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RESEARCH

EU Food Law and Ultra-Processed Food Markets: Safety from What and for Whom?

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Abstract
This article examines the limitations of EU food law in safeguarding public health within ultra-processed food (UPF) markets, focusing on food additives as a case study. It critiques the EU's reliance on macronutrient profiling and consumer informational regulation, arguing these approaches inadequately address systemic health risks associated with UPFs. By analysing current food additive regulations, the article maps out gaps in the EU's food safety assessments, including the failure to consider cumulative and long-term health effects of additive consumption. It also shows how these risks are distributed unequally within structurally inequitable UPF markets, disproportionately burdening the most vulnerable consumers. The article critiques the EU's focus on individual responsibility for dietary choices and calls for a reassessment of food safety standards to address structural risks and ensure equitable safety access within UPF markets.

Keywords Ultra-processed food · Food additives · EU food law · Consumer protection

Introduction

In 2010, a Brazilian team of scientists, led by Carlos Monteiro, a Professor of nutrition in São Paulo, developed a new NOVA classification of food. The NOVA classification was based on Monteiro's studies on associations between poor health and income inequality in Brazil, which led him to develop a new classification based on the extent and purpose of food processing (Monteiro et al., 2016). NOVA divides foods into four main categories,[1] distinguishing one category—"ultra-processed foods" (henceforth "UPF")—as the

[1] The first category is called "unprocessed or minimally processed foods," which can ordinarily be found in nature, such as fruit, vegetables, meat, and eggs. The second category is "processed culinary ingredients," which include things like oil, butter, lard, sugar, salt, vinegar, and honey. The third category is called "processed food," which represents a mixture of both category 1 and 2, such as tinned beans, tomatoes or fish, smoked meat or salmon, and freshly made bread. The fourth category is called "ultra-processed food," which largely includes industrially produced foods such as bread, cereal, flavoured yogurt, savoury, and sweet snacks.

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main culprit for increasing obesity and other diet-related diseases. Monteiro's definition of UPF is long, but among its key features are: (1) UPFs are industrial formulations typically with five or more ingredients; (2) UPFs contain substances and additives not commonly used in culinary preparations; (3) several industrial processes with no domestic equivalents are used in the manufacture of UPFs; (4) UPFs have hyper-palatability, sophisticated and attractive packaging, including aggressive marketing to children and adolescents, and are often owned by transnational corporations (Monteiro et al., 2016). Importantly, according to the NOVA classification, the key characteristic of all UPFs is the level of food processing, not the macronutrient profile of the food. While many UPFs contain high levels of macronutrients of concern, these are not necessarily a defining feature of UPFs. Instead, the defining factors are the degree of processing and the additives required to facilitate this ultra-processing.

The increasing significance of Monteiro's research findings within the broader field of nutritional science, where national and international studies on associations between UPF and ill health have been consistently growing,[2] raises some pressing questions for EU food law and policy. One important aspect concerns the current EU food law's paradigm of macronutrient profiling (i.e., foods high in saturated fat, sugar, and salt) which is used to protect consumers from over-consumption of unhealthy foods. Associations between consumer ill health and the consumption of highly processed food,[3] including food with good macronutrient profiles,[4] arguably challenge the EU food law's paradigm of macronutrient profiling, adding to already extensive academic critiques of the informational model of consumer protection within the European food markets (Edinger, 2014; Gemayel, 2022). Additionally, and most importantly for the purposes of this article, it poses new challenges to the EU food law's safety framework.

This article argues that emerging studies in nutritional science on the associations between UPF consumption and consumer ill health challenge not only the EU's food information paradigm but also its safety framework, which is designed to protect consumers from food safety risks. While the EU's food safety framework is comprehensive, encompassing numerous rules, regulations, and standards—such as those governing food hygiene, food imports, food additives, and contaminants—this article focuses on the regulation of food additives.[5] Food additives are a defining characteristic of UPFs and play a central role in food ultra-processing. Consequently, the key question addressed in this article is how EU food law sets safety standards for food additives and, by extension, how it distributes safety within UPF markets.

[2] It is important to note that although studies on associations between UPF and ill health have been consistently growing, the conclusions of these studies are not entirely homogeneous. Having said that, the current scientific consensus seems to suggest a strong association between UPF and poor health (for more on this, see Tulleken (2024)).

[3] Current EU food law does not distinguish between levels of processing, bundling all forms of food processing into one category of "processed food" (Regulation (EC) No. 852/2004 on the hygiene of foodstuffs).

[4] For example, consider diet coke, an ultra-processed drink, which has a really good macronutrient profile: calories 0; fat 0 g; sugar 0 g; sodium 0 g.

[5] I have chosen food additive regulation as the focus of my case study because additives are central to the production of UPFs. While some UPFs may have excellent macronutrient profiles—being low in fat, sugar, and salt—their health impacts remain negative. Food additives not only enable the ultra-processing of foods but also make it possible to create products with seemingly healthy nutrient profiles that still contribute to poor health outcomes.

To explore the regulation of food additives and assess how EU law establishes safety standards in UPF markets, I draw theoretical insights from Iain Ramsay's concept of the "politics of product safety" (Ramsay, 2012). Ramsay argues that regulating safety involves ethical questions about the consumer's right to protection from certain risks to life and health. Defining acceptable levels of such risks is not merely a technical exercise but also a political decision shaped by value judgments (Ramsay, 2012). Building on this framework, my analysis examines how EU food law both "technically" and "politically" allocates additive safety within UPF markets.

Supported by findings from nutritional epidemiology and studies in geography, sociology, and food culture, my analysis demonstrates that current EU food additive regulations fail to ensure equitable access to food safety within UPF markets. By overlooking the ways in which food additives are used in modern UPF production and how additive safety is distributed within these markets, I argue that EU food law inadequately protects consumers from health risks associated with UPF consumption. Instead, the law individualises the management of systemic health risks stemming from high UPF consumption, disproportionately burdening the most vulnerable consumers with the greatest risks.

The article is structured as follows: Section 1 will introduce scholarly debates on UPF markets and the health risks linked to UPFs. Section 2 will explain the importance of food additives to the production of UPFs. Section 3 will examine the development of food additive laws to understand how consumer protection within UPF markets has historically evolved. Section 4 will examine the EFSA's risk assessment process for food additives to tease out some of the concerns regarding additive safety. Section 5 will look at how EU food law distributes risk and safety within consumer markets. Section 6 will provide some concluding thoughts.

UPF Markets and Consumer Health Risks

In 2023, the total estimated value of the global UPF market reached two trillion USD, and it is expected to grow by further 9% by 2028 (Technavio, 2023). The UK market, alongside the USA, accounts for the largest consumption of UPFs globally (Marino et al., 2021). The World Health Organization has reported that UPF consumption, particularly by children, has been steadily growing in many countries, including the EU and the Global South, where traditional local food cultures are gradually being replaced by UPF diets (Dunford & Popkin, 2023; World Health Organization & UNICEF, 2022).

For decades, food system scholars have critiqued the globalised, capitalist production, distribution, and consumption of food, providing extensive evidence of the negative effects of UPF markets on broader society. They have shown the role that globalization (Zwagerman, 2017), multinational companies (Cheney, 2016), international organizations (Elver, 2016), technological developments (Bratspies, 2017), changing work patterns and social welfare provisioning (Smith et al., 2014), and continued structural discrimination (Freeman, 2020; Lee, 2017) played in sustaining and reproducing harmful and inequitable food systems across different contexts.

More specifically, UPFs and the global ecosystem that was created to support their production, transportation, distribution, and sale have been linked to environmental degradation (García et al., 2023; Lang et al., 2009; Leite et al., 2022; Seferidi et al., 2020), the erosion of local, vibrant small-scale farming (McMahon, 2011, 2013), and labour exploitation (Schneider, 2021), where transnational corporations exert their power and influence

to discipline small-scale farmers across contexts and re-order food production and supply in accordance with the interests of large retailers (Byala, 2023; Clapp et al., 2009; Keenan et al., 2023; McMahon, 2013; Nestle, 2013; Winson, 2013). These highly financialised UPF markets have led to the global distribution of food with long shelf lives and cheap ingredients, key contributors to worsening greenhouse gas emissions, water footprints, and ecological footprints (such as water scarcity, pollution, and deforestation) (Silva et al., 2021; Tulleken, 2024).

More recently, UPF markets have also been increasingly linked to poor health outcomes, with the consumption of UPFs strongly associated with various non-communicable diseases (Cordova et al., 2023; Lane et al., 2024), such as type 2 diabetes (Llavero-Valero et al., 2021; Srour et al., 2020), cardiovascular disease (Bonaccio et al., 2021; Srour et al., 2019), hypertension (Jardim et al., 2021; Prescott et al., 2024; Silva Meneguelli et al., 2020), inflammatory bowel disease (Lo et al., 2022; Narula et al., 2021), fatty liver disease (Zhang et al., 2022a, b), various cancers (Fiolet et al., 2018), frailty (Zhang et al., 2022a, b), depression (Gómez-Donoso et al., 2020), and even dementia (Li et al., 2022). According to these new scientific studies, the effects on health are significant, increasing the risk to develop these various diseases by 25 to 62% (Bonaccio et al., 2021; Chen et al., 2022; Rico-Campà et al., 2019). In addition to adult health, public health organizations and health charities have expressed concerns over obesity and malnutrition in children, where commercially produced, additive-rich food[6] (commercial milk formulas (Smith et al., 2014), commercial baby and toddler foods, treats and snacks commercially produced and advertised for children) has become their main diet (Calcaterra et al., 2023; Childs & Sibson, 2023; Peden & Bishop, 2018).

Some countries have recently taken some restrictive, regulatory actions to reduce consumption of UPFs, albeit largely only to tackle UPFs that are high in macronutrients of concerns (i.e., high in sugar, saturated fat, and salt).[7] For example, some districts in Brazil and Mexico have banned the sale of UPFs (which are also high in sugar, salt, and fat) in schools (Desiderata Institute, 2023; Reiley, 2022; The Global Health Advocacy Incubator, 2023). Similarly, Mexico, Ecuador, Chile, Peru, Uruguay, Argentina, and Columbia require UPFs (high in sugar, salt, and fat) to be labelled with black octagon, which warns consumers not only about the macronutrient profile but bans the use of certain persuasion techniques on food labels[8] (Chen, 2023; Nowell, 2024). Over 45 countries have imposed taxes on some ultra-processed beverages[9] (Popkin et al., 2021), while other countries are considering adopting similar measures. In other words, while some countries in the Latin America have adopted additional restrictions for the sale and advertising of some UPFs, most countries continue to largely rely on the food informational model, which is based on the macronutrient profiling paradigm, to protect consumers from unhealthy diets (Desiderata Institute, 2023; Popkin et al., 2021; Reiley, 2022; The Global Health Advocacy Incubator, 2023).

[6] All UPFs are commercially produced as per NOVA classification.

[7] Under the NOVA classification, the defining characteristic of UPFs is the extent of food processing rather than the macronutrient profile (i.e., fat, sugar, or salt). Although many UPFs are high in macronutrients of concern, this is not an essential feature. Instead, what fundamentally distinguishes UPFs is the intensive processing they undergo and the use of additives that enable this ultra-processing.

[8] For example, a ban to use nutrition claims such as high in vitamin C, high in calcium; cartoon characters; and promotions on food product labels.

[9] Again, it largely targets those UPF beverages that are high in macronutrients of concerns.

The EU's regulatory approach to UPF markets as well as to the food markets more generally has been heavily, almost exclusively, reliant on information regulation (Friant-Perrot & Garde, 2014; Gokani, 2024; MacMaolain, 2007. For example, the nutritional labelling requirements, health claim regulations, and the famous "traffic light system" implemented across European countries, as well as nation-state-led dietary and healthy eating programs, all seek to inform and empower consumers to make healthier food choices (Garde, 2008). Under this neo-classical economic rationale for market regulation, consumers are expected to take responsibility for their food choices, which are informed by the food information provided on labels or elsewhere.

Legal scholarship has actively engaged with this regulatory paradigm, tirelessly documenting many limitations to consumer empowerment via information, such as pointing out consumer cognitive biases or heuristics, which prevent them from paying attention to food information, understanding it, drawing correct inferences, or using that information to support their decision-making on food consumption (Alemanno, 2013; Aparicio, 2013; Gokani, 2022, 2024; Huizing Edinger, 2013; Lang et al., 2009). Some have suggested that the EU's regulatory efforts to reduce UPF consumption, albeit not necessarily directly, through increased market transparency and informational flow are counter-productive, given the incessant and highly effective marketing of UPFs and their accessibility in terms of cost and convenience (Bartlett & Garde, 2013; Galmiche et al., 2023; Garde, 2008; Handsley & Reeve, 2020; Ngqangashe et al., 2022). But perhaps the most pertinent problem with the EU's current regulatory approach to UPF markets more specifically, and food markets more generally, is its limited acknowledgment of the significance of economic, social, and cultural environments, which often determine food choices (Gemayel, 2022; Gokani, 2024).

Although scholarly engagement with the regulation of UPF markets within food law and policy is expanding (Edinger, 2014; Gemayel, 2022), the current legal debate remains largely focused on the consumer informational paradigm and its limitations in addressing the challenges that the UPF markets pose. This might be for several reasons. First, current legal scholarship is naturally structured around and responds to the EU food law's regulatory rationale, focusing on the framing of "UPF consumption" rather than, or in addition to, "UPF safety" as a regulatory problem. In other words, many different safety rules and processes are in place to ensure food safety, including UPF safety, in EU markets, such as food import rules, food hygiene rules, protections from food contamination, rules on food additives, and other,[10] which are presumed to protect consumers from food safety concerns within the EU food marketplace (Bremmers & Purnhagen, 2018). What this in effect means is that EU food law distinguishes UPF safety from UPF consumption, legally framing the *over-consumption* of UPFs, not the *safety* of UPFs, as a regulatory problem. Consumer information paradigm which targets over-consumption rather than safety is a regulatory response that is thus not surprising, and neither is the continued scholarly attention to and interrogation of the information regulatory approach.

Second, the food industry's role in shaping scholarly, including regulatory and policy debate on food more generally, and UPF markets, more specifically, has been significant. Creating scientific uncertainty and blurring boundaries between "healthy" and "unhealthy"

[10] That is, General Food Law Regulation (Regulation (EC) No. 178/2002); Hygiene Regulations (Hygiene Package); Official Controls Regulation (OCR)—Regulation (EU) 2017/625; Regulations on Novel Foods and GMOs No. 2015/2283 and No. 1829/2003; Regulations on Animal Health and Welfare, No. 2016/429 and No. 1099/2009; Regulation on Food Contact Materials, No. 1935/2004.

foods has been one of the most popular and effective techniques of persuasion used by the food industry to argue against increased regulation for UPFs and, instead, increased attention to changing consumer behaviour via information and education. See, for example, a quote from an article published in the *Journal of Food Law and Policy,* written by a representative of the European Sugar Association, who was reflecting on WHO's and UN's concerns in early 2010 about diet-related rise in noncommunicable diseases:

> The Political Declaration partly blames obesity and other noncommunicable diseases on consumption of certain types of foods or nutrients (e.g., food s high in fat, sugars, and salt), and on advertising strategies of such products towards children. This has confirmed a growing tendency within countries to take initiatives that draw a distinction between "healthy" and "unhealthy" foods, without necessarily following the principles that obesity results from an imbalance between energy intake and expenditure and that educating consumers about having a balanced diet and an active lifestyle is more appropriate than demonising a specific nutrient. The question then revolves around how far governments should go to regulate the manufacture and sale of food products under the pretext of consumer protection (Majster, 2021, p. 182).

The food industry's participation at local and global policy-making on food matters and their continued insistence on increasing regulation to address consumer unhealthy diets rather than unhealthy food products is not new and has been widely discussed in academic scholarship (Cannon, 1987; Koszucka et al., 2020; Ramsay, 2012; Scott, 1990). The creation of the European Food Safety Authority in fact was one of the most prominent attempts to rebalance power relations within the European food policy-making (Ramsay, 2012). Some however argue that the industry's presence in scientific research and representation at regulatory and policy-making bodies remains considerable (Tulleken, 2024). For example, most recently, the technique of "scientific uncertainty" directed at Monteiro's definition of UPF has been widely used to move regulatory and public debates away from UPF as a problem and towards concerns over consumer behaviour and their balanced diets (for some examples, see, Gibney et al., 2017; Jones, 2019; Knorr & Watzke, 2019; Loth, 2024; Robinson, 2024; Sadler et al., 2022).

Third, the type of consumer harm that is attributed to UPF markets has arguably influenced the legal scholarship's direction of travel away from questions of UPF safety and towards questions of healthy and balanced diets. Health risks linked to UPF consumption are not immediate or noticeable. A one-off or even an occasional consumption of a diet coke or a portion of industrially produced ice cream is unlikely to pose health risks to consumers. However, consumption of UPF over extended periods of time has been linked to increased health risks, suggesting that the nature of harm that emanates from UPF markets is in fact slow, routine, compounding over time and thus often hidden or easily misattributable to other causes, such as lack of exercise or lack of willpower (Bonaccio et al., 2021; Chen et al., 2022; Cordova et al., 2023; Lane et al., 2024; Rico-Campà et al., 2019; Tulleken, 2024). Thus, the informational paradigm aimed at changing unhealthy diets has arguably been seen as an effective response to UPF-related harm (Gemayel, 2022; Huizing Edinger, 2013). Additionally, food safety laws have historically evolved as a response to scandals, health crises, or food frauds—events and circumstances that often exposed extensive, shocking and immediately noticeable harm to consumers, such as listeria, salmonella, BSE in beef, anti-freeze in wine, and many more, and which could be directly attributed to a specific substance, contaminant, or pollutant in the food (Bradgate & Howells, 1991; Echols, 1998; Kets, 2016; Leighton, 2016; van der Meulen et al., 2015). Thus, consumer harm associated with UPF markets does not seem to fit easily within the legal academic

tradition of food safety. However, as studies in nutritional science on associations between consumer ill health and UPF consumption show (Bonaccio et al., 2021; Chen et al., 2022; Cordova et al., 2023; Lane et al., 2024; Rico-Campà et al., 2019; Tulleken, 2024), consumer harm within UPF markets seem to lie at the intersection of both the food information and the food safety frameworks.

Thus, in this article, I suggest that UPF markets pose questions for consumer law and policy not only about UPF consumption and the consumer informational model of protection, but also about UPF *safety* and the food safety framework. I argue that legal studies on food information should be brought into the conversation with food safety law scholarship to build an understanding of UPF markets and their impacts on consumers, which extends beyond a simplifying narrative of UPF *consumption* vs UPF *safety*, where UPF *safety* is legally assumed and where UPF *consumption* is regarded as a regulatory problem. Drawing from Iain Ramsay's work on the "politics of products safety," I suggest that a rethink of the EU's food safety framework, which includes UPF safety, is particularly timely, given the EU's continued prioritisation of information regulation, in spite of the growing studies on the dangers of UPF markets to human health. To examine these questions, the article uses a case study of food additive regulation to examine legal safety claims and safety distribution, to which I shall now turn.

Food Law, Regulation of Food Additives, and UPF Markets

The article's analytical focus on the regulation of food additives might not be an obvious choice. Thus, before I examine how the regulatory framework on food additives understands and distributes risk and safety within UPF markets, it is important to explain why food additives play an important, arguably essential role, in the construction and development of UPF products and UPF markets.

Some food additives have a long history in safeguarding population health and preserving food. For example, pickling with vinegar or preserving food with salt or sugar have been a part of human development for many centuries (Avey, 2014). However, Monteiro's NOVA classification suggests that it is the use of industrially produced food additives—unlike more traditional additives such as salt, sugar, or vinegar—that distinguishes UPFs from other food groups. These additives comprise a wide range of substances not typically consumed as food or used as food ingredients. Food additives, such as different colours, preservatives, antioxidants, emulsifiers, thickeners, gelling agents, stabilisers, flavour enhancers, sweeteners, raising agents, acidity regulators, firming agents, modified starches, bulking agents, anti-caking agents, and enzymes, perform different functions (Branen et al., 2001) that are absolutely essential for the production of a UPF product. For example, food additives help combine ingredients that naturally do not combine (think of water and oil), glue ingredients together that are dry, dye ingredients that lost colour due to intensive processing, add texture, smell, or taste to products that were lost in the intense manufacturing process, extend the storage and shelf-life of food, or make the food look better. Some of these additives are natural (meaning, they have been extracted from nature, such as salt used to preserve meat or fish), and some are synthetic (human-made, such as monosodium glutamate, BHA, BHT). Essentially, without food additives, the production and industrial manufacturing of UPF would not be possible. The varied functions that additives perform are at the very core of UPF manufacturing, the result of which are products with long shelf life and hyper-palatability in terms of texture, taste, colour, and smell.

In addition to that, food additives facilitate cost-cutting within the UPF global marketplace. Due to advancements in food processing technologies, the food industry has been increasingly replacing expensive ingredients with cheaper, modified versions (Tulleken, 2024), while using food additives to imitate the taste, smell, colour, or texture of the original expensive ingredients. For example, expensive ingredients such as milk, cream, eggs, and olive oil can easily be replaced with cheaper versions such as palm stearin, palm kernel oil, or reconstituted milks. Expensive butter is often replaced with cheap starches that are extracted from many different plants and modified so they can be mixed with water to make all sorts of gels and pastes with different textures at different temperatures (Tulleken, 2024). Fats are often replaced with cheaper versions of plant oils, which are transformed into a more solid texture through hydrogenation. Once hydrogenated, these oils are refined, bleached, and deodorised to remove impurities, colour, and taste. In fact, the natural colour, taste, and texture of freshly pressed plant oils pose challenges for UPF manufacturers who require universally usable oils—those that are tasteless, odourless, and colourless, suitable for any UPF product (Tulleken, 2024).

The interchangeability of these plant-based oils is extremely useful in managing market fluctuations; for example, if olive oil prices spike, it can easily be substituted with a cheaper option, like palm or sunflower oil. Additives such as emulsifiers, gums, colours, and preservatives play a crucial role in processing these inexpensive ingredients and enhancing the final UPF product. When food processing through extraction, refinement, and modification results in the loss of taste, texture, colour, or smell—a process intentional and desirable by UPF manufacturers—additives not only restore these qualities but also enable the development of UPF products with new, varied textures and tastes that align with diverse consumer preferences across different regions.

Under current EU food law, all food additives must be authorised by the European Food Safety Authority (EFSA) (Regulation (EC) No. 1333/2008 of the European Parliament and of the Council of 16 December 2008 on food additives) and, once authorised, are regarded as safe for human consumption. However, the legalised use of additives in food is a relatively recent development from the mid-1900s, whereas the history of banning food adulteration and additives extends much further back. Thus, to understand how food additives became widely used in food production and global trade, as well as the role played by the chemical industry, it is helpful to examine the much longer history of legal controls over food adulteration.

The "Politics" of Historical Regulation of Food Additives: Chemical Industry and Trade Liberalisation on International Regulatory Agenda

Legal controls over what could be added to food have a long history, with some dating back to ancient laws, where, for example, the sale of watered-down beer was prohibited in Babylon (1750 BC), the adulteration of grains, oil, and salt was prohibited under Sanskrit law (from 300 BC), and prohibitions on the adulteration of cereals and edible fats in India were imposed around 2,000 years ago (Anklam & Battaglia, 2001). Selective legal controls over food quality and safety continued throughout the Middle Ages,[11] but these were rather limited in scope (Anklam & Battaglia, 2001; Bradgate & Howells, 1991; Bremmers

[11] See, for example, English law on food established by King John *The Assize of Bread and Ale 1266.*

& Purnhagen, 2018). Because early trade in food mostly consisted of raw and unprocessed products, instances of food adulteration were relatively rare. For example, it is difficult to adulterate coffee beans, yet ground coffee has a long history of adulteration (Fortin, 2023). As food became increasingly processed, more opportunities for adulteration emerged, and foods such as wine, bread, beer, honey, and oils became popular targets for fraud (Fortin, 2023). The growth in trade from the sixteenth to the nineteenth centuries, largely driven by colonial expansions, created more opportunities for food adulteration. Consequently, most countries became increasingly concerned with food fraud, leading to the development of distinct and varied national food control systems (Fortin, 2023).

Some European countries adopted national laws, known as "Purity Laws" (Lopez, 2016) to control the quality and standards of specific foods, for example, Germany enforced controls on the minimum alcohol content of fruit liquors and the ingredients of beer; Italy required specific ingredients for pasta; Belgium, France, Spain, Luxembourg, and Italy regulated chocolate density; and France regulated bread ingredients (Guido, 1991; Lee, 1988; Lopez, 2016; Van De Gevel & Mayes, 1989). In addition to addressing food adulteration through "Purity Laws," the use of chemical substances in food, particularly chemicals that were believed to be carcinogenic, was largely banned in many countries (Lopez, 2016). In other words, early regulations of toxic and chemical substances (at the turn of the century) were based on the presumption that "a threshold dose, which can be regarded as harmless, does…not exist" (Jas, 2013, p. 50); as a result, their use in food was prohibited.

However, in the mid-1900s, this cautious and health-prioritising logic, which underpinned the "restrictive" national regulatory approaches in many countries, was replaced with a more liberal approach to chemical product regulation (1945–2000s). This marked the start of intense and extensive growth in the use of chemical products in food, underpinned by the regulatory rationale of needing to balance the practicalities of economic life and international trade with toxicity risk management (Boutillier et al., 2022). Old national food control laws that had developed as a result of historical food scandals and fraud created different food standards across countries, which became particularly problematic for global traders (Fortin, 2023), who argued that disparate standards created unjustifiable barriers to trade. Trade organizations started engaging in lobbying activities to remove trade barriers by harmonising food standards (Jas, 2013).

The USA's chemical industry was noticeably influential in such global food standard harmonising initiatives. After the end of the Second World War, the synthetic chemistry industry, largely driven by USA companies such as Dow Chemicals, Monsanto, and Dupont-Nemours, became increasingly interested in finding new ways for their synthetic chemicals to be used for purposes other than the war industry. The use of these synthetic chemical products in the food industry and agriculture, it was argued at the time, could address global hunger concerns as well as increase agricultural productivity (Boutillier et al., 2022). At the same time, increasing consumer awareness and interest in the quality and safety of food grew, and consumer groups started pressuring their governments to increase protections against hazardous foods, particularly globally traded foods, for which protection was limited due to differences in food standards across countries (Fortin, 2023). Global traders, consumer groups, and regulators thus started looking for international leadership in harmonising food safety standards, which in the mid-1900s led to the establishment of major international regulatory organizations: the Food and Agriculture Organization of the United Nations (FAO) in 1945 and the World Health Organization (WHO) in 1948.

One of the first and most important tasks that the FAO and WHO undertook was an international, collaborative work on the regulation of food additives (Boutillier et al.,

2022). It was initiated well before even the international food safety standards were harmonised via the Codex Alimentarius Commission in 1963. In 1955, the Joint FAO/WHO Expert Committee on Food Additives (JECFA) was established and tasked as an international agency to consider and offer advice on the safety of food additives. Interestingly, it suggested that health concerns needed to be considered in relation to restrictive policies' effects on international trade, proposing to move towards a less restrictive regulatory approach on additives. In other words, instead of banning all toxins, the Committee suggested that the regulation should be relaxed, moving towards governing toxicity risk through authorisation of additives; instead of banning all additives, the idea of developing "positive lists" of additives that could be safely added to food came to dominate debates on global additive regulation (Jas, 2013).

The construction of the "positive lists" by the Committee however was difficult to achieve in practice as food additives and their uses differed significantly across countries, and so a single international "list" was simply not feasible at the time. Although the function of such "positive lists" was to identify additives that were safe and those that posed risks to human health, in effect, this meant refusing to authorise additives with variable risks depending on the doses of use. This regulatory approach, which either authorised an additive for use in food or banned it, was considered impractical and unnecessarily restrictive to international trade (Jas, 2013). As a result, in the 1950s–1960s, the Committee devised the acceptable daily intake (ADI)—a scientific method used to assess the risk of danger and harm of additives' toxicity (Jas, 2013). ADI as a measure of toxicity was seen as a practical solution to the differences in political and economic contexts at the time: it allowed for adjustments in daily intakes of additives on the basis of diet variability across contexts. As Jas has explained: "The fact that ADI…became one of the pillars of the construction of regulations on food additives and contaminants on an international, European and national scale, is probably due far more to this indicator's capacity to serve the interests of economic development than to its capacity to effectively guarantee the protection of public health" (Jas, 2013, p. 62).

Despite *considerable scientific disagreement* on the rigor and appropriateness of using ADI to measure safe levels of additives' toxicity, it was adopted in 1960 (Jas, 2013). The JECFA has played a leading role in setting the worldwide agenda for how food additives should be evaluated, and the ADI measure was increasingly used in many countries, including EU member states, to determine the safety of food additives (Jas, 2013).

A few years after the JECFA was set up, the European Economic Community was created, leading the initial six member states to tackle barriers to trade. The different national controls on food additives were one such barrier, and the adoption of a Directive on colouring matters in 1962 was the first step in harmonisation (Jukes, 2020). This was followed by directives for preservatives (1964), antioxidants (1970), and emulsifiers, stabilisers, thickeners, and gelling agents (1974). The EU adopted the ADI methodology as part of its regulatory framework for food additives, aligning with the global standards set by JECFA (Magnuson et al., 2013). Over the years, the EU developed more sophisticated food additive regulations under the Scientific Committee on Food (SCF) and later under the EFSA, which continues to assess ADIs today. The ADI as a risk management technique became highly "sticky" and difficult to challenge despite growing studies pointing to harmful effects on consumers.

For example, despite studies dating back to the late 1970s showing that certain food colourings (E102 tartrazine, E104 quinoline yellow, E110 sunset yellow FCF, E122 carmoisine, E124 ponceau 4R, E129 allura red) cause food intolerance and attention deficit hyperactivity disorder-like behaviour in children (Millichap & Yee, 2012; NHS, 2018), the

EFSA refused to ban these additives (Lopez, 2016). Instead, it used information (on labels and warnings for children) to nudge consumers to reduce or avoid foods containing these substances, which are often found in soft drinks, sweets, cakes, and ice cream (Boutillier et al., 2022; Dipalma, 1990; Millichap & Yee, 2012; Tomaska & Brooke-Taylor, 2014). Similar concerns had been raised regarding other additives, as Lopez has noted:

> …in June 2012 The Centre for Science in the Public Interest…published results of its own study demonstrating alarming levels of carcinogens in Coca-Cola formed by ammoniated caramel colouring. Nevertheless, EFSA rules in the same year that dietary expose was lower than the predetermined ADI level, and therefore the colouring additive was safe for consumption. Sodium nitrite is responsible for the desirable red or pink colour of packaged meat, but its toxicity at high doses has resulted in its application to humanely induce death in feral pigs and wild boar. Propyl gallate protects the oils and fats in products from oxidation, but a 2009 study found that propyl gallate also acts as an oestrogen antagonist. Butylated hydroxyanisole (BHA) and butylated hydroxytoluene (BHT) have been added to edible fats and fat-containing foods for their antioxidant properties; notwithstanding, the U.S. National Institute of Health's report that BHA is reasonably anticipated to be a human carcinogen based on evidence of carcinogenicity in experimental animals, and studies remain divided whether BHT raises the risk of cancer, asthma, and behavioural issues in children. Carrageenan is widely used throughout the food industry for its gelling, thickening and stabilizing properties. Following several peer-reviewed animal studies that found tumour growth was promoted or initiated by carrageenan, scientists have raised concerns about whether the food-grave variety of the additive may lead to parallel health problems in humans (Lopez, 2016, pp. 227–228).

These scientific studies and growing public concerns over the safety of food additives have had an impact on the EFSA's regulatory approach to chemical products since around the mid-2000s (Boutillier et al., 2022; Lopez, 2016; Magnuson et al., 2013), where daily intake levels for some additives were lowered (for example, indigo carmine, bixin, norbixin, and amaranth) or the use of some additives was banned altogether (for example, titanium dioxide). Although the last decade could be described as a gradual tightening of the EU's approach to additive regulation, concerns persist over the food industry's influence over the regulation of food additives (Corporate Europe Observatory, 2022), where, for example, over-reliance on scientific studies funded by the industry resulted in a questionable approval of a harmful additive (i.e., aspartame) (Millstone & Dawson, 2019).

To address some of this criticism, in 2008, the EU adopted a new framework for additives under Regulation (EC) No. 1331/2008. This framework included separate regulations for food additives (1333/2008/EC), food enzymes (1332/2008/EC), and flavourings and food ingredients with flavouring properties (1334/2008/EC). It was designed to be more focused on consumer health than previous regulatory attempts (Jukes, 2020). Under Regulation (EC) No. 1331/2008, food additives are subjected to safety evaluations by the EFSA and must be approved for inclusion on a Community list. The inclusion of an additive on this list is based on the EFSA's assessment of its safety.[12]

[12] Additionally, the EFSA undertook a re-evaluation of the safety of all food additives that were permitted for use in the EU before 2009, aiming to provide further assurances about their safety. Although the EFSA was tasked with completing this re-evaluation by 2020, so far, only 70% of additives approved before 2009 (315 in total) have been re-evaluated (European Food Safety Authority, 2024).

The historically influential role of the chemical—and later, food—industry in shaping expert knowledge within the food science community, as well as in driving trade liberalization movements during the 1960s–1980s, enabled the extensive and rapid expansion of additive use in food production (for evidence on this, see Henry et al., 2021; Jas, 2013; Lin, 2023; Tulleken, 2024). This growth was accompanied by an increase in food scandals related to additive-rich foods, as well as scientific studies raising concerns over the safety of specific additives (Henry et al., 2021; Weeks, 2014). At the EU policy level, several initiatives were undertaken to address these developments, such as the establishment of the EFSA and the adoption of a new regulatory framework for food additive regulation in 2008, focusing on prioritising consumer health in food policymaking and increasingly relying on science to "depoliticise" food safety.

However, I argue that while "turning to science" might have reduced the longstanding influence of the chemical and food industry on policy-making, food safety remains to be a political issue, not just a scientific one. As Ramsay has reminded us, regulation of safety raises ethical questions about consumer right to protection from certain risks to life and health. Thus, defining what the acceptable levels of such risks are is not merely a technical question of measuring it; it is also, as Ramsay has insisted, a political question of value judgement, which change over time and context (Ramsay, 2012). Importantly, this judgement of safety also involves a judgement of distribution of safety and risk. As Ramsay has put it:

> Distributional issues are particularly significant when one is dealing with potential inequalities in risk. The methodology of cost-benefit analysis may bias outcomes in favour of certain groups…if social preferences for safety are measured by consumers' willingness to pay, then, given that those with higher incomes will be wiling to pay more, a cost-benefit analysis would be likely to support a proposal to increase the safety of a product at the cost of an associated increase in price that might deny poorer consumers access to the product (Ramsay, 2012, p. 586).

What Ramsay has implied here is that our understanding of safety should also consider how safety is distributed across societal groups without presuming that the choice of safety will be distributed evenly. Examining the impacts of safety and risk distribution becomes particularly crucial when the law aims to regulate consumer access to products, such as food, which is critical to consumer health and survival. Drawing on Ramsay's insights, the following section examines how the EU conducts risk assessments of food additives to understand the legal assumptions about safety. Additionally, as Ramsay suggests—and perhaps more importantly—I explore how additive safety is distributed within current UPF markets. Supported by evidence from nutritional epidemiology and food studies in sociology, culture, and geography, I argue that the EU's food additive risk assessment has significant limitations—not only in the risks it fails to measure but also in identifying and protecting consumer groups who are most likely to be exposed to such risks.

UPF Safety Problem: the EFSA's Risk Assessment of Food Additives

The EU's key principles for governing food safety are outlined in the General Food Law Regulation (Regulation (EC) No. 178/2002), which was adopted by the European Parliament and the Council in 2002 (GFL). The GFL defines risk analysis as a process consisting of three interrelated components: risk assessment, risk management, and risk

communication. This definition aligns with international standards historically developed by the FAO/WHO through the Codex Alimentarius Commission. In this framework, the Council and the Commission are responsible for risk management and risk communication, while the EFSA serves as an independent scientific risk assessor at the EU level. According to Article 3(9) of the GFL, a "risk" is defined as "a function of the probability of an adverse health effect and the severity of that effect, consequential to a hazard." A "hazard" is further defined in Article 3(14) as "a biological, chemical, or physical agent in, or condition of, food or feed with the potential to cause an adverse health effect." This means that the EFSA's food safety risk analysis is specifically limited to the scientific evaluation of biological, chemical, or physical hazards in food. As a result, any health threats or hazards that do not fall within these categories are not considered under the legal definition of food safety in the EU. Therefore, the EU's GFL clearly distinguishes between risks that are included within the legal framework for food safety and those that are excluded.

So, what are the effects of such conceptualisation and the legal framing of food safety and food risks in relation to food additive regulation, specifically, and UPF markets, more generally? All food additives to be legally used in food need to be authorised by the EFSA as they have the potential to produce chemical hazards in food. This means that, generally, food additives do fall under the food safety framework and the EFSA is responsible for assessing their safety. However, my analysis of the EFSA's risk assessment process shows that the additive safety framework is limited. As a result of such limited framing, health risks that are specifically typical to UPF markets fall outside of the legal framing of food hazards as well as the food safety legal paradigm. Instead, EU food law approaches such risks as a regulatory problem of *over-consumption* and seeks to govern them via the informational paradigm. In the following section, I argue that food additives that are ubiquitous in UPF markets should be considered a *food safety issue*, not merely an *over-consumption* issue, as they present health risks to consumers that are currently untested and unknown.

To determine the safety of food additives, the EFSA carries out classical toxicological studies that aim to establish the safe levels of daily intake for each food additive. There are no requirements to conduct clinical trials on food additives (European Food Safety Authority, 2024). Broadly speaking, risk assessment primarily tests whether an additive has a toxic effect on the body. This process involves conducting animal feeding studies to identify the highest dose of an additive that can be consumed daily without causing toxic effects. The toxicological testing includes studies to daily is complicated because diets differ significantly. For example, while the same ADI levels for specific additives established by the EFSA apply across all EU states, dietary patterns vary significantly: Italy and Spain have relatively low consumption of additive-rich UPFs compared to Germany and the UK[13] (Mertens et al., 2022). What is more, neither the GFL nor the EU's food information laws require manufacturers of UPFs to disclose the specific amount of additives in their products, making it impossible for consumers to know how much of these additives they consume per day or how that compares to the ADI. Some studies have examined the intake of certain additives in countries, such as the UK, Italy, France, Ireland, Brazil, and Australia, and have found that both children and adults sometimes exceed the ADI for some additives (Choice, 2020; Kraemer et al., 2022; Vin et al., 2013).

What is perhaps even more problematic is that toxicological studies, while undeniably important, are limited in their ability to capture and investigate other forms of harm to

[13] While after Brexit, the FSA, not EFSA, is currently tasked with assessing the safety of food additives, a great number of ADI levels approved through the EFSA process still apply in the UK.

health that modern UPF markets produce. To understand and investigate these other forms of harm, methodological tools found in disciplines such as epidemiology, behavioural science or the sociology of food are more appropriate than the limited scope of toxicological studies. To further illustrate my arguments, I provide some examples of these limitations below, which are by no means exhaustive.

Scientists in the field of nutritional epidemiology have raised concerns about the cumulative effects of food additives on human health, which are currently untested in toxicological studies (Touvier, 2024). As a result, the EU's conceptualisation of risk in food law also excludes the cumulative harm that the consumption of multiple additives might have on consumer health. This is particularly important in relation to UPF markets as each UPF product often contains not one but a variety of additives (Monteiro et al., 2016). Furthermore, current data on additive-rich UPF consumption shows that consumers often eat several UPF products per day (Chazelas et al., 2021; Newman & Spector, 2024). In some cases, particularly among children, UPFs constitute as much as 60% of their average daily dietary intake, yet the cumulative effects of such high consumption of additives found in UPFs are untested and unknown. While toxicological studies examine the effects of each additive individually, no assessments are carried out to investigate the effects of cocktail of additives. The cumulative, long-term effect that occurs slowly over decades of consuming these cocktails, including well before a person is born, is similarly untested and unknown (Newman & Spector, 2024).

Consuming a mixture of such additives might cause a synergistic, compounded, or antagonistic interaction in the body, yet there is no requirement to test for this harm (Chazelas et al., 2021). Emerging evidence suggests that this potential harm produced by a mixture of additives might further be exacerbated by intensive industrial processing of food; that is, new technologies of food processing that are integral to the UPF production, yet produce toxic substances that are harmful to consumers (Bellicha et al., 2023; Lane et al., 2024; Mehta, 2015). For example, the hydrogenation of oils, an industrial process in which oils are heated in the presence of hydrogen gas at high pressure, has been shown to create trans fats, which have been linked to various health problems, including heart disease, cancer, and immune system disorders (Michels et al., 2021). It was only a few years ago that the EU began regulating trans-fat use in food (Commission Regulation (EU) 2019/649 of 24 April 2019 Amending Annex III to Regulation (EC) No. 1925/2006 of the European Parliament and of the Council as Regards Trans Fat, Other than Trans Fat Naturally Occurring in Fat of Animal Origin, 2019), yet there are other untested and legally permitted forms of food processing that, as emerging evidence suggests, may produce negative health outcomes (Lane et al., 2024).

Studies in nutritional epidemiology have also pointed out that toxicological studies do not assess how additives, both individually and collectively, affect microorganisms in the human gut (Newman & Spector, 2024; Touvier, 2024). Gut microbiome health is a recent but rapidly growing field within nutrition studies, which has expanded to other health fields due to documented significance of the gut microbiome to the overall human health (Kinross, 2024; Valdes et al., 2018). The gut microbiome is a collection of all the genetic material from the microbes in the human gut; it consists of trillions of microorganisms (bacteria, viruses, fungi, protozoa, and many more), and these invisible microbes are essential for the healthy functioning of the body and mind (Irwin et al., 2017, 2022; Nagpal et al., 2021). For example, the gut microbiome not only shapes the human immune system but also helps protect against various pathogens. Scientists have demonstrated that both the health and diversity of these microbial communities are vital for human health (Hul et al., 2024; Kinross, 2024).

Research has shown that the diversity of the Western gut microbiome is decreasing compared to populations living traditional lifestyles, largely due to Western, fibre-poor diets, which fail to provide the primary sources of carbon and energy needed for the distal gut microbiome (Sonnenburg et al., 2016). Concerningly, researchers have found that changes in the gut microbiome resulting from fibre-poor diets, such as those common in UPF markets, could potentially be reversed within a single generation. However, over multiple generations, this type of diet can lead to a progressive loss of diversity that may not be recoverable (Sonnenburg et al., 2016). In addition to being low in fibre, UPFs also contain many food additives that have been found to negatively impact the health and diversity of gut microorganisms. For example, some studies have shown that certain additives, particularly preservatives designed to kill or inhibit bacteria, can significantly disrupt the growth and development of beneficial bacteria in the gut ecosystem (Bancil et al., 2021; Sandall et al., 2020; Swidsinski et al., 2009). In other words, recent evidence suggests that some additives and cocktails of additives might disrupt the healthy growth and diversity of gut microorganisms. It has now been scientifically established that individuals with lower gut microbiome diversity are more likely to develop conditions such as inflammatory bowel disease, celiac disease, type 2 diabetes, eczema, and arthritis (Iatcu et al., 2021; Sonnenburg et al., 2016). Although these studies were conducted using rat and mouse models, and observational evidence on the effects of additives and combinations of additives on the human gut microbiome is still emerging (Laudisi et al., 2019; Touvier, 2024), there is strong evidence to suggest that UPFs, which are low in fibre and rich in additives, are gradually altering the human gut microbiome. As Sonnenburg et al. (2016) have suggested, these changes might become irreversible if Western dietary patterns remain unchanged.

These various studies suggest that the current risk assessment process used by the EFSA to establish additive safety does not test the cumulative effects of additives on consumer health, which are the risks consumers are most likely exposed to when they consume UPFs. What is more, however, consumer exposure to UPFs and the associated health risks with UPF consumption are not evenly distributed across the population. Thus, while, in theory, the EU food law assumes food safety across the single market, in practice, access to safe food is unequal. This is the argument I will address next.

The Problem of Safety Distribution: Unequal Distribution of Health Risks Within UPF Markets

Nutritional epidemiological studies have helped identify health risks that are untested and unaccounted for in the classical toxicological studies on food additives. Although however, while all consumers who consume UPFs are exposed to such untested health risks, some consumers have greater daily exposures, which, as studies suggest, places them at a higher risk of poor health. For example, a recent study, which included data from ten million people, concluded that consuming high levels of UPFs is associated with an increased risk of a range of diseases, particularly cardiovascular and metabolic diseases, in addition to links to mental health conditions which have been rising in Western countries (Lane et al., 2024).

The consumption of UPFs is not even across consumer groups, and its consumption pattern is shaped by the structural context within which consumers live. Studies in geography, sociology, and food culture have produced extensive evidence linking food consumption to a number of intersecting environmental, cultural, socioeconomic, and political factors that shape and often determine everyday food practices (Bakker, 1999; Baltas, 2001; de la

Peña, 2010; Fielding-Singh & Oleschuk, 2023; Sonnino, 2016; Trauger, 2022). For example, a recent extensive study covering evidence on the consumption of UPFs in 32 countries, including 21 EU countries, found that age was significantly associated with UPF consumption in all countries, with children and adolescents consuming the highest levels of UPFs (Dicken et al., 2023). Adults living in an urban residence and unmarried, single, separated, or divorced were also typically associated with a higher UPF intake (Dicken et al., 2023). Lower income and socioeconomic status were linked to higher UPF consumption, although this varied depending on countries and regions. For example, rural living might have reduced UPF consumption levels despite lower income levels (Dicken et al., 2023). Interestingly, education was not found to be a statistically significant marker of higher UPF consumption (Dicken et al., 2023).

Children living in low-income households, who lack a social network and are from single-parent families or living with unemployed parents, were disproportionately likely to be high UPF consumers (Khandpur et al., 2020). UPF consumption in the UK, which is the highest in Europe, is clearly associated with financial disadvantage (Chavez-Ugalde et al., 2024; Gleason, 2022). For instance, the Food Foundation's most recent report found that one-fifth of the most deprived families in the UK would have to spend 50% of their budget to afford the diet recommended by the Government's eating well guidelines (Goudie, 2023), which, concerningly, also includes some UPFs, such as breakfast cereal, flavoured yogurt, or snack bars. This implies that a UPF-free diet for such families would cost even more.

What is more, over 1.2 million people in the UK live in food deserts where "people are likely to pay a higher cost for their weekly food shopping and have to shop in more expensive small convenience stores with a limited stock of good value fresh products" (Blake, 2018). Nearly one million people in the UK do not have a fridge, two million have no cooker, and three million have no freezer, and the rising cost of energy has meant that many cannot afford to use these appliances even if they have them. While most research on food deserts has been conducted on families in the USA and UK, emerging studies on European countries suggest that the problem is rapidly increasing in the EU as well (Cruz-Piedrahita et al., 2024; Helbich et al., 2017; Reimer, 2020; Rochmińska, 2023; Smets et al., 2022). UPFs often become the only viable choice for families with low budgets, as they have a long shelf life, often do not require expensive preparation or processing (such as cooking, frying, boiling, freezing, or pickling), and are much cheaper compared to fresh produce (Gallagher-Squires et al., 2023).

A recent, extensive behavioural study on consumer food choices conducted with EU consumers suggests that consumers continue to prioritise the short-term needs of convenience, price, and taste of UPFs, despite being made aware of the long-term health implications of UPFs (EIT Food Consumer Observatory, 2024). Convenience has been named by consumers as the principal reason for choosing UPF products (EIT Food Consumer Observatory, 2024). For example, a single mother from Denmark said: "I haven't thought of reducing how much UPF I eat, and it's not likely I will. I'm a single parent so time is of great value for me due to the fact that there's only one adult in my household"; another consumer from Italy has remarked that: "Often UPFs are a real lifesaver for a person who works six days a week and dreams of finding something easy and ready when he comes home in the evening" (EIT Food Consumer Observatory, 2024).

These findings are important for current EU food law and policy as they indicate how structural influences shape UPF consumption and, by extension, allocate health risks within food markets: adults who live in urban areas, commute long distances, work long hours, and have competing demands on their time and finances are more likely to consume

high levels of UPF and more likely to be exposed to untested and unknown risks of "additive cocktails," compared to adults who are more time and resource-rich. Perhaps even more concerning is that, in addition to untested cumulative risks of food additives, UPF consumption among children and adolescents has been found to cause addictive effects due to the hyper-palatability of UPFs, which were specifically designed to be particularly rewarding to eat (Gearhardt et al., 2023; LaFata et al., 2024; Tulleken, 2024). This, in effect, means that while, in theory, EU food law assumes food safety for all, in reality, food safety is more structurally accessible for some than for others. Despite this unequal distribution of, and exposure to, health risks resulting from additive-rich UPF consumption, EU food law assumes and expects that such risks are managed via food information. As a result, EU food law individualises the management of structural health risks arising from the high consumption of UPFs, the distribution of which are unequal.

Concluding Thoughts

As global UPF markets continue to expand, there is a clear and troubling link to the rise in diet-related diseases among consumers of additive-rich UPF products. The EU has predominantly responded to this public health challenge, albeit indirectly, by framing the problem as one of over-consumption and addressing it through macronutrient profiling and informational regulation. While this approach seeks to empower consumers to make healthier choices, it arguably overlooks important dimensions of UPF safety and the inequitable distribution of associated health risks across communities.

This paper has argued that the EU food law's reliance on macronutrient profiling and its informational paradigm is inadequate for addressing the full scope of risks posed by UPFs. Emerging evidence demonstrates that even foods with good macronutrient profiles can be harmful due to the level of ultra-processing and the use of food additives. Additives, as a defining feature of UPFs, highlight significant gaps in the EU's safety framework, particularly regarding how safety is defined, measured, and distributed. These gaps raise pressing questions about how EU food law constructs the boundaries of consumer protection and whether it sufficiently accounts for structural inequalities that shape consumer experiences and exposures.

My analysis shows that the current regulatory framing, which reduces serious health concerns to individual over-consumption, fails to address the systemic nature of risks embedded in UPF markets. By overlooking the intersection of additive *consumption* and *safety*, and by extension, UPF *consumption* and UPF *safety*, EU food law effectively individualises structural risks, burdening consumers—particularly the most vulnerable—with managing health outcomes. To address these shortcomings, I argue that questions of additive safety (and by extension UPF safety) and its unequal distribution should be reintroduced into regulatory and legal academic discussions.

The significance of this research extends beyond EU food law and policy, offering a framework for consumer law scholarship to explore safety through a distributional lens. It emphasises the importance of asking whose safety the law prioritises and how safety is allocated within consumer markets. By examining additive safety as a case study, this paper argues for the need to move beyond binary approaches to UPF markets—such as consumption versus safety—and to seek synergies between food safety and consumer information scholarship. Future research should build on this work by exploring other aspects of UPF

regulation, such as processing and marketing, to further advance our understanding of how EU food law can better protect consumers in an increasingly complex food landscape.

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Declarations

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