



What are ultra-processed foods (UPFs)?

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There is a long formal scientific definition of UPF but it can be boiled down to this: if a food is wrapped in plastic and has at least one ingredient that you wouldn't usually find in a standard home kitchen, it's probably UPF.

Ultra-processed food is very different to "processed food". Humans and our ancestors have processed food for over a million years. Cooking, salting, drying, milling, tinning and chopping are all ancient forms of processing and have shaped our bodies, our teeth and our guts. Humans need to process our food to survive.

What makes ultra-processed foods distinctive is that they have gone through industrial processes that have changed the nature of the original ingredients, leaving little, if any, of the original whole food behind. They usually include the addition of industrial chemicals to the recipe that you would never find in a family kitchen. These ingredients include soy protein isolate, emulsifiers, artificial colours and flavours and other additives to make them tastier and have a longer life.

Some UPFs are obvious junk food (fizzy drinks, shop-bought biscuits and cakes, fast food) but the category includes many staples of our diet and foods marketed as healthy, like most supermarket bread, children's yoghurts and breakfast cereals. UPFs are typically ready-to-consume or heat up, and are fatty, salty or sugary and depleted in dietary fibre, offering little to no nutritional value.

There are few incentives in the food system that drive manufacturers to consider human health and so UPF is typically made from the cheapest possible ingredients and engineered to be addictive and drive excess consumption.

What is the NOVA classification?

The NOVA classification, which divides foods into four groups according to their level of processing, was first developed as an epidemiological tool by the Brazilian physician Carlos Monteiro and his team at the Centre for Epidemiological Research on Nutrition and Health (NUPENS) at the University of São Paulo in Brazil in 2009 (Monteiro, 2009).

Group 1: Unprocessed or minimally processed foods

Group 2: Processed culinary ingredients

Group 3: Processed foods

Group 4: Ultra-processed food and drink products

The NOVA classification defines Group 4 UPFs as “industrial formulations made entirely or mostly from substances extracted from foods (oils, fats, sugar, starch and proteins), derived from food constituents (hydrogenated fats and modified starch), or synthesized in laboratories from food substrates or other organic sources (flavor enhancers, colors, and several food additives used to make the product hyper-palatable). Manufacturing techniques include extrusion, moulding and preprocessing by frying. Beverages may be ultra-processed. Group 1 foods are a small proportion of, or are even absent from, ultra-processed products.”¹

How do I identify UPFs?

UPFs are the most easily available, affordable and widely consumed food and drink today so you don't have to look very far to find them. You can pretty much find them in every supermarket, store, vending machine or other place where food and drink are sold. UPFs are ubiquitous.

The easiest way to spot a UPF is if a food or drink is wrapped in plastic and has at least one ingredient that you wouldn't usually find in a standard home kitchen (e.g., hydrogenated vegetable oils, extracted or refined protein, starches, colours, flavours, texturants, humectants, emulsifiers). UPFs are often heavily marketed, including through the use of branding, cartoons and characters, and celebrity endorsements. Despite concerns about their healthfulness, they often have a health claim on the packet (e.g., 'High in fibre', 'Protein bar', 'Added vitamins' etc).

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1 - <https://ecuphysicians.ecu.edu/wp-content/pv-uploads/sites/78/2021/07/NOVA-Classification-Reference-Sheet.pdf>

What is the evidence that UPFs affect our health?

UPF now makes up 60% of the average diet in the UK and the USA. For some people, 80-100% of their energy intake comes from UPF. On average, children get even more of their calories from these substances than adults, with increasing evidence of negative impacts. Increasing UPF consumption in the early years can even impact on child growth in height (Dos Santos Costa, et al. 2022; Swinburn et al. 2019; Rodriguez-Martinez et al. 2020). More British five-year-olds are not only living with obesity compared to their European peers, they are among the shortest in Europe too². UPF is our food culture, the stuff from which we construct our bodies. It is now the national diet in Australia, Canada, the UK and the USA.

Ultra-processed foods seem to make us overeat. More research is being done to determine why, but overconsumption seems to be related in part to the physical and chemical composition of these foods, additives and excessive quantities of refined ingredients used in their manufacture, promoting the increased, rapid and more frequent consumption of products which seem to bypass the body's satiety signals, which tell us when we are full.

A large body of data has emerged in support of the hypothesis that diets high in UPF damage the human body, increasing rates of cancer, metabolic disease and mental illness, that UPFs damage human societies by displacing food culture and driving inequality, poverty and early death, and that they damage the planet with carbon emissions and loss of biodiversity (Anastasiou, et al. 2022; Seferidi, et al. 2020).

Inevitably, most studies related to public health focus on obesity (Rauber, et al. 2020; Dicken & Batterham, 2021), but there is also evidence that increased UPF intake is strongly associated with an increased risk of:

- Death – so called all-cause mortality (Schnabel, et al. 2019; Rico-Campà, et al. 2019; Kim et al. 2019; Bonaccio, et al. 2021; Chen et al. 2020)
- Cardiovascular disease (strokes and heart attacks) (Kim et al. 2019; Bonaccio, et al. 2021; Srouf, et al. 2019)
- Cancers (all cancers overall, as well as breast cancer specifically) (Fiolet, et al. 2018)
- Type two diabetes (Llaveró-Valero, et al. 2021; Srouf, et al. 2020)

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2 - <https://www.thetimes.co.uk/article/british-five-year-olds-up-to-7cm-shorter-than-western-peers->

- High blood pressure (Jardim, et al. 2021; Silva Meneguelli, et al. 2020; Mendonça, et al. 2017)
- Fatty liver disease (Zhang, et al. 2022a)
- Inflammatory bowel disease (ulcerative colitis and Crohn's disease) (Narula, et al. 2021; Lo, et al. 2022)
- Depression (Gómez-Donoso, et al. 2020)
- Worse blood fat profile (Schnabel, et al. 2018)
- Frailty (as measured by grip strength) (Mariath, et al. 2021; Zhang, et al. 2022b)
- Irritable bowel syndrome and dyspepsia (indigestion) (Schnabel, et al. 2018)
- Dementia (Li, et al. 2022)

This evidence is robust and importantly it shows that UPF is not simply salty, fatty, sugary food low in fibre.

Across over 50 prospective cohort studies statistical adjustments have been made for salt, sugar, fat, fibre and overall dietary pattern and in almost all cases both the significance of the effect and the size of the effect of UPF remain the same. It is the processing that's important. In other words, home-made chips, lasagne and cake are not at all the same in terms of their effect on diet related disease (Dicken & Batterham, 2021; Dicken & Batterham, 2022).

The same effect was shown in an expertly run randomised clinical trial, conducted by Kevin Hall at the National Institutes of Health in the USA. Volunteers were randomised to either an 80% UPF diet or an 80% unprocessed diet for two weeks and then swapped to the other diet. Despite both diets being matched for sugar, salt, fibre and fat, and both diets being rated as equally delicious, all volunteers eating the UPF diet consumed ~500kcal more each day and gained weight consistent with this. On the unprocessed diet all volunteers lost weight despite having access to as much food as they could eat each day (Hall, et al. 2020).

Brazil, Canada, Chile, Ecuador, France, Israel, Mexico, Peru and Uruguay all encourage, via national dietary guidance, labelling or other mechanisms, people to limit their ultra-processed food intake. The World Health Organisation and UNICEF, the United Nations' Children's Fund, both recognise the importance of addressing ultra-processed food consumption for ending childhood obesity. The UN Food and Agriculture Organization also recommends limiting UPF consumption (Monteiro et al. 2019), as does the American Heart Association's dietary guidance for cardiovascular health (Lichtenstein et al. 2021).

Are all UPFs equally harmful?

There are likely to be UPFs which are healthier than other UPFs. The problems associated with UPF are less about individual foods and more about higher overall consumption and dietary patterns.

NOVA provides a framework for research, drawing a boundary around a group of foods, allowing scientists to assess whether diets characterised by those foods lead to poor health outcomes. That hypothesis has been thoroughly tested and substantiated. NOVA suggests that we also need to look beyond nutrients to the degree of processing characterising the diet as a whole. It argues that it's the overall dietary pattern that needs addressing.

Are all processed foods UPF?

Processed foods, as defined by NOVA, are different to ultra-processed foods. They include 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 antioxidants); freshly made unpackaged breads and cheeses. Most processed foods have two or three ingredients.

Processed foods are very different from ultra-processed foods, which are made by a series of industrial processes, many requiring sophisticated equipment and technology. They include 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 and other baby food products.

What should we do to reduce our UPF consumption? Do we need to eliminate UPFs from our diets?

It is not the fault of the consumer that these foods make up a large percentage of diets. Our food system is dominated by these products and policy change is needed to help us all have affordable access to a more whole and minimally processed diet. While the media might like to focus on individual choices, those calling for action on UPFs are clear that action is needed at a policy level to re-shape the system as a whole.

Furthermore, the data is clear that minimally processed whole food is unaffordable for many people and families in the UK. Advocates calling for reductions in UPF consumption are not telling people to spend more on food – this is a policy issue related to making whole and minimally processed foods more affordable and accessible. The UK government's own Eatwell Guide encourages consumption of whole and minimally processed foods.

There are grounds for encouraging fresh preparation and cooking from scratch, where this is a viable option. This won't be possible for everyone, all the time, and it's therefore equally as important to ensure that healthy processed foods are available and that healthier (non-UPF) 'convenience' foods are available and accessible.

Researchers and other stakeholders calling for action on UPFs are therefore not calling for a blanket ban on these products. The evidence suggests that altering the food environment to make healthier choices more readily accessible and affordable would bring considerable benefits to public health. Some UPF products, such as breads and cereals, are also available in non-ultra-processed form. Shifting diets onto a healthier footing need not involve blanket bans but a range of policy measures that promote a healthy, balanced diet and reduce exposure to UPFs.

Many of our choices are made for us, shaped by the environment in which we live. Ultra-processed foods are typically cheap, accessible and heavily marketed – often more than healthy foods. Their convenience, hyper-palatability and the dominance of transnational corporations using pervasive advertising and promotion, give ultra-processed foods enormous market advantages and often mean that people have very little choice or autonomy over whether to buy and eat them, especially in locations where minimally processed and fresh food is scarce. Government action to re-shape the context in which purchasing decisions are made is therefore needed.

Why, given the evidence, is the UPF concept being questioned by certain quarters?

The science around the impact they have on our bodies is complicated and we don't understand the full effect their varied ingredients and the processing involved have on our metabolism, behaviour, and gut microbiome, an evolving area of science across many disciplines.

Efforts to reduce the consumption of UPFs will impact on the profits of many of the largest businesses globally who produce and market them. Seven out of ten food items from Britain's biggest producers are ultra-processed³. It is understandable that many of those businesses who have worked hard to reformulate in accordance with legislation on salt, fat and sugar content will feel threatened by the new evidence arising on the health impacts of ultra-processing. It is often from those quarters that criticism emanates of the term "ultra-processed", its definition under the NOVA classification system and calls to address the dominance of UPFs in our diets and include them in national dietary guidance.

Efforts to reduce UPF consumption can work hand-in-hand, however, with those working to reduce our sugar, salt and fat intake and the food industry needs to recognise this. A 2023 series on the commercial determinants of health in the Lancet outlined how "four industries (tobacco, unhealthy food, fossil fuel, and alcohol) are responsible for at least a third of global deaths per year" and "their products and practices are having increasingly negative impacts on human and planetary health and equity" (The Lancet, 2023). The World Health Organization has raised similar concerns, concluding that "company choices in the production, price-setting and targeted marketing of products", including "ultra-processed foods, tobacco, sugar-sweetened beverages and alcohol lead to diseases such as cardiovascular disease, type 2 diabetes and certain cancers, as well as hypertension and obesity"⁴.

The UPF narrative is not going away and whether it's a result of reputational risk or the desire to protect public health and the environment, food businesses need to respond, increasing their support for healthy, balanced diets and away from those dominated by UPFs, backed up by responsible government policy encouraging healthy and sustainable diets.

This Q&A has been authored by Rob Percival and Cathy Cliff from the Soil Association, Dr Dolly van Tulleken, Dolitics and Dr Vicky Sibson, First Steps Nutrition Trust.

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3 <https://www.tortoisemedia.com/2023/05/24/seven-out-of-ten-food-items-from-britains-biggest-producers-are-ultra-processed/>

4 <https://www.who.int/news-room/fact-sheets/detail/commercial-determinants-of-health>

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