

Ultra-processing Unleashed

What is it and should we fear it?



Dr Emma Derbyshire, PhD,
Nutritional Insight

There has been increased media coverage around the theme of 'ultra-processing'. This appears to be partly driven by: 1) The 'clean eating' trend; and 2) Publication of the NOVA system - a system that classifies foods and ingredients according to how they will be used along with how they are processed. Whilst this topic appears to be on trend it should be considered that food types and nutrients are not considered as part of this categorisation system. This article explains the background behind ultra-processing, provides examples and looks at the wider perspective.

Introduction

Ultra-processing is a new, popular term that is cropping up in media circles. However, before we take a look at what this is let's take a step back and look at the role of food processing. Early in the 19th century, poverty, infectious and deficiency diseases were prolific. After the world wars ended, nutritional and food science innovations, including food processing, led to the second half of the 19th century having much safer, more palatable and nutritious foods.¹ For example, antioxidants are now one of the most studied food preservatives and it was from their use in food that scientists realised that these not only inhibited oxidative processes in foods but also in human metabolism.²

Undoubtedly, in present day, both fresh and processed foods make up vital parts of the food supply. Processed food contributes to both food security (ensuring that sufficient food is available) and nutrition security (ensuring that food quality meets human nutrient needs). Diets are also more likely to meet food guidance recommendations if nutrient-dense foods, either processed or not, are selected.² Despite this logic in the era of healthism there has been an upsurge in information about 'clean eating'⁴ and alarmist views on ultra-processed foods. This article explains how ultra-processing is defined, provides examples and puts things into a wider context.

Definitions

Most of what we read about ultra-processed foods and drinks (UPFD) derives from one main classification system.

This was developed, in 2016, by Professor Monteiro and his team at the University of São Paulo, Brazil, and defined as: "a food classification system (known as NOVA) which categorises foods according to the extent and purpose of food processing, rather than in terms of nutrients".⁵ NOVA (not an acronym) classifies foods and food products into four distinct groups (see **Table One**). Food processing as identified by NOVA involves physical, biological and chemical processes that occur once foods are separated from nature, and before they are eaten or used as part of meals.⁵ Modes of food preparation in the home or restaurant kitchens, including disposal of non-edible parts, fractioning, cooking, seasoning, and mixing various foods, are not taken into account by NOVA.⁵

Other definitions and grading levels of food processing also exist but have not been as popular as NOVA. For example LanguaL™ - an acronym for 'Langua aLimentaria' or 'language of food' is a sophisticated method which captures a numbers of descriptors for the different aspects of food processing.⁶ At present, the European food composition databases (known as Eurofir) have programmed in more than 27,000 foods using LanguaL.^{6,7} The European Food Safety Authority has also developed the FoodEx system to define foods which encompasses both food chemical exposures and food intake for dietary purposes.⁸ Unfortunately, the NOVA appears to be being used over LanguaL and the FoodEx systems in studies, possibly because of its simplicity.

Application and examples

As shown in **Table One**, UPFD are defined as those 'typically with five or more ingredients'. Subsequently, most of what is currently sold in supermarkets falls under this definition. The French NutriNet-Santé study has estimated that ultra-processed foods contribute to about a fifth (18 per cent) of all foods eaten with young adults, smokers, males, those who are less educated and/or overweight/obese being more likely to consume these.⁹ However, before the definition of UPFD continues to be embedded in research studies, the definition itself is in need of firm critique. It has been pointed out that the NOVA definition of UPFD itself is rather loose.¹⁰

For example, it states that UPFD 'often' include sugar, oils, fats, salt, antioxidants, stabilisers, and preservatives without specifying cut-off thresholds for these per gram or per portion.⁸ As mentioned in the NOVA definition itself 'food types and nutrients are not considered'. Thus, a food could be 'ultra-processed' yet be of value in terms of nutritional density. **Table Two** provides a summary of UPFD both listed by NOVA and identified through the analysis of food labels and application of the NOVA definition.

As can be seen from **Table Two** some foods meeting the UPFD definition can have 'functional' value. For example, breakfast cereals fall under the group 4

category of being ultra-processed. Yet low sugar brands fortified with micronutrients have an important role to play in health. For example, US data from the National Health and Nutrition Examination Survey (NHANES)¹¹ shows that without fortification the percentage of children (aged 2 to 18 years) with intakes of niacin, iron, thiamine and vitamin A below the Estimated Average Requirement increased by 155, 163, 113 and 35%, respectively. Similarly, infant formula is also placed by the NOVA system as group 4. Clearly, whilst breast feeding for the first six months of life is regarded as the optimal way of feeding infants,¹² for those who cannot feed infants this way formulas have an important role to play.

Table One: Definitions of the Different Processing Tiers

GROUP	Level of Processing	Definition applied	Examples
1	Unprocessed or minimally processed foods	Natural foods altered by the removal of inedible/unwanted parts, drying, crushing, grinding, fractioning, filtering, roasting, boiling, pasteurisation, refrigeration, freezing, placing in containers, vacuum packaging, or non-alcoholic fermentation	Fresh foods, grains, legumes, meat, poultry, fish, seafood
2	Processed culinary ingredients	Substances obtained directly from group 1 foods or from nature by processes such as pressing, refining, grinding, milling, and spray drying	Salt, sugar and molasses, honey, vegetable oils, starches
3	Processed foods	Relatively simple products made by adding sugar, oil, salt or other group 2 substances to group 1 foods. Most processed foods have two or three ingredients	2-3 ingredients. Salted, cured or smoked foods, canned fruit and vegetables, fresh breads
4	Ultra-processed food and drink (UPFD) products	Industrial formulations typically with five or more ingredients. Such ingredients 'often' include those also used in processed foods, such as sugar, oils, fats, salt, antioxidants, stabilisers, and preservatives	5+ ingredients. Packaged snacks, bread and buns, breakfast cereals, pre-prepared meals, chocolate, confectionary and many more

Source: Adapted from Monteiro *et al.* (2016)⁸

Table Two: Examples of UPFD

Ultra-processed	Ultra-processed but with purpose?
Biscuits, cakes, cake mixes and pastries, cereal and cereal bars	Fortified breakfast cereals
Breads and buns	Wholegrain bread and crackers, gluten-free bread
Carbonated drinks	Probiotic drinks
Chips, crisps, sauces, sweet/savoury packaged snacks	Multigrain crisps, some rice cakes
Chocolate, confectionary and sweets	Dark chocolate
Energy drinks, fruit yoghurts and fruit drinks	Non-dairy milk drinks, fortified milk drinks
Fruits canned in syrup	Sugar-free jelly
Pre-prepared meat, poultry, fish, vegetable and other 'recipe' dishes	Health and 'slimming' products such as powdered or 'fortified' meal and dish substitutes
Ice cream	Frozen yoghurt
Jams, margarines and spreads	Cholesterol reducing spreads and drinks
Poultry and fish 'nuggets' and 'sticks', sausages, burgers, hot dogs and other reconstituted meat products. Salted, pickled, smoked or cured meat and fish	Vegetarian/vegan products
Ready to heat products including pre-prepared pies and pasta and pizza dishes	Healthy living meals
Some baby products	Infant formulas and follow-on milks

Source: Monteiro *et al.* (2016)⁸ and NOVA definition applied to products labels.

Consumer research also shows that people are wanting more flexibility in their diet and reducing meat consumption is one form of this 'flexibility'.¹³ Many products on the market, such as vegetarian and vegan sausages, could be placed under group 4. Mycoprotein™ is one example, yet this product is high in protein, low in fat and produced as sustainably as possible.¹⁴ The product has also been tested clinically with recent evidence finding that its consumption can help to reduce energy intake and insulin release in overweight adults.¹⁵ Interestingly, products such as gluten-free bread (alongside bread *per se*) also fit into the mix of being ultra-processed. Yet gluten-free living already entails a substantial restriction when it comes to food choice. This, in turn, has been linked to social and psychological distress.¹⁶ So it seems that placing foods such as these into group 4 could only exacerbate these restrictive feelings.

Discussion

On the whole media coverage around the consumption of UPFD is largely based on studies using the NOVA definition. Whilst this is relatively straightforward to apply it has its setbacks. For example, this is a crude system of grouping foods into categories based on their degree of processing.¹⁰ The NOVA definition of UPFD uses the word '*formulations*' which is open to interpretation, states that these '*often include*' sugar, oils, fats, salt, antioxidants, stabilisers, and preservatives rather than '*do*' and including listed cut-off thresholds. It also states that the number of ingredients is '*typically five or more*'. So, in theory, if food producers wish to move into group 3 (processed) components such as fortificants, product stabilisers and preservatives would need to be removed from the list. This poses potential nutritional and food safety risks.

The real reality is that most of the food and drinks that we consume are processed to some extent. Simply put, processing is any food that has been altered in some way during its preparation which can be as basic as freezing, drying, canning and baking.¹⁷ In the UK, many foods that fall under the bank of UPFD are already limited. For example, we have had the recent Change4Life Campaign specifying that children should eat no

more than two refined supermarket snacks per day (each no more than 100 kcal).¹⁸ It is worth mentioning at this point that certain foods listed in group 2 such as salt and sugar are also restricted too. Bearing this in mind, group 4 foods should not be earmarked as being unhealthy whilst those lower down in the list go ignored. Ideally, a whole foods approach should be considered as it is difficult to tease out whether the NOVA classification system would ultimately lead consumers to choose better diets compared to healthy diet patterns advised.¹⁹ Finally, it should also be considered that many manufacturers are now reducing the sugar and salt content and improving the nutritional profile of their products.

It could be predicted that given growing populations and modern-day lifestyles processed foods may not disappear but change form. The clean eating trend now appears to be shifting across into clean labelling. However, scaremongering and confusing the public about UPFD is not the best way forward. Equally, reducing the number of ingredients to less than five may not be feasible in many instances. Instead food producers should look to reviewing energy, fat and salt profiles, using natural colours, preservatives, antioxidants and emulsifiers where possible that are EU approved²⁰ and embedding sustainable production methods. It is also worth mentioning that the European Food Safety Authority is assessing the safety of all new food additives and re-evaluating all of those submitted before 2009.²¹ This is expected to be completed by 2020.¹⁸

Conclusions

In conclusion, the definition of ultra-processing requires further scientific rigour before public policies relating to this are put into place. For example, it cannot be speculated that all UPFD foods are high in salt and sugar and have a low nutritional density. Future definitions should be refined and move towards the inclusion of evaluating nutritional profiles of foods alongside the extent to which they are processed. We should also not jump towards clean labelling, i.e. less than five ingredients listed on the label, but instead look towards what can be improved.

References: 1. Welch RW, Mitchell PC (2000). Food processing: a century of change. *Br Med Bull.*; 56(1): 1-17. 2. Cömet ED, Gökmen V (2018). Evolution of food antioxidants as a core topic of food science for a century. *Food Res Int.*; 105: 76-93. 3. Weaver CM, et al. (2014). Processed foods: contributions to nutrition. *Am J Clin Nutr.*; 99(6): 1525-1542. 4. McCartney M (2016). Margaret McCartney: Clean eating and the cult of healthism. *BMJ.*; 354: i4095. 5. Monteiro CA (2016). Food classification. *Public Health NOVA. The star shines bright.* *World Nutrition.*; 7(1-3): 28-38. 6. Langua L (2015). The International Framework for Food Description. Accessed online: www.langua.org/ (Mar 2018). 7. Becker W, et al. (2008). Proposal for structure and detail of a EuroFIR standard on food composition data. II: Technical annex. Accessed online: www.eurofir.org/wp-content/uploads/2014/05/2.-Proposal-for-structure-and-detail-of-a-EuroFIR-standard-on-food-composition-data-II-Technical-Annex.pdf (Apr 2018). 8. European Food Safety Authority (2015). The food classification and description system FoodEx2 (revision 2). Accessed online: <https://efsa.onlinelibrary.wiley.com/doi/epdf/10.2903/sp.efsa.2015.EN-804> (Apr 2018). 9. Julia C, et al. (2018). Contribution of ultra-processed foods in the diet of adults from the French NutriNet-Santé study. *Public Health Nutr.*; 21(1): 27-37. 10. Gibney MJ (2017). Ultra-processed foods in human health: a critical appraisal. *Am J Clin Nutr.*; 106: 717-724. 11. Fulgoni VL, Buckley RB (2015). The Contribution of Fortified Ready-to-Eat Cereal to Vitamin and Mineral Intake in the U.S. Population, NHANES 2007-2010. *Nutrients.*; 7(6): 3949-3958. 12. World Health Organization (2018). Breastfeeding. Accessed online: www.who.int/nutrition/topics/exclusive_breastfeeding/en/ (Mar 2018). 13. Mintel (2018). Meat Alternatives. Accessed online: <https://store.mintel.com/meat-alternatives-canada-january-2018>. (Mar 2018). 14. Quorn (2018). What is Mycoprotein™? Accessed online: www.quorn.co.uk/about-quorn (Apr 2018). 15. Bottin JH, et al. (2016). Mycoprotein reduces energy intake and postprandial insulin release without altering glucagon-like peptide-1 and peptide tyrosine-tyrosine concentrations in healthy overweight and obese adults: a randomised-controlled trial. *Br J Nutr.*; 116(2): 360-374. 16. Rose C & Howard R (2014). Living with coeliac disease: a grounded theory study. *J Hum Nutr Diet.*; 27(1): 30-40. 17. NHS Choices (2017). Eating processed foods. Accessed online: www.nhs.uk/livewell/goodfood/pages/what-are-processed-foods.aspx (Mar 2018). 18. Public Health England (2018). PHE launches Change4Life campaign around children's snacking. Accessed online: www.gov.uk/government/news/phe-launches-change4life-campaign-around-childrens-snacking (Mar 2018). 19. American Society for Nutrition (2018). The Debate Over the Health Effects of Food Processing. Accessed online: <https://nutrition.org/the-debate-over-the-health-effects-of-food-processing/> (March 2018). 20. Food Standards Agency (2016). Current EU approved additives and their E Numbers. Accessed online: www.food.gov.uk/science/additives/enumberlist#toc-2 (March 2018). 21. European Food Safety Authority (2018). Food Additives. Accessed online: www.efsa.europa.eu/en/topics/topic/food-additives (April 2018).

Disclaimer: This review was supported by the Marlow Foods. The views expressed are those of the authors alone and Marlow Foods had no role in writing the review.