winterman, 2013). We often snack and graze throughout the day. We expect food to be convenient, and our palates have adapted to expect sweeter and more salty flavours. In addition, a growing interest in lower meat diets might be leading to a rise in consumption as some alternative protein sources, such as soya protein isolates, are ultra-processed (Gehring et al., 2020; The Vegan Society, 2020).

Beneath these societal drivers are failings in government and public health policy. Efforts to tackle obesity have arguably placed too much emphasis on reformulation to reduce the calorie, sugar, fat or salt content of processed foods, without enough emphasis being placed on the overall quality of the diet. Research into ultra-processed foods is revealing that these efforts are unlikely to be adequate, unless they are coupled with action to re-balance the diet in its totality.

Composition of the UK shopping basket (%)



Percentage composition of the average shopping basket according to NOVA food processing category



Ultra-processed foods and health

In a 2020 review of the literature on ultra-processed foods and health, Elizabeth et al. found that 37 of 43 peer-reviewed papers had established a clear association between ultra-processed foods and poor health outcomes, including overweight, obesity and cardio-metabolic risks; cancer, type-2 diabetes and cardiovascular diseases; irritable bowel syndrome, depression and frailty conditions; and all-cause mortality.

Among children and adolescents, consumption of ultra-processed foods had been associated with cardio-metabolic risks and asthma. The authors did not find any studies evidencing an association between ultra-processed foods and beneficial health outcomes.

Research into the biological mechanisms underpinning these associations is steadily evolving, but Elizabeth et al. conclude: "There is now a considerable body of evidence supporting the use of ultra-processed foods as a scientific concept to assess the 'healthiness' of foods within the context of dietary patterns and to help inform the development of dietary guidelines and nutrition policy actions."

The first randomised control trial – the 'gold standard' of nutritional research – examining ultra-processed foods was published in 2019. The study demonstrated that when presented with a diet containing greater quantities of ultra-processed foods, overall calorie intake was higher and participants put on weight. When the participants were presented with a low processed diet that contained roughly the same macronutrient quantities – the 'low processed' and 'ultra-processed' diets were designed to match in calories, energy density, macronutrients, sugar, sodium, and fibre – participants lost weight (Hall et al., 2019). The study did not investigate why these results were obtained, but it noted that appetite-suppressing hormones increased during the unprocessed diet as compared with the ultra-processed diet, and the hunger hormone ghrelin was decreased during the unprocessed diet compared to baseline. The findings suggest that targeting individual nutrients such as calories or fat may not present the most effective solution to tackling obesity. "Limiting consumption of ultra-processed foods may be an effective strategy for obesity prevention and treatment," the authors conclude.

Further interpretations have been proposed since the study was published, including the suggestion that ultra-processed foods are less satiating (building on the evidence of hormone change) which means that the participants ate more to feel full (Adams et al., 2020). Strengthening this proposal, a recent blind randomised crossover trial found that participants felt fuller for longer after eating a minimally processed cheese toastie compared to after eating an ultra-processed version.

They also found that the participants' blood glucose spiked more dramatically after the ultra-processed meal even though the macronutrient content in both meals were matched (Dioneda et al., 2020). These studies highlight that there has not been enough research into the micronutrient content of food and how ultra-processing affects nutrient absorption and the gut microbiome (Barabási, Menichetti and Loscalzo, 2020).

The gut microbiome

The relationship between the gut microbiome and human health is a growing and exciting area of research. The microbiome is complex and determining direct causal relationships is not always possible, but a robust body of evidence is affirming that ultra-processed can negatively affect the microbiome and health:

- Food additives ubiquitous in ultra-processed foods such as emulsifiers have been shown to affect the gut microbiota in animals. Mice fed low concentrations of two commonly used emulsifiers – carboxymethylcellulose and polysorbate-80 – showed reduced microbial diversity. Reduced microbial diversity in humans is associated with poor health outcomes, including obesity and type 2 diabetes (Valdes et al., 2018).
- Emulsifiers common in ultra-processed foods have been shown to enhance gut inflammation, including via their impact on microbiota composition and functionality (Chassaing et al., 2017).
- The interaction between food additives and the microbiome could impact the way our bodies digest and take up nutrients from our food. "The thesis that a distressed gut microbiota is a mechanism that might explain how food processing features could harm human health is gaining empirical evidence," Miclotte and Wiele write (2019).
- Higher consumption of ultra-processed foods has also been associated with higher risk of type 2 diabetes (Srour et al., 2020). One of the reasons for this could be that artificial sweeteners, such as aspartame have replaced the sugar in many soft drinks. Aspartame has been shown to impact insulin resistance which in turn affects how sugar is absorbed into the blood stream (Miclotte and Wiele, 2019).
- Research into the microbiome has shown that there are similarities in bacteria in obese participants and this differed when compared to participants of healthy weight (Ley et al., 2006). More generally higher consumption of ultra-processed foods has been associated with a higher risk of irritable bowel syndrome (Schnabel et al., 2018).
- Low calorie sweeteners commonly used in ultra-processed foods including sucralose, aspartame, and saccharin have been shown to disrupt the balance and diversity of gut microbiota. Mice given sucralose for six months had an increase in the expression in the gut of bacterial pro-inflammatory genes and disrupted faecal metabolites (Valdes et al., 2018).
- Research is also revealing an association between the gut microbiome and mental and emotional health and wellbeing. Patients with depression, bipolar disorder, schizophrenia, and autism spectrum disorder have notable differences in the composition of their microbiome (Butler et al., 2019).

Additives in ultra-processed foods

(adapted from Monteiro et al., 2019)

Food substances used in ultra-processed foods include hydrolysed proteins, soya protein isolate, gluten, casein, whey protein, 'mechanically separated meat', fructose, high-fructose corn syrup, 'fruit juice concentrate', invert sugar, maltodextrin, dextrose, lactose, soluble or insoluble fibre, hydrogenated or interesterified oil; and also other sources of protein, carbohydrate or fat which are neither foods from NOVA group 1 or group 3, nor culinary ingredients from NOVA group 2. The presence in the list of ingredients of one or more of these food substances identifies a product as ultra-processed.

Cosmetic additives are often at the end of lists of ingredients of ultra-processed foods, together with other additives, and include flavours, flavour enhancers, colours, emulsifiers, emulsifying salts, sweeteners, thickeners, and anti-foaming, bulking, carbonating, foaming, gelling and glazing agents. The presence in the list of ingredients of one or more additives that belong to these classes of additives also identifies a product as ultra-processed.

The Early Years

Global and national public health recommendations say that infants should be exclusively breastfed for about 6 months, with complementary foods introduced alongside breastfeeding after this time.

Several UK infant food companies, however, persist in marketing infant food for babies who are less than six months of age, in contravention of the World Health Organization Code of Marketing of Breastmilk Substitutes. The UK has some of the lowest breastfeeding rates in the world, with eight out of ten women stopping breastfeeding before they want to (UNICEF, 2020), and this is partly due to the influence of infant food marketing and advertisements.

NOVA classification describes commercially produced infant formula and many other infant foods as ultra-processed, yet these foods are often a part of infant diets. Infant food companies market highly macerated and heat processed products on the premise that they are convenient and healthy, but these foods are often high in free sugars. Public health guidance encourages infants from 6 months to be offered a range of food textures and flavours, best eaten as simple finger foods. Many infant foods, including pureed food pouches, are lacking in texture and typically provide a predominance of sweet flavours that bear little resemblance to the natural flavours of fruits and vegetables. This can lead to overeating and a loss of recognition of the food being eaten, inhibiting the learning of chewing skills and the development of a more grown-up palate (First Steps Nutrition Trust, 2019).

Infants and young children are consuming sweeteners such as acesulfame-K, aspartame, saccharin and sucralose in ultra-processed foods, including 'low calorie' and 'diet' drinks. Although there is limited UK data on consumption, it be believed that over 45% of children aged 12-18 months consume low-calorie soft drinks, with many children consuming between a fifth and a half of a 330ml can of soft drink each day (First Steps Nutrition Trust, 2019).

Fresh and natural foods

The 2019 Global Burden of Disease study examined the health effects of diets in 195 countries. The study found that a suboptimal diet was a preventable risk factor for non-communicable diseases and was responsible for one fifth of premature mortality globally. The study found the most important risk factors to be a lack of wholegrains, fruits, vegetables, and nuts and seeds in the diet. An excess of sodium was the number one risk. Although the study didn't make the link, ultra-processed foods are one of the primary sources of sodium in diets in the UK and globally (Global Burden of Disease, 2019).

These findings cohere with Scarborough et al. (2016) who concluded that to meet national dietary guidelines, UK diets should include 54% more fruit and vegetables and 90% more beans and pulses, with a 53% reduction in 'foods high in fat and sugar' (ultra-processed foods making up the bulk of this category). The UK Government's independent advisory body on science and nutrition, SACN, has also recommended an increase in the consumption of wholegrains and pulses to boost intakes of fibre (SACN, 2015).

Conclusion

The science concerning ultra-processed foods and health is complex and still evolving. While more research into the biological mechanisms affected by ultra-processed foods is needed, there is nothing mysterious or uncertain about their consequences. The evidence has now reached a critical mass. The science of ultra-processed foods must be translated into policy, namely into policies aimed at re-balancing the national diet away from ultra-processed foods and towards more diverse, fresh and natural foods, most notably wholegrains, fruits, vegetables, nuts and seeds. This re-balancing should be seen in a positive light, as a move towards more enjoyable and complex flavours and textures, as a way of reconnecting people with how food is produced, and the complex relationship between personal and planetary health.

Sustainability Implications: Energy and Resource Consumption

Processing in all forms requires energy input, for example milling or heating. However, the energy inputs required in ultra-processed foods can be considerably higher (Boye and Arcand, 2013; van der Goot et al., 2016). This is due to many factors; for example in the manufacturing of soya isolates, there are multiple intensive processing steps to reach the final product and the use of solvents such as hexane, from petrochemical origin, has additional energy and resource implications (Preece, Hooshyar and Zuidam, 2017).

Large scale manufacturing often requires the standardisation of ingredients, such as the dehydration of raw materials which are then rehydrated to a precise level (van der Goot et al., 2016). Both dehydration and rehydration of raw products are energy and resource intensive (van der Goot et al., 2016).

In many life cycle analyses comparing a home cooked meal to a ready meal, the home cooked meal is less energy intensive when comparing energy and resources used in processing, transport and packaging (Davis and Sonesson, 2008; Schmidt Rivera, Espinoza Orias and Azapagic, 2014). These studies have not included analysis of the additives and extra processing found in ultra-processed foods, which are likely to add to the product's environmental footprint (Boye and Arcand, 2013).

While the environmental impacts of any foods or diets are complex, there might be environmental benefits in re-balancing diets away from ultra-processed foods.

International Policy Responses

In light of the evidence associating ultra-processed foods with obesity and chronic disease, several national governments have responded with policies designed to limit and reduce their consumption, alongside efforts to boost the consumption of fresh and natural foods.

In 2014, Brazil responded with the Ministry of Health issuing dietary guidelines targeting a reduction in ultra-processed foods. The guidelines said: "Make natural or minimally processed foods the basis of your diet" and "Avoid consumption of ultra-processed foods." Brazil's dietary guidelines rely on voluntary measures to reduce consumption; no regulations have yet been implemented and it is still to be seen whether the guidelines have affected obesity rates (Mariath and Martins, 2020).

Canada and Uruguay have also introduced dietary guidance recommending the decrease in consumption of ultra-processed food. Canada's guidelines say: "Limit highly processed foods. If you choose these foods, eat them less often and in small amounts."

Despite France's relatively low consumption of ultra-processed foods, the French Government has set the target of reducing ultra-processed foods in the national diet by 20% (of the 14% that they form) between 2018 and 2021 (Ministère des Solidarités et de la Santé, 2018).

The ambition is coordinated by the Ministry of Health and backed by the Government, with two linked targets:

1. "Halt the growth in the consumption of ultra-processed products (according to the NOVA classification) and reduce the consumption of these products by 20% over the period between 2018 and 2021."
2. "Increase the consumption of organic products in the population so that 100% of the population consume at least 20% of their fruit consumption and vegetables, cereal products and legumes from organic products per week."

The French Government's public health strategy contextualises the target, noting "an association between the consumption of products ultra-processed (as defined by NOVA) and the risk of developing chronic diseases."

The target was introduced despite objections from the food industry, who wanted the onus of responsibility to be placed on consumers, preferring self-regulation rather than policy. They suggested that consumers should be encouraged to make the right choices through the Nutri-Score front of pack labelling system (although this system is based on nutrient content and not level of processing) (Mialon et al., 2020).

Vision and recommendations: towards a rebalanced UK diet

Imagine a scenario where our diets and our food system have been transformed. We are producing food in nature-friendly farming systems, where soils, trees and grasslands soak up carbon, and provide habitats for wildlife.

A more diverse range of crops and animals is grown and eaten, and we're producing more fruits, nuts, pulses and vegetables. Regional processing, marketing and distribution infrastructure allows fresh, delicious, wholesome food to be delivered efficiently to citizens, with less packaging, at prices that are fair to them and to producers. Children in schools are eating freshly prepared meals and food education is an integral part of the curriculum. As a population, we are healthier and more connected to where our food comes from. Processed foods such as frozen vegetables and tinned fish are an important part of our diets, and we still enjoy the odd biscuit and plenty of baked beans, but through a 'great re-balancing act', ultra-processed foods are a much smaller part of our diets relative to fresh and natural foods.

1) Introduce a percentage reduction target for ultra-processed foods

Re-balancing our diets means both eating more of the best foods and less of the worst. The UK Government should follow the French example and introduce a percentage reduction target for ultra-processed foods, aiming to move the UK from 'worst in class' to among the 'best in class' within ten years. Across nineteen European countries, the median proportion of ultra-processed foods in the diet is 33.9%, with Portugal (10.2%) and Italy (13.4%) at the bottom, and the UK at the top. The National Food Strategy should champion this ambition – aiming to align the UK diet with the European median within 5 years and further reduce consumption to 15% by 2030, to put us among the 'best in class'.

2) Invest in world-leading food education for all children

It's unacceptable that children are growing up detached from the joys of cooking and growing, not knowing where their food comes from. Although the National Curriculum says schools should be 'instilling a love of cooking' in pupils from a young age, many schools are failing to implement the practical cookery components of the curriculum. Some families cannot afford the ingredients for these lessons, and some schools are lacking in equipment. The Government should be covering the cost of ingredients and should make sure that all schools have the equipment they need to teach practical cookery.

We know that food education can be transformative. The 'whole school approach' embodied in the Food for Life School Award has had a marked impact on diets and inequalities. Independent evaluation shows that pupils in Food for Life-engaged schools – where pupils are engaged with food, cooking and growing and visiting farms – are twice as likely to eat their five-a-day compared to children in matched comparison schools, and they eat a third more fruit and vegetables overall. If every primary school in the country was a Food for Life school, a million more children would be eating their five-a-day.

Among other school food initiatives, TastEd is reconnecting children with the sensory qualities of fresh and natural foods (TastEd, 2020). A teacher will bring fresh vegetables or fruits into the classroom, and the children will talk and write about what they see, smell, touch, hear and taste and whether they enjoy it or not. This is food education pared down to its simplest form, but the impact on the way children relate to food can be huge. Increased uptake of Food for Life, Taste Ed and other school food initiatives, should be supported by the Government and championed by the National Food Strategy.

3) Harness public procurement to normalise healthy and sustainable diets

The UK Government spends over £2 billion each year procuring foods for schools, hospitals and other public settings. This spending power should be harnessed to normalise healthy and sustainable diets, based around fresh and natural foods, sourced from sustainable farming systems including organic.

As a first step, the School Fruit and Veg Scheme should be re-specified and extended. Under the scheme, all children aged 4-6 attending a state-funded school in England are entitled to receive a free piece of fruit or veg each school day. £40 million per annum is spent on the scheme, but only 40% of the produce is British. Research suggests that the produce supplied through the scheme can sometimes be of low quality, can be lacking in freshness, and that there is consequently a high level of waste. This is a missed opportunity. Teachers attest to the nutritional importance of the scheme, but the scheme could serve a wider purpose, introducing children to delicious fresh produce, locally sourced where possible. Re-specifying the scheme so that a higher percentage of the produce is British, local and organic would not only support British production, but would ensure fresher and more appealing produce, delivered through shorter supply chains, which could lead to increased consumption and enjoyment by children.

4) Re-set the narrative around healthy eating and obesity

The Government estimate that the NHS currently spends £6bn per year on treatment of illnesses related to poor diet, which include obesity and related non-communicable diseases (Parliament UK, 2017). In addition, 40% of premature deaths could have been prevented through better diet and health (causes of death: cardiovascular disease, diabetes, cancer, COPD) (Parliament UK, 2017). Public Health England's analysis of COVID related data also highlighted that COVID had a more serious impact on those with obesity, with more people requiring intensive care treatment and dying from associated complications (Public Health England, 2020).

Even though ultra-processed foods were acknowledged as a 'major vector of non-communicable diseases' in 2017 (Parliament UK, 2017), the government's obesity strategy (Department of Health & Social Care, 2020), remains focussed on calorie, fat and sugar reduction through voluntary reformulation targets. Given the weight of evidence concerning ultra-processed foods and obesity, re-balancing the diet towards fresh and natural foods should be a priority – this will mean reframing public health narratives around healthy eating, and looking beyond reformulation.

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