Ultraprocessed Foods in the U.S.: Recommended Definitions and Policies

Healthy Eating Research

Technical Report, May 2026

Suggested Citation

Lott ME, Taillie LS, Krieger J, Reed L, Ananthan S, D'Angelo Campos A, Story M. Ultraprocessed Foods in the U.S.: Recommended Definitions and Policies. Durham, NC: Healthy Eating Research, 2026. Available at: https://healthyeatingresearch.org/research/ultraprocessed-foods-in-the-u-s-recommended-definitions-and-policies/

*MEL, LST, and JK are joint co-first authors.

Acknowledgements

This expert panel was supported by Healthy Eating Research with funding from the Robert Wood Johnson Foundation. We would like to express our gratitude and appreciation to our panel co-chairs for their leadership throughout this project, as well as to the expert panel members who provided input on the methodology, reviewed the evidence, and actively engaged in panel deliberations. Individuals were invited to serve on this panel based on their subject-matter expertise. The recommendations in this report do not necessarily reflect the views of the organizations with which panelists are affiliated.

We would also like to thank the Global Food Research Program at the University of North Carolina Gillings School of Global Public Health for conducting the policy scan and definition modeling, which informed the panel's deliberations. Finally, we would also like to thank the individuals listed under panel support for their assistance throughout the project.

Panel Chairs

Jim Krieger, MD, MPH
Executive Director, Healthy Food America
Clinical Professor Emeritus, Health Systems and Population Health
University of Washington School of Public Health

Lindsey Smith Taillie, PhD
Professor and Associate Chair of Academics, Department of Nutrition
Co-Director, Global Food Research Program
Gillings School of Global Public Health, University of North Carolina at Chapel Hill

Panel Conveners

Mary Story, PhD, RD
Director, Healthy Eating Research
Professor, Family & Community Health and Global Health
Duke University

Megan Elsener Lott, MPH, RDN
Deputy Director, Healthy Eating Research
Duke University

Panel Members

Emily M. Broad Leib, JD
Clinical Professor of Law
Director, Center for Health Law and Policy Innovation
Director, Food Law and Policy Clinic
Harvard Law School

Scott Faber, JD
Senior Vice President of Government Affairs, Environmental Working Group
Adjunct Professor of Law
Georgetown University Law Center

Jessie H. Gouck, MUP
Health Program Manager, Equity and Strategic Alignment
Nutrition and Physical Activity Branch
California Department of Public Health

Thomas Gremillion, JD, MA
Director of Food Policy
Consumer Federation of America

Alyson E. Mitchell, PhD
Professor and Food Chemist
Department of Food Science and Technology
University of California, Davis

Carlos A. Monteiro, MD, PhD
Professor Emeritus
University of São Paulo, Brazil

Alyssa J. Moran, ScD, MPH, RD
Deputy Director
Center for Food & Nutrition Policy
University of Pennsylvania

Dariush Mozaffarian, MD, DrPH
Director, Food is Medicine Institute
Dean Emeritus, Distinguished Professor
Tufts University

Aviva A. Musicus, ScD
Science Director, Center for Science in the Public Interest
Adjunct Assistant Professor of Nutrition
Harvard T.H. Chan School of Public Health

Jennifer L. Pomeranz, JD, MPH
Associate Professor of Public Health Policy and Management
School of Global Public Health, New York University

Neena Prasad, MD, MPH
Director, Food Policy Program and Maternal & Reproductive Health Program
Bloomberg Philanthropies

Stephanie Scarmo, PhD, MPH
National Senior Policy Analyst
American Heart Association

Marlene Schwartz, PhD
Director, Rudd Center for Food Policy & Health
Professor, Human Development and Family Sciences
University of Connecticut

Johan B. Ubbink, PhD
Professor and Head of Department
Department of Food Science and Nutrition
University of Minnesota

Panel Support

Senthil Ananthan, MPH, MBA
Research Analyst, Healthy Eating Research
Duke University

Lindsey Reed, MPH
Senior Research Analyst, Healthy Eating Research
Duke University

UNC Global Food Research Program Team

Bridget Hollingsworth, MPH, RDN
Project Manager, Global Food Research Program
Gillings School of Global Public Health, University of North Carolina at Chapel Hill

Donna R. Miles, PhD
Director of Research Programming Services, Global Food Research Program
Gillings School of Global Public Health, University of North Carolina at Chapel Hill

Aline D'Angelo Campos, PhD, MPP
Post-Doctoral Fellow, Global Food Research Program
Gillings School of Global Public Health, University of North Carolina at Chapel Hill

Definitions

Additive: Any substance that is used in a way that causes it—directly or indirectly—to become part of a food or to change any of the food's characteristics.[1]

Additives with "cosmetic" functions: Classes of additives whose function is to make the final product palatable or more appealing. Cosmetic additives disguise undesirable sensory properties created by ingredients, processes, or packaging used in the manufacture of ultraprocessed foods, or give the final product sensory properties especially attractive to sight, taste, smell and/or touch.[2,3] Additives with cosmetic function include:

- **Anti-Foaming Agents:** Prevents or reduces foaming.
- **Bulking Agents:** Contributes to the bulk of a food without contributing significantly to its available energy value.
- **Carbonating Agents:** Provides carbonation in a food.
- **Color:** Adds or restores color in a food.
- **Emulsifiers:** Forms or maintains a uniform emulsion of two or more phases in a food.
- **Emulsifying salt:** Rearranges proteins in order to prevent fat separation during the manufacturing of processed food.
- **Flavors:** Enhances, modifies, or imparts specific tastes or aromas.
- **Flavor Enhancers:** Enhances the existing taste and/or odor of a food.
- **Foaming Agents:** Makes it possible to form or maintain a uniform dispersion of a gaseous phase in a liquid or solid food.
- **Gelling Agents:** Gives a food texture through formation of a gel.
- **Glazing Agents:** Imparts a shiny appearance or provides a protective coating when applied to the external surface of a food.
- **Sweeteners:** Imparts a sweet taste to a food (other than a mono- or disaccharide sugar).
- **Thickeners:** Increases the viscosity of a food.

Calcium sulfate: An additive used primarily as a firming agent. It is most commonly found in the food supply as a coagulant in tofu production.

FDA "Healthy:" On December 19, 2024, FDA announced a final rule to update the "Healthy" claim that manufacturers can voluntarily use on food packages. To meet the updated criteria, a food product needs to: 1) contain a certain amount of food from at least one of a set of specified food groups or subgroups recommended by the Dietary Guidelines for Americans (such as fruits, vegetables, grains, fat-free and low-fat dairy, and protein foods), and 2) meet specific limits for added sugars, saturated fat, and sodium.[4]

Generally Recognized as Safe: As currently defined by the FDA, a substance added to foods that is generally recognized, among qualified experts, as having been adequately shown to be safe under the conditions of its intended use. Substances that are generally recognized as safe are not subject to premarket review and approval by FDA. Concerns have been raised regarding the process for GRAS determination, including that food industry entities may independently determine the safety of substances using their own experts, and that notification to

the FDA is voluntary, which may result in the agency being unaware of some substances introduced into the food supply.[5]

Markers of UPFs: Ingredients, additives, or substances that indicate a food product is ultraprocessed according to the Nova classification system.

Mintel's Global New Product Database: Monitors worldwide product innovation and new product activity in consumer packaged goods markets, including foods and drinks, as well as household, beauty, and personal care products. GNPD allows you to screen products by country, category, packaging, price, and other features.[6]

Nitrates and Nitrites: Additives used to preserve food, inhibit bacterial growth, and maintain a pink color in meats. Nitrates and nitrites are commonly found in processed meats (e.g., bacon, ham, sausages).

Non-culinary ingredients: varieties of sugars (fructose, high-fructose corn syrup, 'fruit juice concentrates,' invert sugar, maltodextrin, dextrose, lactose), modified oils (hydrogenated or interesterified oils), and protein sources (hydrolysed proteins, soya protein isolate, gluten, casein, whey protein and 'mechanically separated meat') that are not typically used in home kitchens.[2]

Non-sugar sweeteners: Ingredients used to sweeten and in some cases enhance the flavor of foods or beverages. Most provide few or no calories and are much sweeter than table sugar, thus smaller amounts are needed to achieve the same level of sweetness in food. There are six high-intensity sweeteners approved by the FDA as food additives: aspartame, acesulfame potassium (Ace-K), sucralose, neotame, advantame, and saccharin. In addition, three plant- or fruit-based high-intensity sweeteners are generally recognized as safe and thus permitted for use in the food supply: steviol glycosides, monk fruit (also known as Luo Han Guo), and thaumatin. Sugar alcohols (polyols) are also generally recognized as safe and approved for use as sugar substitutes in foods.[7] Finally, FDA recognizes "non-traditional sugars," which are metabolized differently than traditional sugars: allulose, D-tagatose, and isomaltulose.[8]

Nova: A classification system for the primary purpose of categorizing foods according to the extent and purpose of industrial processing[2]:

- **Unprocessed or minimally processed foods (Nova Group 1)**: Foods that have not been altered from their original state or that have only been altered using simple industrial processes that do not add salts, fats, or sugars. The main purpose of the processing methods employed in this category is to extend the life of the food or facilitate its preparation. Examples include removing unwanted parts, drying, crushing, grinding, fractioning, roasting, boiling, pasteurization, refrigeration, freezing, and vacuum packaging.[2]
- **Processed culinary ingredients (Nova Group 2):** Substances obtained from whole foods and used in culinary preparations rather than consumed on their own. Examples include oils and fats, sugar, and salt.[2]
- **Processed foods (Nova Group 3):** Industrial products made by adding salt, sugar or other substances found in Nova group 2 to group 1 foods, using preservation methods such as canning and bottling, or non-alcoholic fermentation.[2]
- **Ultraprocessed foods (UPFs) (Nova Group 4):** Industrial formulations containing few or no whole-food ingredients and assembled into edible products using a series of intense physical and chemical processing methods. The main purpose of the processing methods employed in this category is to create highly profitable products due to their low cost, long shelf life, high sensory appeal, and high convenience—thus displacing foods from other categories, which make up traditional dietary patterns all over the world. Examples of processing methods include hydrolysis, hydrogenation, interesterification, extrusion, molding, and pre-frying. UPFs also often contain not only salts, fats, and sugars, but also ingredients of exclusive industrial use (i.e., not used in home kitchens) and cosmetic additives that enhance the final products' sensory properties.[2]

Vitamins and Minerals: Micronutrients recognized as essential for human nutrition for which FDA has established Reference Daily Intakes (RDIs) used in nutrition labeling.

Abbreviations

The following abbreviations are used throughout the report, and further defined where necessary.

FDA. U.S. Food and Drug Administration

FGE. Food Group Equivalent

GNPD. Mintel's Global New Product Database

GRAS. Generally Recognized as Safe

HFSS. High in fat, sugar, and salt

NFP. Nutrition Facts Panel

NPM. Nutrient Profile Model

NSS. Non-Sugar Sweetener

PAHO. Pan American Health Organization

RACC. Reference Amount Customarily Consumed

SATF. Substances Added to Food database

UPF. Ultraprocessed Food

Contents

Introduction

Under the widely used Nova classification system, ultraprocessed foods (UPFs) are industrial formulations that contain few or no whole-food ingredients and have gone through intense physical and chemical processing methods to enhance their shelf life, convenience, and sensory appeal. Common examples include most sweetened and diet beverages, flavored chips, and candies, as well as many breakfast cereals, breads, baked goods, flavored dairy products, processed meats, and ready-to-eat meals.

The U.S. has one of the highest levels of UPF consumption in the world,[9,10] posing significant concerns for public health. UPFs have become a large portion of the American diet largely because they are widely available, heavily marketed, inexpensive, convenient, and highly appealing. Estimates suggest that between 53%-58% of calories consumed by U.S. adults and 62% of calories consumed by U.S. youth come from UPFs.[11–14] UPFs can even be an issue for the youngest consumers, as evidenced by a recent study, which found that of 651 infant and toddler food products sold in the eight largest grocery stores in North Carolina, 71% were classified as UPFs.[15] Although UPF intake is high across the entire U.S. population, estimates suggest that individuals with lower education levels and lower incomes tend to consume more UPFs than their counterparts.[12,16,17]

Short-term intervention trials demonstrate that dietary patterns high in UPFs lead to higher energy intake and adverse weight outcomes,[18–20] while observational studies consistently link high UPF intake to increased risk of adverse health outcomes such as cardiovascular disease and mortality, all-cause mortality, type 2 diabetes, obesity, depression, and anxiety, among others.[9,21] This growing body of evidence documenting harms from UPFs has driven interest in policy interventions to limit their consumption. This interest has been further fueled by efforts from the current federal administration, the Make America Healthy Again (MAHA) movement, and state legislation to regulate food additives and UPFs.

Despite growing interest, there is no consensus on how best to define UPFs for policy purposes. As a result, advocates and policymakers have proposed a wide range of UPF definitions, some of which are not well aligned with the scientific evidence linking UPFs to health harms. At the same time, definitions established by researchers may be difficult to operationalize for policy as they often require detailed, product-level review that is impractical for implementation. To advance effective nutrition policy, policymakers need a clear, evidence-informed definition of UPFs that can be applied consistently across settings. They also need practical policy solutions to reduce harms from UPF consumption, along with an understanding of each option's strengths and limitations.

Purpose

To address these needs, Healthy Eating Research (HER) convened an expert panel with the goal of developing evidence-informed recommendations for policymakers and advocates to consider as they advance legislative, regulatory, or other policy actions to limit UPF exposure and consumption at the local, state, and federal levels. The panel was charged with:

- Assessing evidence on existing UPF definitions and policies to recommend a definition of UPF suitable for guiding policy development.
- Identifying and assessing policy options to reduce UPF exposure and consumption in the U.S.

At the time of writing, the Expert Panel recognizes that the U.S. government—through a joint effort of the FDA, HHS, and USDA—is actively developing a definition of UPF.[22] The panel intends for this work to help inform and strengthen that ongoing effort.

Background

This section of the report provides an overview of the origins and role of food processing, existing ultraprocessed food definitions, and a summary of the evidence linking ultraprocessed food consumption with adverse health outcomes.

Food Processing

Food processing encompasses any action that alters foods from their natural state. Humans have processed foods for thousands of years, with early cooking and preservation methods playing a foundational role in human evolution and survival.[23] Traditional food processing has long played an important role in the food system by extending shelf life, enabling foods to be transported far from where they are produced; reducing food waste; inactivating food-borne pathogens; facilitating culinary preparation; and improving the digestibility and bioavailability of certain micronutrients.[24–26]

In contrast, the purpose and extent of industrial food processing shifted dramatically in the mid-20th century, expanding well beyond preservation and safety. This shift was driven by changing societal conditions that reduced time and opportunities for home cooking—most notably women's increased participation in the workforce—as well as food manufacturers' efforts to create highly profitable products.[27] With the introduction of modern processing techniques and an expanding array of cosmetic food additives, processing increasingly served to make foods more affordable, convenient, and highly appealing to human senses. Over time, these products began to replace home- and community-based food preparations and displaced traditional diets, raising broader societal concerns about the shift in control over cultural norms

and social food practices from individuals and communities to commercial entities. In this context, researchers sought to examine whether foods produced through these novel methods and for these new purposes were associated with adverse health outcomes. Doing so required a systematic approach to classifying foods by their degree of processing, which ultimately led to the development of the Nova classification system.[9]

Ultraprocessed Food Definitions

The Nova Classification System

The Nova classification system was developed by researchers from the Center for Epidemiological Studies in Health and Nutrition at the School of Public Health, University of São Paulo in Brazil for the primary purpose of categorizing foods based on their degree of processing for research studies. The Nova classification system divides foods into four mutually exclusive groups described in **Table 1**: unprocessed or minimally processed, processed culinary ingredients, processed foods, and ultraprocessed foods.[9]

Table 1. **The Nova Classification System[9]**

Category	Definition	Examples
Unprocessed or minimally processed foods **(Nova 1)**	Foods that have not been altered from their original state or that have only been altered using simple industrial processes that do not add salts, fats, or sugars. The main purpose of the processing methods employed in this category is to extend the life of the food or facilitate its preparation. Examples include removing unwanted parts, drying, crushing, grinding, fractioning, roasting, boiling, pasteurization, refrigeration, freezing, and vacuum packaging.	Fresh or frozen fruits, vegetables, pulses, grains, nuts, pasteurized milk, chilled or frozen meat
Processed culinary ingredients **(Nova 2)**	Substances obtained from category 1 foods or from nature and used in culinary preparations rather than consumed on their own. These may be pressed, centrifuged, refined, evaporated, extracted or mined. Examples include oils and fats, sugar, and salt.	Butter, vegetable oils, sugar, molasses, salt
Processed foods **(Nova 3)**	Foods that have been altered from their original state by the industry by methods that add salts, fats, or sugars or other category 2 ingredients. The main purpose of the processing methods employed in this category is to preserve foods or alter their sensory properties. These foods can be consumed alone or as part of freshly prepared meals or dishes. Examples include canning, bottling, and fermentation.	Canned vegetables in brine, fresh cheeses, freshly made breads
Ultraprocessed foods (UPFs) **(Nova 4)**	Branded, commercial formulations made from inexpensive ingredients extracted or derived from whole foods and combined with additives. Most contain few or no whole-food ingredients and are assembled into edible products using a series of intense physical and chemical processing methods. The main purpose of the processing methods employed in this category is to create highly profitable products due to their low cost, long shelf life, high sensory appeal, and high convenience—thus displacing foods from other categories, which make up traditional dietary patterns all over the world. Examples of processing methods include hydrolysis, hydrogenation, interesterification, extrusion, molding, and pre-frying. UPFs also often contain salts, fats, and sugars, typically in higher concentrations than in processed foods, as well as preservatives and other additives that extend shelf life. The distinguishing features of UPFs from processed foods are the prevalence of ingredients of exclusive industrial use (i.e., not used in home kitchens), such as protein isolates, mechanically separated meats, and modified starches or oils, and additives that enhance the final products' sensory properties, such as colors, flavors, flavor enhancers, non-sugar sweeteners, and emulsifiers.	Packaged chips and puffs, packaged cookies and biscuits, instant soups and noodles, ready-to-eat or ready-to-heat meals, candy, soft drinks

Other Definitions of UPFs

Since the introduction of the Nova classification system in 2009, several alternative frameworks have been proposed to characterize UPFs. These include classification systems developed by the European Prospective Investigation into Cancer and Nutrition (EPIC), the International Food Policy Research Institute (IFPRI), the UnProcessed Pantry Project (UP3), and Siga. While these frameworks vary in structure, description of food processing techniques, inclusion of additives or nutrients as indicators of UPF status, level of detail, and underlying emphasis, they share a common goal of distinguishing highly processed foods from minimally processed or whole foods. Some systems, such as Siga, employ more detailed, algorithm-based approaches that use specific and extensive lists of UPF markers to differentiate among types of additives and incorporate additional nutritional criteria.[28] Others are more conceptual in nature and, to our knowledge, have not been empirically validated against health outcomes.

In addition to these academically developed frameworks, three third-party product certification systems were recently launched in the U.S. to certify products as "non-UPFs."[29–31] These classification systems use varying combinations of processing methods and ingredients and neither have been empirically validated with respect to health outcomes.

Importantly, the body of epidemiologic and interventional research linking UPF consumption to adverse health outcomes is almost entirely grounded in the Nova classification system.

Ultraprocessed Foods and Health Outcomes

A large body of evidence consistently shows that diets high in UPFs are associated with numerous negative health outcomes, with the strongest evidence linking consumption to cardiovascular disease, type 2 diabetes, and mental health disorders. The evidence on the impact of consuming subcategories of UPFs is limited.

Summary of Evidence on Diets High in Total UPF Intake

Epidemiological studies find that diets high in UPFs are linked to a wide range of poor health outcomes.[21,32–41] Nearly all of these studies use the Nova classification system to identify ultraprocessed foods. A recent *BMJ* review of observational research, drawing on evidence from multiple meta-analyses, reported consistent associations between higher UPF intake and adverse health outcomes. Evidence was strongest for direct associations between UPF consumption and cardiovascular diseases, type 2 diabetes, anxiety, and combined mental health disorders; additionally, evidence for associations between UPF consumption and all-cause mortality, depression, poor sleep, wheezing, and obesity were considered strong.[21] A subsequent meta-analysis in *The Lancet* also found strong associations with Crohn's disease, abdominal obesity, chronic kidney disease, dyslipidemia, hypertension, and cerebrovascular disease.[9] In addition to the observational evidence, short term randomized controlled trials show that diets mainly composed of UPFs promote higher energy intake and adverse weight outcomes compared to diets primarily composed of minimally processed foods.[18–20] Individuals in these studies were allowed to eat as much or as little as they desired from either UPF-based or minimally processed food-based meals, both of which had the same total amount of presented calories, fiber, sugar, salt, and macronutrient content.

Summary of Evidence on UPF Subcategories

Most observational studies have assessed associations between diets high in total UPF intake and adverse health outcomes, treating UPFs as a single category rather than examining specific subcategories (e.g., sugar-sweetened beverages, candy, refined grains, dairy). One advantage of this approach is that it captures broader dietary patterns. A few recent studies have disaggregated UPF into subcategories of food groups and found that some groups, such as sugar-sweetened beverages, diet beverages, ready-to-heat and ready-to-eat meals, condiments, refined grains, and processed meats, may have stronger associations with adverse health outcomes. However, such studies are limited in number and assess a restricted set of health outcomes.[42–46] Moreover, one of these studies found subgroup associations may differ depending on the health outcome analyzed, and subgroups that do not have associations with health outcomes may, when aggregated, still be associated with health risks.[42] Thus, there currently is insufficient evidence to determine whether certain UPF subgroups are more harmful to health than others.

Evaluating subcategories of UPF presents several important methodological challenges. First, ideal analyses would compare UPFs and non-UPFs within the same food category and assess substitution effects (e.g. UPF versus non-UPF yogurts). However, most existing studies instead compare UPF subcategories to intake of all other non-UPF foods. Second, consumption of specific food subcategories is strongly correlated with overall dietary patterns, making it difficult to isolate the independent health effects of individual foods. Third, many UPF subgroups are consumed infrequently, resulting in limited statistical power and unstable estimates. Fourth, dietary assessment in many studies relies on food frequency questionnaires, which use broad food group categories and do not allow for differentiation among specific products. Consequently, all reported "fruits", "vegetables", "nuts", or "whole grain breads" are typically classified as non-UPFs, while categories such as "chips" or "refined breakfast cereals" are classified as UPFs, despite substantial variation within each group. Fewer studies use 24-hour dietary recalls or food records, which allow for more accurate, product-level classification of UPFs and non-UPFs.[47]

Mechanisms Linking UPFs to Health Harms

Although research on the mechanisms linking UPFs to health harms is still emerging, evidence to date suggests multiple mechanisms for how UPFs affect the body, summarized in **Table 2.** Taken together, the current evidence suggests that the mechanisms through which UPFs impact health are multifactorial, operating simultaneously and likely in synergy. As a result, efforts focusing on single mechanisms are unlikely to fully mitigate the harms posed by UPFs.

Table 2. **Mechanisms Through Which UPFs May Influence Health**

Mechanism	Description
Food Matrix Degradation	Refers to the structural breakdown of food, which disrupts its chemical and physical architecture. Food matrix degradation can result in alterations to the digestibility of UPFs: studies show that the nutrients in UPFs tend to be absorbed more quickly compared to those in less processed foods. This can lead to altered metabolic responses, which can make UPFs less satiating and prompt higher glycemic responses compared to less processed foods.[48,49] Food matrix degradation can also lead to the loss of beneficial components, such as dietary fiber, certain micronutrients, and trace bioactive nutrients—i.e., compounds that are not required in human diets but are beneficial to health, such as phytochemicals.[50–55]
Hyperpalatability	UPFs are often hyperpalatable—i.e., exceptionally appealing to human senses in terms of taste and mouthfeel. Their hyperpalatability is evident in short-term intervention trials, in which participants on UPF-based diets ate more quickly and chewed less—ultimately consuming more calories—than participants on minimally processed foods-based diets.[18,19]
Nutrients of Concern	Most UPFs are high in one or more nutrients where excessive intake is linked to health harms.[52–54,56–59] These nutrients have been grouped by some experts as HFSS (high in saturated fat, added sugar, and sodium) or labeled as nutrients of public health concern by the Dietary Guidelines for Americans. While there is growing controversy over the relevance of saturated fat as a marker of healthfulness of a food,[60,61] it is clear that the high content of these nutrients in many UPFs helps to explain some of their health effects. In addition, UPFs often contain refined carbohydrates, which have also been linked to health harms.[62–64]
Energy Density	UPFs are often energy-dense—i.e., they contain a high amount of calories per unit of weight or volume.[57,65–67] As a result, diets high in UPFs are consistently associated with higher caloric intake and adverse outcomes on body weight.[53,68,69]
Addictive Nature	A subset of foods, most of which are classified as UPFs, meet the most recent scientific criteria commonly used to characterize addictive products, such as tobacco. These criteria include the ability to trigger intense cravings and compulsive intake, produce temporary mood alterations mediated by brain-based reward pathways, and provide sufficient reinforcement to sustain repeated intake.[70] Foods that combine high concentrations of refined carbohydrates and fats—a profile common among many UPFs—appear particularly likely to exhibit addictive properties.[71,72] In addition, the use of additives to enhance the sensory appeal of UPFs also likely amplifies their addictiveness—much like tobacco products, whose addictiveness has been shown to increase with the use of flavor- and aroma-enhancing additives.[73]
Presence of Xenobiotics and Contaminants	UPFs often contain xenobiotics—i.e., chemical substances foreign to biological systems. These substances may be intentionally added to UPFs to enhance their sensory properties and shelf life (as food additives), or they may enter UPFs through contamination during processing or from contact with packaging materials. For example, growing evidence implicates certain additives common in UPFs, such as non-sugar sweeteners and emulsifiers, as potentially harmful to the human microbiome—which, in turn, can promote inflammatory processes that contribute to poor metabolic outcomes.[74–81] Additional examples include harmful contaminants formed during processing itself, such as acrylamide, or leached from plastic packaging, such as phthalates and bisphenol.[9,82,83] While such contaminants are not exclusive to UPFs, studies show that diets high in UPFs are associated with higher concentrations of biomarkers of such substances[84–88] and that UPFs are more commonly wrapped in plastic than less processed foods.[89]

How The Concept of "Ultraprocessed Food" Differs From Traditional Nutrient-Based or Food Group-Based Approaches

Traditional approaches to assessing the healthfulness of foods have focused on nutrient profiles—for example, the amount of calories, protein, saturated and unsaturated fats, added sugars, sodium, fiber, vitamins, and minerals—and sometimes key ingredients contributing to food group recommendations (i.e., presence of whole grains). These nutrient-focused approaches underpin many longstanding nutrition policy tools, such as dietary guidelines, nutrition labeling and health claims, front-of-package labeling and warning schemes, and eligibility criteria for health claims or foods provided by federal nutrition programs.[4,90]

Related policy approaches have targeted specific food groups. For example, incentive programs like the Gus Schumacher Nutrition Incentive Program (GusNIP) and Food is Medicine programs provide benefits that can be used for purchasing fruits and vegetables. Separately, numerous countries and some U.S. jurisdictions tax sugar-sweetened beverages or specific food groups deemed unhealthy, most commonly candy; however, these latter taxes are typically low-level sales taxes designed primarily for revenue generation rather than public health purposes.[91]

While nutrient content and food groups are essential components of diet quality, these do not capture all attributes that may influence associations between diet and health outcomes. Notably, all three randomized trials and many observational studies still observe associations between high UPF intake and poor health after taking their nutrient content into account, which suggests that these associations are at least partly due to factors beyond nutrients.[92–102] Exclusively nutrient- or food group-based approaches face the following challenges:

- Nutrient content does not equate to degree of processing. As described above, other pathways through which processing can influence health include loss of natural structure, hyperpalatability, addictiveness, loss of trace bioactive compounds, presence of potentially harmful additives, and presence of harmful compounds from agriculture, processing, or contact contaminants.[82,83]

- The food industry can reformulate products to meet nutrient criteria without addressing other attributes that affect product healthfulness, such as degree of processing or the presence of harmful additives or contaminants. For example, industry can replace added sugars with non-sugar sweeteners (NSS) or supplement a product with vitamins or isolated proteins. These reformulations can pose their own issues. Growing evidence links NSS to potential adverse health outcomes,[103–111] and added vitamins or protein may create a health halo around otherwise unhealthy products, such as seen with protein-fortified breakfast cereals or vitamins added to fruit drinks.[112,113]

- Products may contain healthful ingredients but still be considered UPFs. For example, products containing whole grains, a healthful ingredient, may also contain added sugars, flavorings, and/or colors, and be produced through high-temperature extrusion that destroys their natural food structure.

Similarly, processing alone is not sufficient to determine the overall healthfulness of a food. Critics of the UPF concept note that it does not capture all dimensions of a food's healthfulness, resulting in variation in health effects within both UPF and non-UPF categories. However, the UPF framework is not intended to serve as the sole measure of nutritional quality. Rather, it provides an additional, important, and independent metric that complements traditional nutrient- and food group-based approaches. Thus, processing-based approaches should be used alongside other dietary assessment approaches in policy and communication efforts aimed at improving diet quality and health.

Expert Panel Process and Methods

This technical report and included recommendations are the culmination of a structured, multi-component process.

1) Convene an Expert Panel

HER identified the need to build consensus around defining UPFs in a policy context and to identify policy levers through which UPFs could be addressed. HER invited Drs. Jim Krieger and Lindsey Smith Taillie to chair the effort. HER and co-chairs invited and convened a multidisciplinary panel of 14 individuals with expertise spanning nutrition, food science, epidemiology, nutrition policy, food law, policymaking, and advocacy. The expert panel met virtually six times from July 2025 to February 2026. In addition, two topic-specific working groups composed of panel members met virtually to further explore (1) UPF definitions and (2) policy approaches and legal considerations in greater depth. Ad hoc subgroups were also formed as needed to address specific technical issues.

2) Policy Analyses and UPF Definition Modeling

A research team composed of HER staff, panel chairs, and members of the UNC Global Food Research Program conducted a series of preparatory analyses to inform and support the expert panel's deliberations. Specifically, the research team:

1. Conducted a policy scan to identify U.S. policies related to UPFs, including both proposed and enacted;

2. Modeled alternative UPF definitions to assess how effectively each definition captures UPFs within the food supply and the proportion of food products classified as UPF under each approach; and

3. Developed and evaluated a preliminary set of UPF policy options, drawing on expert input and existing policy frameworks, and used panel survey results assessing impact, feasibility, and equity to guide policy prioritization and discussion.

Detailed methods for each of these components are provided in the following sections of the report on **Defining Ultraprocessed Foods** and **Policy Options to Limit Exposure and Consumption of UPFs**.

The expert panel provided input across all phases of the project, including the development of the methodology for modeling alternative definitions of UPF; the establishment of criteria for evaluating policy options; and the formulation and refinement of the final recommendations. Results from each of these analyses were presented and discussed during panel meetings.

3) Development of Expert Panel Recommendations

Throughout the process, panel members completed a series of structured Qualtrics surveys designed to assess their level of agreement with draft recommendations and to identify areas requiring further discussion. Four response options were used to gauge agreement: "Unqualified yes," "Accept (or I can live with) the decision," "Do not fully agree; however, I will not block it," and "I do not support this recommendation." Open-ended questions accompanied each survey to allow panel members to provide detailed feedback and suggest revisions.

Panel chairs facilitated discussions during panel meetings to address areas where consensus had not been reached. When feasible, recommendations were revised to reflect panel feedback and reassessed through follow-up surveys. In cases where consensus could not be achieved, a majority vote was used to determine whether a recommendation would be adopted.

Final recommendations developed through this iterative, consensus-oriented process are presented in the **Defining Ultraprocessed Foods** and **Policy Options to Limit Exposure and Consumption of UPFs** sections of this report. The technical report was drafted by the HER leadership team and panel chairs, and was reviewed by Expert Panel members who provided input to ensure the accuracy, clarity, and fidelity of the report to the panel's deliberations and recommendations. The HER leadership team and panel chairs are solely responsible for the final content of this report.

Defining Ultraprocessed Foods

The expert panel was tasked with developing an operational definition of ultraprocessed foods suitable for use in policy development. An operational definition provides a practical and replicable way to identify which products are considered ultraprocessed using criteria that can be applied across regulatory, legislative, and programmatic settings. This section presents the evidence supporting the panel's recommended scientific and operational definitions of ultraprocessed foods and discusses considerations for exempting certain products from policy action. Recommendations and implementation considerations are presented following a summary of methods and key findings from a policy scan to identify U.S. policies related to UPFs and modeling analyses to assess the effectiveness of alternative UPF definitions.

Methodology and Key Findings

Policy Scan

The research team first conducted a policy scan to examine how UPFs are defined in existing and proposed U.S. policies. Using NexisUni, the team searched all U.S. legal instruments (bills, resolutions, administrative codes, and executive orders) where UPFs were explicitly identified as the policy target (n=51). Identified policies were screened, with 40 of these (33 bills, 6 resolutions, and 1 executive order) meeting our inclusion criteria. UPF definitions were extracted and reviewed in detail by the research team. Full details on the policy scan and results can be found in **Appendix A**.

Eight proposals (20%) dated from 2021-2024, and the remaining 32 (80%) were introduced in the first half of 2025. About a third of proposals (n=14, 35%) defined UPFs based solely on the presence of specific food additives—most commonly food dyes, dough conditioners (e.g., potassium bromate), emulsifiers (e.g., brominated vegetable oil or BVO), and preservatives (e.g., propylparaben). Fewer proposals (n=11, 28%) used criteria more closely related to the Nova classification system, though none provided comprehensive specifications for operationalizing Nova. Some (n=4, 10%) defined UPFs as foods including any additive from certain classes of cosmetic ingredients drawn from the Nova system (e.g., emulsifiers, colors, flavors). Lastly, about a third of proposals (n=14, 35%) stated the intent to target UPFs but did not provide a UPF definition; rather just a long list of ingredients to be targeted. A full description of UPF definitions identified in existing U.S. policy proposals can be found in **Appendix A – Table A1**.

Modeling UPF Definitions

A modeling analysis was conducted to better understand how accurately UPF definitions capture ultraprocessed foods. Using Mintel's Global New Products Database (GNPD)[6] from 2018-2024, the modeling analysis was designed to identify the total proportion of foods and beverages in the U.S. food supply that

qualify as UPFs under each UPF definition included in **Table 3**, as well as the proportion of Nova Category 4 UPFs captured by each definition.

Notably, the GNPD represents only packaged foods, and therefore captures only a subset of food and beverage products available in a typical U.S. grocery store. Accordingly, our analysis was limited to products with a Nutrition Facts Panel and excludes items such as fresh fruits and vegetables, bottled water, ground coffee, tea bags, deli or hot prepared foods sold in grocery stores, and foods obtained from restaurants or schools.

Because processing is not disclosed on food labels, all definitions were applied by programmatically identifying UPF markers in ingredient lists. Specifically, SAS macros were used to scan ingredient lists from product packaging and flag each ingredient as a UPF marker (yes/no); products containing any UPF marker were classified as UPFs.

The "Full Nova" definition, including the full list of cosmetic additives and nonculinary ingredients (as reflected in Row 1 of **Table 3**), served as the baseline or comparison definition for the modeling exercise. It also provided the basis for developing a list of ingredients that are UPF markers, as follows:

- **Cosmetic additives**: To construct the ingredients lists of cosmetic additives, we first took the cosmetic additive types defined by Nova 4 and mapped them to CODEX Functional Class definitions and FDA Technical Effect definitions as shown in **Appendix A – Table A3**.[16,56] Then, we identified all ingredients in each dataset (CODEX and FDA) that had these functions or technical effects.
- **Non-culinary ingredients**: This list of ingredients, compiled from guidance provided by the research team that developed Nova,[2,114] is shown in **Appendix A – Table A4**.

The full details of how this Nova-based list of UPF ingredient markers was constructed are available in **Appendix C**.

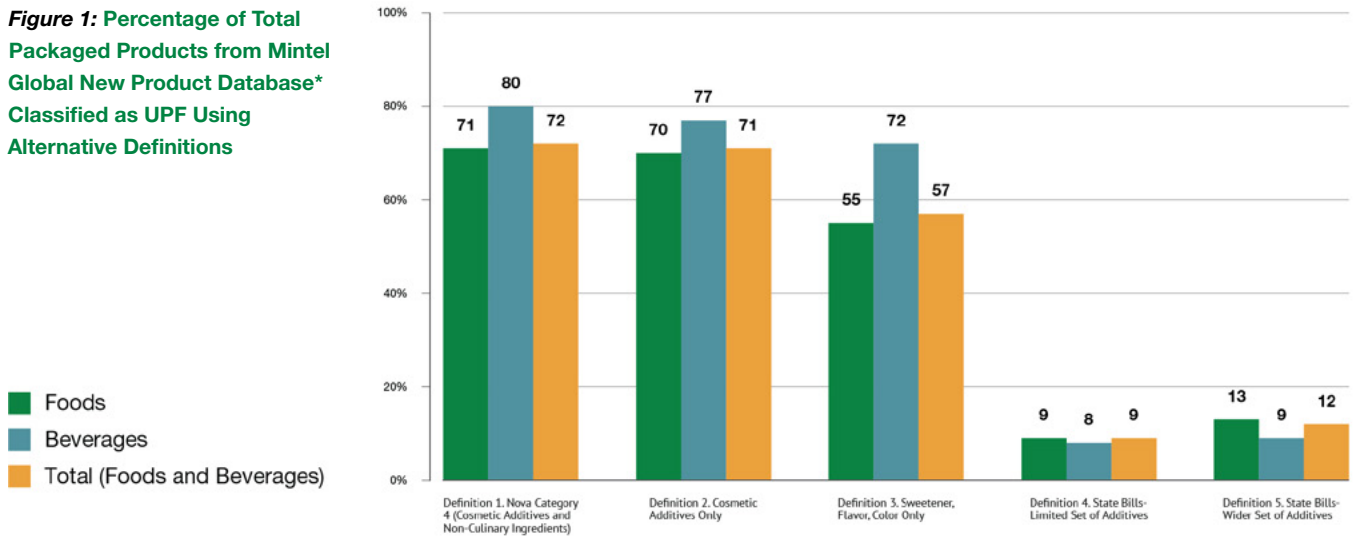
Table 3. **UPF Definitions Used for Modeling Analysis**

Definition	Description	Notes
1. Full set of Nova's Category 4 UPF-marker ingredients	Nova considers 13 specific types of food additives with "cosmetic" functions as UPF markers: anti-foaming agents, foaming agents, bulking agents, gelling agents, thickeners, carbonating agents, colors, emulsifiers, emulsifying salts, flavors, flavor enhancers, glazing agents, and sweeteners.	See Appendix A – Table A3 for an example list.
	Nova also considers non-culinary ingredients (i.e., sources of carbohydrates, fats, or proteins that are not typically used in home kitchens) as UPF markers.	See Appendix A – Table A4 for an example list.
2. Nova's UPF-cosmetic function additives	This definition considered only the aforementioned types of food additives whose function is considered "cosmetic" by Nova as UPF markers. Non-culinary ingredients were not considered UPF markers under this definition.	This analysis was conducted due to prior work[56] suggesting that most UPFs contain cosmetic additives and thus could be identified using just these ingredients, creating a simpler list of ingredients to review, manage, and update.
3. Limited set of Nova's UPF-marker additives	This definition considered only three types of food additives as UPF markers: non-sugar sweeteners, flavors, and colors.	This approach was considered due to previous findings that most UPFs contain a sweetener, flavor, or color.[56]
4. Specific ingredients most commonly targeted by state bills	This definition included 14 specific ingredients most commonly targeted by states' UPF-related bills (as identified through the policy scan).	See Appendix A – Table A5 for an example list.
5. Longer set of specific additives targeted by some state bills	This definition included 47 specific ingredients targeted by some states' UPF-related bills (as identified through the policy scan).	See Appendix A – Table A6 for an example list.

Figures 1 and 2 summarize the results from the modeling analysis, and the bullets that follow summarize key takeaways from the analysis.

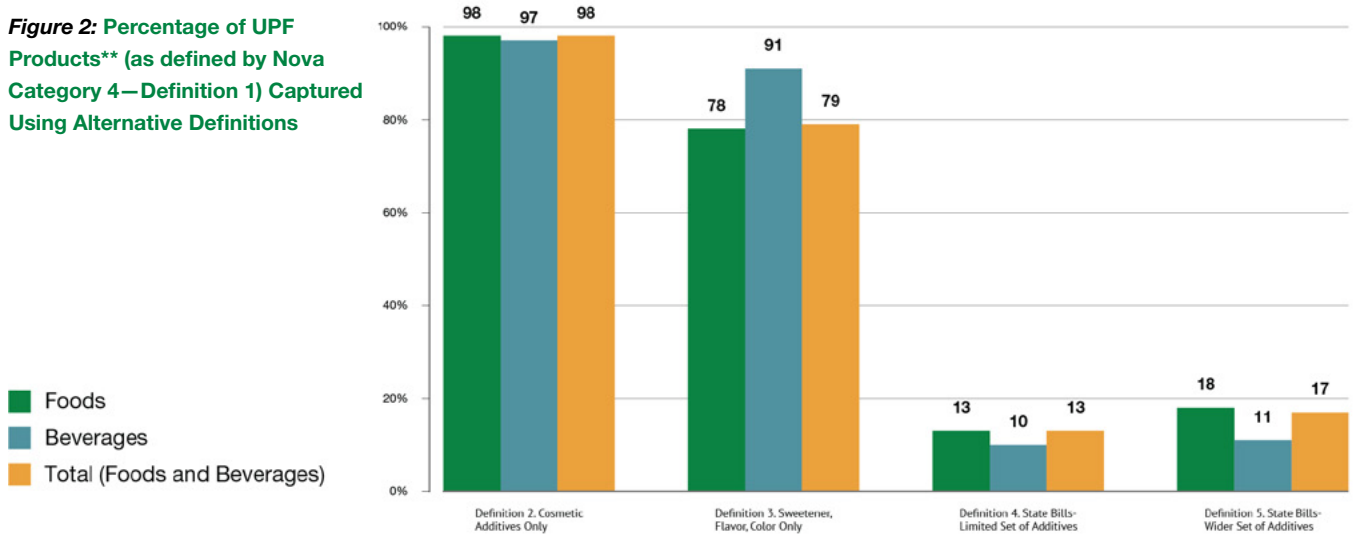
- *Prevalence of UPFs in Total Packaged Products (**Figure 1**):* The full Nova Category 4 ingredients marker approach (Definition #1) identified 72% of U.S. packaged foods and beverages as ultraprocessed. Using only the cosmetic additive ingredients (Definition #2) yields a similar result (71% of foods identified as ultraprocessed), while using only sweeteners, flavors, and colors (Definition #3), identified 57% of packaged foods as UPF. State bills using a list of additives (Definitions #4 and #5) rather than a formal UPF definition resulted in much lower estimates of UPFs, with only 9%-12% of foods and beverages identified as UPF.
- *Percent of UPF Products, as Defined by Nova Category 4 (**Figure 2**):* Definitions using cosmetic additives only (Definition #2) and sweeteners, flavors, and colors only (Definition #3) identified the majority of foods classified as ultraprocessed under Nova Category 4 (98% and 79%, respectively). In contrast, state-based approaches identified only 13%-17% of Nova Category 4 products as UPFs.
- The vast majority of foods and beverages categorized as UPF had multiple ingredient markers. Only 18% of products identified by Nova Category 4 (Definition #1) had one ingredient marker, with the remaining 82% of products containing two or more markers.

***Figure 1:* Percentage of Total Packaged Products from Mintel Global New Product Database* Classified as UPF Using Alternative Definitions**



*Total sample included 92,727 packaged food and beverage products from the Mintel GNPD 2018-2024.

***Figure 2:* Percentage of UPF Products** (as defined by Nova Category 4—Definition 1) Captured Using Alternative Definitions**



**This data excludes products with no ingredients, no portion values, variety packs, errors, alcohol, baby formula, medicated candies, and duplicate records.

Modeling "Add-On" Conditions

The research team also modeled other possible approaches that could be added to the definition of UPFs to narrow the scope of products included in policy regulation (see **Table 4**). The idea behind these "Add-On" conditions was to offer policy-makers a mechanism for narrowing the scope of products when designing policies, such as focusing on certain food categories with evidence of harm from overconsumption independent of UPF status. For the purpose of modeling, all "Add-On" conditions were applied to the Nova Category 4 definition (Definition #1). A full description of the modeling methodology is in **Appendix A.**

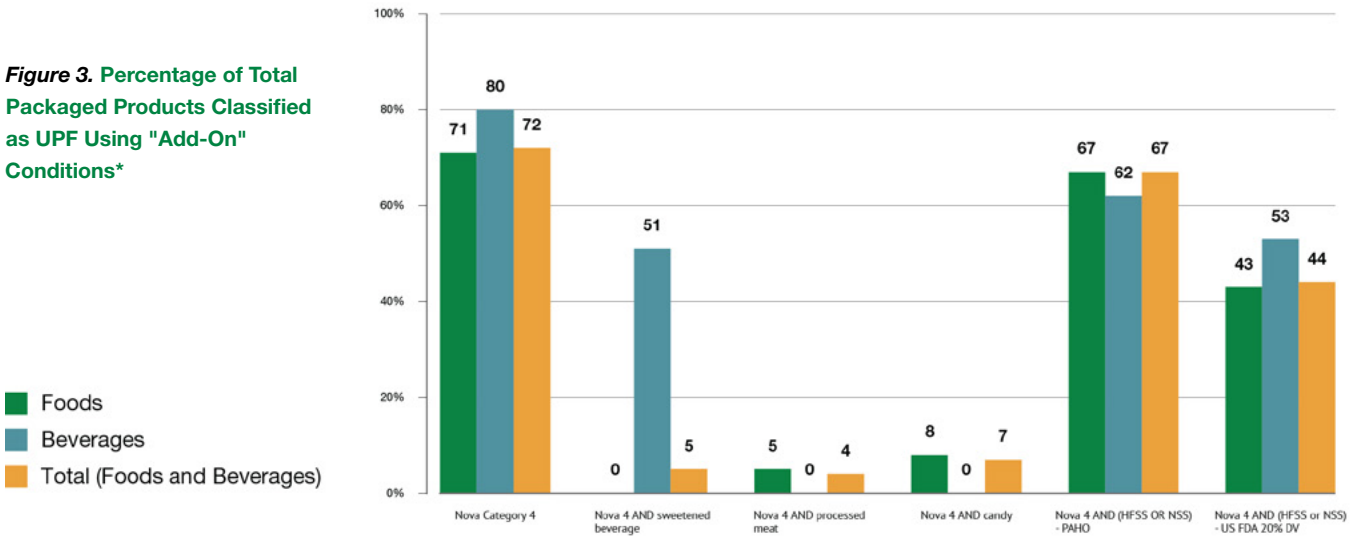
Table 4. **"Add-On" Conditions**

"Add-On" Condition	Description	Notes
HFSS-PAHO approach	The Pan American Health Organization's (PAHO) approach to defining when a food is high in saturated fat, added sugar, or salt (HFSS) or contains non-sugar sweeteners (NSS). The PAHO model has been used as the foundation for many global food policies.	Product is a UPF under the Nova 4 classification AND: 1. It exceeds ANY of the HFSS thresholds according to PAHO: • ≥10% calories from added sugar • ≥10% calories from saturated fat • ≥1mg of sodium per calorie OR 2. It contains NSS
HFSS-FDA approach	FDA's approach to defining when a nutrient is high in saturated fat, added sugar, or salt (HFSS). The FDA model is used in the current proposed U.S. front of package labeling rule. We have modified this approach to include "or contains non-sugar sweeteners (NSS)" as in the PAHO model.	Product is a UPF under the Nova 4 classification AND: 1. It exceeds ANY of the HFSS thresholds according to the FDA: • ≥20% daily value added sugar per portion/serving • ≥20% daily value saturated fat per portion/serving • ≥20% daily value sodium per portion/serving OR 2. It contains NSS
Category specific	Product is UPF and belongs to certain food categories for which the evidence shows potential of harm with overconsumption, independent of UPF status.	Product is a UPF under the Nova 4 classification AND in the category of interest: • sweetened beverages (beverages sweetened with added sugars or NSS) • processed meats • candy

The percent of UPF products that meet these additional criteria is summarized in **Figure 3**. Key takeaways are summarized here:

- Applying food category specific criteria to the Nova 4 definition, narrows the policy-relevant UPF scope to 4%-7% of total products, depending on category. Under this approach, 4% of total UPF are processed meats, 5% of total UPF are sweetened beverages, and 7% of total UPF are candies.
- When the PAHO nutrient profile model (HFSS or NSS) criteria are layered onto Nova 4, 67% of products are identified as UPF for policy.
- When the FDA 20% Daily Value approach is layered onto Nova 4, a smaller share of products (44%) are identified as UPF for policy.

Figure 3. **Percentage of Total Packaged Products Classified as UPF Using "Add-On" Conditions***



*This data excludes products with no ingredients, no portion values, variety packs, errors, alcohol, baby formula, medicated candies, and duplicate records.

Additional Modeling of FDA "Healthy"

After modeling the "Add-On" conditions, the research team was interested in understanding the impact of exempting products from any type of policy using a modified version of the FDA's "Healthy" criteria. The FDA allows a product to use a "Healthy" claim if it contributes at least a minimum amount of recommended food group equivalents (e.g., protein, dairy, whole grains) and meets strict thresholds for added sugar, sodium, and saturated fat (these vary by category). Although FDA's current definition does not address NSS, we use a modified definition for this report that disqualifies products containing NSS from receiving the "Healthy" designation, due to the growing evidence suggesting long-term NSS consumption may be linked to health harms.[103–111]

Five product categories—breads, ready-to-eat cereals, tofu, water (excluding bottled water), and yogurt—were selected to evaluate how often foods considered "Healthy" would qualify for the exemption while still being classified as UPF. These categories were selected because they contain some products typically considered to be healthy (e.g., whole-wheat bread, ready-to-eat cereals, yogurt) and are often discussed in debates regarding how to define UPFs.

Products were first classified as UPF using ingredient marker criteria (Nova 4-Definition #1). They were then assessed against modified FDA "Healthy" thresholds for nutrients and NSS. For water, the product also had to contain less than 5 calories per serving and could not contain NSS. Bread, cereal, yogurt, and tofu were assessed for food group equivalents (FGEs); because FGEs cannot be directly determined from labels, ingredient order was used as a proxy, with validation conducted for whole-grain breads. The analysis estimated the share of products that met modified "Healthy" criteria, the overlap between UPF and "Healthy" products, and the most common UPF marker additives within each category. A full description of the methodology and results can be found in **Appendix A**. The share of products that are both UPF and meet our modified FDA "Healthy" criteria (and thus would be exempted from a UPF policy) varies widely by food category:

- **Bread:** A majority of breads were UPF (85%) and only a small proportion (8%) also met "Healthy" criteria. Products that did not meet this criteria were not whole grain. The most common UPF ingredient markers in breads were dough thickeners and emulsifiers.
- **Ready-to-eat cereals:** Most ready-to-eat cereals were UPF (77%) and only 3% also met "Healthy" criteria. Products that did not meet this criteria were largely high in added sugars and low in whole grains. The top UPF ingredient marker in cereals was added flavor.
- **Tofu:** Tofu was less likely to be UPF (21%), and a small portion of those products (8%) also met "Healthy" criteria. The top ingredient marker of UPF in tofu was thickener.
- **Water:** Most products in this category were flavored or carbonated and were labeled UPF (85%), but over half (56%) also met "Healthy" criteria. Products that did not meet this criteria contain more than 5 calories per serving. The top UPF ingredient marker in water was added flavor.
- **Yogurt:** Most yogurts were UPF (86%) and only 2% met "Healthy" criteria. Products that did not meet this criteria often had too much added sugar and saturated fat. The top ingredient markers of UPF in yogurts were thickeners, emulsifiers, and sweeteners.

Limitations

While our findings align with prior estimates that roughly 70% of U.S. foods are ultraprocessed, they may overestimate UPF prevalence because the analysis reflects products rather than purchases and relies on Mintel data, which emphasizes newly introduced or reformulated products. In addition, Mintel does not include packaged foods without nutrition facts labels (e.g., coffee, tea, plain bottled water), which are unlikely to be UPFs. A sensitivity analysis using household food purchase data showed a similar prevalence of UPFs for foods to Mintel, but a lower estimated prevalence for beverages, largely due to these issues. Finally, the analysis is limited to packaged foods sold in stores and may not generalize to other settings such as schools or restaurants. A full description of our limitations and methodology can be found in **Appendix A**.

Recommended Scientific Definition of Ultraprocessed Foods For Policy

Recommended Scientific Definition of Ultraprocessed Foods For Policy: The panel recommends using Nova Category 4 as the scientific basis for defining ultraprocessed foods in policy.

To develop a policy-relevant operational definition, the panel first established consensus on an appropriate scientific foundation of UPF—Nova Category 4.

Nova 4 was selected as the strongest foundation due to its robust empirical evidence linking UPFs to adverse health outcomes and its ability to capture multiple mechanisms through which UPFs may influence health. Nova 4's broad categorical approach also limits opportunities for industry evasion, increasing the likelihood that policies based on this definition will meaningfully improve diet quality and health. Accordingly, the panel recommends Nova Category 4 as the scientific basis for defining UPF in policy.[9]

Recommended Operational Definition of Ultraprocessed Foods For Policy

Recommended Operational Definition of Ultraprocessed Foods For Policy: A product is a UPF if it contains at least one ingredient marker for Nova 4 UPF (i.e., a cosmetic additive and/or an ingredient of non-culinary use).

Effective food policy requires a clear and practical classification system for determining which foods fall within the scope of policy action. The expert panel considered how to operationalize the Nova 4 definition for use in the U.S. food supply. Like with other food classification systems, a policy-relevant definition of UPF should meet the following criteria:

1. **Align with evidence-based health recommendations:** The classification system should promote foods and dietary patterns known to support population level health and reduce disease risk, based on the best available scientific evidence.
2. **High diagnostic accuracy:** When applied across the full spectrum of foods in the marketplace, the system should reliably identify the foods it is intended to capture and exclude those outside the intended scope. The system should be sensitive (in this case, identifies foods that are UPFs as UPFs) and specific (i.e., identifies non-UPFs as non-UPFs).
3. **Reproducible:** The system should yield consistent classifications when implemented across different jurisdictions, data sources, or evaluators.
4. **Practical to implement:** The system should be feasible to apply across the entire food supply without requiring burdensome, product-by-product expert review.
5. **Free from conflicts of interest:** The development and structure of the system should be insulated from stakeholders with financial or commercial interests.
6. **Transparent:** The rationale, development process, and all system components should be publicly documented and readily accessible.
7. **Flexible:** The system should be able to accurately classify new products that come into the marketplace.

In the U.S., manufacturers rarely disclose detailed processing methods and the technical function of ingredients is not currently required to be reported on packages. Thus, to operationalize Nova 4, we recommend using ingredient-based markers that are consistently available on the nutrition facts panel of packaged foods in the U.S. Importantly, the inclusion of specific markers is not based on inherent health risks of those individual ingredients, but rather on their value as reliable indicators that a food is a UPF as defined by Nova 4.

Ingredient Markers of UPFs

Ingredient Class and Definition	
Non-Culinary Ingredients	Ingredients that rarely appear in home cooking and are typically only used in industrial formulations.[2,114] Examples include: fruit juice concentrate, high fructose corn syrup, interesterified oil, lecithin, protein isolates, textured proteins (See full list in **Appendix A – Table A4**).
Cosmetic Additives	Ingredients used to create or restore sensory qualities, including any additive in the following functional classes:[105,106] • flavors (natural and artificial), flavor enhancers; • colors (natural and artificial); • sweeteners; • emulsifiers, emulsifying salts; • thickeners, bulking agents; • anti-foaming agents, carbonating agents; • gelling agents, glazing agents; and • related functional classes recognized under FDA technical effects and CODEX categories. (See examples in **Appendix A – Table A3**)

The panel recommends that a food is considered a UPF if it contains any ingredient "marker" from the following classes: non-culinary ingredients or cosmetic additives.

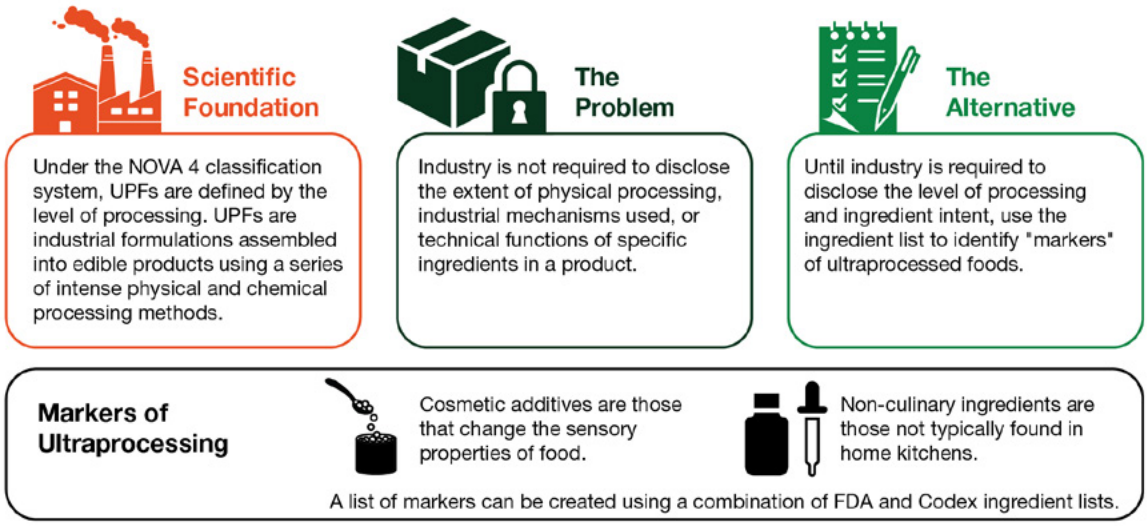
Together, these two classes enable reproducible, large-scale classification of likely UPFs based solely on publicly available ingredient declarations. This process to define and identify UPFs is illustrated in **Figure 4**.

Notably, several store-bought foods do not require application of the ingredient-marker system because they are not UPFs. These include 1) products that do not have a nutrition facts panel, such as fruits, vegetables, and plain meats, and 2) products considered culinary ingredients, such as olive oil, plain sugar, and salt.[2] In addition, product categories that are medically necessary such as infant formula, oral nutrition therapy products, oral rehydration solutions, and other federally defined medical foods under the Orphan Drug Act of 1983, 21 U.S.C 36033(b)(3)[115] were not classified as UPFs under this approach.

The panel also recommends excluding the following ingredients from the list of UPF markers: vitamins and minerals, herbs and spices, and yeast and yeast derived additives. The rationale is provided in **Appendix A**.

The panel did not recommend including any of the additional criteria (HFSS or food category-based) as part of the operational definition of ultraprocessed foods, because these classification approaches address other nutritional dimensions of foods rather than the degree of processing.

Figure 4: **Conceptual Framework for Defining and Identifying Ultraprocessed Foods**



Recommended Process for Creating a List of Ingredient Markers of UPFs

Using ingredient markers to identify UPFs requires the creation and maintenance of a list of ingredients and their technical functions as cosmetic additives (e.g. colors, flavors, emulsifiers). In brief, this process involves taking the functional classes defined by Nova and mapping them to the technical functions specified in databases of ingredients. All ingredients with the aforementioned technical functions are flagged as UPF markers, as are all ingredients designated as a non-culinary ingredient. All products containing one or more of these ingredient markers are classified as UPF. New ingredients entering the food supply must also be tracked through the use of regularly updated data that provide ingredient-level information, such as the USDA Global Branded Foods Database.[116] For details on the process used to create the list used in this report, please refer to **Appendix C**.

A government agency—such as the FDA or state or local public health agency—could create and maintain a list of UPF ingredient markers. In the absence of a single responsible authority, however, the panel recommends that this task be carried out by a consortium of government stakeholders and academic experts (including food scientists and dietitians). Such a consortium would help streamline decision-making, ensure consistency across jurisdictions, and promote transparency. Similar models already exist. For example, the "Streamlined Sales Tax Governing Board," a multi-state consortium, develops ingredient-based definitions of foods to determine taxability,[117] while the Codex Alimentarius Commission—established by WHO and FAO—reviews new food ingredients and assigns technical functions through formal standard-setting procedures.[118] Building on these precedents, a UPF consortium could routinely review novel ingredients entering the food supply and, when technical functions have not been assigned by FDA or Codex, make determinations regarding their function and UPF status.

Recommended Products to Exempt from Policies Targeting UPFs

Recommended Products to Exempt from Policies Targeting UPFs: The panel recommends exempting products from policies targeting UPFs if they meet a modified version of the FDA's definition for "Healthy" claims—that is, they contain adequate amounts of recommended food groups, remain below nutrient thresholds for added sugar, sodium, and saturated fat, and do not contain NSS.

The panel considered whether certain UPF products should be exempt from policy action and concluded that exemptions should be limited, as extensive exemptions can complicate implementation and undermine alignment with the Nova 4 definition. The use of a single, standardized exemption framework can help ensure that the UPF definition is applied consistently across policy contexts.

The panel recommends exempting UPF products from policy action if they meet the following modified criteria for the FDA "Healthy" claim:

- Contain sufficient food group equivalents of foods recommended for consumption, as defined by FDA;
- Fall below FDA-established thresholds for added sugars, sodium, and saturated fat; and
- Do not contain non-sugar sweeteners (NSS).

Importantly, exempting a product from policy action does not alter its classification as an ultraprocessed product.

This approach is described in detail in **Appendix A**.

Considerations for Exempting Products that Meet FDA "Healthy" Criteria

Use of the FDA "Healthy" exemption helps avoid capturing UPFs that provide high levels of desirable food group equivalents and low levels of nutrients of concern—foods that dietitians and nutrition guidelines have historically recommended as healthy choices. These products may appear in federal nutrition programs such as WIC or school meals (e.g., whole-grain breads, select low-sugar whole grain breakfast cereals, and yogurts). Industry is also likely to use these products as "edge cases" to undermine the UPF concept and block policy action. Our analysis found that these cases were relatively rare. For example, only 8% of packaged breads were both UPF and met FDA "Healthy" criteria (see **Appendix A – Table A14**).

Additionally, given that the FDA currently defines these foods as "Healthy," application of this definition will help create consistency that may reduce consumer confusion. For example, this will help avoid a scenario in which a product contains both a label identifying it as ultraprocessed and a claim that it is "Healthy."

At the same time, it is important to note that the question of whether any UPFs can be healthy is controversial.[47] Even if some UPF products meet FDA "Healthy" criteria, they use the same industrial processes and ingredients as other UPFs. In most cases, non-UPF alternatives exist for these products and these may be healthier alternatives. Moreover, dietary guidelines recommend whole foods as the main component of the diet.

Notably, the panel's recommended modification to the FDA "Healthy" definition excludes products containing non-sugar sweeteners (NSS). Accordingly, any product with NSS would be ineligible for a "Healthy" exemption, even though the

current FDA definition does not address NSS. The panel proposes this modification for two reasons: first, a growing body of evidence suggests potential harms associated with NSS consumption;[103–111] and second, allowing NSS would enable products to meet FDA thresholds for added sugars through sweetener substitution rather than meaningful reformulation. Without this modification, products such as flavored waters sweetened with monk fruit or yogurts sweetened with sucralose could qualify as "Healthy" because they meet food group equivalent requirements and added sugar limits. Excluding NSS prevents such products from being classified as FDA "Healthy" and, by extension, from qualifying for exemptions from UPF policy actions. At present, the panel is unaware of similarly widespread opportunities to substitute additives for sodium or saturated fat—the other nutrient criteria in the FDA "Healthy" definition—though future developments may warrant additional safeguards.

The FDA "Healthy" definition has additional limitations for regulatory use. It is food-category specific, which adds complexity, and information on food group equivalents is not required on food packaging, making independent verification difficult. Consistent with FDA requirements for use of the "Healthy" claim, the panel recommends that manufacturers seeking exemption from UPF policy actions be required to demonstrate that their products meet all "Healthy" claim criteria.

Key Considerations for Defining and Implementing UPF Classification Systems for Policy

Evaluation of Recommended Approach Using Criteria for a Strong Food Classification System

The ingredient-marker approach recommended by the panel performs well when considering the criteria for strong food classification systems described previously.[119] As summarized in **Table 5**, the approach demonstrates strong performance across key domains, including alignment with evidence-based research, diagnostic accuracy, reproducibility, practicality, independence from conflicts of interest, transparency, and flexibility.

Table 5. **How an Ingredient-Marker Approach Compares to Criteria for Strong Food Classification System**

Nutrient Profile Model (NPM) Criterion	How an ingredient-marker approach to Nova 4 compares
Aligned with evidence-based health recommendations	The Nova approach to UPFs has been used in over 100 studies that have examined associations of UPF and health outcomes. Other UPF classification systems have not been empirically validated against health outcomes.
High diagnostic accuracy	The ingredient marker approach identifies foods that are UPF and reliably distinguishes between UPF and non-UPF compared to the scientific Nova definition.[56,120,121]
Reproducible	Ingredient marker lists can be implemented algorithmically by using software programs to search for terms in ingredient lists and thus does not require subjective reviewing or coding by an individual. It can be applied across packaged food data at different jurisdictional levels.
Practical to implement	Ingredient lists can be applied algorithmically to a large number of foods across databases, although development and maintenance of ingredient marker lists and managing "Healthy" criteria exemptions will require some administrative effort (see: **Appendix C** for process).
Free from conflicts of interest	Nova was developed by independent academic researchers who are widely viewed as independent and have no structural ties to commercial stakeholders.
Transparent	Core definitions and rationale for the Nova classification system are widely published in peer-reviewed literature. To ensure transparency, policymakers should publish lists of ingredient markers, the process used to identify them as UPF markers, and the process for updating lists.
Flexible	New products and ingredients can be included by establishing a process that evaluates regularly updated data on products and ingredients in the U.S. food supply. New UPF ingredient markers can be identified and classified as they emerge.

Implementation Considerations for Using an Ingredient List Approach

Despite the good alignment between our proposed approach and the criteria for strong food classification systems, several implementation concerns emerged regarding the use of ingredient markers for defining UPFs for policy. These primarily relate to creating, maintaining, and updating ingredient lists in a large and rapidly changing food supply as well as the potential for the food industry to use techniques like reformulating or renaming ingredients to avoid products being identified as UPF. To address these, the panel recommends a combination of 1) ongoing monitoring of the U.S. food supply to develop regularly updated lists of UPF ingredient markers, 2) improving ingredient transparency, and 3) relying on existing regulatory protections and adopting new strategies to prevent evasion. Together, these approaches can help ensure that UPF policies remain scientifically robust, operationally feasible, and aligned with equity and public health goals.

Absence of a comprehensive, publicly accessible U.S. ingredient database. Although manufacturers are required to list ingredients, there is no unified system documenting all additives in the U.S. food supply or their functions. The FDA maintains the Substances Added to Food (SATF) database, but it does not include all ingredients used in the food supply because it only captures key categories of additives that the FDA addresses (e.g., FDA-regulated food and color additives, additives listed in existing regulations, prohibited or sanctioned substances).

Lack of transparency. GRAS substances (i.e., those generally recognized as safe among qualified experts) are not subject to FDA premarket review or notification requirements and therefore may be added to the food supply without inclusion in the SATF database (i.e., "Secret GRAS"), complicating efforts to systematically classify products and maintain up to date ingredient maker lists. In addition, manufacturers are not required to disclose the technical function of ingredients, making it difficult to determine whether certain components function as cosmetic additives and are UPF markers. For example, vitamins and minerals can be added for fortification purposes or as colorants. The use of generic labeling terms in the U.S. (e.g., "spices" or "natural flavors") further obscures ingredient identity and function, limiting transparency. The inclusion of technical function of ingredients on products is required in other countries, including the United Kingdom, Australia, and countries in the European Union[122,123] (see example ingredient list in image; source: UK Open Food Facts[124]).

Food supply evolution and industry evasion. As the food industry innovates rapidly, a static list of ingredients or markers will quickly become outdated. Novel emulsifiers, flavor technologies, or industrial ingredients may emerge, and reliance on a fixed ingredient list risks misclassification or loss of relevance over time. Moreover, manufacturers may attempt to "game the system" by modifying products in ways that obscure their UPF status, such as substituting new cosmetic additives not yet captured in existing lists or using generic ingredient names. Companies may also use ingredients that are not fully disclosed on food labels. Although FDA requires most packaged foods to list ingredients by weight, several categories are exempt, including processing aids, incidental additives present at insignificant levels and without a functional role in the final product, certain flavorings and spice blends, and ingredients protected as trade secrets. In addition, components of complex ingredients may be grouped together rather than itemized, further limiting transparency.[125]

Strategies to address these challenges are summarized in **Table 6**.

In addition to the recommendations, the panel considered whether requiring manufacturers to disclose key food processing methods on packaging could strengthen public sector monitoring of ultraprocessed foods. Such disclosures could also support development of an operational definition of *food matrix degradation*, a proposed mechanism underlying UPFs' health effects beyond nutrient composition. Food matrix degradation has been linked to faster digestion, altered satiety signaling, changes in the gut microbiome, and the reconstruction of foods using cosmetic additives or modified textures. This concept could be operationalized by identifying specific processing methods (e.g., extrusion, ultra-fine grinding, puffing) and validated using measurable physical properties such as particle size or loss of intact plant cells. The panel noted, however, that some degree of matrix modification is necessary for digestibility—particularly for starch-based staple foods—highlighting the need to distinguish beneficial processing from harmful matrix degradation. Further research is required before processing-based disclosure can be considered for policy implementation.

Table 6. **Strategies to Support Implementation of a Strong UPF Definition**

Strategies to support a publicly accessible U.S. ingredient database
List creation and maintenance. A government agency or consortium of government and academic stakeholders should develop and update lists of ingredients used in food manufacturing, a process that is feasible and already done by several groups of researchers. Updated information on new ingredients entering the U.S. food supply can be obtained through regularly updated public databases (e.g., the USDA Global Branded Foods database[126]) or proprietary databases (Global Mintel New Products Database[6] or Innova), which specifically track products in the U.S. market that are newly launched or reformulated and are updated continuously. In both cases, the updated databases can be used to generate ingredient lists, which can then be compared against historical lists to flag any novel ingredients. Technical functions (and thus UPF marker status) can be assigned using a combination of recognized national and international resources (e.g. CODEX additive standards, Joint FAO/WHO Expert Committee on Food Additives (JECFA) flavor databases, and FDA SATF) (See details in **Appendix C)**. If the ingredient does not already have an assigned technical function, one could be determined through an established review process by the independent consortium (as previously described).
Periodic review of UPF definitions. UPF definitions should incorporate formal mechanisms for periodic review and revision, such as annual or biannual updates. Similarly, the FDA should regularly update its "Healthy" definition to align with updates to science (and thus update exemptions to UPF policies).
Strategies to improve ingredient transparency
Require full ingredient disclosure. Require manufacturers to disclose all ingredients on food labels, listing by name rather than under generic terms like "natural flavor," "artificial flavor," "spices," or "artificial colors"[127] or in groups. Although the list used in this report already captures the use of some generic terms (natural and artificial flavors and colors are all considered UPF markers), full ingredient disclosure is important for consumer understanding of the specific ingredients in a given food.
Require disclosure of ingredient technical function. FDA should require disclosure of ingredients' technical functions, particularly when ingredients function as cosmetic additives (e.g., emulsifier, thickener). This would reduce ambiguity, minimize opportunities for renaming or replacement, and keep the operational definition robust over time.
Closing the GRAS loophole. The FDA is currently considering revisions to how novel ingredients enter the U.S. food supply. Under the existing Generally Recognized As Safe (GRAS) rule, manufacturers are not required to notify the FDA when introducing new ingredients.[128,129] Closing this loophole by requiring pre-market FDA notification would improve oversight and allow new substances to be systematically added to the FDA's Substances Added to Food (SATF) inventory, supporting timely assessment of whether to include them as UPF markers.
Strategies to address regulatory evasion
Reliance on existing regulatory protections. FDA regulations require most food ingredients to be listed on labels, with only limited exceptions (e.g., incidental additives).[125] The panel recommends all ingredients be included on food labels.
Precautionary policy approach. The panel proposes a precautionary policy approach under which any novel ingredient whose technical function or culinary use is unknown is treated as a UPF marker until evidence indicates otherwise. Similar approaches have been used in other countries' front-of-package labeling policies, where products are presumed to exceed nutrient thresholds (e.g., high in sugar, sodium, or saturated fat)—and therefore subject to labeling requirements (e.g., warning labels)—unless manufacturers demonstrate otherwise by declaring information on the label.

Applying an Ingredient-List Approach Beyond Packaged Foods

This report focuses on store-bought foods, which account for the majority of calories consumed in the United States. However, several of the policies discussed later in the **Policy Options to Limit Exposure and Consumption of UPFs** section could also apply in restaurant settings, and some are specific to schools. Implementing UPF definitions in these contexts may require additional considerations, as restaurants are not federally required to disclose ingredient lists. For school-based policies, governments could adopt approaches similar to California's AB 1264 ("Real Food, Healthy Kids Act"), which requires vendors to provide ingredient lists for all foods served.

Federal Definition of UPFs

As the panel developed its recommendations for defining UPFs, the federal government signaled interest in developing its own UPF definition. The FDA issued a request for information on UPF definitions[130] and the Secretary of Health and Human Services, Robert F. Kennedy Jr., has indicated that a federal definition could be issued as early as April 2026. A federal definition could take the form of non-binding guidance, a regulation, or legislation. Because regulatory or legislative approaches to define UPFs would likely require significant time to finalize and implement, the panel's recommendations may help inform them. In general, state and local jurisdictions would retain authority to establish their own UPF definitions. A federal definition would preempt state or local definitions only if it were incorporated into a preemptive federal policy, such as mandatory nutrition labeling.

Scope, Feasibility, and Equity Considerations

The panel's recommended UPF definition encompasses a large proportion of the U.S. packaged food supply—potentially up to three-fourths—which raises concerns about policy feasibility, implementation costs, and potential impacts on food access

and affordability. As a result, policymakers may prefer to limit policies to a subset of UPFs to mitigate these challenges. For example, narrowing the scope of UPF products covered in school nutrition programs could help reduce implementation costs related to staff training, technical assistance, kitchen equipment, and infrastructure upgrades that would otherwise result from a need to return to preparing all meals from scratch. Similarly, a more targeted approach could lower administrative burdens for government procurement programs or help ensure that tax policies do not compromise affordability for households with limited incomes. In contrast, policies intended to inform consumer choice, such as front of package labeling, may benefit from broader coverage, including most or all UPFs to maximize communication and public awareness.

Strategies to address these challenges are summarized in **Table** 7.

Table 7. **Strategies to Support Scope, Feasibility, and Equity**

Build structured exemptions into UPF policies
Limited exemptions could be considered for specific populations, cultural contexts, affordability, or market availability. For example, New York City sets sodium limits for foods purchased by government agencies, but exempts soy sauce due to lack of availability of products that meet the standard.[131]
Consider additional criteria
To ensure that the targets of policy action align with intended public health goals and minimize unintended consequences, policies could narrow the scope by applying additional criteria. While the panel did not come to consensus on recommending a specific set of criteria, options could include restricting policies to specific food groups or layering on additional nutrition criteria. For example, tax policies could target specific UPF categories with strong evidence of harm or of public health concern (e.g., sweetened beverages, processed meats, candy). Note, when applying additional criteria or creating exemption lists, policymakers should proceed with caution. These approaches can unintentionally encourage product reformulation that allows manufacturers to evade regulation without improving the healthfulness of products; increase complexity in monitoring, enforcement, and implementation; and create pressure from industry to expand exemptions for specific ingredients or foods.

Figure 5: **Approaches to Categorizing Food for Policy**

Ultraprocessed Food

Defined by the amount of industrial processing and additives like emulsifiers, non-sugar sweeteners, and cosmetic dyes. This does not consider nutritional value of the product.

Examples: Diet beverages, breakfast cereals, and ready-to-eat meals

Nutrients of Concern

Defined by nutrient thresholds linked to chronic disease and overconsumption of calories.

Examples: High in saturated fat, added sugars, or sodium; contain refined, processed carbohydrates

Additives of Safety Risk

Defined by inclusion of specific ingredients and chemical substances with documented toxicological or safety concerns.

Examples: Red Dye 3, Nitrates, Nitrites, Brominated Vegetable Oil (BVO)

Food Groups and Subcategories

Defined by broad categories that have widespread scientific agreement regarding health harms.

Examples: Sugar-sweetened beverages (SSBs), processed meats, candy

Synergy with Other Nutrition and Health Policies

UPF status reflects only one dimension of a food's healthfulness and, while important, is unlikely to achieve all nutrition and public health goals on its own. Multiple food classification systems are already embedded in U.S. nutrition policy and may complement UPF-focused approaches, including systems based on nutrients, additives of safety risk, and food groups or subcategories with strong evidence of harm (e.g., sugar-sweetened beverages, processed meats) (**Figure 5**). These approaches remain valuable due to their familiarity, policy precedent, and relevance for specific health objectives such as reducing added sugar or sodium. Policymakers may choose to use one or more classification systems within a single policy or deploy separate policies focused on different frameworks, requiring careful alignment to either broaden reach or more precisely target high-risk products.

As discussed in the **Background** section, UPF-only policies do not fully address other dietary risk factors, such as non-

UPF foods high in added sugar, saturated fat, or sodium; foods recommended in moderation; or harmful additives not specific to UPFs. Policymakers seeking to address multiple dimensions of unhealthfulness will therefore need to consider coordinated use of several categorization approaches. However, applying multiple criteria without careful design could increase implementation complexity or stakeholder confusion. Clear communication, standardized definitions, and alignment with existing nutrient-, food group-, and additive-based policies will be essential. Because UPF-focused policies alone cannot shift dietary patterns, they should be paired with strategies that promote healthy, minimally processed foods to create a more comprehensive and coherent approach to improving dietary health.

Policy Options to Limit Exposure and Consumption of UPFs

In addition to establishing an operational definition of ultraprocessed foods, the panel developed evidence-informed recommendations for policies to reduce exposure to and consumption of UPFs. This section presents the process the panel used to develop and evaluate a preliminary set of UPF policy options on impact, feasibility, and equity, followed by recommendations and implementation considerations. The resulting recommendations are intended to guide policymakers and advocates in designing and implementing effective actions at the local, state, and federal levels.

Methodology and Key Findings

To identify and prioritize policy options to reduce UPF exposure and consumption in the U.S., the research team developed a list of 26 policies informed by the policy scan, current UPF policy activity, the panel's knowledge of similar policies that seek to reduce harms from other unhealthy foods (e.g., added sugars and non-sugar sweeteners), and by reviewing similar published recommendations from authoritative bodies and the peer-reviewed literature.[83,132–134]

Expert panel members were then surveyed via Qualtrics to assess the views of the panel members on public policies to reduce exposure to and consumption of UPFs in the U.S. The survey used the Nova Category 4 definition of UPFs, with the caveat that some policies may only include a subset of all Nova 4 products. Panelists rated each policy on a scale from 1 (low) to 5 (high) based on three domains: expected impact, feasibility, and equity which are defined in **Table 8**.

Qualtrics survey results were used to inform panel discussions to determine overall agreement and inform the final tiered policy recommendations (tiers are described later in this section). **Table 9** summarizes the top five policies within each domain: impact, feasibility, equity.

Table 8. **Definitions of the Domains Used to Evaluate the Policy Options in the Survey**

Domain	Definition
Impact	The extent to which a policy could reduce UPF consumption if effectively implemented.
Feasibility	How easy or difficult the policy would be to adopt and implement, considering factors such as political will, legal constraints, industry opposition, cost, and implementation logistics.
Equity	The extent to which the policy could reduce disparities in UPF consumption and address differential impacts on people with low incomes. For example, high equity (a rating of 5) would indicate the policy is likely to lower consumption and exposure among people who bear a disproportionate burden of the chronic conditions associated with UPF consumption.

Table 9. **Highest Ranking Policies within Each Domain***

Impact (total score)	Feasibility (total score)	Equity (total score)
Taxes on targeted UPFs (55)	Nutrition guidelines and standards for specific programs (50)	School procurement restrictions (50)
Taxes on all or most UPFs (54)	Food additive restrictions (50)	Restrictions on marketing UPFs to children (50)
School procurement restrictions (51)	Nutrition guidelines and standards (50)	Healthy food policies in schools (47)
Restrictions on marketing UPFs to children (51)	Early childhood procurement restrictions (49)	Early childhood procurement restrictions (47)
Early childhood procurement restrictions (46)	School procurement restrictions (48)	Nutrition guidelines and standards for specific programs (44)

** The range for total scores per policy within each domain was 12-60.*

The three domains were overlaid, as displayed in **Figure 6,** using the total scores summed across all respondents for each criterion. At subsequent expert panel meetings, policies were discussed by quartiles of high feasibility and high impact, high feasibility and low impact, low feasibility and high impact, and low feasibility and low impact. The policies viewed as having high impact and high feasibility were school procurement restrictions, early childhood procurement restrictions, government facility procurement restrictions, nutrition guidelines and standards, nutrition guidelines and standards for specific programs, and SNAP restrictions. Of these policies, school procurement restrictions, early childhood procurement restrictions, and nutrition guidelines and standards for specific programs had the highest equity ranking, while nutrition guidelines and standards had the lowest. The detailed scores for each policy option are presented in a summary table, ordered by impact total score in **Appendix B**.

Recommendations for Policies to Limit Exposure and Consumption of UPFs

This section outlines recommended policy strategies to reduce potential harms associated with UPF consumption. As summarized in **Table 10**, these policies aim to lower exposure to UPFs by influencing their affordability, acceptability, and accessibility across different settings and populations. Although all 26 policies were discussed and used to inform the recommendations, the final recommendations described below do not directly correspond one-to-one with those in the original Qualtrics survey, as some policies were combined or modified for clarity and to avoid overlapping content. Each policy was assigned to one of four tiers:

Figure 6. **Bubble Chart of Impact, Feasibility, and Equity Ratings of 26 UPF Policies**

Figure 6. *Visualization of policy ratings from a Qualtrics survey assessing strategies to reduce exposure to and consumption of UPFs in the U.S. Policies are plotted by feasibility (y-axis) and impact (x-axis), as defined in* ***Table 8.*** *Bubble size reflects equity, with larger bubbles indicating higher equity scores. Colors represent equity score ranges, with blue as the highest (42-50), followed by orange (36-41), yellow (31-35) and green (28-30).*

- **Tier 1 recommended policies (high impact, high feasibility):** Policies which have a high likelihood of adoption and successful implementation, and are likely to have a high impact on reducing potential harms from UPFs.
- **Tier 2 recommended policies (high impact, low feasibility or low impact, high feasibility):**
  - *High Impact, Low Feasibility:* Some policies in this category may be difficult to implement in the near term, but could have substantial impact over time. Increasing their feasibility will likely require "ground-softening" efforts such as building public and policymaker support, strengthening the evidence base, and developing coalitions and partnerships.
  - *Low Impact, High Feasibility:* These policies can serve as early wins that build momentum for more impactful policies that are currently less feasible by bringing attention to the need for addressing UPFs.
- **Tier 3 policies (not recommended at this time):** Policies in this tier did not receive majority support for placement in Tier 1 or Tier 2. While not recommended for action at this time, they are included to ensure transparency in the panel's deliberative process.
- **Complementary policies:** Includes approaches aimed at reducing UPF consumption or related harms but are unlikely to have substantial impact on UPF consumption on their own. These policies may be most effective when paired with a recommended Tier 1 or Tier 2 policy. This category also includes policies designed to increase consumption of minimally processed foods, which can be incorporated into broader policy packages to support recommended actions.

The policies and their respective strengths and limitations are described below. For each policy, we summarize its purpose, the problem it addresses, selected evidence of effectiveness when available, relevant precedents, and key implementation considerations. These summaries are not comprehensive reviews. The section concludes with a discussion of potential implications for socioeconomic disparities in UPF exposure and consumption.

Table 10. **Policy Recommendations to Reduce Harms from UPFs**

Tier 1 Policies: **High Impact, High Feasibility**
Impose taxes on selected UPFs: Impose an excise tax on selected UPFs (e.g., sweetened beverages, processed meats).
Restrict procurement of UPFs in institutional settings: Restrict the amount of UPFs that can be purchased and provided in publicly funded settings, including schools, early learning and childcare sites, and government facilities: • **School procurement and service restrictions:** Restrict the amount of UPFs that can be purchased and provided in schools. This includes programs like the School Breakfast Program, National School Lunch Program, competitive foods (i.e., Smart Snacks), summer meals and afterschool programs, and local school wellness policies. • **Early childhood procurement and service restrictions:** Restrict the amount of UPFs that can be purchased and provided in early learning and childcare sites. This includes federal programs like Child and Adult Care Food Program (CACFP) and Head Start, as well as meal requirements set via state laws or local childcare licensing. • **Government facility and contractor procurement and service restrictions:** Restrict the amount of UPFs that can be purchased and provided in government buildings and institutions (e.g., hospitals, jails). Restrict the amount of UPFs that government contractors can purchase and provide using government funds.
Fund UPF countermarketing campaigns: Provide public funds for campaigns that use countermarketing methods to reduce the desirability of and demand for UPFs (e.g., modeled on tobacco Truth campaign, use organic media channels/social media).
Limit UPFs in Dietary Guidelines: Include guidance to limit consumption of UPFs in dietary guidelines provided by the federal government, other regulatory bodies, and professional organizations representing health professionals (e.g., DGA, guidelines for foods provided by institutions, and organizational policy and position statements or clinical practice guidelines).
Require UPF identity labels on the front of food packages: Require a label on the front of UPF packages indicating that a product is UPF. For example, the label may state, "This product is ultraprocessed." It may or may not include a warning icon or text (inclusion of these elements likely increases impact, but decreases feasibility).

Table 10 cont. **Policy Recommendations to Reduce Harms from UPFs**

Tier 2 Policies: **High Impact, Low Feasibility OR Low Impact, High Feasibility**
Restrict UPFs in food retail settings: Limit the promotion and placement of UPFs in food retail settings (groceries, supermarkets, convenience stores, dollar stores, etc.), such as in checkout aisles, on end caps, and/or in front of store displays.
Restrict procurement of UPFs in Food is Medicine programs: Restrict the amount of UPFs that can be purchased and provided by Food is Medicine programs (i.e., health care-based FIM programs like medically tailored meals or groceries, Medicare Advantage grocery programs).
Require and fund UPF topics in nutrition education programs: Require and provide funding for discussion of UPFs (what they are, how to identify, why to limit consumption, what products are healthy substitutes) in USDA nutrition education curriculum, such as SNAP-Ed, the Expanded Food and Nutrition Education Program (EFNEP), and school health and nutrition education curricula.
Require UPF health warning labels on the front of food packages: Require a front-of-package warning on UPF packages that identify the product as UPF and warn about adverse health effects of consumption.
Restrict UPF product price and volume promotions in food retail settings: Restrict price promotions of UPF products in food retail settings—e.g., 2 for 1 promotions.
Eliminate tax breaks for marketing of UPFs: Disallow tax deductions for marketing and advertising of UPFs in the U.S. tax code.
Prohibit nutrition or health claims on UPF product packages: Prohibit health claims or nutrient-content claims on the packages of UPF products.
Restrict the marketing of UPFs: Restrict the marketing of UPFs to children, including via advertising (TV, digital, in-store), as well as using child-directed appeals on UPF products (e.g., cartoon characters).
Fund UPF public awareness campaigns: Publicly fund nutrition education campaigns to educate the general public about UPFs.
Tier 3 Policies: **Policies lacking sufficient agreement among panel members for assigning to Tier 1 or Tier 2. These policies are not recommended for action at this time.**
Restrict the purchase of UPFs using SNAP benefits: Restrict the purchase of UPFs using Supplemental Nutrition Assistance Program (SNAP) benefits.
Impose taxes on all or most UPFs: Impose an excise tax on all or most UPFs
Complementary Policies: **Policies aimed at reducing UPF consumption or harm but that may have limited impact on these UPF-related outcomes on their own. These policies may be useful and synergistic when paired with another policy**
Restrict food additives: Ban specific additives associated with adverse health outcomes from the general food supply.
Fund policies and programs to support serving fresh or healthy foods in schools, early childhood sites, and congregate meal settings: Provide support for farm-to-school programs and/or cooking from scratch programs, such as: increased meal reimbursements, funding for kitchen infrastructure, and program workforce development (e.g., training, technical assistance).
Fund healthy food incentive policies and programs: Expand nutrition incentive programs like Double Up Food Bucks for fruits and vegetables.
Fund Food is Medicine programs: Fund FIM programs, including health care-based FIM programs like medically tailored meals or groceries, public health insurance programs such as Medicare Advantage that provide grocery benefits, and state level programs.

Tier 1 Policies: High Impact, High Feasibility

The following policies are recommended by the panel based on their likelihood of adoption and successful implementation, as well as their potential for high impact in reducing potential harms associated with UPF consumption.

Tier 1 Policies
Impose taxes on selected UPFs
Restrict procurement of UPFs in institutional settings
Fund UPF countermarketing campaigns
Limit UPFs in Dietary Guidelines
Require UPF identity labels on the front of food packages

Impose taxes on selected UPFs

Expert Panel Recommendation

Governments should impose excise taxes on selected UPFs and collect them from manufacturers or distributors.

UPF taxes can be adopted at the federal, state, and local levels, though they are likely most feasible at the state and local levels, given recent experience with similar policies, such as sweetened beverage taxes.

Rationale

Excise taxes on sweetened beverages provide an example of what a selective UPF tax might look like. They have been widely adopted globally, including in eight local jurisdictions and one tribal government in the U.S.[135,136]

An excise tax on UPFs would likely increase the shelf price of taxed products, reduce sales, encourage substitution to non-taxed products, and lower consumption. Evaluation of taxes on sweetened beverages—one type of UPF—have demonstrated all these benefits.[137,138] Taxes also raise revenues that can be used to fund healthy eating programs.[139]

While policies that target all UPFs would affect most packaged foods sold in the U.S., the panel viewed this as a particular concern for tax policies and therefore evaluated taxes on selected UPFs and taxes on all UPFs separately. Given current concerns about food affordability and the disproportionate burden that a broad tax could place on households with lower-incomes, the panel determined that taxing selected UPF products is a more feasible and equitable approach. For example, certain UPF categories, such as sweetened beverages and processed meats, have strong evidence of health harms beyond their classification as UPFs and may be appropriate targets for selective taxation.

As with sweetened beverage taxes,[139] policymakers should invest revenues from UPF taxes in ways that benefit lower-income communities disproportionately impacted by UPFs. For example, revenues can expand access to healthy foods through fruit and vegetable incentive programs or Medicaid Food is Medicine initiatives. Directing revenues in this way makes the tax progressive. Evaluations of SSB taxes show that when revenues are earmarked for programs serving households with lower-incomes, these households receive greater benefits than the taxes they pay, resulting in a net transfer of resources from higher- to lower-income households.[140]

Restrict procurement of UPFs in institutional settings

Expert Panel Recommendation

Governments should restrict the amount of UPFs that can be purchased and provided in publicly funded settings, including schools, early learning and childcare sites, and government facilities. This includes school meal programs (e.g., the School Breakfast Program [SBP], National School Lunch Program [NSLP], competitive foods/Smart Snacks, summer meals, afterschool programs, and local school wellness policies), early childhood programs (e.g., Child and Adult Care Food Program [CACFP] and Head Start, as well as state and local childcare meal requirements), and food service in government buildings and institutions (e.g., hospitals and jails). Governments should also restrict the use of public funds by contractors to purchase and provide UPFs.

This policy can be implemented at the federal, state, and local levels.

Rationale

Procurement policies govern how goods and services are acquired and may include regulations related to competition, transparency, pricing, and product specifications. In the U.S., federal procurement is directed by the Office of Management and Budget (OMB),[141,142] with implementation involving entities such as the Office of Federal Procurement Policy (OFPP), the Federal Acquisition Regulatory Council (FARC), and the General Services Administration (GSA). Federal agencies may also establish program-specific procurement requirements.

Federal child nutrition programs administered by the U.S. Department of Agriculture—including the SBP, NSLP, summer meal programs, and CACFP —operate under additional procurement requirements governing the foods and beverages that may be purchased, served, and sold.[143] In addition, nutrition standards for these programs are established through a regulatory process and focus on meeting food group recommendations and nutrient criteria (e.g., limits on calories, sodium, and added sugars). Procurement policies are a key mechanism for implementing these standards, as institutions must purchase foods that enable compliance with program requirements. Such policies have been used to support procurement of foods meeting nutrition standards (e.g., whole-grain specifications and sodium limits), incorporate geographic preferences (e.g., farm to school), ensure culturally appropriate

offerings, and advance environmental sustainability and animal welfare goals.[144,145]

Other federal nutrition programs, such as The Supplemental Nutrition Program for Women, Infants, and Children (WIC), The Emergency Food Assistance Program, Commodity Supplemental Food Program, and the Food Distribution Program on Indian Reservations (FDPIR), operate differently with the USDA deciding which foods are included based on federal nutrition standards, Dietary Guidelines for Americans (DGA), and agricultural availability.[146] While USDA sets the overall food packages, state agencies and Indian Tribal Organizations (ITOs) manage local distribution, with WIC state agencies further defining allowed brands but not making procurement decisions.

The extent to which UPFs are provided through federal food assistance programs varies. For example, while WIC standards do not explicitly restrict UPFs, WIC food packages exclude most UPF products because they are narrowly defined to meet the specific nutritional needs of participants. In contrast, estimates suggest that a substantial proportion of foods provided through school meal programs and summer meals are UPFs.[147]

Procurement policies provide a mechanism for reducing access to UPFs and increasing availability of minimally processed foods by establishing limits on the proportion of UPFs that may be purchased, served, and sold (e.g., a maximum percentage with progressively stricter targets over time). International examples demonstrate the feasibility of this approach; for instance, Brazil limits the share of federal funds that may be spent on processed and ultraprocessed foods in schools and is lowering this cap over time (currently 20%, with a goal of 10%).[148]

Restrictions on UPFs should be accompanied by technical assistance, kitchen equipment and infrastructure upgrades, and adequate funding to support the purchase and preparation of fresh or minimally processed foods, including foods cooked from scratch. Complementary policies—such as farm-to-school initiatives—can further support implementation.

Federal nutrition and procurement standards represent a floor; state and local governments can strengthen these requirements. For example, many states require licensed childcare centers to comply with CACFP nutrition standards regardless of participation in the federal program. The following sections provide additional context for schools, childcare settings, and government facilities and contractors.

Schools

The amount of UPFs that can be purchased, served, and sold through school nutrition services should be restricted at the federal, state, and local levels. Such restrictions would build on the existing foundation of strong nutrition standards for school meals and competitive foods (also known as Smart Snacks), which currently regulate nutrients and food groups but do not address degree of processing.

UPF procurement limits should apply across all school food programs, including the SBP, NSLP, Smart Snacks, summer meal programs, and afterschool programs, and may be implemented through federal program requirements, state nutrition standards, and local school wellness policies.[149,150] Although quantitative data on UPF volumes in schools are limited, most schools rely heavily on convenience and quick-preparation foods, which are likely processed or ultraprocessed.[147,151] Food manufacturers have reformulated many products to meet nutrient criteria (e.g., whole grains, sodium reductions), however as there are currently no limits on processing, many foods served in schools remain ultraprocessed. Policies restricting UPFs will need to include mechanisms for monitoring and reporting UPFs purchased, served, and sold.

Evidence from prior school nutrition policies demonstrates the feasibility and effectiveness of this approach. Improvements to nutrition standards following the Healthy, Hunger-Free Kids Act of 2010 were associated with meaningful gains in the nutritional quality of foods consumed at lunch among NSLP participating students.[152,153] Similarly, a Boston Public School's policy restricting SSB availability was associated with a reduction in SSB consumption.[154] Establishing UPF purchasing limits through school procurement policies offers a clear opportunity to further improve the healthfulness of school foods.

Because schools serve nearly 30 million children each day and are required to align meals with the DGAs, limiting UPFs through procurement policies represents a highly feasible, high-impact strategy.

Early childhood settings

The amount of UPFs that can be purchased and provided at early learning and childcare settings should be restricted at the federal, state, and local levels. Early childhood is a critical period for establishing dietary preferences and eating patterns, and a large share of infant and toddler food products available in the U.S. are ultraprocessed, suggesting substantial opportunity to improve diet quality through procurement standards.[15]

Restricting UPF procurement in childcare settings would build on existing nutrition policies that have improved food quality for young children. CACFP serves more than 4 million children from low-income families in participating childcare settings and requires adherence to the program's nutrition standards,[155–157] providing a strong platform for further restrictions on food processing. Similar to schools, CACFP-participating programs and other publicly funded early childhood programs (e.g., Head

Start) rely on procurement policies to support compliance with nutrition guidelines.

Evidence suggests these policies matter: children attending CACFP-participating childcare centers have higher overall dietary quality on days they are in care compared with days they are not.[158] Incorporating limits on UPFs into procurement policies for early childhood settings offers a highly feasible, high-impact strategy to further improve nutrition during this sensitive developmental period.

Government facilities and contractors

The amount of UPFs that can be purchased, served, and sold in government facilities and programs—including government buildings, carceral facilities, hospitals, military bases, and privately operated sites receiving public funds for meals or snacks—should be restricted at the federal, state, and local levels. These settings serve large and often captive populations, including individuals with limited food choice, heightened health needs, or reliance on publicly provided meals, making food standards in these environments particularly consequential.

Evidence from federal, state, and local initiatives demonstrates the feasibility of using procurement policies to improve food environments in government facilities. Programs such as the CDC Food Service Guidelines[159] and the Good Food Purchasing Program[160] have been adopted across a range of government contexts, including cafeterias, vending machines, and concession operations.[160–162] Local examples, such as Los Angeles's incorporation of nutrition standards into food vendor contracts across multiple departments and venues, illustrate how procurement requirements can be embedded into contracts to increase availability of healthier options.[163]

Food environments in government settings can shape dietary intake, health outcomes, and social norms, and governments have direct authority to set expectations for foods purchased and served with public funds. Unlike federal child nutrition programs, many institutional settings lack comprehensive nutrition standards, leaving procurement policies as a primary mechanism for improving food quality. Restricting UPFs in these settings represents a highly feasible, high-impact opportunity to improve diet quality, model healthy food environments, and ensure public funds are used in ways that support population health.[161,164–167]

Fund UPF countermarketing campaigns

Expert Panel Recommendation

Governments should allocate funding to support countermarketing campaigns targeting UPFs and ensure that public health agencies have the resources needed to design, implement, and sustain these campaigns.

This policy can be implemented at the federal, state, and local levels.

Rationale

UPF companies invest heavily in marketing that promotes the desirability of UPFs; normalizes their consumption; targets children through the use of cartoon characters, digital games, and other appeals; uses sophisticated psychological techniques; and creates health halos (e.g., "natural," "whole grain,").[168,169]

Countermarketing is a public health communications strategy "designed to reduce the consumption of unhealthy products by exposing the motives of and denormalizing marketing activities initiated by the producers of these products."[170] Tobacco countermarketing campaigns implemented by state and local agencies provide examples of how a UPF campaign can be developed.[171]

A UPF countermarketing campaign can deliver emotionally engaging messages, such as stories, through media channels including digital (e.g., YouTube, podcasts, videogames, social media) and traditional media, to:

- Expose manipulative industry tactics;
- Denormalize UPF marketing;
- Reframe UPFs as harmful, not beneficial;
- Correct misinformation;
- Highlight how UPFs undermine health, culture, and family wellbeing; and
- Expose the health, societal, economic, and environmental costs of UPF production and consumption.

Countermarketing messages should center on industry actions in the design, production, marketing, and sale of UPFs, rather than on individual consumption choices.

Evidence from analogous public health efforts supports the use of countermarketing to reduce consumption of harmful products. Tobacco countermarketing initiatives, such as the Truth campaign, have demonstrated effectiveness in reducing youth smoking prevalence.[172] Drawing on this experience, a countermarketing campaign targeting UPFs can similarly reduce their desirability and consumption. In addition, a randomized controlled trial of countermarketing directed at sugar sweetened fruit drinks found reductions in parents' purchases of these products for their children.[173] Countermarketing approaches have also been implemented by the Hawai'i Department of Public Health and Youth Speaks in San Francisco, providing further precedent for this strategy.[174–176]

Public funding allows scalable implementation of countermarketing campaigns. Delivery via organic media channels and social media may maximize reach per dollar spent.

Limit UPFs in Dietary Guidelines

Expert Panel Recommendation

Federal agencies and health professional organizations should recommend reducing consumption of UPFs through dietary guidelines, nutrition standards, and/or policy statements. This includes guidance issued by federal entities (e.g., the DGA, USDA, CDC, FDA, and other agencies) as well as policy statements and clinical practice guidelines developed by professional organizations.

These policies can be implemented at the federal level and by professional bodies.

Rationale

The federal DGAs provide evidence-based recommendations to promote health, prevent chronic disease, and meet nutritional needs throughout the lifespan. The DGAs are updated every 5 years and are used to set standards for the foods and beverages provided through government nutrition programs, as well as to inform the public about healthy dietary patterns. As most federal nutrition programs are required to align with (or be informed by) the DGAs, this policy has the potential to impact nutrition standards for multiple programs such as NSLP, SBP, CACFP, WIC, FDPIR, SNAP-Ed, senior nutrition programs, and some military and veteran meal programs, as well as federal regulations such as nutrition labeling and health claims authorized by FDA. State and local governments also have the ability to set additional nutrition standards for programs, and many use the DGAs as the scientific basis for these efforts.

For the first time, the 2025-2030 DGAs included recommendations to reduce consumption of "highly processed foods" and prioritize "real," "whole, nutrient-dense foods." The accompanying report, *The Scientific Foundation for the Dietary Guidelines for Americans*,[177] defines highly processed foods as "any food, beverage, or engineered food-like item that is made primarily from substances extracted from foods (such as refined sugars, refined grains/starches, and refined oils) and/or containing industrially manufactured chemical additives." Although this definition is not grounded in the body of research linking UPFs to adverse health outcomes, it represents an important initial step toward incorporating guidance on food processing into the DGAs. Future DGAs should build on this progress by explicitly recommending limits on UPF consumption and by adopting the evidence-based UPF definition recommended in this report.

Many health professional organizations conduct independent reviews of the scientific literature to develop nutrition policy statements and clinical practice guidelines. These recommendations shape the nutrition guidance clinicians provide to patients and often influence broader nutrition policy. While some of these guidelines reference UPF, they typically focus on products that are high in saturated fat, added sugars, and sodium (HFSS), energy-dense foods, and nutrient-poor products rather than UPFs as defined by the Nova classification system.[178,179] The panel recommends that professional organizations adopt the panel-recommended definition of UPFs when developing guidelines and apply the proposed exemption for products meeting the modified FDA "Healthy" criteria.

Recommendations to limit UPF consumption should be paired with guidance that encourages greater intake of fresh, minimally processed, whole foods—an approach already reflected in the DGAs and many professional organization guidelines.

While guidelines have major impacts on government food programs, their effects on individual food choices may be limited, as adherence to the DGA recommendations has historically been low. For example, adherence to the 2020-2025 guidelines—measured using an index ranging from 0 to 100—was 54 among children and adolescents, 57 among adults up to age 59, and 61 among older adults.[180] These findings underscore the need for policy, systems, and environmental changes that make healthier choices easier, more accessible, and more affordable for individuals and families.

Require UPF identity labels on the front of food packages

Expert Panel Recommendation

The FDA should require a mandatory front-of-package label identifying ultraprocessed food products. For example, the label could state, "This product is ultraprocessed," with or without an accompanying warning icon.

Because food package identity labeling falls under federal jurisdiction, the FDA has sole authority to implement this requirement, and federal law preempts state or local labeling mandates. Although state and local entities may choose to apply UPF identity labels on menus or in other food service settings, this was not discussed by the panel and therefore, is not included in this recommendation.

Rationale

Labels play an important role in helping consumers understand product content and identity and make healthier choices. In the case of UPFs, evidence from multiple countries shows that consumers often have difficulty distinguishing between UPFs and less-processed products, suggesting a clear role for labeling policies.[181–185] Research on interpretive front-of-package labels—such as those warning that products are high in added sugars, saturated fats, and sodium—demonstrate that well-designed labels are noticed by consumers, shift purchases toward healthier options, and encourage product reformulation.[186] Globally,

many such labels often include icons, stop sign images, or other graphics.[187]

Although UPF identity labels have not yet been adopted as policy, emerging evidence suggests they may be effective. Experimental online studies show that UPF identity labels improved consumers' ability to correctly identify UPFs, reduced purchase intent for UPFs relative to neutral labels, and increased selection of less processed alternatives.[188–190] When paired with nutrient-based front-of-package labels, UPF identity labels improved consumers' understanding of both processing and nutrient content—two related but distinct dimensions of nutritional quality.[191] This distinction is important, as some products lower in nutrients of concern may still be UPF based on their formulation and processing.[192]

UPF identity labels can therefore serve as a valuable component of a comprehensive front-of-package labeling system. This approach complements nutrient-specific labels—such as those indicating products are high in saturated fat, added sugars, or sodium—currently under consideration by FDA.

Although the panel did not review "non-UPF" certifications, these emerging third party labels raise concerns about consumer confusion and potential conflicts of interest, as certifiers are paid by companies seeking certification.[29–31] There is no scientific evidence demonstrating the effectiveness of these labels. In addition, non-UPF labels may confer health halos on products that remain unhealthy based on nutrient content or other health criteria, such as the presence of harmful chemicals not included in certification criteria. A standardized, government led approach that labels products as UPFs will provide clearer, more transparent information to consumers while avoiding these limitations.

Tier 2 Policies: High Impact, Low Feasibility or Low Impact, High Feasibility

The following policies are recommended by the panel as Tier 2 policies, and include approaches that either have the potential for substantial impact but face significant feasibility challenges, or are easier to implement but are likely to have more modest impacts on their own.

Tier 2 Policies
Restrict UPFs in food retail settings
Restrict procurement of UPFs in Food is Medicine programs
Require and fund UPF topics in nutrition education programs
Require UPF health warning labels on the front of food packages
Restrict UPF product price and volume promotions in food retail settings
Eliminate tax breaks for marketing of UPF
Prohibit nutrition or health claims on UPF product packages
Restrict the marketing of UPFs
Fund UPF public awareness campaigns

Restrict UPFs in food retail settings

Expert Panel Recommendation

Governments should restrict the promotion and placement of UPFs in food retail settings, including checkout aisles, end caps, and front of store displays. Examples of retail settings are grocery stores, supermarkets, convenience stores, and dollar stores.

This policy can be implemented at the federal, state, and local levels. The panel rated this policy as lower impact and higher feasibility.

Rationale

Healthy retail policies shape consumer food choices by regulating product availability, placement, or promotion. A strong body of evidence shows that product placement influences purchasing behavior, particularly by encouraging impulse purchases.[193,194] In U.S. retail stores, the most visible and heavily trafficked areas—such as checkout lanes and aisle end caps—are dominated by UPFs, including candy, sugar-sweetened beverages, and salty snacks.[195]

Berkeley, California adopted the world's first mandatory healthy checkout policy in 2020, later followed by two other California jurisdictions.[196–198] Although the Berkeley policy does not explicitly target UPFs, it permits only beverages without added sugars or artificial sweeteners in checkout areas of large food retail stores, effectively removing many UPF beverages from these high-visibility locations. One year after implementation, the presence of SSBs, candy, and diet beverages in checkout

areas declined substantially.[199] Similarly, a comparable policy in England was associated with reduced purchases of products high in sugar, sodium, and fat.[200]

By reshaping what foods are most visible, accessible, and promoted at the point of purchase, healthy retail policies can substantially reduce exposure to ultraprocessed foods without restricting consumer choice. Because retail environments strongly influence impulse purchasing and normalize frequent consumption of prominently displayed products, limiting UPF placement and promotion can shift purchasing patterns. These policies are promising because they address environmental drivers of diet quality and can be implemented across diverse retail contexts, making them a feasible and scalable strategy to support healthier food environments. Several organizations have developed technical assistance or policy tools for jurisdictions looking to pass healthy retail policies.[201]

Restrict procurement in Food is Medicine programs

Expert Panel Recommendation

Governments should restrict the purchase and provision of UPFs in Food is Medicine programs.

This policy can be implemented at the federal and state levels. The panel rated this policy as lower impact and higher feasibility.

Rationale

Food is Medicine (FIM) programs provide nutritionally-tailored healthy foods to patients as part of treatment plans for managing and preventing diet-related diseases in a way that is integrated and paid for by the health care sector. Examples include medically tailored groceries, medically tailored meals, and produce prescription programs.[202,203] These foods can be provided by health care providers, health care delivery systems, and insurers (e.g., Medicare Advantage grocery programs). Funding is often provided through Section 1115 Medicaid waivers, though states use other Medicaid and non-Medicaid authorities.[204,205]

While many FIM programs aim to promote healthier diets, most do not yet restrict UPFs, though momentum for such policies is building. The voluntary Food is Medicine Coalition's Medically Tailored Meal Nutrition Standards prohibit inclusion of UPFs in medically tailored meals.[206] In addition, California and Michigan issued guidance to restrict UPFs from state FIM Medicaid programs.[207,208]

FIM UPF policies should focus on medically tailored meals and groceries. A policy could prohibit provision of UPFs and disallow participant use of FIM benefits to purchase UPFs (excluding those that are medically necessary, such as medical nutritional supplements). Because prescription programs explicitly fund produce (fruits and vegetables) and do not include UPFs, they would not be a target for this policy.

Direct evidence on the impact of excluding UPFs from FIM programs on UPF consumption and diet quality is not available. In general, evidence from randomized controlled trials suggests that FIM interventions positively influence diet quality and food security, which are key mediators for clinical outcomes.[209]

Poor diet quality is a leading risk factor for cardiometabolic disease and is responsible for an estimated 45% of all cardiometabolic disease deaths.[210] Treatment for diet-related cardiometabolic diseases costs approximately $50.4 billion annually in the United States.[211] Food is Medicine interventions that seek to remove or reduce UPFs can impact the health of those who are adversely affected by diet-related conditions.

Require and fund UPF topics in nutrition education programs

Expert Panel Recommendation

Governments should require and provide public funding to support individual-level nutrition education programs to include education on UPFs. Programs such as SNAP-Ed (if re-funded), the Expanded Food and Nutrition Education Program (EFNEP), and school health and nutrition education curricula should teach what UPFs are, how to identify them, why limiting consumption matters, and how to identify healthier substitutes.

This policy can be implemented at the federal, state, and local levels. The panel rated this policy as lower impact and higher feasibility.

Rationale

Governments play an important role in the design and implementation of health education programs. Health education standards in the U.S. are set primarily at the state level, with local districts adapting and implementing them, while the federal government provides nonbinding model guidance such as the National Health Education Standards.[212]

Peer-reviewed evidence suggests that Americans have limited understanding of UPFs, creating a barrier to informed dietary decision-making. Available research indicates that while consumers report increasing awareness of UPFs and interest in reducing consumption, many struggle to accurately identify which products are ultraprocessed. For example, a recent survey found that only about half of U.S. shoppers classified soft drinks as UPFs, and fewer than one in five (19%) recognized protein bars as UPFs. The same survey showed that shoppers substantially underestimate their own UPF intake, estimating that only about 20% of their calories came from UPFs—far below population level consumption estimates.[213]

Including information about UPFs in nutrition education programs can help address these knowledge gaps by improving awareness, recognition, and understanding of the role UPFs

play in diet quality and health. However, evidence indicates that individual-level nutrition education alone is unlikely to produce sustained changes in dietary behavior.[214–217] Education is most effective when paired with policy, systems, and environmental strategies that reinforce learning and make healthier choices more available, affordable, and accessible. Integrating UPF content into nutrition education programs should therefore be viewed as a foundational—but not standalone—component of a broader approach to reducing UPF consumption.

Require UPF health warning labels on the front of food packages

Expert Panel Recommendation

Governments should require front-of-package warning labels on UPF products that alert consumers to the adverse health effects associated with UPF consumption.

This policy can be implemented at the federal, state, and local levels. The panel rated this policy as higher impact and lower feasibility.

Rationale

Warning labels inform consumers about the health risks associated with consumption of labeled products, assisting them in making healthier choices. Unlike identity labels, which simply classify a product as ultraprocessed, health warning labels communicate both that a product is a UPF and that its consumption is associated with specific adverse health outcomes, providing clearer and more motivating information for consumers.

Although UPF-specific warning labels have not yet been evaluated in real-world settings, substantial evidence from analogous policies supports their likely effectiveness. Health warnings on sugary drinks, red and processed meats, and tobacco products have consistently been shown to reduce purchases and consumption.[218–227] Experimental studies further indicate that health warning labels—especially those that highlight disease risk—have a stronger influence on consumer behavior than nutrient-focused labels alone.[218] Together this evidence suggests that warning labels addressing health risks can meaningfully discourage consumption of harmful products.

UPF warning labels could build on existing models, such as the sugary drink warning previously adopted in the City and County of San Francisco, by focusing on health outcomes with the strongest evidence of association with UPF consumption. For example, labels could state that consuming UPFs contributes to type 2 diabetes, cardiovascular disease, and mental health disorders. Incorporating interpretive symbols (e.g., warning icons—such as an exclamation point or a black box) or graphic elements—approaches shown to enhance salience and effectiveness—would likely strengthen impact.[225,226] Identifying the issuing authority (such as the FDA or a state or local health department) could further reinforce credibility and public trust.

Precedents such as California's Proposition 65—requiring products containing chemicals that cause cancer, birth defects, or other reproductive harms to have a package warning indicating which chemicals are present and stating adverse health effects[228]—demonstrate that health warning labels for consumer products can be implemented even in complex regulatory environments. While UPF warning labels may face First Amendment challenges, these challenges are not insurmountable, and the potential public health benefits are substantial. Yet, because of these legal hurdles, the panel rated the feasibility of this policy option lower, resulting in a Tier 2 recommendation.

As part of a broader front-of-package labeling system, UPF health warnings could complement nutrient-specific labels currently under FDA consideration, offering consumers clearer, more comprehensive information about food-related health risks.

This policy option is feasible at federal, state, and local levels. Because the federal Food, Drug, and Cosmetic Act does not preempt health safety warnings, states and localities retain authority to implement warning labels. Politically, early adoption may be more feasible at state and local levels, providing opportunities for policy innovation and evidence generation before potential federal action.

Restrict UPF product price and volume promotions in food retail settings

Expert Panel Recommendation

Governments should restrict price and volume promotions, such as "two-for-one" sales, of UPF products in food retail settings.

This policy can be implemented at the federal, state, and local levels. The panel rated this policy as higher impact and lower feasibility.

Rationale

Price and volume promotions are a powerful driver of food and beverage purchasing, particularly by encouraging higher volume purchases and impulse buying.[229]

Food manufacturers and retailers frequently use strategies such as price discounts, "two-for-one" offers, and multi-pack promotions, and evidence shows that these tactics are used disproportionately for unhealthy products.[230–232] Although few studies have examined promotions by degree of processing, available research suggests that processed and ultraprocessed foods are promoted far more frequently than unprocessed

foods or culinary ingredients, reinforcing their visibility and affordability in retail environments.[233]

Restricting price and volume promotions for UPFs is therefore likely to reduce purchases and consumption by increasing the effective price of these products and removing incentives for over-purchasing. Experimental evidence supports this mechanism: in an online grocery store study, participants purchased approximately 10% fewer calories when promotions were removed, despite having the same budget and purchasing instructions.[234] This finding suggests that eliminating promotions can meaningfully shift purchasing behavior without limiting consumer choice.

International experience further demonstrates the feasibility of this policy approach. As of October 2025, the United Kingdom has banned price and volume promotions for foods and drinks high in fat, sugar, or salt—or otherwise classified as "less healthy"—across supermarkets, large retailers, and online platforms, and has also restricted free refill promotions of certain soft drinks in restaurants and cafes.[235] Although similar food promotion restrictions have not yet been implemented in the United States, comparable policies targeting tobacco pricing have been adopted by multiple U.S. jurisdictions (New York, New Jersey, Rhode Island).[236] These state laws and local ordinances, which prohibit coupon redemptions and multi-pack discounts that reduce prices below listed levels, have withstood First Amendment and preemption challenges, providing relevant legal precedent.[237,238]

Together, this evidence indicates that restricting price and volume promotions is a viable policy tool for reducing exposure to and consumption of UPFs. This approach addresses a key commercial practice that amplifies demand for ultraprocessed products and complements other retail- and price-based strategies to improve diet quality.

Eliminate tax breaks for marketing of UPFs

Expert Panel Recommendation

The federal government should disallow tax deductions for marketing and advertising of UPFs in the U.S. tax code.

Because tax deductions are governed primarily by federal law, this policy would require federal action, though states with similar corporate tax provisions could adopt comparable measures. The panel rated this policy as higher impact and lower feasibility.

Rationale

Under current U.S. tax law, companies may deduct advertising and marketing expenses as ordinary and necessary business costs under Internal Revenue Code §162.[239] Extensive evidence shows that advertising and marketing increase sales and consumption of promoted products, including unhealthy foods and beverages.[240–243] As a result, allowing tax deductions for marketing UPFs effectively subsidizes commercial activities that encourage consumption patterns associated with unhealthy diets and adverse health outcomes. Removing these deductions would realign public spending with public health goals by eliminating government-supported incentives for promoting harmful products.

Emerging international precedent demonstrates the feasibility of this approach. Ecuador recently adopted a tax rule prohibiting producers of UPFs from deducting costs associated with promoting and advertising these products.[244] Although this policy is relatively new and thus lacks real-world evaluation data, modeling evidence suggests substantial potential benefits. A simulation study found that eliminating tax deductions for marketing unhealthy foods could be among the most cost-effective interventions for reducing childhood obesity in the U.S., with meaningful reductions in body mass index and health care expenditures projected over time.[245,246]

Eliminating tax deductions for UPF marketing raises potential First Amendment considerations because it targets advertising, a form of corporate free speech. However, similar concerns have been navigated in other policy domains, such as restrictions on tobacco promotion. Importantly, this policy does not prohibit speech, but rather withdraws preferential tax treatment that subsidizes the marketing of unhealthy products. By addressing an upstream economic driver of food marketing, this approach complements other regulatory and pricing strategies and offers a promising, though currently less feasible, tool for reducing population-level exposure to ultraprocessed food marketing.

Prohibit nutrition or health claims on UPF product packages

Expert Panel Recommendation

The FDA should prohibit health- and nutrient-content claims on packaging of UPF products.

Because regulation of health and nutrition claims falls under FDA authority, this policy would require federal action. The panel rated this policy as higher impact and lower feasibility.

Rationale

The food and beverage industry uses health- and nutrient-content claims as a marketing strategy, framing products as healthier through references to added nutrients (e.g., protein, vitamins, fiber), reduced levels of nutrients of concern (e.g., "low sugar", "low fat", "low sodium"), or implied health benefits (e.g., "boosts immunity", "supports heart health"). These claims are common across the food supply. An analysis of 80 million food and beverage purchases by U.S. households between 2008 and 2012 found that 13% of food purchases and 35% of beverage purchases carried a low-content nutrient claim, and in some categories—such as sugar sweetened fruit drinks marketed

to young children—nearly all products (97%) displayed at least one health or nutrient claim.[247,248]

A growing body of research demonstrates that these claims influence consumer perceptions and increase purchase intent and preference for products bearing these claims, often creating a health halo that leads consumers to view products as healthier overall.[249–251] When applied to UPFs, such claims can mislead consumers by obscuring nutritional and processing characteristics associated with adverse health outcomes.[252,253] This effect is particularly concerning given the prevalence of claims on UPF products that have been reformulated or fortified to meet specific nutrient thresholds without meaningful improvements to the overall healthfulness of the product.

Although the FDA regulates certain types of claims, important gaps remain. The agency can require removal of false or misleading claims and pre-approve some "health claims." However, manufacturers are still permitted to place nutrient-content claims on products that meet specific nutrient thresholds if they also do not contain nutrients of concern, even when those products remain ultraprocessed and nutritionally poor overall. FDA authority is especially limited for structure/function claims (e.g., "supports digestive health"), which do not require pre-approval and are generally overseen after the fact by the Federal Trade Commission (FTC). To date, only the FTC has brought actions for specific structure/function claims found to be unfair or deceptive. This regulatory landscape creates a substantial loophole that allows unhealthy foods, including UPFs, to be marketed with claims that imply health benefits despite clear evidence of population-level harm.[254–257]

Prohibiting nutrient-content, structure/function, and health claims on UPF product packaging would help close this loophole by reducing misleading marketing and preventing claims that confer unwarranted health halos. While panel members noted challenges—such as the continued use of unregulated claims (e.g., "natural", "pure") and political feasibility—this policy could operate synergistically with other interventions, including front-of-package labeling, to provide clearer and more coherent information to consumers and better align food marketing with public health goals.

Restrict the marketing of UPFs

Expert Panel Recommendation

Governments should restrict the marketing of UPFs to children, including through advertising on television, digital platforms, and in-store settings, as well as through child-directed appeals on product packaging (e.g., cartoon characters).

This policy can be implemented at the federal, state, and local levels, though the specific regulatory approaches will vary by jurisdiction. The panel rated this policy as higher impact and lower feasibility.

Rationale

UPFs dominate food marketing environments, particularly those that reach children. Evidence shows that UPFs account for nearly half of all products advertised in U.S. supermarket circulars, and a systematic review found that most food and beverage advertisements viewed by children on digital platforms promote UPFs.[258] The food industry employs a wide range of marketing techniques—including cartoon and licensed characters, celebrities, sports sponsorships, price promotions, eye-catching packaging, and immersive digital strategies powered by data tracking and algorithm-driven personalization—to increase the appeal and consumption of UPFs among young audiences.[259]

A substantial body of research demonstrates that exposure to both traditional and digital food marketing directly undermines children's diets. Marketing influences not only immediate behavioral outcomes, such as increased calorie intake, purchase requests, and purchasing behaviors, but also intermediate outcomes that shape long-term preferences, including brand recognition, favorable attitudes toward advertised products, and intent to purchase—effects that are especially pronounced for products likely to be UPF.[242,260–262] These findings highlight child-directed food marketing as a powerful commercial driver of UPF consumption and a key contributor to early dietary pattern formation.

International policy experience provides strong evidence that restricting child-directed food marketing can reduce exposure to unhealthy products and prompt changes in industry practices. The United Kingdom has implemented comprehensive restrictions on advertising foods high in saturated fat, added sugar, and sodium to children, including bans in children's programming, limits on paid online advertising, and a ban on all television advertising before 9:00 p.m.[263] Chile has adopted even broader protections, banning child-directed marketing techniques (e.g., cartoon characters, toys), prohibiting marketing of unhealthy foods in schools, and banning television advertising for HFSS foods from 6:00 a.m. to 10:00 p.m., regardless of audience composition. Evaluations of these policies show substantial reductions in child-directed marketing, increases in product reformulation, and declines in purchases of sugary beverages.[264,265]

In the U.S., First Amendment considerations may constrain certain marketing restrictions, but meaningful policy options remain available. Governments can limit marketing in child-centered settings such as schools, childcare facilities, and government venues, and strengthen data-privacy protections that restrict the collection, use, and sale of children's personal information for targeted advertising. Other approaches

used internationally—such as limits on outdoor and transit advertising near schools, vending-machine advertising restrictions, or prohibitions on child-directed appeals—may face greater legal risk but illustrate the breadth of potential regulatory strategies. While industry efforts to circumvent regulations and the rapid evolution of digital marketing present implementation challenges, the evidence clearly supports marketing restrictions as a critical tool for reducing children's exposure to UPFs and countering commercial drivers of unhealthy diets.

Fund UPF public awareness campaigns

Expert Panel Recommendation

Governments should fund nutrition education campaigns to educate the general public about UPFs.

This policy can be implemented at the federal, state, and local levels. The panel rated this policy as lower impact and higher feasibility.

Rationale

Increasing public understanding of UPFs, including what they are, how to identify them, why limiting consumption matters, and which products are healthier substitutes can decrease demand for UPFs and build support for policy and systems change targeting UPFs. Well designed, publicly funded awareness campaigns can play an important role in building this foundational knowledge and increasing literacy around food processing. These campaigns differ from Tier 1 countermarketing efforts. Rather than using provocative or industry-critical messaging, public awareness campaigns emphasize neutral, educational, and advisory information intended to shape social norms and support informed decision-making.

Evidence suggests there is public interest in this type of information. Surveys indicate that the public is concerned about UPFs, with many individuals wanting to reduce consumption but lacking confidence in identifying UPFs or knowing how best to limit intake.[213,266] Providing clear, consistent, and trusted information could help address these knowledge gaps.

However, experience with public awareness campaigns across a range of health issues suggest that, on their own, they tend to have limited and time-bound effects on behavior change and are often costly relative to their impact.[267–270] When paired with stronger policy, systems, and environmental strategies—such as front-of-package identity or warning labels, or marketing restrictions—awareness campaigns may enhance effectiveness by reinforcing consistent messages and helping individuals understand how to interpret and apply new policies in every day food choices.

Tier 3 Policies: Discussed but Not Included in Recommendations

Policies in this tier did not receive majority support for placement in Tier 1 or Tier 2. While not recommended for action at this time, a discussion of the panel's deliberations are included to ensure transparency in the panel's process.

Tier 3 Policies
Restrict the purchase of UPFs using SNAP benefits
Impose taxes on all or most UPFs

Restrict the purchase of UPFs using SNAP benefits

The panel considered a policy prohibiting the use of SNAP (Supplemental Nutrition Assistance Program) benefits for the purchase of ultraprocessed foods, but does not recommend it at this time. A majority of panel members did not support recommending this policy, with concerns raised regarding the lack of evidence for the effectiveness of current SNAP purchase restrictions as well as possible unintended and inequitable impacts.

SNAP is a federal program that provides monthly cash benefits for food purchases to individuals and families with limited-incomes. Although some studies suggest SNAP participants purchase a higher proportion of ultraprocessed foods than nonparticipants, differences are modest and not consistently statistically significant after accounting for food security.[271–273]

In 2025, the federal administration began encouraging states to seek waivers from USDA to restrict the purchase of "non-nutritious items like sweetened beverages and candy" with SNAP benefits. As of March 2026, 22 states have received waivers to restrict SNAP purchases.[274] Most of the approved waivers target soda and candy; some include energy drinks, sweetened beverages, or soft drinks more broadly; a few include desserts; and one includes prepared food. None specifically target UPFs. However, among several proposed bills directing the state to submit a waiver request, at least two (CA SB1134, IL HB5507) include restrictions on the purchase of UPFs. These policies are newly implemented and have not yet been rigorously evaluated. To date, there is no real-world evidence demonstrating that SNAP purchase restrictions improve overall diet quality or health outcomes,[271] and existing experimental and modeling studies provide mixed findings.[275,276]

Some panel members agree that SNAP benefits should not be used to purchase unhealthy products like sugary drinks, noting the potential for such restrictions to reduce chronic disease risk and nutrition-related health disparities.[277] They also highlighted that SNAP restrictions on UPFs support the notion that governments should support healthful dietary patterns in all policies. In contrast, other panel members believe SNAP participants should not be subject to restrictions on

purchases, as restrictions applied only to SNAP participants may be stigmatizing and inequitable, particularly when the same products remain widely available to the general population.[278] Restricting purchases may also lead to substitution, whereby participants use non-SNAP funds to purchase restricted products, potentially limiting the policy's effectiveness.[279,280]

Panel members also expressed concern that SNAP purchase restrictions may disproportionately burden people with low incomes. Many SNAP participants face structural barriers to purchasing and preparing minimally processed foods, including higher relative costs, limited access, and time constraints. Given the dominance of UPF in the current food environment, restricting SNAP purchases risks reducing food choice and autonomy without ensuring meaningful access to healthier alternatives. Moreover, retailers may drop out of the program due to increased implementation costs.[271]

The panel concluded that it is prudent to await findings of current SNAP waiver evaluations before considering the expansion or extension of such policies to ultraprocessed foods. If SNAP purchase restrictions are considered in the future, the panel emphasized that they should be paired with robust nutrition incentives and additional policies designed to improve the affordability, accessibility, and feasibility of healthier food choices.[281] This policy will require either federal action or joint action at the federal and state levels.

Impose taxes on all or most UPFs

The panel considered whether to recommend imposing an excise tax on all or most UPFs collected from manufacturers or distributors. Panel members were divided on whether this policy should be classified as Tier 2 or Tier 3. Ultimately, a majority of panel members decided not to recommend this policy option due to substantial concerns about feasibility, equity, and affordability.

A comprehensive UPF tax would raise prices across a large share of the U.S. packaged food supply, as UPFs constitute the majority of packaged food products and contribute a substantial proportion of total caloric intake in the U.S. Several panel members expressed concern that such a tax could disproportionately burden households with limited incomes and exacerbate economic and health inequities. These concerns weighed heavily in the decision not to recommend this policy for near-term action, particularly in contrast to more targeted UPF taxes discussed in Tier 1 recommendations.

Some panel members noted that a broad UPF tax could produce long-term health and economic benefits if reduced UPF consumption leads to improved population health, lower health-care costs, and increased productivity. Supporting this perspective, a simulation study from Brazil found that a comprehensive UPF tax could slow increases in overweight prevalence and prevent substantial numbers of non-communicable disease cases and deaths.[282] However, many panel members concluded that such potential benefits remain largely theoretical in the U.S. context.

While an excise tax on all or most UPFs could potentially be implemented at federal, state, or local levels, panel members emphasized that widespread public concern about food prices would likely make adoption politically infeasible in the near term. Accordingly, the panel determined that targeted UPF taxes—focused on specific high-risk product categories as discussed in the Tier 1 recommendations—represent a more equitable and feasible policy option at this time.

If policymakers consider a comprehensive UPF tax in the future, the panel emphasized that any such policy should explicitly dedicate revenue to investments that benefit lower-income communities, including improving access to and affordability of non-UPF foods and minimally processed options, in order to mitigate potential regressive impacts.

Complementary Policies

The panel defined complementary policies as those aiming to reduce UPF consumption or related harms but are unlikely to have substantial impact on UPF consumption on their own. These policies may be more effective when paired with a recommended Tier 1 or Tier 2 policy. This category also includes policies designed to promote consumption of less processed foods.

Complementary Policies
Restrict food additives
Fund policies and programs to support serving fresh or healthy foods in schools, early childhood sites, and congregate meal settings
Fund healthy food incentive policies and programs
Fund Food is Medicine programs

Restrict food additives

Expert Panel Recommendation

Governments should ban selected food additives from use in the general food supply.

This policy can be implemented at the federal and state levels.

Rationale

Several food additives commonly found in UPFs—such as titanium dioxide, butylated hydroxyanisole (BHA), butylated hydroxytoluene (BHT), and azodicarbonamide—have been linked to adverse health effects, including cancer risk and endocrine disruption, yet they remain permitted for use in the food supply.[283,284] Numerous food additives enter the food supply through the Generally Recognized as Safe (GRAS)

loophole, which allows manufacturers to self-determine safety without mandatory FDA notification or pre-market review. Although the FDA retains authority to act post-market, limited resources, the large number of substances in use, and the absence of a comprehensive additive inventory constrain systematic review and enforcement.

In response to these concerns, several states have enacted bans on selected additives. For example, California banned four substances (Red 3, propylparaben, potassium bromate, and brominated vegetable oil) in 2023, and West Virginia (butylated hydroxyanisole, propylparaben, and seven food dyes) and Arkansas (potassium bromate and propylparaben) passed bans in 2025.[285] While none of these stated an intent to regulate UPFs, several states proposed and enacted bills to restrict these or other additives in school meals and framed them as restricting UPFs (e.g., AZ 2025 HB2164, SC 2025 HB4339 and others). These state laws frame additive restrictions as targeting UPFs but rely on narrow ingredient lists rather than processing-based definitions. As a result, these policies capture only a small fraction (approximately 15%) of products classified as UPFs, limiting their effectiveness as UPF-focused interventions. While banning harmful additives may restrict some UPF formulations and elevate public awareness, such approaches risk signaling progress without addressing the broader structural features of ultraprocessing, potentially enabling superficial reformulation.

Despite these limitations, policies to remove additives with demonstrated health risks remain important and justified public health measures. Additive bans can improve food safety, reduce harmful exposures, and reinforce broader efforts to strengthen food regulation. In addition, eliminating additives known to cause harm may restrict manufacturers' ability to produce some UPFs if these additives are integral to product formulation. For these reasons, additive restrictions should be pursued as complementary UPF policies, not substitutes for comprehensive strategies aimed at reducing UPF production, availability, and consumption.

Fund policies and programs to support serving fresh or healthy foods in schools, early childhood sites, and congregate meal settings

Expert Panel Recommendation

Governments should support the provision of healthy, less processed foods in schools, early childhood settings, and congregate meal sites by investing in farm-to-school and scratch-cooking programs, increasing meal reimbursements, funding kitchen infrastructure upgrades, and strengthening the food service workforce through training and technical assistance.

This policy can be implemented at the federal, state, and local levels.

Rationale

As discussed in Tier 1 recommendations, policies that support the provision of healthy, less processed foods in schools, early childhood settings, and congregate meal sites can significantly enhance the feasibility and effectiveness of UPF procurement restrictions. Restrictions on UPFs in these settings are more likely to succeed when paired with investments that enable institutions to offer appealing whole, fresh, and minimally processed foods—rather than relying on highly processed convenience items. Many schools have reported substantial barriers to implementation, including inadequate kitchen facilities, limited staff capacity and training for scratch cooking, and concerns about increased food procurement costs.[147]

Policy design can address these barriers directly. For example, California's AB 1624, which restricts UPFs in schools, requires the State Department of Public Health to establish a structured system for providing training and technical assistance to local educational agencies, illustrating how targeted implementation support can improve feasibility while advancing the nutritional quality of school meals.

Fund healthy food incentive policies and programs

Expert Panel Recommendation

Governments should establish, expand, and adequately fund healthy food incentive policies and programs to increase the affordability of nutritious foods, such as fruits and vegetables, for people with lower incomes.

This policy can be implemented at the federal, state, and local levels.

Rationale

Most Americans do not consume enough fruits and vegetables to meet federal dietary recommendations, and cost remains a major barrier to healthier eating—particularly for households with low incomes.[286,287] Fruits and vegetables are often more expensive than shelf-stable, less nutritious "convenience" foods and ultraprocessed foods, which are widely available and heavily promoted.[288] As a result, many households with low incomes struggle to afford sufficient quantities of fruits and vegetables to meet dietary guidelines.[289–292]

Nutrition incentive programs directly address these affordability barriers by subsidizing the purchase of healthy foods, typically fruits and vegetables, for people with limited incomes. The federal Gus Schumacher Nutrition Incentive Program (GusNIP) is a leading example, providing funding to state and local initiatives, such as "Double Up Food Bucks" programs that match SNAP spending on fruits and vegetables or offer fixed incentives for product purchases. Evidence indicates that these programs are associated with moderate but meaningful increases in fruit and vegetable intake among participating households.[293–296]

Panel members emphasized, however, that implementing nutrition incentives at a scale sufficient to transform overall dietary patterns would require substantial investment and is unlikely, on its own, to significantly reduce consumption of UPFs. Nevertheless, by improving affordability and access to healthier foods, incentive programs can play an important supportive role in reducing UPF purchases. As a UPF policy, nutrition incentives may be most effective when implemented alongside policies that discourage UPF consumption—such as taxes, pricing interventions, or retail and procurement policies—helping to simultaneously lower barriers to healthy choices while reducing incentives to purchase ultraprocessed alternatives.

Fund Food is Medicine programs

Expert Panel Recommendation

Governments should establish, expand, and adequately fund Food is Medicine (FIM) programs to increase the availability and affordability of healthy foods for patients managing and preventing diet-related diseases.

Federal, state, and local governments can provide funding to support these programs.

Rationale

FIM programs are discussed in greater detail in the Tier 2 recommendations on FIM procurement restrictions, which addresses the nutritional quality of foods provided through these programs. In contrast, expanding and funding FIM programs focuses on scale and access. At present, the reach of FIM programs remains limited, serving only a small share of individuals who could benefit. For example, Section 1115 Medicaid waivers authorizing FIM programs have been approved in only about a dozen states, and participation in those states is typically restricted to individuals with a narrow set of qualifying medical conditions and additional eligibility requirements.[297] Expanding FIM programs to additional states and broadening eligibility criteria could substantially increase access to healthier foods among populations with high diet-related disease burden.

While evidence on the direct impact of FIM programs on ultraprocessed food consumption is still emerging, these programs have potential to improve diet quality by increasing access to fresh, minimally processed foods among people with chronic conditions. Scaling FIM programs will require significant and sustained public investment. When paired with FIM procurement restrictions that limit UPFs, program expansion can play a complementary role—simultaneously increasing availability of healthier foods while restricting access to ultraprocessed options for participants. Together, these policies create a more coherent Food is Medicine framework that aligns nutritional quality, access, and health outcomes.

Equity Considerations for UPF Policies

The panel considered how proposed policies may affect equity across multiple dimensions, recognizing that interventions could both reduce and exacerbate disparities depending on their design and implementation.

Risks of increasing inequity

Some policies may have unintended consequences that increase inequities. These issues can be addressed by careful, proactive policy design.

- *Economic inequity:* Taxes, particularly broad taxes on all or most UPFs, may impose a regressive financial burden on households with lower incomes, for whom UPFs often make up a large portion of their diet. By increasing food prices, such policies could reduce food affordability for economically vulnerable populations. However, as discussed earlier, dedicating tax revenues to investments in lower-income communities—such as subsidies to purchase whole or minimally processed foods—can mitigate regressive effects and improve equity.

- *Diet quality inequities:* Information-based strategies, such as front-of-package labels and public awareness campaigns, may disproportionately benefit individuals with higher education or health literacy, potentially widening disparities in diet quality. In addition, consumers with lower incomes may continue purchasing UPFs despite labeling due to affordability constraints. Targeted, multi-lingual, multicultural education and outreach efforts that explain how to use labels and identify UPFs can reduce these inequities.

- *Threats to food access for people with low incomes:* Policies that restrict the use of SNAP benefits to purchase certain foods could limit food access in communities where minimally processed or healthier alternatives are scarce or more expensive. Panel members emphasized that any such restrictions should be paired with nutrition incentives (e.g.,. "Double Up Food Bucks") to ensure affordable access to substitutions.

- *Stigma and unfairness:* Some panel members expressed concern that SNAP purchase restrictions could be viewed as unfair, stigmatizing, or paternalistic, as they seek to shape food choices based solely on income status despite high UPF consumption across all income levels. They might lead to negative experiences at the register if a beneficiary is unaware that a selected item is no longer SNAP eligible. Similarly, messaging about UPFs in school curricula could inadvertently stigmatize families by implying that foods provided at home are "bad," when they may reflect what families can reasonably afford or access. Strategies to address these concerns include adopting consistent definitions for SNAP restrictions and using shelf-labels to clearly indicate ineligible items.

Education campaigns can focus on the social and commercial determinants driving UPF consumption rather than placing responsibility on individuals. Complementary policies can increase access to affordable, healthier alternatives in low-resource communities (e.g., increasing SNAP healthy food incentives).

- *Risk of weakening nutrition assistance programs:* Some panel members cautioned that SNAP restrictions could be used politically to undermine the entitlement nature of the SNAP program rather than to improve health. Programs such as SNAP and WIC are already politically vulnerable, and adding restrictions could expose them to additional funding cuts or program rollbacks. Any savings from SNAP restrictions should be reinvested to expand benefits.

Perpetuating structural drivers of inequity

- *Disproportionate burden on under-resourced settings:* Procurement policies and nutrition standards that restrict UPFs may place greater burdens on schools, childcare providers, and institutions serving lower-income populations, which often lack adequate kitchen infrastructure or trained staff to prepare fresh or minimally processed meals. The panel emphasized that targeted funding for kitchen upgrades, workforce training, and technical assistance is critical to prevent these policies from reinforcing structural inequities. Similarly, small, independent retailers may have more difficulty and fewer resources to implement SNAP restrictions. This could be mitigated by grants to offer technical support and implementation resources to small retailers.

Opportunities to increase equity

- *Reducing health disparities:* While taxes may be economically regressive, they can be "progressive for health." Because individuals with lower incomes tend to be more price-sensitive, they may reduce consumption of taxed UPFs more than higher-income consumers, potentially resulting in larger long-term health benefits and lower medical expenditures.

- *Improving access to less processed foods:* Procurement strategies that replace UPFs with less processed foods in schools, early childhood settings, and other institutions serving lower income households can help reduce disparities in diet quality. Similarly, Medicaid Food is Medicine programs and strengthened dietary standards in food assistance programs can increase access to nutritious foods while reducing reliance on UPFs.

- *Countering predatory marketing:* Food marketing for UPFs frequently targets vulnerable populations, including children from households with low-incomes and communities of color. Restrictions on marketing and placement, as well as countermarketing campaigns, present significant equity opportunities by reducing disproportionate exposure to harmful commercial messaging.

- *Directing benefits to vulnerable populations:* Policies that focus on institutional procurement—such as in carceral facilities or long-term care settings—can improve diet quality for highly vulnerable populations. In addition, earmarking tax revenues for investments in lower-income communities and tailoring public awareness and countermarketing campaigns to culturally diverse and linguistically appropriate audiences can further advance equity.

Research Recommendations

The expert panel identified key research priorities to strengthen understanding of the health harms associated with UPF consumption; to better characterize UPF availability across programs and settings; to evaluate the effectiveness, equity impacts, and unintended consequences of policies designed to reduce UPF availability and consumption; and to further methods-based research to advance policies to reduce harms from UPFs.

Research is needed on the effects of consuming UPFs, and general understanding and perceptions of UPFs.

- Examine the effects of consuming UPF subgroups compared to non-UPF subgroups using the same Nova classification methods as prior UPF studies.
- Conduct research to further describe biological and physiological mechanisms that explain how dietary patterns high in UPFs cause adverse health outcomes.
- Understand what characteristics of UPFs (e.g., types of processing methods, energy density, specific ingredients) are predictive of adverse health outcomes.[298]
- Investigate the effect of processing on the nutritional qualities of foods and ingredients to demarcate beneficial processing from excessive food matrix degradation.
- Determine if there are objective biomarkers of exposure to UPFs that are linked to negative health outcomes.[298]
- Conduct experimental studies to examine intermediate dietary quality and health outcomes of consuming UPFs.
- Assess general understanding and perceptions of UPFs in the U.S., including consumer ability to identify UPFs.

Studies should document the availability of UPFs across federal nutrition assistance programs, specific settings, and programs.

- Understand the proportion of UPFs provided in federal nutrition assistance programs, using the definition proposed in this report and definitions put forward by federal agencies, and the extent to which nutrition or procurement standards for federal nutrition assistance programs address UPFs.
- Examine the proportion of foods and beverages offered in the following settings that are UPF: early learning and childcare sites, schools, government sites (i.e., carceral facilities, hospitals, military bases, etc), Food is Medicine programs, and restaurants.

Research is necessary to understand the impact and effectiveness of policies to limit availability and/or consumption of UPFs.

- Evaluate all policies intended to reduce consumption of UPFs via experimental and/or real-world studies.
- Effectiveness and unintended consequences of restricting the purchase of UPFs using SNAP benefits.
- Impact of food additive restrictions on product availability, purchasing, health, and industry reformulation.
- Effectiveness of nutrition education, public awareness campaigns, and counter marketing campaigns on UPF understanding and perceptions.
- Extent to which UPFs are promoted (price promotions, placement, advertised) relative to less processed foods, how these promotions target individuals across income and race/ethnicity, and how effective restricting these promotions is at reducing consumption of UPFs.
- Prevalence of health and nutrition claims on UPF product packages and ads.
- Extent of tax breaks associated with UPF marketing.
- Real-world impact of eliminating tax breaks for marketing of UPFs on purchasing behaviors, health outcomes, and health care costs.

Further methods-based research is needed to advance policies to reduce harms from UPFs.

- Concordance and discordance between different food classification approaches, including processing, nutrients, additives, and food categories.
- Associations of various methods and definitions of processing with health outcomes and comparisons across the methods.
- Evaluation of other approaches to simplify use of Nova, such as identifying foods that are not UPFs as a means to categorize UPFs.
- Validate Nova with processing measures.
- Compare specificity and sensitivity of multiple UPF definitions and exemptions.
- Compare different approaches to developing UPF ingredient lists.

Conclusions

Ultraprocessed foods account for a substantial share of the American diet and are consistently associated with higher energy intake and increased risk of multiple adverse health outcomes. Despite growing scientific and policy interest in the harms and prevalence of UPF consumption, policymakers currently lack a clear, evidence-informed approach for defining UPFs and developing policies in ways that are both scientifically grounded and operationally feasible.

This report addresses that gap by providing evidence-informed recommendations to guide policymakers and advocates in developing policies to reduce UPF exposure at the local, state, and federal levels. The panel recommends using Nova Category 4 as the scientific foundation to inform the development of an operational UPF definition based on ingredient-level markers available on packaged food labels. To avoid unintentionally capturing products that provide meaningful nutritional value, the panel further recommends exempting UPF products that meet a modified version of the FDA's "Healthy" claim criteria.

The panel also identified a set of public policy strategies with strong potential to reduce harms from UPFs. Policies with high likelihood of adoption, feasible implementation, and meaningful impact include taxes on selected UPFs; procurement and service restrictions in schools, early childhood settings, and government facilities; limits on government contractors' use of public funds for UPFs; countermarketing campaigns; incorporation of UPF guidance into dietary guidelines and nutrition standards; and identity labeling of UPFs on the front of food packages. Together, these approaches target the affordability, availability, acceptability, and promotion of UPFs.

The panel recognizes that defining and regulating UPFs presents important challenges, including limited ingredient transparency, rapid product reformulation, and opportunities for regulatory evasion. To address these limitations, the report outlines priority actions for the FDA and other agencies, including ongoing monitoring of the introduction of new ingredients into the U.S. food supply, improved ingredient disclosure, strengthened regulatory protections, and mechanisms to reduce industry circumvention.

UPF-focused policies alone cannot address all dimensions of dietary risk. Policymakers and advocates should therefore implement processing-based approaches alongside complementary, nutrient- and food-group-based strategies to improve diet quality and equity.

Finally, the panel emphasizes the need for continued research to advance this field. Priority areas include better understanding the mechanisms through which UPFs affect health, documenting UPF availability across programs and settings, and evaluating the effectiveness, equity implications, and unintended consequences of UPF-related policies in real-world contexts. Together, these efforts can support the development of coherent, evidence-based policies that shift the U.S. food system toward healthier, more equitable outcomes.

Appendices

Appendix A. Additional Information on Methodology and Key Results for Modeling Alternative Definitions of UPFs

- Figure A1. Legal Instrument Inclusion Diagram
- Table A1. UPF Definitions Identified in Existing U.S. Policy Proposals
- Table A2. UPF Definitions Used for Modeling Analysis
- Table A3. Additives With "Cosmetic" Functions According to Nova as Defined By Codex Functional Classes and FDA Technical Effects
- Table A4. Non-Culinary Ingredients According to Nova
- Table A5. Set of Specific Ingredients Most Commonly Targeted by States' UPF-Related Bills
- Table A6. Longer Set of Specific Additives Targeted by Some State Bills
- Table A7. Prevalence of UPFs Using Alternative Definitions on Packaged Food Products from Mintel Global New Product Database 2018-2024 (n = 92,727)
- Table A8. "Add-On" Conditions
- Table A9. Percent of Total Packaged Products Classified as UPF Using Additional Criteria
- Table A10. Percent of UPF Products Identified
- Table A11. FDA Criteria for "Healthy" Claims
- Table A12. FDA Criteria for "Healthy" Claims for Individual Foods
- Table A13. FDA Criteria for "Healthy" Claims for Combination Foods or Mixed Products
- Table A14. Percent of Products that Contain UPF Markers that Also Meet FDA "Healthy" Criteria Using Mintel 2018-2024 (N=92,727)
- Table A15. Examples of Products that are UPF and Meet Criteria for FDA "Healthy" (UPF marker ingredient is in red)

Appendix B. Additional Information on Methodology and Key Findings for Potential Policies to Limit Exposure and Consumption of UPFs

- Table B1. Policy Options for UPF Regulation As-Written in Qualtrics Survey
- Table B2. Definitions of the Domains Used to Evaluate the Policy Options in the Survey
- Figure B1. Bubble Chart of Impact, Feasibility, and Equity Ratings of 26 UPF Policies
- Table B3. Summary of Survey Results on Policies to Reduce Exposure to and Consumption of UPFs in the U.S.

Appendix C. Instructions on How to Develop a List of Current Ingredients and Additives Used for Identifying UPFs

Appendix D. Expert Panel Member Biographies and Headshots

Appendix A.
Additional Information on Methodology and Key Results for Modeling Alternative Definitions of UPFs

UPF Policy Scan

A full description of the methodology and key findings are provided below. Some text, tables, and figures are repeated in the technical report and appendices for completeness as the complexity of the content warrants a thorough presentation.

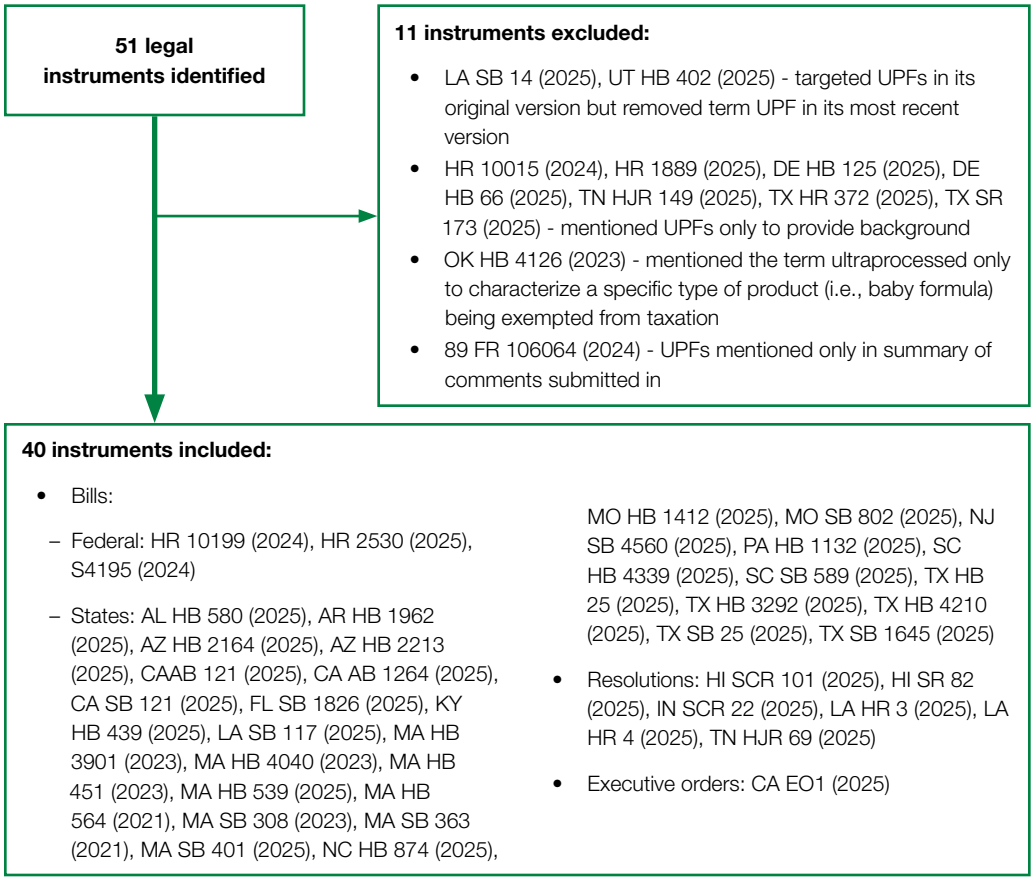
Methodology

To inform the development of a UPF definition and policy recommendations, the research team conducted a policy scan to review how UPFs have been defined and regulated in U.S. policy.

In July 2025, the research team conducted a search in NexisUni, a comprehensive database for federal and state legal instruments. To search for policy proposals that mentioned UPFs, the search terms *ultraprocess** or *ultra-process** were used. The search was restricted to the U.S., but not by date.

Results obtained under "statutes and legislation" or "administrative codes and regulations" were screened to determine eligibility (**Appendix A – Figure A1**). Eligible proposals clearly identified UPFs as the policy target and proposed actions to address them. When multiple versions of the same proposal existed (due to amendments), only the most recent was included. To ensure the analysis was comprehensive, we included companion bills (i.e., matching bills introduced to different legislative chambers) and identical bills introduced in different years. After identifying eligible proposals, the research team examined them in full and UPF definitions were extracted.

Figure A1. **Legal Instrument Inclusion Diagram**



Key Findings

We identified 51 policy proposals mentioning UPFs, of which 40 (33 bills, 6 resolutions, and 1 executive order) met our inclusion criteria. Eight proposals (20%) dated from 2021-2024, and the remaining 32 (80%) were introduced in the first half of 2025. Proposals were from the U.S. Congress and from the states of Alabama, Arizona, Arkansas, California, Florida, Hawaii, Indiana, Kentucky, Louisiana, Massachusetts, Missouri, New Jersey, North Carolina, Pennsylvania, South Carolina, Tennessee, and Texas. A full description of UPF definitions identified in existing U.S. policy proposals is provided in **Appendix A – Table A1.**

About a third of proposals (n=14, 35%) defined UPFs based solely on the presence of specific food additives—most commonly Blue 1, Blue 2, Green 3, Red 3, Red 40, titanium dioxide, Yellow 5, Yellow 6, potassium bromate, brominated vegetable oil (BVO), and propylparaben. One proposal additionally included the additives azodicarbonamide and butylated hydroxyanisole, and another included aspartame. The latter also included certain seed oils, which are not considered UPF markers under Nova 4.

Fewer proposals (n=11, 28%) used criteria more closely related to Nova's. Some (n=4, 10%) defined UPFs as foods including any additive from certain classes (e.g., emulsifiers, colors, flavors) drawn from the Nova system, which classifies their functions as cosmetic. Of these proposals, one also specified nutrient content (i.e., high in added sugar, saturated fat, sodium) when defining UPFs. Alternatively, some proposals (n=8, 20%) either directly referenced or used language closely aligned with Nova's (i.e., mentioning industrial processing, lack of whole-food ingredients, presence of non-culinary ingredients), but only provided examples rather than comprehensively listing ingredients to be targeted.

Lastly, about a third of proposals (n= 14, 35%) stated the intent to target UPFs but did not provide a UPF definition. Notably, two proposals among these, both from the state of Texas, listed a range of 44-52 ingredients for intervention, but never explicitly linked such ingredients to a UPF definition.

Table A1. **UPF Definitions Identified in Existing U.S. Policy Proposals**

Type of definition	Definition specification	Legal instruments**	Notes
Defined by specific ingredients	• Colors: blue 1, blue 2, green 3, red 3, red 40, titanium dioxide, yellow 5, yellow 6 • Dough conditioners: potassium bromate • Emulsifiers: brominated vegetable oil • Preservatives: propylparaben	AL HB 580 (2025), AZ HB 2213 (2025), **AZ HB 2164 (2025)***, FL SB 1826 (2025), KY HB 439 (2025), MO SB 802 (2025), NC HB 874 (2025), NJ SB 4560 (2025), SC SB 589 (2025), SC HB 4339 (2025), TX HB 3292 (2025)	N/A
	• Colors: blue 1, blue 2, green 3, red 3, red 40, titanium dioxide, yellow 5, yellow 6 • Dough conditioners: potassium bromate • Preservatives: propylparaben	AR HB 1962 (2025)	N/A
	• Colors: blue 1, blue 2, green 3, red 3, red 40, titanium dioxide, yellow 5, yellow 6 • Dough conditioners: potassium bromate, azodicarbonamide • Emulsifiers: brominated vegetable oil • Preservatives: propylparaben, butylated hydroxyanisole	MO HB 1412 (2025)	N/A

Type of definition	Definition specification	Legal instruments**	Notes
Defined by specific ingredients	• Colors: blue 1, blue 2, green 3, red 3, red 40, titanium dioxide, yellow 5, yellow 6 • Dough conditioners: potassium bromate • Emulsifiers: brominated vegetable oil • Preservatives: propylparaben • Sweeteners: aspartame • Other: cottonseed oil, grapeseed oil, safflower oil	LA SB 117 (2025)	N/A
Defined by classes of additives	• Containing one or more additive in the following classes: surface-active agents, stabilizers and thickeners, propellants, aerating agents, color and coloring adjuncts, emulsifiers and emulsifier salts, flavoring agents and adjuvants, flavor enhancers, surface-finishing agents, non-sugar sweeteners	HR 10199 (2024), S 4195 (2024), PA HB 1132 (2025)	N/A
Defined by classes of additives and nutrient content	• High in saturated fat, sodium, and added sugars • Containing one or more additives in the following classes: surface-active agents, stabilizers and thickeners, propellants, aerating agents, color and coloring adjuncts, emulsifiers and emulsifier salts, flavoring agents and adjuvants, flavor enhancers, surface-finishing agents, non-sugar sweeteners	CA AB 1264 (2025)	CA AB1264 additionally targets specific food colors, but does not include these in its definition of UPF
Defined directly based on Nova	Paraphrasing Nova (i.e., mentioning industrial processing, absence of whole-food ingredients, presence of ingredients never or rarely used in kitchens, and presence of additives to make the final product palatable, appealing, or preservable)	**CA EO1 (2025)***, MA HB 539 (2025), MA HB 401 (2025), MA SB 308 (2023), MA HB 451 (2023), MA HB 564 (2021), MA SB 363 (2021)	Definitions provide examples of UPFs, non-culinary ingredients, and additives, but do not provide a comprehensive list of markers that would identify UPFs
	Directly referencing Nova	HR 2530 (2025)	N/A
No definition	N/A	CA SB 121 (2025), **CA AB 121 (2025)***, HI SCR 101 (2025), HI SR 82 (2025), IN SCR 22 (2025), **LA HR 3 (2025)***, LA HR 4 (2025)*, **MA HB 4040 (2023)***, MA HB 3901 (2023), TN HJR 69 (2025), TX HB 4210 (2025), TX SB 1645 (2025), **TX SB 25 (2025)***, TX HB 25 (2025)	TX SB25 and HB25 explicitly target UPFs (without a definition) when establishing a committee to examine evidence; later, the bills list 44-52 ingredients for warning labels, but do not tie such ingredients to a UPF definition

***Enacted as of July 2025**

***Legal instruments identified included bills, resolutions, and executive orders*

Modeling Multiple UPF Definitions

A full description of the methodology and key findings are provided below. Some text, tables, and figures are repeated in the technical report and appendices for completeness as the complexity of the content warrants a thorough presentation.

Methodology

The UNC Global Food Research Program Team, under the direction of Dr. Lindsey Smith Taillie, conducted a modeling analysis to identify the proportion of foods and beverages that qualify as UPFs under a variety of UPF definition types. The proportion of UPFs captured by each definition (using Nova 4 as the gold standard for defining UPFs) was also examined.

All analyses used Mintel's Global New Products Database[6] of products in the U.S. market. GNPD includes newly introduced, reformulated, or repackaged products as well as line extensions (e.g. new flavors, new formats) in the U.S. market. Notably, it represents only packaged foods, thus represents only a subsection of food and beverage products available in a typical U.S. grocery store. As a result, our analysis was limited to products that have a nutrition facts panel, and does not include products like fresh fruits and vegetables, bottled water, ground coffee, tea bags, deli/hot meals available in the grocery, or food from restaurants or schools. Ingredient lists and Nutrition Facts Panel (NFP) data are available for packaged food or beverage products in the GNPD database.

Based on results of the Policy Scan and the published literature, the research team initially chose to estimate the proportion of products that would be classified as UPF under five different classification schemes (**Appendix A – Table A2**). Some of the definitions were related to the Nova classification system, other definitions reflect versions currently used in state bills targeting UPF and a final version uses a long list of additives, which while not specifically linked to a UPF bill definition, we included to demonstrate the extent to which such a list captures Nova 4 UPFs. The analysis included products listed in the GNPD database between 2018-2024 (n=92,727). Ingredients listed on product packaging were programmatically searched and flagged for presence of the UPF markers used by the different UPF definitions. We used SAS macros to search ingredient lists from product packaging to flag each ingredient as a UPF marker (yes/no). Any presence of a UPF marker flag indicated the product as a UPF.

Table A2. **UPF Definitions used for Modeling Analysis**

Definition	Description	Notes
1. Full set of Nova's UPF-marker ingredients	Nova considers 13 specific types of food additives with "cosmetic" functions as UPF markers: anti-foaming agents, foaming agents, bulking agents, gelling agents, thickeners, carbonating agents, color, emulsifiers, emulsifying salts, flavors, flavor enhancers, glazing agents, and sweeteners. Nova also considers non-culinary ingredients (i.e., sources of carbohydrates, fats, or proteins that are not typically used in home kitchens) as UPF markers.	See **Appendix A – Table A3** for an example list. See **Appendix A – Table A4** for an example list.
2. Nova's UPF-cosmetic function additives	This definition considered only the aforementioned types of food additives whose function is considered "cosmetic" by Nova as UPF markers. Non-culinary ingredients were not considered UPF markers under this definition.	This analysis was conducted due to prior work[56] suggesting that most UPFs contain cosmetic additives and thus could be identified using just these ingredients, creating a simpler list of ingredients to review, manage, and update.
3. Limited set of Nova's UPF-marker additives	This definition considered only three types of food additives as UPF markers: non-sugar sweeteners, flavors, and colors.	This approach was considered due to previous findings that most UPFs contain a sweetener, flavor, or color.[56]
4. Specific ingredients most commonly targeted by state bills	This definition included 14 specific ingredients most commonly targeted by states' UPF-related bills (as identified through the policy scan).	See **Appendix A – Table A5**. for an example list.
5. Longer set of specific additives targeted by some state bills	This definition included 47 specific ingredients targeted by some states' UPF-related bills (as identified through the policy scan).	See **Appendix A – Table A6**. for an example list.

The "Full Nova" definition, including the full list of cosmetic additives and nonculinary ingredients (as reflected in Row 1 of **Appendix A – Table A2**), served as the baseline or comparison definition for the modeling exercise. Thus, it's important to note the following:

- **Cosmetic additives**: To construct the ingredients lists of cosmetic additives, we first took the cosmetic additive types defined by Nova 4 and mapped them to CODEX Functional Class definitions and FDA Technical Effect definitions as shown in **Appendix A – Table A3.**[16,56] Then, we identified all ingredients in each dataset (CODEX and FDA) that had these functions or technical effects.

- **Non-culinary ingredients**: This list of ingredients was compiled from guidance provided by the research team that developed Nova[2,114] is shown in **Appendix A – Table A4**.

  - Common industrial carbohydrate examples include high-fructose corn syrup, maltodextrin, dextrose, modified starches (e.g., potato starch acetate), and isolated fibers (e.g., inulinin, soluble corn fiber).

  - Common industrial fat examples include interesterified oils, hydrogenated or partially hydrogenated oils, medium-chain triglycerides, and fractionated oils (e.g., palm kernel oil fractions).

  - Industrial protein ingredients include protein isolates (whey, soy, pea, gluten) or hydrolyzed, gelatinized, or textured vegetable proteins, mechanically separated meat, and others.

The full details of how this Nova-linked list was constructed are available in **Appendix C.**

The panel also made several modifications to the ingredients list for the full Nova definition.

- *Exclusions:* The panel excluded the following sets of ingredients because although they can function as cosmetic additives, whether they do in a given product cannot always be ascertained from the ingredients list, which generally does not disclose technical functions. To take a more conservative approach, and in recognition that some of these ingredients can have health benefits (such as fortification with vitamins and minerals), we decided to exclude these from our recommended list of UPF ingredient markers:

  - Vitamins and minerals (including those with multiple technical functions, such as salt (NaCl), calcium sulfate, and beta-carotene and riboflavin)

  - Herbs and spices (as defined in 21 CFR 182.10[299])

  - Yeast and yeast-derived additives

While natural flavors and colors are inherent to the Nova 4 definition, the panel had much discussion over whether these should be included. Ultimately they were included. Regardless of origin, these additives perform the same cosmetic function central to Nova 4 classification; they are used to create, enhance, or restore the sensory qualities of industrial formulations, including taste, aroma, and appearance. The distinction between "natural" and "artificial" versions is primarily regulatory and sourcing-based—natural colors and flavors may be derived from plant or animal materials, whereas artificial counterparts are synthesized—but both undergo industrial extraction or processing steps and serve the same functional role in masking or recreating sensory attributes. For the purposes of operationalizing Nova 4, these functional similarities are what matter: both natural and artificial cosmetic additives signal a degree of processing and formulation intensity characteristic of UPFs and should therefore be included as markers. Common natural colors included coloring agents derived from spices (e.g., "paprika oleoresin"), caramel color, annatto, carmine, beet juice, spirulina, or anything listed as "natural color." Natural flavors are almost always listed as "natural flavor" on ingredient lists.

Further details regarding the exclusion criteria and data quality checks, and ingredient function identification for all modeling analyses are provided below.

Exclusion Criteria and Data Quality Checks

Alcoholic beverages, baby formula, medicated candy, and variety packs were excluded from analysis. Products were also excluded due to missing ingredient list, missing portion size, or NFP errors. For products with non-unique barcodes (indicating multiple iterations of the same product introduced during the period in question), only the most recent version was retained.

Ingredient Function Identification

Food additives' various approved functions were obtained from 1) CODEX General Food Standards for Additives's "functional class", and 2) FDA's Substances Added to Food inventory, (previously known as Everything Added to Foods in the United States, EAFUS)'s "technical effects" (**Appendix A – Table A3**). Additives typically have multiple approved functions. Ingredients whose functions are considered "cosmetic" by Nova guidance were compiled and reviewed by a team of trained nutritionists and registered dietitians, who included spelling variations ('flavor' and 'flavour'), abbreviations ('Tertiary Butylhydroquinone' and 'TBHQ'), and synonyms ('luo han guo' and 'monk fruit') to improve programmatic search results. Lists of additives have been iteratively reviewed, updated, and improved through application to several global food product datasets in various publications.[16,56,300,301]

Table A3 **Additives with "Cosmetic" Functions According to Nova as Defined by CODEX Functional Classes and FDA Technical Effects**

UPF "Cosmetic" Additive Type	CODEX Functional Class	FDA Technical Effect	Examples
Anti-foaming agent	Anti-foaming agent—CODEX GFSA (General Food Standards for Additives)	Surface-active agents 21 CFR 170.3(o)(29)	Calcium Alginate, Mono- and Diglycerides of Fatty Acids, Polyethylene Glycol
Foaming agent	Foaming agent—CODEX GFSA		
Bulking agent	Bulking agent—CODEX GFSA	Stabilizers & Thickeners 21 CFR 170.3(o)(28)	Carboxymethyl Cellulose, Carrageenan, Guar Gum, Modified Food Starch, Pectin, Polydextrose
Gelling agent	Gelling agent—CODEX GFSA		
Thickener	Thickener—CODEX GFSA		
Carbonating agent	Carbonating agent—CODEX GFSA	Propellants, aerating agents, and gases 21 CFR 170.3(o)(25)	Carbon Dioxide, Nitrous Oxide
Color	Color—CODEX GFSA	Color and coloring adjuncts 21 CFR 170.3(o)(4)	Caramel Color, FD&C Blue No. 1, Grape Color Extract, Titanium Dioxide
Emulsifier	Emulsifier—CODEX GFSA	Emulsifiers and emulsifying salts 21 CFR 170.3(o)(8)	Carob Bean Gum, Gum Arabic, Hydroxypropyl Methylcellulose, Lecithin
Emulsifying salt	Emulsifying salt—CODEX GFSA		
Flavor	*CODEX GFSA does not approve specific Flavor additives, so defined as substances with a Flavor and Extracts Manufacturers Association (FEMA) or Joint FAO/WHO Expert Committee on Food Additives (JECFA) number and listed in those databases as a flavoring agent or flavor enhancer and excluding those in 21 CFR 182.10 (herbs and spices)*	Flavoring agents and adjuvants 21 CFR 170.3(o)(12)	Artificial Flavor, Natural Flavor
Flavor enhancer	Flavor enhancer—CODEX GFSA	Flavor enhancers 21 CFR 170.3(o)(11)	Monosodium Glutamate (MSG), Potassium Chloride
Glazing agent	Glazing agent—CODEX GFSA	Surface-finishing agents 21 CFR 170.3(o)(30)	Agar, Carnauba Wax, Mineral Oil
Sweetener	Sweetener—CODEX GFSA	Non-nutritive sweeteners 21 CFR 170.3(o)(19) + FDA described Plant- and Fruit-based high-intensity sweeteners + Sugar Alcohols https://www.fda.gov/food/food-additives-petitions/aspartame-and-other-sweeteners-food	Acesulfame-K, Aspartame, Monkfruit, Stevia, Sucralose, Thaumatin

Table A4. **Non-Culinary Ingredients According To Nova**

Casein
Dextrose
Fruit juice concentrate
Fructose
Fructose-glucose syrup
Glucose-fructose syrup
Gluten
High fructose corn syrup
Hydrogenated oils
Hydrolyzed protein
Insoluble fiber
Interesterified oils
Invert sugar
Maltodextrin
Lactose
Lecithin
Mechanically deboned
Mechanically separated
Milk protein isolate
Milk proteins
Milk solids
Modified starch
Partially inverted brown sugar syrup
Protein isolates
Soluble fiber
Soy isolate
Soy protein isolate
Textured wheat protein
Textured vegetable protein
Whey isolate
Whey powder
Whey protein

Table A5. **Set of Specific Ingredients Most Commonly Targeted by States' UPF-Related Bills**

Azodicarbonamide (ADA)
Blue 1
Blue 2
Brominated vegetable oil (BVO)
Butylated hydroxyanisole (BHA)
Butylated hydroxytoluene (BHT)
Green 3
Partially hydrogenated oils
Potassium bromate
Propylparaben
Red 3
Red 40
Titanium dioxide
Yellow 6

Table A6. **Longer Set of Specific Additives Targeted by Some State Bills**

Acesulfame potassium, aspartame, sucralose
Acetic acid ester
Anisole
Azodicarbonamide (ADA)
Bleached flour
Blue 1
Blue 2
Bromated flour
Butylated hydroxyanisole (BHA)
Butylated hydroxytoluene (BHT)
Calcium bromate
Canthaxanthin
Citrus red 2
Diacetyl
Diacetyl tartaric and fatty acid esters of mono- and diglycerides (DATEM)
Dimethylamylamine (DMAA)
Dioctyl sodium sulfosuccinate
Ficin
Green 3
Interesterified palm oil
Interesterified soybean oil
Lactylated fatty acid esters of glycerol and propylene glycol
Lye
Morpholine
Olestra
Orange b
Partially hydrogenated oil
Potassium aluminum sulfate
Potassium bromate
Potassium iodate
Potassium oxide
Propylparaben
Red 3
Red 4
Red 40
Sodium aluminum sulfate
Sodium lauryl sulfate
Sodium stearyl fumarate
Stearyl tartrate
Synthetic trans fatty acids
Thiodipropionic acid
Titanium dioxide
Toluene
Yellow 5
Yellow 6

Key Findings

Appendix A – Table A7 describes the prevalence of products identified as UPF using different definitions through the modeling analysis described above. The full Nova Category 4 ingredients marker approach (Definition #1) identified 72% of U.S. packaged foods and beverages as ultraprocessed. Using only the cosmetic additive ingredients (Definition #2) yields a similar result (71% of foods identified as ultraprocessed), while using only sweeteners, flavors, and colors (Definition #3), identified 57% of packaged foods as UPF. The definitions used by the state bills that had been proposed up until July 2025 resulted in much lower estimates of UPFs, with only 9% of foods identified as UPF when the most common state approach was used (i.e., a limited set of additive markers, or Definition #4) and 12% when the state approach with ~40 additives was used (Definition #5).

Considering the full Nova Category 4 approach to be the most robust measure of UPFs, the percentage of UPFs identified under Nova Category 4 that would also be identified as UPFs under the alternative definitions was also examined. While definitions using cosmetic additives (Definition #2) and sweeteners, flavors, and colors (Definition #3) identified the majority of UPFs (98% and 79%, respectively) the state-based approaches only identified 13%-17% of Nova Category 4 products as UPFs.

Although not directly relevant to the definition, the panel was interested to understand what proportion of UPFs had multiple ingredient markers vs. only one marker. The vast majority of UPFs had multiple ingredient markers—only 18% of products identified by Nova Category 4 ingredients had one ingredient marker, with the remaining 82% of UPFs containing two or more markers.

Table A7. **Prevalence of UPFs Using Alternative Definitions on Packaged Food Products from Mintel Global New Product Database 2018-2024 (n = 92,727)**

	% of Total Packaged Products		
UPF Definition	**Foods**	**Beverages**	**Total**
1. Nova Category 4 (Cosmetic Additives and Non-Culinary Ingredients)	71	80	72
2. Cosmetic Additives Only	70	77	71
3. Sweetener, Flavor, Color Only	55	72	57
4. State Bills- Limited Set of Additives	9	8	9
5. State Bills- Wider Set of Additives	13	9	12
	% of UPF Products*		
UPF Definition	**Foods**	**Beverages**	**Total**
2. Cosmetic Additives Only	98	97	98
3. Sweetener, Flavor, Color Only	78	91	79
4. State Bills- Limited Set of Additives	13	10	13
5. State Bills- Wider Set of Additives	18	11	17

**As identified by Nova Category 4 (Definition #1). Note: The Mintel data used in analysis excludes products with no ingredients, no portion value, variety packs, errors, alcohol, baby formula, medicated candies, and duplicate records.*

Modeling Other "Add-On" Approaches

Methodology

The research team also modeled other possible approaches that could be added to the definition of UPFs to narrow the scope of products included (see **Appendix A – Table A8**). For example, combining the "Full Nova" approach with other policy-relevant approaches to classifying foods as unhealthy, such as the concept of HFSS foods (i.e., a food meets thresholds for added sugar, sodium, and saturated fat or contains NSS), which has been used in many WHO-linked nutritional profile models[302,303] and international food policies.[304–306] Another approach is to focus on certain food categories for which the evidence shows greater potential for harm with overconsumption. For each approach, we identified products that met the UPF definition under Nova 4 and also met the additional criteria (high in nutrients of concern, containing NSS, or being in a specific product category). To identify HFSS products, we modeled the Pan American Health Organization's (PAHO) approach (≥10% calories from added sugar, ≥10% calories from saturated fat, or ≥1mg of sodium per calorie) and the FDA's definition for being "high" in a nutrient (≥20% daily value of added sugar, sodium, or saturated fat per portion). A food could also be considered HFSS if it contained any NSS ingredient. The PAHO model was selected for its use as the foundation for many global food policies and the FDA model was selected as it is the foundation for the current proposed U.S. front-of-package labeling rule. Although NSS is included in the PAHO model, it is not included in the FDA front-of-package proposed labeling rule; however, we opted to include it in both models for consistency.

For product categories, the research team modeled sweetened beverages (i.e., those that contain added sugar or NSS), processed meats, and candy due to their prominence in policy discussions about food subcategories to regulate.

Table A8. **"Add-On" Conditions**

"Add-On" Condition	Description	Notes
HFSS- PAHO approach	PAHO's approach to defining when a food is HFSS or contains NSS. The PAHO model has been used as the foundation for many global food policies.	Product is a UPF if it is a UPF under the Nova 4 classification AND: 1. It exceeds ANY of the HFSS thresholds according to PAHO: • ≥10% calories from added sugar • ≥10% calories from saturated fat • ≥1mg of sodium per calorie OR 2. It contains NSS
HFSS- FDA approach	FDA's approach to defining when a nutrient is high in HFSS. We have modified this approach to include "or contains non-sugar sweeteners (NSS)" as in the PAHO model.	Product is a UPF under the Nova 4 classification AND: 1. It exceeds ANY of the HFSS thresholds according to the FDA: • ≥20% daily value added sugar per portion/serving • ≥20% daily value saturated fat per portion/serving • ≥20% daily value sodium per portion/serving OR 2. It contains NSS
Category specific	Product is UPF and belongs to certain food categories for which the evidence shows potential of harm with overconsumption, independent of UPF status.	Product is UPF if it is UPF under the Nova 4 classification AND in the category of interest: • sweetened beverages (beverages sweetened with sugar sweeteners or NSS) • processed meats • candy

Key Findings

The percent of products that would be classified as UPFs when additional criteria are applied (food category specific or HFSS) is found in **Appendix A – Tables A9 and A10.** When food category criteria are layered on to Nova 4, between 4-7% of total products would be defined as UPF for policy (4% for processed meats, 5% for sweetened beverages, and 7% for candy). When layering on HFSS and NSS criteria, 67% of products would be identified as UPF for policy by the PAHO nutrient profile model whereas only 44% would be identified using the US FDA 20%DV approach.

Table A9. **Percent of Total Packaged Products Classified as UPF Using Additional Criteria**

	% of Total Packaged Products		
	Foods	**Beverages**	**Total**
Nova Category 4	71	80	72
Nova 4 AND sweetened beverage	.	51	5
Nova 4 AND processed meat	5	.	4
Nova 4 AND candy	8	.	7
Nova 4 AND (HFSS OR NSS)—PAHO	67	62	67
Nova 4 AND (HFSS or NSS)—US FDA 20% DV	43	53	44

Looking within each subcategory, 95% of sweetened beverages were identified as Nova 4 UPFs, 79% of processed meats are Nova 4 UPFs, and 95% of candies are Nova 4 UPFs.

When considering how well the additional criteria capture products relative to those identified as UPF by Nova 4, sweetened beverages capture 7% of Nova 4 products, processed meat captures 6% of Nova 4 products, and candy captures 10% of Nova 4 products. Layering on the PAHO criteria would capture 93% of UPFs as identified by Nova 4, whereas layering on the FDA 20% DV approach with NSS would capture 61% of UPFs.

Table A10. **Percent of UPF Products Identified**

	% of UPF Products*		
	Foods	**Beverages**	**Total**
Nova 4 AND sweetened beverage	.	64	7
Nova 4 AND processed meat	7	.	6
Nova 4 AND candy	11	.	10
Nova 4 AND (HFSS OR NSS)—PAHO	94	78	93
Nova 4 AND (HFSS or NSS)—US FDA 20% DV	60	67	61

**As identified by Full Nova (N = 66,970)*

Note: The PAHO model includes the presence of NSS in its classification system. The FDA 20% DV model does not include NSS (it only includes thresholds for added sugar, sodium, and saturated fat) but the presence of NSS was included for this model as well for consistency.

Modeling FDA "Healthy" Exemption

Methodology

The research team wanted to understand the impact of exempting products from any chosen UPF policy using a modified version of the FDA's criteria for "Healthy" claims (**Appendix A – Tables A11, A12, and A13**). The FDA allows a product to use a "Healthy" claim if it contributes at least a minimum amount of recommended food group equivalents (e.g., protein, dairy, whole grains) and meets strict thresholds for added sugar, sodium, and saturated fat (these vary by category). Although FDA's current definition does not address NSS, the research team uses a modified definition for this report that disqualifies products containing NSS from receiving the "Healthy" designation, due to the growing evidence suggesting long-term NNS consumption may be linked to health harms.[103–111]

To understand how the application of this criteria would apply to the U.S. food supply, five product categories (breads, ready-to-eat cereals, tofu, water [excluding bottled water], and yogurt) were examined in detail. Categories were selected because they contain some products typically considered to be healthy (e.g., whole grain bread) and are often included in debates about how to define UPFs. First, the research team assessed whether each product in these categories were UPF using the ingredient marker approach described above for Nova 4. Then, the modified FDA "Healthy" criteria was applied to assess the percent of products within each category that met the criteria as well as what percent of products were both UPF and met FDA "Healthy" criteria.

To assess whether products met modified FDA "Healthy" criteria, the research team first assessed whether products were under the nutrient thresholds and did not contain NSS. For water, the product also had to contain <5 calories per serving and could not contain NSS (our modification). Then, bread, cereal, and tofu were assessed to determine whether products contained sufficient Food Group Equivalents (FGEs). The research team was unable to ascertain the FGEs in a product directly from the label information, as the gram weight of each ingredient is not provided by manufacturers. Instead, the ingredient labels were used as a proxy. Specifically, foods qualified when the first ingredient on product packaging was a food group equivalent (FGE) food/ingredient (e.g., whole grains [bread], fat-free or low-fat dairy [yogurt], or beans, peas, lentils [tofu]). To validate this assumption for breads, dietitians manually reviewed products with a whole grain listed as the first ingredient, using Whole Grain Stamp data and on-package claims. All of these products reported or claimed more than 16g of whole grains per RACC/50g minimum. In addition to tabulating the percent of products that met criteria, the research team also calculated the frequency of UPF marker additives in each category and identified the most frequently occurring additives that qualified the product as UPF.

Table A11. **FDA Criteria for "Healthy" Claims**

Food Groups					
Foods can qualify for the "Healthy" claim if they are from food groups encouraged in DGAs with no other ingredients except water: Vegetables, Fruits, Whole Grains, Low-fat Dairy, Lean Meat, Seafood, Eggs, Beans/Peas/Lentils, Nuts/Seeds.					
	Food Group Equivalent	**Added Sugar**	**Sodium**	**Saturated Fat**	**Calories**
Dairy products	2/3 equivalent dairy	≤5% DV	≤10% DV	≤10% DV	N/A
Nuts, seeds, and soy products	1 oz equivalent	≤2% DV	≤10% DV	5% DV excluding saturated fat inherent in nuts, seeds, and soybeans	N/A
Grain products	2/4 oz equivalent whole grain	≤10% DV	≤10% DV	≤5% DV	N/A
Water, coffee, or tea	N/A	None	N/A	N/A	<5kcals per RACC

Table A12. **FDA Criteria for "Healthy" Claims for Individual Foods**

Individual Foods				
An individual food that has a reference amount customarily consumed (RACC, used to determine serving size), greater than 50 grams (g) or greater than 3 tablespoons (Tbsp) and meets all these conditions per RACC; or an individual food that has a RACC of 50 g or less or 3 Tbsp or less and meets all these conditions per 50 g of food.				
Food Group	**Food Group Equivalent (Minimum)**	**Added Sugar Limit**	**Sodium Limit**	**Saturated Fat Limit**
Vegetables	1/2 cup equivalent	2% DV (1 g)	10% DV (230 mg)	5% DV (1 g)
Fruits	1/2 cup equivalent	2% DV (1 g)	10% DV (230 mg)	5% DV (1 g)
Grains	3/4 oz whole-grain equivalent (16g whole grains)	10% DV (5 g)	10% DV (230 mg)	5% DV (1 g)
Dairy	2/3 cup equivalent	5% DV (2.5 g)	10% DV (230 mg)	10% DV (2 g)
Protein Foods				
Game meat	1½ oz equivalent	2% DV (1 g)	10% DV (230 mg)	10% DV (2 g)
Seafood	1 oz equivalent	2% DV (1 g)	10% DV (230 mg)	5% DV**
Egg	1 oz equivalent	2% DV (1 g)	10% DV (230 mg)	10% DV (2 g)
Beans, peas, lentils	1 oz equivalent	2% DV (1 g)	10% DV (230 mg)	5% DV (1g)
Nuts, seeds, and soy products	1 oz equivalent	2% DV (1 g)	10% DV (230 mg)	5% DV**
Oils				
100% oil	N/A	0% DV	0% DV	20% of total fat
Oil-based spreads (fats solely from oil)	N/A	0% DV	10% DV (230 mg)	20% of total fat
Oil-based dressing (≥30% oil)	N/A	2% DV (1 g)	10% DV (230 mg)	20% of total fat

** *Saturated fat inherent in seafood, nuts, seeds, and soybeans does not count toward this limit.*

Table A13. **FDA Criteria for "Healthy" Claims for Combination Foods or Mixed Products**

Combination Foods or Mixed Products			
Food Group Equivalent (Minimum)	**Added Sugar Limit**	**Sodium Limit**	**Saturated Fat Limit**
Mixed Product			
A Mixed Dish product must meet these conditions per RACC.			
1 total FGE, no less than 1/4 FGE from at least two food groups	10% DV (5 g)	15% DV (345 mg)	10% DV ** (2 g)
Main Dish			
A Main Dish product (defined in § 101.13(m)) makes a major contribution to a meal: weighs ≥6oz per labelled serving, contains ≥40g food from each of at least two food groups, and must meet these conditions.			
2 total FGEs, no less than 1/2 FGE from at least two food groups	15% DV (7.5 g)	20% DV (460 mg)	15% DV ** (3 g)
Meal Product			
A Meal Product (defined in § 101.13(l)) makes a major contribution to the total diet: weighs ≥10oz per labelled serving, contains ≥40g food from each of at least two food groups, and must meet these conditions.			
3 total FGEs, no less than 1/2 FGE from at least three food groups	20% DV (10 g)	30% DV (690 mg)	20% DV ** (4 g)

** *Saturated fat inherent in seafood, nuts, seeds, and soybeans does not count toward this limit.*

Key Findings

We found substantial heterogeneity in the percent of products that contain UPF markers that also meet FDA "Healthy" criteria **(Appendix A – Table A14)**. In bread, 85% of products were considered UPF, and only 8% were UPF and met "Healthy" criteria. Simply put, most UPF breads do not meet whole grain requirements. For ready-to-eat (RTE) cereals like flakes and sweetened cereals, 77% were considered UPF. Only 3% were UPF and met the "Healthy" definition (most UPF cereals exceed added sugar thresholds and many do not meet whole grain requirements). For tofu, 21% were considered UPF and 8% were both UPF and met the "Healthy" criteria. For water, 86% were considered UPF and 56% were considered UPF and met FDA "Healthy" criteria. Most waters would be exempt under this criteria, but those that are not "Healthy" contain more than 5 calories per serving. Lastly, 86% of yogurts were considered UPF, with only 2% that were UPF and meeting FDA "Healthy." While most yogurts meet the dairy FGE requirements, they exceed both added sugar and saturated fat thresholds.

Table A14. **Percent of Products that Contain UPF Markers that Also Meet FDA "Healthy" Criteria Using Mintel 2018-2024 (N=92,727)**

	Percent of All Products				
	Number of products	% UPF under Full Nova	% that meet FDA "Healthy" Definition	% that are UPF and meet "Healthy" definition (i.e., would be exempt)	% that are UPF and do not meet "Healthy"
Breads*	2093	85	9	8	77
Ready-to-eat cereals*	1850	77	6	3	74
Tofu*	58	21	69	8	12
Water**	1175	86	70	56	30
Yogurt*	1247	86	8	2	84
** Using the first ingredient to flag whether something meets the thresholds for food group equivalent*					
*** Plain Water is exempt from nutrition labelling and unlikely to be in the Mintel database; majority of products in the Water categories are carbonated and/or flavored*					

The top ingredient markers of UPFs in each category were as follows: breads (dough thickeners/emulsifiers), cereals (flavor), tofu (thickener), water (flavor, carbonation), and yogurt (thickeners, emulsifiers, sweeteners). **Appendix A – Table A15** provides examples of foods that contained a UPF marker but met the FDA "Healthy" criteria.

Table A15. **Examples of Products that are UPF and Meet Criteria for FDA "Healthy" (UPF Marker Ingredient is in Red)**

Category	Example product that is UPF and FDA "Healthy"
Breads	Sara Lee 100% Whole Wheat Bread Ingredients: Whole Wheat Flour, Water, Sugar, **Wheat Gluten**, Yeast, Contains 2% Or Less Of Each Of The Following: [Vegetable Oil (Soybean), Salt, Preservatives [Calcium Propionate, Sorbic Acid], **Datem**, **Natural Flavors**, Monoglycerides, **Citric Acid**, **Soy Lecithin**].
Ready-to-eat cereals	Private Label Whole Grain Toasted Oat Cereal Ingredients: Whole Grain Oat Flour, **Wheat Starch**, Calcium Carbonate, Salt, **Trisodium Phosphate**, **Caramel Color**. Vitamins and Minerals: Ferric Orthophosphate, Niacinamide, Zinc Oxide, Thiamin Mononitrate, Calcium Pantothenate, Pyridoxine Hydrochloride, Folic Acid.
Tofu	House Foods Firm Tofu Ingredients: Water, Soybeans, Calcium Sulfate, **Glucono-Delta-Lactone**.
Water	LaCroix Sparkling Water Lime Ingredients: Carbonated Water, **Natural Flavor**.
Yogurt	Fage TruBlend Lowfat Strawberry Greek Yogurt Ingredients: Strained Yogurt (Grade A Pasteurized Skimmed Milk and Cream, Cultures), Strawberries, Chicory Root Fiber, **Natural Flavor**, **Fruit Pectin**, **Elderberry Juice Concentrate (For Color)**. Live Active Cultures (L. Bulgaricus, S. Thermophilus, L. Acidophilus, Bifidus and L. Casei) Stonyfield Plain Low Fat Yogurt Ingredients: Cultured Pasteurized Organic Low Fat Milk, **Pectin**, Vitamin D3, 6 Live Active Cultures (s thermophilus, l bulgaricus, l acidophilus, bifidus, l paracasei, l rhamnosus)

Limitations to Our Approach

Our findings are consistent with other reports estimating ~70% of U.S. foods are UPF.[301,307] However, it's worth noting that our findings are higher than some estimates that look at purchases of UPFs for a few reasons: 1) They reflect products regardless of market share (vs purchases which reflect what people actually buy) and 2) Given the nature of Mintel data, which reflects products that are newly introduced, repackaged, or reformulated, products that are rarely reformulated or repackaged may be less likely to appear. However, a sensitivity analysis found that in a given year, Mintel data represent about 50% of all food purchases, and this figure is likely much higher for top sellers. Also, the data do not reflect packaged foods that do not contain nutrition facts labels (e.g., coffee, tea, bottled water). These products are unlikely to be UPFs, meaning that the estimates of UPFs are higher than they would be if all packaged products were included. Indeed, a sensitivity analysis applying the same operationalized Nova 4 definition in a dataset of US household food purchases in 2020 (n=59,939 households) found that 68% of food purchases would be classified as UPF, compared to 71% in Mintel. However, only 61% of beverage purchases were UPF, compared to 80% in Mintel, reflecting the lack of water, tea, and coffee in Mintel.

A broader limitation is that our analysis applied to only packaged foods purchased from stores. Although foods from stores represent ~70% of American's daily calories,[308] the results on prevalence of UPFs under different definitions may not generalize to other settings, such as schools or restaurants.

Appendix B.
Additional Information on Methodology and Key Findings for Potential Policies to Limit Exposure and Consumption of UPFs

A full description of the methodology and key findings are provided below. Some text, tables, and figures are repeated in the technical report and appendices for completeness as the complexity of the content warrants a thorough presentation.

Methodology

To identify policy options for reducing UPF consumption in the U.S. and make prioritized recommendations, a list of potential policies for the panel to consider was developed, under the direction of Dr. Jim Krieger. This list was informed by the aforementioned policy scan, current UPF policy activity at the federal and state levels, the panel's knowledge of similar policies that seek to reduce harms from other unhealthy foods (e.g., added sugars and non-sugar sweeteners), and by reviewing similar published recommendations from authoritative bodies and the peer-reviewed literature.[83,132–134] For the most part, the panel considered public policies—laws, regulations, funding authorizations, and procedures and practices of government agencies. The panel generally did not include institutional policies with a few exceptions, including food is medicine procurement restrictions and dietary guidelines for organizations and associations.[132]

A Qualtrics survey was then conducted to assess the views of the panel members on public policies to reduce exposure to and consumption of UPFs in the U.S. The survey consisted of 26 policies, which are listed and defined in **Appendix B – Table B1** as they were listed in the survey.

Table B1. **Policy Options for UPF Regulation As-Written in Qualtrics Survey**

School procurement restrictions—Restrict the amount of UPFs that can be purchased and provided at schools
Early childhood procurement restrictions—Restrict the amount of UPFs that can be purchased and provided at early learning and childcare sites
Government facility procurement restrictions—Restrict the amount of UPFs that can be purchased and provided in government buildings and institutions (e.g., hospitals, jails)
Government contractor procurement restrictions—Restrict the amount of UPFs that government contractors can purchase and provide using government funds
Food is Medicine procurement restrictions—Restrict the amount of UPFs that can be purchased and provided by Food is Medicine programs (e.g., health care-based FIM programs like medically tailored meals or groceries or public health insurance programs)
SNAP restrictions—Prohibit purchase of UPFs with SNAP benefits
Nutrition guidelines and standards for specific programs—e.g., Restrict the amount of UPFs in WIC package foods
Food additive restrictions—Ban specific additives from the general food supply
Health warning labels—Require a warning on UPF packages about adverse health effects of consumption
Identity warning labels—Require a label on UPF packages indicating they are UPFs
Ban on positive health claims on UPF product packages—Prohibit specific positive nutrition or health claims on packages of UPF products
Restrictions on marketing UPFs to children—Restrict advertising (TV, digital, in-store) of UPFs, and/or restrict use of child-directed appeals on UPF products (e.g., cartoon characters)
Elimination of tax breaks for marketing of UPFs*
Healthy retail policy—Limit the promotion and placement of UPFs in food retail settings (groceries, supermarkets, convenience stores, etc.), such as in checkout aisles, on end caps, and/or front of store displays
Nutrition guidelines and standards—Include guidance to limit consumption of UPFs in dietary guidelines and related nutrition standards (e.g., DGA, guidelines for foods provided by institutions, etc.)

School nutrition education curriculum requirements—Require discussion of UPFs (what they are, how to identify, why to limit consumption, what products are healthy substitutes) in school health and nutrition education curricula
USDA nutrition education programs—Require discussion of UPFs (what they are, how to identify, why to limit consumption, what products are healthy substitutes) in USDA nutrition education curriculum, such as SNAP-Ed
Public information and awareness campaigns—Provide public funds for campaigns to educate the general public (or specific subgroups) about UPFs (what they are, how to identify, why to limit consumption, what products are healthy substitutes)
Countermarketing campaigns—Provide public funds for campaigns that use countermarketing methods to reduce desirability of and demand for UPFs (e.g., exposing the manipulative practices of producers, highlighting negative health consequences, creating emotional appeals against the product)
Taxes on all or most UPFs—Impose an excise tax on all or most UPFs, similar to SSB or tobacco excise taxes
Taxes on targeted UPFs—Impose an excise tax on selected UPFs (e.g., sweetened beverages, processed meats)
UPF product price promotion restrictions—Restrict price promotions of UPF products in food retail settings—e.g., 2 for 1 promotions
Fund Food is Medicine programs (e.g., health care-based FIM programs like medically tailored meals or groceries or public health insurance programs)
Healthy food incentive programs (e.g. double up bucks for F&V)
Healthy food policies in schools (e.g., farm-to-school programs, fund cooking from scratch)
Create tax breaks for companies to market non-UPFs*

**These policies were not defined in the Qualtrics survey.*

Expert panel members, co-chairs, and one convening representative were asked to complete the survey, for a total of 17 respondents. Respondents rated policies on a Likert scale from 1 (lowest) to 5 (highest) based on their: impact, feasibility, and equity. These domains are described in **Appendix B – Table B2**. For the survey, Nova Category 4 was used as the underlying scientific definition for UPF with the caveat that there may be instances where the products included under a given policy may only include a subset of all Nova 4 products. Some respondents did not rate each policy. Missing responses were populated with the average score for the respective policy. Survey results were summed to determine the total score for each domain of each policy, as well as the percent of respondents who rated the policy a 4 or 5, with 5 being the highest. The total score was used as the primary metric for data reporting and visualizations.

Table B2. **Definitions of the Domains Used to Evaluate the Policy Options in the Survey**

Domain	Definition
Impact	The extent to which a policy would reduce UPF consumption were it effectively implemented.
Feasibility	How easy or difficult it would be to adopt and implement the policy, considering political will and challenges, public interest and support, legal considerations, industry opposition, cost, logistics of implementation, and ease of implementation, for example.
Equity	The extent to which the policy would reduce disparities in UPF consumption and how policies may differentially affect people with low-incomes. For example, high equity (a rating of 5) would indicate the policy is likely to lower consumption and exposure among people who bear a disproportionate burden of the chronic conditions associated with UPF consumption.

Results from the Qualtrics survey were plotted in a bubble chart, presented in **Appendix B – Figure B1**, to visually reflect final ratings for each of these domains. At subsequent expert panel meetings, policies were discussed by quartiles of high feasibility and high impact, high feasibility and low impact, low feasibility and high impact, and low feasibility and low impact. Conclusions from these discussions were used to gauge panel agreement on recommended policy options to reduce harm from UPFs and assign them to tiers, which are described in the **Policy Options to Limit Exposure and Consumption of UPFs section** of the technical report.

Key Findings

A total of 12 out of 17 eligible respondents completed the survey. Across the 26 policies, total scores per subcategory ranged between 12 and 60. The 26 policies are defined in **Appendix B – Table B1.**

The five highest ranking policies based on total scores in terms of impact were: Taxes on targeted UPFs (total score: 55; % 4 or 5: 100%); Taxes on all or most UPFs (total score: 54; %4 or 5: 91.7%); School procurement restrictions (total score: 51; %4 or 5: 83.3%); Restrictions on marketing UPFs to children (total score: 51; %4 or 5: 83.3%); and Early childhood procurement restrictions (total score: 46; %4 or 5: 58.3%).

The five highest-ranking policies for feasibility were: Nutrition guidelines and standards for specific programs (total score: 50.4; %4 or 5: 75%); Food additive restrictions (total score: 50.2; %4 or 5: 75%); Nutrition guidelines and standards (total score: 50; %4 or 5: 83.33%); Early childhood procurement restrictions (total score: 49; %4 or 5: 83.3%); and School procurement restrictions (total score: 48; %4 or 5: 75%).

The five highest ranking policies for equity were: School procurement restrictions (total score: 50; %4 or 5: 83.3%); Restrictions on marketing UPFs to children (total score: 50; %4 or 5: 83.3%); Healthy food policies in schools (total score: 47; %4 or 5: 75%); Early childhood procurement restrictions (total score: 47; %4 or 5: 66.7%); and Nutrition guidelines and standards for specific programs (total score: 44.4; %4 or 5: 50%).

Appendix B – Figure B1 displays each policy graphically based on the three domains. The policies viewed as having the highest potential impact and highest feasibility were school procurement restrictions, early childhood procurement restrictions, government facility procurement restrictions, nutrition guidelines and standards, nutrition guidelines and standards for specific programs, and SNAP restrictions. Of these policies, school procurement restrictions, early childhood procurement restrictions, and nutrition guidelines and standards for specific programs had the highest equity ranking, while nutrition guidelines and standards had the lowest.

Figure B1. **Bubble Chart of Impact, Feasibility, and Equity Ratings of 26 UPF Policies**

Figure B1. Graphical depiction of ratings of policies from policy options Qualtrics survey to reduce exposure to and consumption of UPFs in the U.S. The policy options are ranked across three domains as summarized in table B1: (i) as the policies move up the y-axis, they are ranked as more feasible; (ii) as the policies move right across the x-axis, they are ranked as having greater impact; and (iii) as the bubbles become larger, they are ranked as more equitable, with blue indicating the highest equity score (42-50), orange indicating equity scores 36-41, yellow indicating equity scores 31-35, and green indicating the lowest equity scores (28-30).

The detailed scores for each policy option are presented in the summary table, ordered by impact score (**Appendix B – Table B3**).

Table B3. **Summary of Survey Results on Policies to Reduce Exposure to and Consumption of UPFs in the U.S.**

	Impact		Feasibility		Equity	
Policy	total score	% 4 or 5	total score	% 4 or 5	total score	% 4 or 5
Taxes on targeted UPFs	55.0	100.0%	40.0	41.7%	44.0	66.7%
Taxes on all or most UPFs	54.0	91.7%	26.0	16.7%	40.0	50.0%
School procurement restrictions	51.0	83.3%	48.0	75.0%	50.0	83.3%
Restrictions on marketing UPFs to children	51.0	83.3%	31.0	33.3%	50.0	83.3%
Early childhood procurement restrictions	46.0	58.3%	49.0	83.3%	47.0	66.7%
Government facility procurement restrictions	42.0	50.0%	48.0	66.7%	41.0	33.3%
Healthy food policies in schools (e.g., farm-to-school programs, fund cooking from scratch)	42.0	66.7%	40.0	50.0%	47.0	75.0%
SNAP restrictions	41.4	41.7%	44.0	58.3%	40.8	41.7%
UPF health warning labels on the front of food packages	41.0	58.3%	37.0	33.3%	32.0	8.3%
Dietary guidelines and standards	41.0	58.3%	50.0	83.3%	33.0	25.0%
UPF product price promotion restrictions	39.0	25.0%	30.0	16.7%	31.0	16.7%
Government contractor procurement restrictions	38.4	33.3%	39.6	41.7%	36.0	16.7%
Nutrition guidelines and standards for specific programs	38.4	41.7%	50.4	75.0%	44.4	50.0%
Healthy retail policy	37.0	33.3%	43.0	50.0%	30.0	16.7%
Countermarketing campaigns	36.0	33.3%	41.0	58.3%	36.0	33.3%
Elimination of tax breaks for marketing of UPFs	34.0	16.7%	35.0	41.7%	37.1	25.0%
Food additive restrictions	33.8	33.3%	50.2	75.0%	30.5	16.7%
Ban on positive health claims on UPF product packages	33.0	25.0%	39.0	50.0%	32.0	16.7%
Healthy food incentive programs (e.g. double up bucks for F&V)	32.7	33.3%	40.4	41.7%	42.6	58.3%
Create tax breaks for companies to market non-UPFs	32.7	8.3%	32.7	16.7%	28.4	8.3%
UPF identity labels on the front of food packages	32.0	25.0%	40.0	58.3%	28.0	8.3%
School nutrition education curriculum requirements	31.0	33.3%	43.0	66.7%	28.0	25.0%
Food is Medicine procurement restrictions	30.5	25.0%	44.7	58.3%	33.8	33.3%
Public information and awareness campaigns	30.0	16.7%	42.0	66.7%	31.0	16.7%
USDA nutrition education programs	29.0	16.7%	44.0	66.7%	36.0	41.7%
Fund Food is Medicine programs	27.6	16.7%	39.6	33.3%	31.2	25.0%

Although all 26 policies were discussed and used to inform the recommendations, the final recommendations described in the report do not directly correspond one-to-one with those in the original Qualtrics survey, as some policies were combined or modified for clarity and to avoid overlapping content. Each policy was assigned to one of four tiers:

- **Tier 1 recommended policies (high impact, high feasibility):** Policies which have a high likelihood of adoption and successful implementation, and are likely to have a high impact on reducing potential harms from UPFs.
- **Tier 2 recommended policies (high impact, low feasibility or low impact, high feasibility):**
  - *High Impact, Low Feasibility:* Some policies in this category may be difficult to implement in the near term, but could have substantial impact over time. Increasing their feasibility will likely require "ground-softening" efforts such as building public and policymaker support, strengthening the evidence base, and developing coalitions and partnerships.
  - *Low Impact, High Feasibility:* These policies can serve as early wins that build momentum for more impactful policies that are currently less feasible by bringing attention to the need for addressing UPFs.
- **Tier 3 policies (not recommended at this time):** Policies in this tier did not receive majority support for placement in Tier 1 or Tier 2. While not recommended for action at this time, they are included to ensure transparency in the panel's deliberative process.
- **Complementary policies:** Includes approaches aimed at reducing UPF consumption or related harms but are unlikely to have substantial impact on UPF consumption on their own. These policies may be most effective when paired with a recommended Tier 1 or Tier 2 policy. This category also includes policies designed to increase consumption of minimally processed foods, which can be incorporated into broader policy packages to support recommended actions.

Appendix C.

Instructions on How to Develop a List of Current Ingredients and Additives Used for Identifying UPFs

The following steps could be followed to prepare a list of ingredients that are UPF markers. These steps are what were used in this report.

Step 1: Start with Nova 4 cosmetic additive types and non-culinary ingredients.

1a. Cosmetic additives: The process of assembling a list of cosmetic additives involves first laying out the Nova 4 cosmetic additive types that can be mapped to datasets of technical effects/functional classes (see **Appendix A – Table A3** for all cosmetic additive types).

*1b. Non culinary ingredients***:** The list of these ingredients has been compiled by the research team that developed Nova[2,12] (see **Appendix A – Table A4**).

Step 2: Combine multiple datasets that list food ingredients and their technical effects or functional classes.

2a. The U.S. Food and Drug Administration (FDA) Substances Added to Food (SATF) Inventory: Available online at https://hfpappexternal.fda.gov/scripts/fdcc/index.cfm?set=FoodSubstances. Each additive's name, alternate names, and Technical Effects are listed, and the full inventory can be downloaded directly from the website in CSV format. The SATF Inventory includes many Technical Effects (32, defined in 21 CFR 170.3[309]), some of which are not considered Cosmetic according to Nova and thus are irrelevant for the purposes of identifying UPFs. For example, the FDA designates some ingredients with the Technical Effect of "Antioxidant," which is not considered a Cosmetic functional class by Nova. FDA updates this inventory regularly; both the downloadable and web versions list the date last updated. It is also important to note that the SATF is not a comprehensive list of all ingredients in the US food supply. It only captures key categories of additives that the FDA addresses (e.g., FDA-regulated food and color additives, additives listed in existing regulations, prohibited or sanctioned substances.

To create a list of the relevant additives for identifying UPFs, download the SATF inventory in Excel format from https://hfpappexternal.fda.gov/scripts/fdcc/index.cfm?set=FoodSubstances, and filter the column "Used for (Technical Effect)" to include each of the technical effects that designate a food as a UPF (see **Appendix A – Table A3**).

2b. Codex General Standard for Food Additives: Codex Alimentarius is a collection of internationally recognized food standards, guidelines, and codes of practice to facilitate the safety, quality, and fairness of international food trade.[118] The Codex General Standard for Food Additives (GSFA) Online Database is available at https://www.fao.org/fao-who-codexalimentarius/codex-texts/dbs/gsfa/en/. Each additive's name, synonym(s), and Functional Classes are listed, and the full inventory is also available in PDF format. The CODEX database includes 27 Functional Classes, not all of which are considered Cosmetic and relevant for identifying UPFs. CODEX updates the GFSA Online Database with each annual session of Codex Alimentarius Commission.[310] Risk assessments of all food additives are conducted by an independent, international expert scientific group—the Joint FAO/WHO Expert Committee on Food Additives (JECFA).[311] These specifications, prepared by the JECFA and adopted by CODEX are available in GSFA. Flavourings are not available in GSFA but can be found in an online searchable database at the JECFA website at https://www.fao.org/food/food-safety-quality/scientific-advice/jecfa/jecfa-flav/browse-alphabetically/en/.

To create a list of the relevant additives for identifying UPFs, go to the functional classes database (https://www.fao.org/gsfaonline/reference/techfuncs.html?lang=en) and select each of the functional classes that designate a food as a UPF (see **Appendix A1**). Then copy/paste the list of additives into your spreadsheet and repeat the process for the flavourings available in the JECFA flavouring database (https://www.fao.org/food/food-safety-quality/scientific-advice/jecfa/jecfa-flav/browse-alphabetically/en/).

2c. Generic terms: Added to this database are the generic terms "color," "flavor," as in the US manufacturers are excepted from the requirement to report the specific name of an ingredient and can report the collective/generic name on the ingredient list and remain in compliance with 21 CFR 101. 4(b)(1).[125]

A row for the ingredient "color" can be added to the database and identified as having the function of "Color." Therefore, any product with the word "color" in the ingredient list would be classified as having an additive with the function color.

2d. Combining lists and resolving differences in classification: All ingredients included in 2a and 2b were pulled and compiled into one list, and each ingredient in the list was flagged for all potential Technical Effects (2a) or Functional Classes (2b). Most additives have multiple Technical Effects and/or Functional Classes—all were identified and retained. For example, an ingredient approved by Codex for use with the Functional Class of Emulsifier, and in the SATF with the Technical Effects of Emulsifier, Color, and Flavor, retained all possible purposes of the additive, i.e., Emulsifier, Color, and Flavor. Thus, any ingredient identified as a cosmetic additive in either dataset is considered as such and thus flagged as a UPF marker.

The spreadsheet can include each ingredient in a unique row, flagged for all possible Technical Effects and/or Functional Classes, each in unique columns. Synonyms or alternate spellings could each be included in unique rows or added to an additional column(s), as long as those alternate spellings are flagged for the same Technical Effects and/or Functional Classes. Alternatively, a separate spreadsheet for each Technical Effect or Functional Class could also work for the mapping described in Step 4.

2e. Exclusions recommended in this report: In this report, several types of ingredients are recommended to be excluded as markers of UPF: herbs/spices, vitamins/minerals, salt, and yeast. These ingredients can be identified by existing regulatory documents: herbs/spices are listed in 21 CFR 182.10[299] and tagged as such within the downloadable SATF database, while "nutrient supplements" are outlined elsewhere in 21 CFR 170.3.[309]

To exclude those from the lists above, the additives can be removed from the database entirely, or "un-flagged" to remove other Technical Effects and/or Functional Classes.

Step 3. Create a dataset of current U.S. branded food products and ingredients.

3a. Download dataset of U.S. packaged food products.

Options include:

USDA Global Branded Food Products Database: The USDA Global Branded Food Products Database is a publicly available database of commercial branded packaged foods descriptions, nutrient data, serving size, and ingredient information, provided by food industry organizations to the USDA through a Public-Private Partnership.[312] According to the website, this dataset is updated monthly. Access at Food Data Central, https://fdc.nal.usda.gov/

Mintel: Mintel Global New Products Database (GNPD) offers detailed product descriptions, ingredient, nutrient, packaging, images, and brand information, and highlights trends in new products in >50 countries around the globe. New, reformulated, updated, and repackaged products are photographed and information from the package entered into the GNPD database.[6] Access at http://www.mintel.com. (Note: this data is proprietary and requires a contract). The dataset includes information about the country where each product is sold, so only information on the US market can be used.

Innova: Innova Market Insights New Products Database (IMI NPD) offers detailed product descriptions, ingredient, nutrient, packaging, images, and brand information, claiming to capture more than 90% of global innovation. New, reformulated, updated, and repackaged products from >70 countries are photographed and information from the package entered into the IMI NPD database. Access at https://www.innovamarketinsights.com/databases/ (Note: this data is proprietary and requires a contract). Similar to Mintel, the dataset includes information about the country where each product is sold, so only information on the U.S. can be used.

Others: Any databases of packaged food products relevant to the policy area of interest can be used. For example, for school food environments or early childhood/adult care food programs, it would be best to use procurement data or inventory data from distributors to best reflect the specific food products available for foodservice. Regardless of source, the dataset must provide item-level data on ingredients to be able to classify UPFs.

3b. Parse data and generate ingredients list: Products of interest (e.g., specific year, market, category, etc.) are downloaded from NFP source (e.g., Mintel) as a CSV file and processed using SAS to create a SAS NFP database. Records with a value for the variable 'Ingredients' are parsed from the full list of ingredients into a separate variable for each ingredient. For example, each record in the SAS NFP database includes a record id and a variable for ingredients (i.e., 2 variables). The SAS NFP database is updated to include individual variables for the maximum number of ingredients in all ingredient lists (e.g., if the maximum number of ingredients among all products includes 92 ingredients then there will be 94 variables: 'record id', 'ingredients', and then 92 individual ingredient variables ['ingredient 1', 'ingredient 2'….'ingredient 92']). If an ingredient list contains three ingredients, then the first ingredient is parsed into the variable 'ingredient 1', the second ingredient is parsed into the variable 'ingredient 2', the third ingredient is parsed into the variable 'ingredient 3', and the variables for 'ingredient 4' to 'ingredient 92' will be blank for that record. The SAS NFP database is then processed using SAS macros as defined in Step 4.

Step 4. Mapping—Identify products that contain non-culinary ingredients or cosmetic additives and flag them as containing a UPF marker ingredient.

4a. Flag products with ingredients that are non-culinary ingredients or have an FDA technical effect or CODEX Functional class that is considered Cosmetic by Nova. Individual SAS macros are created for each list of ingredients for each FDA/CODEX technical effect/functional class and non-culinary ingredient (e.g., one SAS macro with ingredients considered a non-culinary ingredient; another SAS macro with ingredients listed as FDA/CODEX emulsifier; another SAS macro with ingredients listed as a FDA/CODEX flavor enhancer, etc.). Then, using the SAS macro to search products' ingredients lists, each individual ingredient for each product is programmatically flagged as being a non-culinary ingredient or having a relevant technical effect/functional class. (Note: If of interest, it is possible to create separate SAS macros for FDA technical effects and Codex functional classes.) If SAS is not available, then other

programming languages may be used (e.g., Stata, R) or other methods using alternative software (e.g., Excel).

If a product contains at least one ingredient flagged for a FDA/CODEX technical effect/functional class, then the product is considered to contain an ingredient from that additive class (e.g., if an ingredient is included in the list of CODEX emulsifiers, then that product is considered to contain an added emulsifier); same for non-culinary ingredients. If a product does not contain any ingredients that are flagged (i.e., none of its ingredients are included in any SAS macro list of search terms), then that product is not considered to have a FDA/CODEX technical effect/functional class of interest.

4b. Identify UPFs: According to Steps 2a, 2b and 2c, any product that contains at least one of the ingredient markers of UPFs (cosmetic additive or non-culinary ingredient) is flagged as a UPF.

Step 5. Updates

5a. Updating technical effects and functional classes: As data sources 2a and 2b are updated, incorporate new ingredients and their Technical Effects and/or Functional Classes into the SAS macros from Step 4.

5b. Identifying novel ingredients in the food supply (specifically those not included in updates to data sources 2a and 2b): All datasets listed in Step 3 are updated continuously. At least once a year, Step 3b could be repeated and the annual ingredient inventory compared to previous year, which will allow identification of novel ingredients in the US food supply (including new ingredients or renamed ingredients).

If the novel ingredients are not already identified as additives in data sources 2a or 2b with Technical Effects or Functional Classes, the purpose of each novel ingredient should be determined through a review process established by the policy (e.g. governmental agency review, review by a consortium).

5c. Updating list of UPFs. Apply updated SAS macros (Step 4) to new year(s) of product datasets from Step 3a.

To access the specific ingredients lists created for this panel report, please contact the Global Food Research Program (taillie@unc.edu).

Appendix D.

Expert Panel Member Biographies and Headshots

Panel Member	Biography
Jim Krieger, MD, MPH Panel Co-Chair 	Jim Krieger, MD, MPH is Executive Director of Healthy Food America and Clinical Professor Emeritus at the University of Washington School of Public Health. He previously worked for 25 years at Public Health—Seattle & King County as Chief of Chronic Disease Prevention and as an attending physician at the University of Washington Harborview Medical Center. He supports policy change to promote healthy eating and health equity through research, provision of technical assistance to policy makers and advocates, direct advocacy, and teaching. He has contributed to implementation of the nation's second menu labeling regulation, adoption of sweetened beverage taxes, development of sugary drink counter-marketing campaigns, consideration of front of package food labels by FDA, and developing policies focused on non-sugar sweeteners and ultraprocessed foods. His research has included evaluation of sweetened beverage taxes, food package warning labels, and policies to address non-sugar sweeteners. He teaches graduate health policy at University of Washington. He received his undergraduate degree at Harvard, MD at the University of California, San Francisco, and MPH at University of Washington.
Lindsey Smith Taillie, PhD Panel Co-Chair 	Lindsey Smith Taillie, PhD, MPH is a Professor and associate chair of nutrition at the Gillings School of Global Public Health at the University of North Carolina, Chapel Hill. Her research focuses on examining how the food environment affects unhealthy diets, obesity, and diabetes as well as evaluating food policies to promote healthier diets in the US and globally. Dr. Taillie is co-director of the Global Food Research Program and currently co-leads a large multi-country project to inform and evaluate an array of healthy food policies around the world including in Latin America, Asia, and Africa. In the US, her work has focused on policies including marketing restrictions, nutrition labels, taxes on sugary drinks, the Supplemental Nutrition Assistance program and WIC, and school foods.
Emily Broad Leib, JD Panel Member 	Emily Broad Leib, JD is a Clinical Professor of Law, Director of Harvard Law School Center for Health Law and Policy Innovation, and Founder and Director of the Harvard Law School Food Law and Policy Clinic, the first law school clinic in the U.S. devoted to providing legal and policy solutions to the health, economic, and environmental challenges facing our food system. Working directly with clients such as NGOs, governmental bodies, and community groups, Broad Leib champions reduction in food waste, improved food security and access to healthy foods, and equity and sustainability in food production. Her scholarly work has been published in the California Law Review, Wisconsin Law Review, Harvard Law & Policy Review, Food & Drug Law Journal, Journal of Food Law & Policy, and New England Journal of Medicine, among others.

Scott Faber, JD Panel Member 	Scott Faber is the Senior Vice President of Government Affairs for the Environmental Working Group, a national environmental health organization. He joined EWG in 2012, and has since led EWG campaigns related to farm, food and chemical safety policies. From 2007 to 2012, Mr. Faber was Vice President for Government Affairs for the Grocery Manufacturers Association, where he led GMA's efforts to enact the Food Safety Modernization Act. From 2000 to 2007, Mr. Faber was a campaign manager for the Environmental Defense Fund. Mr. Faber has frequently testified before Congress as an expert on farm, food, and chemical safety policies. He holds a J.D. from Georgetown University Law Center, where he is an Adjunct Professor.
Jessie Gouck, MUP Panel Member 	Jessie Gouck is an Equity and Strategic Alignment Program Manager at California Department of Public Health. She is an Experienced Senior Program Specialist with a demonstrated history of working in the public health and community planning sectors. She has extensive experience creating policy and environmental change in support of active living and healthy eating, with roles as communicator, facilitator, writer, educator and motivator. She engages both the public and private sectors in conversations about health and land use, specifically in communities with the greatest health risks due to income, class and race. Jessie earned her Master's degree focused in Urban and Regional Planning from State University of New York at Buffalo.
Thomas Gremillion, JD, MA Panel Member 	Thomas Gremillion is the Director of Food Policy at the Consumer Federation of America. He oversees the research, analysis, advocacy and media outreach for the group's food policy activities. He also coordinates the Safe Food Coalition, a group of consumer, trade union, and foodborne illness victim organizations dedicated to reducing foodborne illness by improving government food inspection programs. Prior to joining CFA in 2015, Gremillion practiced environmental law at Georgetown University Law Center's Institute for Public Representation and at the Southern Environmental Law Center in Chapel Hill, NC. He is a member of the D.C. and North Carolina bars and holds a J.D. from Harvard Law School, a B.S. in mathematics from the University of South Carolina, and an M.A. in International Relations from La Universidad Andina Simón Bolívar in Quito, Ecuador.

Alyson E. Mitchell, PhD Panel Member 	Alyson Mitchell is a Professor of Food Chemistry in the Department of Food Science and Technology at the University of California, Davis. A Fellow of the American Chemical Society, she earned both her B.S. in Environmental Toxicology and Ph.D. in Pharmacology and Toxicology from UC Davis. Dr. Mitchell's research advances the chemical understanding of food to enhance quality, promote health, optimize co-product use, and drive innovation in sustainable food processing. She addresses critical challenges related to the chemical composition of food crops and the impact of modern processing, packaging, and storage on food quality. Her work focuses on improving the nutrient density and healthfulness of both fresh and, especially, processed foods. She also explores sustainability-driven innovations, such as using almond shells, a key agricultural byproduct, as a filtration media to remove phenolic compounds from food processing wastewater. Collectively, her research supports public health and fosters science-based solutions for a more sustainable, nutritious, and resilient food system.
Carlos Monteiro, MD, PhD Panel Member 	Carlos A. Monteiro, MD, PhD, is an Emeritus Professor of Nutrition and Public Health at the University of São Paulo, Brazil. His research interests include new methods to assess diet quality, epidemiology of obesity and other nutrition-related chronic diseases, and food processing and human health. On these subjects, he has published more than 300 journal articles that had more than 30,000 citations in the Web of Science (H index: 81).
Alyssa Moran, ScD, MPH, RD Panel Member 	Alyssa Moran, ScD, MPH, RD is the Deputy Director at the Penn Center for Food & Nutrition Policy at the University of Pennsylvania and Adjunct Assistant Professor of Health Policy at the Johns Hopkins Bloomberg School of Public Health. She specializes in developing, implementing, and evaluating food and nutrition policies such as marketing restrictions, procurement and service policies, taxes and subsidies, and food labels. She is a registered dietitian and has more than a decade of hands-on public health experience implementing prominent nutrition policies, including the National Salt and Sugar Reduction Initiative and the New York City Food Standards—one of the first U.S. policies to mandate limits on ultra-processed foods. A leading voice in exposing the systemic causes of diet-related illnesses, she regularly publishes on the topic in leading academic and lay publications, including JAMA, Nature, Newsweek, and The Washington Post.

Dariush Mozaffarian, MD, DrPH Panel Member 	Dariush Mozaffarian is a cardiologist, public health scientist, and Director of the Food is Medicine Institute at Tufts University. He is Dean Emeritus and Jean Mayer Professor at the Friedman School of Nutrition Science and Policy, Professor of Medicine at Tufts School of Medicine, and attending physician in cardiology at Tufts Medical Center. He is a globally recognized leader in the science of nutrition, cardiometabolic diseases, policy, and Food is Medicine, aiming to create the evidence and translation for a food system that is nutritious, equitable, and sustainable. Dr. Mozaffarian has authored nearly 600 scientific publications and is one of the top cited researchers in medicine. He has served in numerous advisory roles, including currently serving on the President's Council on Sports, Fitness, and Nutrition, and his work has been featured in an array of media outlets. Thomson Reuters has named him as one of the World's Most Influential Scientific Minds.
Aviva Musicus, ScD Panel Member 	Dr. Aviva Musicus, ScD is the Science Director of Center for Science in the Public Interest (CSPI), a nonprofit organization that aims to improve population health by advocating for evidence-based and community-informed policies on nutrition, food safety, and health. As the leader of CSPI's Science Department, Dr. Musicus ensures that CSPI relies on the best available scientific evidence and rigorous scientific methods to inform its advocacy. She additionally manages CSPI's advocacy on food labeling, food additives, new food technologies, and sodium and added sugar reduction. Dr. Musicus is also an Adjunct Assistant Professor of Nutrition at the Harvard T.H. Chan School of Public Health, where she teaches and conducts research on nutrition policy. Dr. Musicus holds a doctorate in Nutrition from the Harvard T.H. Chan School of Public Health and a Bachelor's degree in Environmental Studies from Yale University.
Jennifer Pomeranz, JD, MPH Panel Member 	Jennifer L. Pomeranz, is a public health lawyer and Associate Professor at the School of Global Public Health at New York University. Her research focuses on public health law and policy with a focus on the food environment. She is the first author of the textbook Public Health Law in Practice and the author of Food Law for Public Health, both published by Oxford University Press. Ms. Pomeranz has published over one-hundred articles in the leading peer review journals and has served on health and food-related advisory committees for New York City and non-profit organizations and was a member of an ad hoc Committee of the National Academies of Sciences, Engineering, and Medicine. She earned her Juris Doctorate from Cornell Law School and Master of Public Health from the Harvard School of Public Health.

Neena Prasad, MD, MPH Panel Member 	Neena Prasad is a public health physician currently serving as the Director of Bloomberg Philanthropies' Food Policy and Maternal & Reproductive Health Programs and is the focal point for Bloomberg Philanthropies' tobacco control work in India. Since joining Bloomberg Philanthropies in 2008, Neena has played a pivotal role in shaping and executing innovative and large-scale initiatives aimed at addressing critical global health challenges. Recognized for her expertise and leadership, Neena serves on the Board of Directors at the Campaign for Tobacco Free Kids and previously served on advisory committees for UNICEF; the Friedman School of Nutrition Science and Policy at Tufts University; and Planned Parenthood Global. Prior to joining Bloomberg Philanthropies, Neena was a Primary Care Physician at St. Michael's Hospital in Toronto and an Assistant Professor in the Department of Family and Community Medicine at the University of Toronto. Neena holds an MSc in Psychiatry and Behavioral Neurosciences and an MD, both from McMaster University, Canada, as well as an MPH with a concentration in International Health from the Harvard T.H. Chan School of Public Health.
Stephanie Scarmo, PhD, MPH Panel Member 	Stephanie Scarmo, Ph.D., MPH is a National Senior Policy Analyst at the American Heart Association (AHA), the nation's oldest and largest voluntary organization dedicated to fighting heart disease and stroke. In this role, Stephanie translates science in the areas of nutrition, obesity, and heart and stroke research for local, state, and federal advocacy. Prior to joining the AHA, Stephanie served as an Officer for the Kids' Safe and Healthful Foods Project at The Pew Charitable Trusts. She was also a Staff Scientist at the Center for Science in the Public Interest, a Research Associate at the Rudd Center for Food Policy and Obesity, and she completed a postdoctoral fellowship at the New York University School of Medicine. Stephanie earned her doctorate and Master of Public Health degrees in epidemiology from the Yale School of Public Health.
Marlene Schwartz, PhD Panel Member 	Marlene Schwartz, Ph.D. is Director of the Rudd Center for Food Policy & Health and Professor of Human Development and Family Sciences at UConn. Dr. Schwartz studies how nutrition and wellness policies implemented in schools, food banks, and local communities can improve food security, diet quality, and health outcomes. Dr. Schwartz earned her Ph.D. in Psychology from Yale University. Prior to joining the Rudd Center, she served as Co-Director of the Yale Center for Eating and Weight Disorders. Her current projects are funded by the Robert Wood Johnson Foundation, the United States Department of Agriculture, the National Institutes of Health, and the Centers for Disease Control and Prevention.

Johan B. Ubbink, PhD Panel Member 	Dr. Job Ubbink is Professor and Head of the Department of Food Science and Nutrition at the University of Minnesota. He was trained as a physical and polymer chemist at the University of Leiden (The Netherlands) and he obtained his PhD in Chemical Engineering and Materials Science at Delft University of Technology (The Netherlands). He has worked for over 15 years in R&D positions in the food industry, including 11 years at the Nestle Research Center (Lausanne, Switzerland). Prior to joining the University of Minnesota, he was associated with the California Polytechnic State University (San Luis Obispo), the University of Bristol (UK) and the ETH Zurich (Switzerland). He was visiting scientist at Moscow State University (Russia) and he has taught as visiting professor at the School of Food Engineering, University of Campinas (Brazil). His research interests include the materials science of foods and ingredients, food processing, ingredient upcycling, the science of food and cooking and the cultural aspects of food and diet.
Mary Story, PhD, RD Panel Convener 	Mary Story PhD, RD is Professor in Global Health, and Family Medicine and Community Health at Duke University, and Director for Academic Programs at the Duke Global Health Institute. Prior to coming to Duke in January 2014, she was Senior Associate Dean for Academic and Student Affairs, and Professor in the Division of Epidemiology and Community Health in the School of Public Health, Univ of Minnesota. Since 2005, she has directed the Robert Wood Johnson Foundation national program Healthy Eating Research focused on policy, systems and environmental solutions to improve child nutrition, food and nutrition security and prevent child obesity. She was elected to membership in the National Academy of Medicine (formerly the Institute of Medicine) in 2010. She has over 500 scientific publications in child and adolescent nutrition and obesity. She served on the USDHHS/USDA 2015-2020 Dietary Guidelines Scientific Advisory Committee. She has received numerous national awards for her research, including The Obesity Society, 2019 Friends of Albert (Mickey) Stunkard Lifetime Achievement Award.
Megan Lott, MPH, RD Panel Convener 	Megan Lott serves as Deputy Director for the Healthy Eating Research program and is based at the Duke Global Health Institute at Duke University. In this role, Megan provides administrative leadership to the program and oversees the program's operating structure, including day-to-day interactions with program funders and a nationwide network of grantees. Megan is a member of the program leadership team that develops and implements the program's strategic plan and is also engaged in policy and research collaborations with key partners, including federal government agencies and NGOs, to identify research priorities and advance RWJF and HER program goals. In her 11 years with HER, Megan has overseen 8 expert panel projects. In 2020, Megan received the Excellence in Dietary Guidance Award from the APHA Food and Nutrition Section and the Excellence in Public Health/Community Nutrition Award from the Academy of Nutrition and Dietetics PHCN Dietetic Practice Group in recognition of her work in translating previous HER expert panel's recommendations into practical strategies for parents, caregivers, and health professionals to use in practice. Prior to joining the HER team, Megan spent 6 years in Washington, D.C. working on federal and state nutrition policy. Megan is a Registered Dietitian with a BS in Nutrition Sciences and Dietetics from the University of Cincinnati and a Master's in Public Health from the University of North Carolina at Chapel Hill.

Senthil Ananthan, MPH, MBA Panel Support 	Senthil Ananthan serves as a Research Analyst for Healthy Eating Research and is based at the Duke Global Health Institute at Duke University. In this role, Senthil manages the commissioned research portfolio, assists with review processes for HER's funding opportunities, and coordinates the HER working groups. Prior to coming to Duke, Senthil worked as a Health Equity Fellow for the Food Security Program at Mecklenburg County Public Health. In this role, he contributed to policy, system, and environmental change strategies to improve healthy food access and address COVID-19 and chronic disease health disparities. Senthil has interned for the Food Assistance team at the Center on Budget and Policy Priorities where he monitored legislative developments related to nutrition assistance programs and assisted with research projects. Senthil holds a Master of Public Health and a Master of Business Administration from the University of Alabama at Birmingham and a Bachelor of Science in Economics from Auburn University.
Lindsey Reed, MPH Panel Support 	Lindsey Reed serves as a Senior Research Analyst for the Healthy Eating Research program and is based at the Duke Global Health Institute at Duke University. In this role, Lindsey provides leadership and expertise in the planning and organizing of research activities to support the mission of HER, including serving as the program lead for all commissioned research sub-grants and as a content expert for special projects. She also assists with review processes for HER's funding opportunities and coordinates the HER working groups. In previous roles, Lindsey developed evaluation tools and metrics to support a city-wide community collaborative seeking to improve health equity in New Orleans. She also served in the Peace Corps in Botswana, and was Operations Manager for an emergency feeding non-profit in rural western North Carolina. Lindsey holds a Masters of Public Health in Nutrition from Tulane University School of Public Health and Tropical Medicine, and a Bachelor of Science in Health Promotion from Appalachian State University

References

1. Understanding How the FDA Regulates Food Additives and GRAS Ingredients. Food and Drug Administration. September 6, 2024. Accessed April 2, 2026. https://www.fda.gov/food/food-additives-and-gras-ingredients-information-consumers/understanding-how-fda-regulates-food-additives-and-gras-ingredients
2. Monteiro CA, Cannon G, Levy RB, et al. Ultra-processed foods: what they are and how to identify them. *Public Health Nutr*. 2019;22(5):936-941. doi:10.1017/S1368980018003762
3. Food Additive Functional Classes, CODEX Alimentarius. Food and Agriculture Organization. Accessed April 2, 2026. https://www.fao.org/fao-who-codexalimentarius/%20GSFA-online%20/Functional-Classes/en/
4. Use of the "Healthy" Claim on Food Labeling. U.S. Food and Drug Administration. March 14, 2025. Accessed March 31, 2026. https://www.fda.gov/food/nutrition-food-labeling-and-critical-foods/use-healthy-claim-food-labeling
5. Generally Recognized as Safe (GRAS). Food and Drug Administration. October 3, 2024. Accessed April 2, 2026. https://www.fda.gov/food/food-ingredients-packaging/generally-recognized-safe-gras
6. Mintel GNPD: Product Database for CPG Innovation & Insight. Mintel. December 1, 2022. Accessed April 1, 2026. https://www.mintel.com/products/gnpd/
7. Aspartame and Other Sweeteners in Food. Food and Drug Administration. February 27, 2025. Accessed April 2, 2026. https://www.fda.gov/food/food-additives-petitions/aspartame-and-other-sweeteners-food
8. Sugars That Are Metabolized Differently Than Traditional Sugars. Food and Drug Administration. September 9, 2024. Accessed April 2, 2026. https://www.fda.gov/food/food-additives-petitions/sugars-are-metabolized-differently-traditional-sugars
9. Monteiro CA, Louzada ML, Steele-Martinez E, et al. Ultra-processed foods and human health: the main thesis and the evidence. *The Lancet*. 2025;406(10520):2667-2684. doi:10.1016/S0140-6736(25)01565-X
10. Marino M, Puppo F, Del Bo' C, et al. A Systematic Review of Worldwide Consumption of Ultra-Processed Foods: Findings and Criticisms. *Nutrients*. 2021;13(8):2778. doi:10.3390/nu13082778
11. Juul F, Parekh N, Martinez-Steele E, Monteiro CA, Chang VW. Ultra-processed food consumption among US adults from 2001 to 2018. *Am J Clin Nutr*. 2022;115(1):211-221. doi:10.1093/ajcn/nqab305
12. Steele EM, O'Connor LE, Juul F, et al. Identifying and Estimating Ultraprocessed Food Intake in the US NHANES According to the Nova Classification System of Food Processing. *J Nutr*. 2023;153(1):225-241. doi:10.1016/j.tjnut.2022.09.001
13. Williams AM, Ogburn DF. Ultra-processed Food Consumption in Youth and Adults: United States, August 2021–August 2023. 2025;(536).
14. Wolfson JA, Tucker AC, Leung CW, Rebholz CM, Garcia-Larsen V, Martinez-Steele E. Trends in Adults' Intake of Un-processed/Minimally Processed, and Ultra-processed foods at Home and Away from Home in the United States from 2003–2018. *J Nutr*. 2025;155(1):280-292. doi:10.1016/j.tjnut.2024.10.048
15. Dunford EK, Pries A, Calvo MS, Coyle DH. Tiny Tummies, Big Questions: Unpacking Ultra-Processed Ingredients and Additives in Complementary Foods in the United States. *Nutrients*. 2026;18(4):584. doi:10.3390/nu18040584
16. Dunford EK, Miles DR, Popkin BM. Exploring disparities in the proportion of ultra-processed foods and beverages purchased in grocery stores by US households in 2020. *Public Health Nutr*. 2025;28(1):e85. doi:10.1017/S1368980025000606
17. Baraldi LG, Martinez Steele E, Canella DS, Monteiro CA. Consumption of ultra-processed foods and associated sociodemographic factors in the USA between 2007 and 2012: evidence from a nationally representative cross-sectional study. *BMJ Open*. 2018;8(3):e020574. doi:10.1136/bmjopen-2017-020574
18. Hall KD, Ayuketah A, Brychta R, et al. Ultra-Processed Diets Cause Excess Calorie Intake and Weight Gain: An Inpatient Randomized Controlled Trial of Ad Libitum Food Intake. *Cell Metab*. 2019;30(1):1. doi:10.1016/j.cmet.2019.05.008
19. Hamano S, Sawada M, Aihara M, et al. Ultra-processed foods cause weight gain and increased energy intake associated with reduced chewing frequency: A randomized, open-label, crossover study. *Diabetes Obes Metab*. 2024;26(11):5431-5443. doi:10.1111/dom.15922
20. Dicken SJ, Jassil FC, Brown A, et al. Ultraprocessed or minimally processed diets following healthy dietary guidelines on weight and cardiometabolic health: a randomized, crossover trial. *Nat Med*. Published online August 4, 2025:1-12. doi:10.1038/s41591-025-03842-0
21. Lane MM, Gamage E, Du S, et al. Ultra-processed food exposure and adverse health outcomes: umbrella review of epidemiological meta-analyses. *BMJ*. 2024;384:e077310. doi:10.1136/bmj-2023-077310
22. Ultra-Processed Foods; Request for Information. Federal Register. July 25, 2025. Accessed March 31, 2026. https://www.federalregister.gov/documents/2025/07/25/2025-14089/ultra-processed-foods-request-for-information
23. Rogers MA, Amer H. Food as we knew it: Food processing as an evolutionary discourse. *Trends Food Sci Technol*. 2022;128:68-74. doi:10.1016/j.tifs.2022.07.015
24. van Boekel M, Fogliano V, Pellegrini N, et al. A review on the beneficial aspects of food processing. *Mol Nutr Food Res*. 2010;54(9):1215-1247. doi:10.1002/mnfr.200900608
25. Michel M, Eldridge AL, Hartmann C, Klassen P, Ingram J, Meijer GW. Benefits and challenges of food processing in the context of food systems, value chains and sustainable development goals. *Trends Food Sci Technol*. 2024;153:104703. doi:10.1016/j.tifs.2024.104703
26. Ashraf SA. Food fortification as a sustainable global strategy to mitigate micronutrient deficiencies and improve public health. *Discov Food*. 2025;5(1):201. doi:10.1007/s44187-025-00512-5
27. Wood B, Williams O, Baker P, Sacks G. Behind the 'creative destruction' of human diets: An analysis of the structure and market dynamics of the ultra-processed food manufacturing industry and implications for public health. *J Agrar Change*. 2023;23(4):811-843. doi:10.1111/joac.12545
28. Davidou S, Christodoulou A, Fardet A, Frank K. The holistico-reductionist Siga classification according to the degree of food processing: an evaluation of ultra-processed foods in French supermarkets. *Food Funct*. 2020;11(3):2026-2039. doi:10.1039/C9FO02271F
29. The Non-UPF Program—On a Mission to Reduce Intake of Ultra-Processed Foods. The Non-UPF Program. Accessed March 31, 2026. https://www.nonupfprogram.org
30. Non-UPF Verified. Non-UPF Verified. Accessed March 31, 2026. https://www.nonultraprocessed.org

31. Non-UPF Verified™ Program. WISEcode™. Accessed March 31, 2026. https://getwisecode.com/

32. Delpino FM, Figueiredo LM, Bielemann RM, et al. Ultra-processed food and risk of type 2 diabetes: a systematic review and meta-analysis of longitudinal studies. *Int J Epidemiol*. 2022;51(4):1120-1141. doi:10.1093/ije/dyab247

33. Lane MM, Davis JA, Beattie S, et al. Ultraprocessed food and chronic noncommunicable diseases: A systematic review and meta-analysis of 43 observational studies. *Obes Rev*. 2021;22(3):3. doi:10.1111/obr.13146

34. Pagliai G, Dinu M, Madarena MP, Bonaccio M, Iacoviello L, Sofi F. Consumption of ultra-processed foods and health status: a systematic review and meta-analysis. *Br J Nutr*. 2021;125(3):3. doi:10.1017/S0007114520002688

35. Moradi S, Kermani M ali H, Bagheri R, et al. Ultra-Processed Food Consumption and Adult Diabetes Risk: A Systematic Review and Dose-Response Meta-Analysis. *Nutrients*. 2021;13(12):12. doi:10.3390/nu13124410

36. Moradi S, Entezari MH, Mohammadi H, et al. Ultra-processed food consumption and adult obesity risk: a systematic review and dose-response meta-analysis. *Crit Rev Food Sci Nutr*. Published online June 30, 2021:1-12. doi:10.1080/10408398.2021.1946005

37. Jardim MZ, Costa BV de L, Pessoa MC, Duarte CK. Ultra-processed foods increase noncommunicable chronic disease risk. *Nutr Res*. 2021;95:19-34. doi:10.1016/j.nutres.2021.08.006

38. Chen X, Zhang Z, Yang H, et al. Consumption of ultra-processed foods and health outcomes: a systematic review of epidemiological studies. *Nutr J*. 2020;19(1):1. doi:10.1186/s12937-020-00604-1

39. Silva Meneguelli T, Viana Hinkelmann J, Hermsdorff HHM, Zulet MÁ, Martínez JA, Bressan J. Food consumption by degree of processing and cardiometabolic risk: a systematic review. *Int J Food Sci Nutr*. 2020;71(6):6. doi:10.1080/09637486.2020.1725961

40. Askari M, Heshmati J, Shahinfar H, Tripathi N, Daneshzad E. Ultra-processed food and the risk of overweight and obesity: a systematic review and meta-analysis of observational studies. *Int J Obes*. 2020;44(10):10. doi:10.1038/s41366-020-00650-z

41. Elizabeth L, Machado P, Zinöcker M, Baker P, Lawrence M. Ultra-Processed Foods and Health Outcomes: A Narrative Review. *Nutrients*. 2020;12(7):7. doi:10.3390/nu12071955

42. Canhada SL, Vigo Á, Giatti L, et al. Associations of Ultra-Processed Food Intake with the Incidence of Cardiometabolic and Mental Health Outcomes Go Beyond Specific Subgroups—The Brazilian Longitudinal Study of Adult Health. *Nutrients*. 2024;16(24):4291. doi:10.3390/nu16244291

43. Chen Z, Khandpur N, Desjardins C, et al. Ultra-Processed Food Consumption and Risk of Type 2 Diabetes: Three Large Prospective U.S. Cohort Studies. *Diabetes Care*. 2023;46(7):1335-1344. doi:10.2337/dc22-1993

44. Dicken SJ, Dahm CC, Ibsen DB, et al. Food consumption by degree of food processing and risk of type 2 diabetes mellitus: a prospective cohort analysis of the European Prospective Investigation into Cancer and Nutrition (EPIC). *Lancet Reg Health - Eur*. 2024;46:101043. doi:10.1016/j.lanepe.2024.101043

45. Li Y, Li X, Pan A, Koh WP. Consumption of ultra-processed foods and risk of all-cause and cause-specific mortality: the Singapore Chinese health study. *Nutr J*. 2025;24(1):146. doi:10.1186/s12937-025-01219-0

46. Mendoza K, Smith-Warner SA, Rossato SL, et al. Ultra-processed foods and cardiovascular disease: analysis of three large US prospective cohorts and a systematic review and meta-analysis of prospective cohort studies. *Lancet Reg Health – Am*. 2024;37. doi:10.1016/j.lana.2024.100859

47. Rezende LFM, Martinez-Steele E, Louzada ML da C, Levy RB, Monteiro CA. Misleading narrative of "healthy" ultraprocessed foods. *BMJ*. 2026;392(e087538). doi:10.1136/bmj-2025-087538

48. Fardet A. Minimally processed foods are more satiating and less hyperglycemic than ultra-processed foods: a preliminary study with 98 ready-to-eat foods. *Food Funct*. 2016;7(5):5. doi:10.1039/C6FO00107F

49. Fardet A, Méjean C, Labouré H, Andreeva VA, Feron G. The degree of processing of foods which are most widely consumed by the French elderly population is associated with satiety and glycemic potentials and nutrient profiles. *Food Funct*. 2017;8(2):2. doi:10.1039/C6FO01495J

50. Basile AJ, Ruiz-Tejada A, Mohr AE, Stanley S, Hjelm E, Sweazea KL. Minimally processed foods have a higher total antioxidant content compared to processed and ultra-processed foods: results from an analysis of 1946 food items. *Br J Nutr*. 2024;132(12):1555-1561. doi:10.1017/S0007114524002800

51. Leitão AE, Roschel H, Oliveira-Júnior G, et al. Association between ultra-processed food and flavonoid intakes in a nationally representative sample of the US population. *Br J Nutr*. 2024;131(6):1074-1083. doi:10.1017/S0007114523002568

52. Martini D, Godos J, Bonaccio M, Vitaglione P, Grosso G. Ultra-Processed Foods and Nutritional Dietary Profile: A Meta-Analysis of Nationally Representative Samples. *Nutrients*. 2021;13(10):10. doi:10.3390/nu13103390

53. Neri D, Steele EM, Khandpur N, et al. Ultraprocessed food consumption and dietary nutrient profiles associated with obesity: A multicountry study of children and adolescents. *Obes Rev*. 2022;23(S1):e13387. doi:10.1111/obr.13387

54. Martinez Steele E, Marrón Ponce JA, Cediel G, et al. Potential reductions in ultra-processed food consumption substantially improve population cardiometabolic-related dietary nutrient profiles in eight countries. *Nutr Metab Cardiovasc Dis*. 2022;32(12):2739-2750. doi:10.1016/j.numecd.2022.08.018

55. Martínez Steele E, Monteiro CA. Association between Dietary Share of Ultra-Processed Foods and Urinary Concentrations of Phytoestrogens in the US. *Nutrients*. 2017;9(3):209. doi:10.3390/nu9030209

56. Popkin BM, Miles DR, Taillie LS, Dunford EK. A policy approach to identifying food and beverage products that are ultra-processed and high in added salt, sugar and saturated fat in the United States: a cross-sectional analysis of packaged foods. *Lancet Reg Health – Am*. 2024;32. doi:10.1016/j.lana.2024.100713

57. Gupta S, Hawk T, Aggarwal A, Drewnowski A. Characterizing Ultra-Processed Foods by Energy Density, Nutrient Density, and Cost. *Front Nutr*. 2019;6. Accessed November 21, 2022. https://www.frontiersin.org/articles/10.3389/fnut.2019.00070

58. Kesaite V, Chavez-Ugalde Y, White M, Adams J. Overlap between ultra-processed food and food that is high in fat, salt or sugar: analysis of 11 annual waves of the UK National Diet and Nutrition Survey 2008/2009–2018/2019. *BMJ Nutr Prev Health*. Published online March 28, 2025. doi:10.1136/bmjnph-2024-001035

59. Louzada ML da C, Ricardo CZ, Steele EM, Levy RB, Cannon G, Monteiro CA. The share of ultra-processed foods determines the overall nutritional quality of diets in Brazil. *Public Health Nutr*. 2018;21(1):94-102. doi:10.1017/S1368980017001434

60. Steen JP, Klatt KC, Chang Y, et al. Effect of Interventions Aimed at Reducing or Modifying Saturated Fat Intake on Cholesterol, Mortality, and Major Cardiovascular Events: A Risk Stratified Systematic Review of Randomized Trials. *Ann Intern Med*. 2026;179(2):242-255.

61. Astrup A, Magkos F, Bier DM, et al. Saturated Fats and Health: A Reassessment and Proposal for Food-Based Recommendations. *JACC*. 2020;76(7):844-857. doi:10.1016/j.jacc.2020.05.077

62. Wan Y, Tobias DK, Dennis KK, et al. Association between changes in carbohydrate intake and long term weight changes: prospective cohort study. *BMJ*. 2023;382(e073939). doi:10.1136/bmj-2022-073939

63. Oettlé GJ, Emmett PM, Heaton KW. Glucose and insulin responses to manufactured and whole-food snacks. *Am J Clin Nutr*. 1987;45(1):86-91. doi:10.1093/ajcn/45.1.86

64. Zhao Y, Dang X, Du H, et al. Understanding the Impact of Extrusion Treatment on Cereals: Insights from Alterations in Starch Physicochemical Properties and In Vitro Digestion Kinetics. *Animals*. 2024;14(21):3144. doi:10.3390/ani14213144

65. Sutton CA, Stratton M, L'Insalata AM, Fazzino TL. Ultraprocessed, hyper-palatable, and high energy density foods: Prevalence and distinction across 30 years in the United States. *Obesity*. 2024;32(1):166-175. doi:10.1002/oby.23897

66. Dicken SJ, Brown A. Is energy density an implicit part of the purpose behind ultra-processed food? A comparison of relative energy density across ultra-processed and minimally processed food. *medRxiv*. Preprint posted online October 22, 2025:2025.10.21.25338444. doi:10.1101/2025.10.21.25338444

67. Poti JM, Mendez MA, Ng SW, Popkin BM. Is the degree of food processing and convenience linked with the nutritional quality of foods purchased by US households? *Am J Clin Nutr*. 2015;101(6):1251-1262. doi:10.3945/ajcn.114.100925

68. Shim JS, Shim SY, Cha HJ, Kim J, Kim HC. Association between Ultra-processed Food Consumption and Dietary Intake and Diet Quality in Korean Adults. *J Acad Nutr Diet*. 2022;122(3):583-594. doi:10.1016/j.jand.2021.07.012

69. Forde CG, Mars M, de Graaf K. Ultra-Processing or Oral Processing? A Role for Energy Density and Eating Rate in Moderating Energy Intake from Processed Foods. *Curr Dev Nutr*. 2020;4(3).

70. Gearhardt AN, DiFeliceantonio AG. Highly processed foods can be considered addictive substances based on established scientific criteria. *Addiction*. 2023;118(4):589-598. doi:10.1111/add.16065

71. Schulte EM, Avena NM, Gearhardt AN. Which Foods May Be Addictive? The Roles of Processing, Fat Content, and Glycemic Load. *PLOS ONE*. 2015;10(2):e0117959. doi:10.1371/journal.pone.0117959

72. Schulte EM, Smeal JK, Gearhardt AN. Foods are differentially associated with subjective effect report questions of abuse liability. *PLOS ONE*. 2017;12(8):e0184220. doi:10.1371/journal.pone.0184220

73. Rose JE, Salley A, Behm FM, Bates JE, Westman EC. Reinforcing effects of nicotine and non-nicotine components of cigarette smoke. *Psychopharmacology (Berl)*. 2010;210(1):1-12. doi:10.1007/s00213-010-1810-2

74. Zinöcker MK, Lindseth IA. The Western Diet–Microbiome-Host Interaction and Its Role in Metabolic Disease. *Nutrients*. 2018;10(3):3. doi:10.3390/nu10030365

75. Suez J, Cohen Y, Valdés-Mas R, et al. Personalized microbiome-driven effects of non-nutritive sweeteners on human glucose tolerance. *Cell*. 2022;185(18):18. doi:10.1016/j.cell.2022.07.016

76. Trakman GL, Fehily S, Basnayake C, et al. Diet and gut microbiome in gastrointestinal disease. *J Gastroenterol Hepatol*. 2022;37(2):2. doi:10.1111/jgh.15728

77. Brichacek AL, Florkowski M, Abiona E, Frank KM. Ultra-Processed Foods: A Narrative Review of the Impact on the Human Gut Microbiome and Variations in Classification Methods. *Nutrients*. 2024;16(11):1738. doi:10.3390/nu16111738

78. Armstrong TS, Chappell KD, Ajibulu L, Wong K. Dietary biomarkers of ultra-processed foods: A narrative review. *Clin Nutr Open Sci*. 2025;62:156-163. doi:10.1016/j.nutos.2025.06.001

79. Bancil AS, Sandall AM, Rossi M, Chassaing B, Lindsay JO, Whelan K. Food Additive Emulsifiers and Their Impact on Gut Microbiome, Permeability, and Inflammation: Mechanistic Insights in Inflammatory Bowel Disease. *J Crohns Colitis*. 2021;15(6):6. doi:10.1093/ecco-jcc/jjaa254

80. Sellem L, Srour B, Javaux G, et al. Food additive emulsifiers and cancer risk: Results from the French prospective NutriNet-Santé cohort. *PLOS Med*. 2024;21(2):e1004338. doi:10.1371/journal.pmed.1004338

81. Sellem L, Srour B, Javaux G, et al. Food additive emulsifiers and risk of cardiovascular disease in the NutriNet-Santé cohort: prospective cohort study. *BMJ*. 2023;382. doi:10.1136/bmj-2023-076058

82. Srour B, Kordahi MC, Bonazzi E, Deschasaux-Tanguy M, Touvier M, Chassaing B. Ultra-processed foods and human health: from epidemiological evidence to mechanistic insights. *Lancet Gastroenterol Hepatol*. 2022;7(12):12. doi:10.1016/S2468-1253(22)00169-8

83. Touvier M, Louzada ML da C, Mozaffarian D, Baker P, Juul F, Srour B. Ultra-processed foods and cardiometabolic health: public health policies to reduce consumption cannot wait. *BMJ*. 2023;383. doi:10.1136/bmj-2023-075294

84. Cai C, Song Z, Xu X, et al. The neurotoxicity of acrylamide in ultra-processed foods: interventions of polysaccharides through the microbiota–gut–brain axis. *Food Funct*. 2025;16(1):10-23. doi:10.1039/D4FO03002H

85. Rigo D, Gurak PD, de Melo DW, et al. Acrylamide levels and health risk assessment from consumption of ultra-processed wheat flour-based products: A Brazilian perspective. *J Food Compos Anal*. 2025;145:107819. doi:10.1016/j.jfca.2025.107819

86. Martínez Steele E, Buckley JP, Monteiro CA. Ultra-processed food consumption and exposure to acrylamide in a nationally representative sample of the US population aged 6 years and older. *Prev Med*. 2023;174:107598. doi:10.1016/j.ypmed.2023.107598

87. Buckley JP, Kim H, Wong E, Rebholz CM. Ultra-processed food consumption and exposure to phthalates and bisphenols in the US National Health and Nutrition Examination Survey, 2013–2014. *Environ Int*. 2019;131:105057. doi:10.1016/j.envint.2019.105057

88. Martínez-Steele E, Khandpur N, Louzada ML da C, Monteiro CA. Association between dietary contribution of ultra-processed foods and urinary concentrations of phthalates and bisphenol in a nationally representative sample of the US population aged 6 years and older. *PLOS ONE*. 2020;15(7):e0236738. doi:10.1371/journal.pone.0236738

89. Yates J, Kadiyala S, Deeney M, et al. A toxic relationship: ultra-processed foods & plastics. *Glob Health*. 2024;20(1):74. doi:10.1186/s12992-024-01078-0

90. WIC Food Packages - Regulatory Requirements for WIC-Eligible Foods. Food and Nutrition Service, U.S. Departments of Agriculture. Accessed March 31, 2026. https://www.fns.usda.gov/wic/food-packages/regulatory-requirements

91. Pomeranz JL, Cash SB, Mozaffarian D. US Policies That Define Foods for Junk Food Taxes, 1991-2021. *Milbank Q*. 2023;101(2):560-600. doi:10.1111/1468-0009.12652

92. Dicken SJ, Batterham RL. The Role of Diet Quality in Mediating the Association between Ultra-Processed Food Intake, Obesity and Health-Related Outcomes: A Review of Prospective Cohort Studies. *Nutrients*. 2022;14(1):1. doi:10.3390/nu14010023

93. Bonaccio M, Castelnuovo AD, Ruggiero E, et al. Joint association of food nutritional profile by Nutri-Score front-of-pack label and ultra-processed food intake with mortality: Moli-sani prospective cohort study. *BMJ*. 2022;378:e070688. doi:10.1136/bmj-2022-070688

94. Chen X, Chu J, Hu W, et al. Associations of ultra-processed food consumption with cardiovascular disease and all-cause mortality: UK Biobank. *Eur J Public Health*. 2022;32(5):5. doi:10.1093/eurpub/ckac104

95. Du S, Kim H, Crews DC, White K, Rebholz CM. Association Between Ultraprocessed Food Consumption and Risk of Incident CKD: A Prospective Cohort Study. *Am J Kidney Dis*. 2022;80(5):5. doi:10.1053/j.ajkd.2022.03.016

96. Wang L, Du M, Wang K, et al. Association of ultra-processed food consumption with colorectal cancer risk among men and women: results from three prospective US cohort studies. *BMJ*. 2022;378:e068921. doi:10.1136/bmj-2021-068921

97. Samuthpongtorn C, Nguyen LH, Okereke OI, et al. Consumption of Ultraprocessed Food and Risk of Depression. *JAMA Netw Open*. 2023;6(9):e2334770. doi:10.1001/jamanetworkopen.2023.34770

98. Li YD, Fu YX, Gong LL, et al. Ultra-processed food consumption and renal cell carcinoma incidence and mortality: results from a large prospective cohort. *BMC Med*. 2024;22:459. doi:10.1186/s12916-024-03677-5

99. Wang J, Chen T, Zhu W, et al. Ultra-processed food, genetic risk, and the risk of cardiometabolic diseases and cardiometabolic multimorbidity: A prospective study. *Nutr Metab Cardiovasc Dis*. 2024;34(12):2799-2806. doi:10.1016/j.numecd.2024.09.011

100. Weinstein G, Kojis D, Banerjee A, Seshadri S, Walker M, Beiser AS. Ultra-processed food consumption and risk of dementia and Alzheimer's disease: The Framingham Heart Study. *J Prev Alzheimers Dis*. 2025;12(2):100042. doi:10.1016/j.tjpad.2024.100042

101. Wang L, Steele EM, Du M, et al. Association Between Ultra-processed Food Consumption and Mortality Among US Adults: Prospective Cohort Study of the National Health and Nutrition Examination Survey, 2003-2018. *J Acad Nutr Diet*. 2025;125(7):875-887.e7. doi:10.1016/j.jand.2024.11.014

102. Hatta-Langedyk J, Wang L, Fan B, Shi P, Mozaffarian D. Ultra-Processed Food vs. Diet Quality in Relation to Cardiometabolic Health and All-Cause Mortality: NHANES 1999-2018. *Am J Public Health*. Published online In press.

103. World Health Organization. *Use of Non-Sugar Sweeteners: WHO Guideline*. World Health Organization; 2023.

104. Lott M, Reed L, Deuman K, Story M, Cradock A, Patel AI. *Healthy Beverage Consumption in School-Age Children and Adolescents: Recommendations from Key National Health and Nutrition Organizations. Consensus Statement*. Healthy Eating Research; 2025.

105. Bian X, Chi L, Gao B, Tu P, Ru H, Lu K. Gut Microbiome Response to Sucralose and Its Potential Role in Inducing Liver Inflammation in Mice. *Front Physiol*. 2017;8. doi:10.3389/fphys.2017.00487

106. Dalenberg JR, Patel BP, Denis R, et al. Short-Term Consumption of Sucralose with, but Not without, Carbohydrate Impairs Neural and Metabolic Sensitivity to Sugar in Humans. *Cell Metab*. 2020;31(3):493-502.e7. doi:10.1016/j.cmet.2020.01.014

107. Romo-Romo A, Aguilar-Salinas CA, Brito-Córdova GX, Gómez-Díaz RA, Almeda-Valdes P. Sucralose decreases insulin sensitivity in healthy subjects: a randomized controlled trial. *Am J Clin Nutr*. 2018;108(3):485-491. doi:10.1093/ajcn/nqy152

108. Rios-Leyvraz M, Montez J. *Health Effects of the Use of Non-Sugar Sweeteners: A Systematic Review and Meta-Analysis*. 1st ed. World Health Organization; 2022.

109. Chen Z, Wei C, Lamballais S, et al. Artificially sweetened beverage consumption and all-cause and cause-specific mortality: an updated systematic review and dose-response meta-analysis of prospective cohort studies. *Nutr J*. 2024;23(1):86. doi:10.1186/s12937-024-00985-7

110. Qin P, Li Q, Zhao Y, et al. Sugar and artificially sweetened beverages and risk of obesity, type 2 diabetes mellitus, hypertension, and all-cause mortality: a dose–response meta-analysis of prospective cohort studies. *Eur J Epidemiol*. 2020;35(7):655-671. doi:10.1007/s10654-020-00655-y

111. Queiroz I, Defante MLR, Tavares A, et al. High consumption of artificially sweetened beverages and associated risk of cardiovascular events: A systematic review and meta-analysis. *Curr Probl Cardiol*. 2025;50(1):102837. doi:10.1016/j.cpcardiol.2024.102837

112. McKeon GP, Hallman WK. Front-of-Package Protein Labels on Cereal Create Health Halos. *Foods*. 2024;13(8):8. doi:10.3390/foods13081139

113. Verrill L, Wood D, Cates S, Lando A, Zhang Y. Vitamin-Fortified Snack Food May Lead Consumers to Make Poor Dietary Decisions. *J Acad Nutr Diet*. 2017;117(3):376-385. doi:10.1016/j.jand.2016.10.008

114. Martinez Steele E, Khandpur N, Batis C, et al. Best practices for applying the Nova food classification system. *Nat Food*. Published online June 2, 2023. doi:10.1038/s43016-023-00779-w

115. *U.S.C. Title 21 - FOOD AND DRUGS*. Accessed April 1, 2026. https://www.govinfo.gov/content/pkg/USCODE-2015-title21/html/USCODE-2015-title21-chap9-subchapV-partB-sec360ee.htm

116. Food Search. U.S. Department of Agriculture. Accessed April 1, 2026. https://fdc.nal.usda.gov/food-search?type=Branded

117. Streamlined Sales Tax Governing Board. Streamlined Sales Tax Governing Board. Accessed April 1, 2026. https://www.streamlinedsalestax.org

118. Food and Agriculture Organization of the United Nations, World Health Organization. *Codex Alimentarius Commission Procedural Manual*. 2025. doi:10.4060/cd7978en

119. Gitz E, Orlan E, Patiño Rincon Gallardo S, Schoj V. *Nutrient Profile Models: A Valuable Tool for Developing Healthy Food Policies*. Global Health Advocacy Incubator; 2024. https://assets.advocacyincubator.org/uploads/2024/NPM_Position_Paper.pdf?_gl=1*1cgrhna*_gcl_au*ODEzNzc3NTQ4LjE3NzUwNzQ5NDA.

120. Grilo MF, Nunes BS, Duran AC, et al. Applying the Nova food classification to food product databases using discriminative ingredients: a methodological proposal. *Front Public Health*. 2025;13. doi:10.3389/fpubh.2025.1575136

121. Zancheta Ricardo C, Duran AC, Grilo MF, et al. Impact of the use of food ingredients and additives on the estimation of ultra-processed foods and beverages. *Front Nutr*. 2023;9. doi:10.3389/fnut.2022.1046463

122. Additives. Food Standards Australia New Zealand. Accessed April 1, 2026. https://www.foodstandards.gov.au/consumer/additives/additiveoverview

123. Food additives. Food Standards Agency. Accessed April 1, 2026. https://www.food.gov.uk/safety-hygiene/food-additives

124. hvraven. Digestives Dark chocolate - Ingredients. Open Food Facts. Accessed April 1, 2026. https://uk.openfoodfacts.org

125. Code of Federal Regulations. *21 CFR 101.4 - Food; Designation of Ingredients*. Accessed April 1, 2026. https://www.ecfr.gov/current/title-21/part-101/section-101.4

126. U.S. Department of Agriculture, Agricultural Research Service. Global Branded Food Products Database Documentation. Accessed April 1, 2026. https://fdc.nal.usda.gov/GBFPD_Documentation#bkmk-2

127. Center for Science in the Public Interest. *CA Food Chemical Safety & Transparency: Legislative Outline*. 2025. https://www.cspi.org/sites/default/files/2026-02/CSPI%20CA%20Food%20Chemical%20Safety%20%26%20Transparency%20Bill%20Outline_0.pdf

128. *Food Additives Amendment of 1958*. 1958. https://www.govinfo.gov/content/pkg/STATUTE-72/pdf/STATUTE-72-Pg1784.pdf#page=5

129. GRAS loophole: How do new substances enter the food supply? Center for Science in the Public Interest. Accessed April 1, 2026. https://www.cspi.org/GRAS-loophole

130. Food and Drug Administration. Ultra-Processed Foods; Request for Information. Federal Register. July 25, 2025. Accessed January 28, 2026. https://www.federalregister.gov/documents/2025/07/25/2025-14089/ultra-processed-foods-request-for-information

131. NYC Health. *Meals and Snacks Purchased and Served*. https://www.nyc.gov/assets/doh/downloads/pdf/cardio/cardio-meals-snacks-standards.pdf

132. Scrinis G, Popkin B, Corvalan C, et al. Policies to halt and reverse the rise in ultra-processed food production, marketing, and consumption. *The Lancet*. 2025;(In press).

133. Mozaffarian D. Regulatory Policy to Address Ultraprocessed Foods. *N Engl J Med*. 2025;392(24):2393-2396. doi:10.1056/NEJMp2503241

134. Pomeranz JL, Mande JR, Mozaffarian D. U.S. Policies Addressing Ultraprocessed Foods, 1980–2022. *Am J Prev Med*. 2023;65(6):1134-1141. doi:10.1016/j.amepre.2023.07.006

135. Global Food Research Program UNC. *Sugary Drink Taxes around the World*. 2026. https://www.globalfoodresearchprogram.org/wp-content/uploads/2026/03/GFRP-UNC_Tax_maps_drinks_2026-March.pdf

136. The World Bank. World Bank Global SSB Tax Database. Accessed April 1, 2026. https://ssbtax.worldbank.org/

137. Andreyeva T, Marple K, Marinello S, Moore TE, Powell LM. Outcomes Following Taxation of Sugar-Sweetened Beverages: A Systematic Review and Meta-analysis. *JAMA Netw Open*. 2022;5(6):e2215276. doi:10.1001/jamanetworkopen.2022.15276

138. Shen J, Wang J, Yang F, An R. Impact of soda tax on beverage price, sale, purchase, and consumption in the US: a systematic review and meta-analysis of natural experiments. *Front Public Health*. 2023;11. doi:10.3389/fpubh.2023.1126569

139. Krieger J, Magee K, Hennings T, Schoof J, Madsen KA. How sugar-sweetened beverage tax revenues are being used in the United States. *Prev Med Rep*. 2021;23:101388. doi:10.1016/j.pmedr.2021.101388

140. Jones-Smith JC, Knox MA, Coe NB, et al. Sweetened beverage taxes: Economic benefits and costs according to household income. *Food Policy*. 2022;110:102277. doi:10.1016/j.foodpol.2022.102277

141. Overview of the Federal Procurement Process and Resources. Congress.gov. Accessed April 1, 2026. https://www.congress.gov/crs-product/RS22536

142. Office of Federal Procurement Policy. The White House. Accessed April 1, 2026. https://obamawhitehouse.archives.gov/node/14988

143. U.S. Department of Agriculture, Food and Nutrition Service. USDA Child Nutrition Programs Procurement Regulations. Accessed April 1, 2026. https://www.fns.usda.gov/f2s/usda-procurement-regulations

144. U.S. Department of Agriculture, Food and Nutrition Service. Final Rule: Geographic Preference Option for the Procurement of Unprocessed Agricultural Products in Child Nutrition Programs. Accessed April 1, 2026. https://www.fns.usda.gov/cn/fr-042211

145. Good Food Values. Center for Good Food Purchasing. Accessed April 1, 2026. https://goodfoodpurchasing.org/good-food-values/

146. U.S. Department of Agriculture. Food Distribution Programs. Accessed April 1, 2026. https://www.nutrition.gov/topics/food-security-and-access/food-assistance-programs/food-distribution-programs

147. Gombi Vaca MF, Lyerly R, Cohen JFW, Schwartz M. *Ultra-Processed Foods in School Meals: Challenges and Opportunities*. Healthy Eating Research; 2025. https://healthyeatingresearch.org/wp-content/uploads/2025/12/HER_UPF-Brief-1.pdf

148. Vilela PR. Brazil limits ultra-processed foods in school meals to 15%. Agência Brasil. February 5, 2025. Accessed April 1, 2026. https://agenciabrasil.ebc.com.br/en/politica/noticia/2025-02/brazil-limits-ultra-processed-foods-school-meals-15

149. Piekarz-Porter E, Leider J, Turner L, Chriqui JF. District Wellness Policy Nutrition Standards Are Associated with Healthier District Food Procurement Practices in the United States. *Nutrients*. 2020;12(11):3417. doi:10.3390/nu12113417

150. Robles C, Mirosevic V. *Social Protection Systems in Latin America and the Caribbean: Brazil*. UN-ECLAC; 2013:60.

151. Cohen J, Chapman L, Gombi-Vaca M, et al. *Current State of Processed Foods in Schools*. Nourish Lab; 2025. https://www.childnourishlab.org/_files/ugd/383bcd_0a42f43b97f84f26860a980a284e5d91.pdf

152. Kinderknecht K, Harris C, Jones-Smith J. Association of the Healthy, Hunger-Free Kids Act With Dietary Quality Among Children in the US National School Lunch Program. *JAMA*. 2020;324(4):359-368. doi:10.1001/jama.2020.9517

153. Johnson DB, Podrabsky M, Rocha A, Otten JJ. Effect of the Healthy Hunger-Free Kids Act on the Nutritional Quality of Meals Selected by Students and School Lunch Participation Rates. *JAMA Pediatr*. 2016;170(1):e153918. doi:10.1001/jamapediatrics.2015.3918

154. Cradock AL, McHugh A, Mont-Ferguson H, et al. Effect of School District Policy Change on Consumption of Sugar-Sweetened Beverages Among High School Students, Boston, Massachusetts, 2004-2006. *Prev Chronic Dis*. 2011;8(4):A74.

155. Nutrition Standards for CACFP Meals and Snacks. Accessed March 5, 2026. https://www.fns.usda.gov/cacfp/nutrition-standards

156. On a Mission to Feed Children and Adults in Care. National CACFP Association. May 29, 2024. Accessed March 5, 2026. https://www.cacfp.org/2024/05/29/on-a-mission-to-feed-children-and-adults-in-care/

157. Code of Federal Regulations. *7 CFR 226.20 - Requirements for Meals.* Accessed April 1, 2026. https://www.ecfr.gov/current/title-7/part-226/section-226.20

158. Forrestal S, Boyle M, Franckle R, et al. *Study of Nutrition and Activity in Child Care Settings II (SNACS II)*. U.S. Department of Agriculture, Food and Nutrition Service, Office of Policy Support; 2025. Accessed March 5, 2026. https://www.fns.usda.gov/research/cacfp/snacs2?utm_source=chatgpt.com

159. Center for Disease Control. Food Service Guidelines for Federal Facilities. July 24, 2024. Accessed April 1, 2026. https://www.cdc.gov/nutrition/php/food-service-guidelines/food-service-guidelines-federal-facilities.html

160. The Center for Good Food Purchasing. Accessed April 1, 2026. https://goodfoodpurchasing.org/

161. Robles B, Wood M, Kimmons J, Kuo T. Comparison of Nutrition Standards and Other Recommended Procurement Practices for Improving Institutional Food Offerings in Los Angeles County, 2010–2012. *Adv Nutr*. 2013;4(2):191-202. doi:10.3945/an.112.003285

162. Center for Science in the Public Interest. Government food purchasing and service: Model policies and examples. June 2024. Accessed April 1, 2026. https://www.cspi.org/resource/government-food-purchasing-and-service-model-policies-and-examples

163. Wood M. Integrating Healthy Nutrition Standards and Practices Into Food Service Contracting in a Large US County Government. *Prev Chronic Dis*. 2024;21. doi:10.5888/pcd21.230220

164. Cole RE, Bukhari AS, Champagne CM, McGraw SM, Hatch AM, Montain SJ. Performance Nutrition Dining Facility Intervention Improves Special Operations Soldiers' Diet Quality and Meal Satisfaction. *J Nutr Educ Behav*. 2018;50(10):993-1004. doi:10.1016/j.jneb.2018.06.011

165. Kirkpatrick KM, Abourjeily ZN, Rittenhouse MA, Purcell MW, McCarthy RG, Scott JM. Increasing Access and Availability of Nutrient-Dense Foods at United States Marine Corps Food Venues Is Feasible and Profitable. *Nutrients*. 2025;17(15):2556. doi:10.3390/nu17152556

166. Lopez NV, Spilkin A, Brauer J, et al. Nutritional adequacy of meals and commissary items provided to individuals incarcerated in a southwest, rural county jail in the United States. *BMC Nutr*. 2022;8(1):96. doi:10.1186/s40795-022-00593-w

167. Moran A. An Intervention to Increase Availability of Healthy Foods and Beverages in New York City Hospitals: The Healthy Hospital Food Initiative, 2010–2014. *Prev Chronic Dis*. 2016;13. doi:10.5888/pcd13.150541

168. Sato P de M, Leite FHM, Khandpur N, Martins APB, Mais LA. "I Like the One With Minions": The Influence of Marketing on Packages of Ultra-Processed Snacks on Children's Food Choices. *Front Nutr*. 2022;9. doi:10.3389/fnut.2022.920225

169. Baker P, Slater S, White M, et al. Towards unified global action on ultra-processed foods: understanding commercial determinants, countering corporate power, and mobilising a public health response. *The Lancet*. 2025;406(10520):2703-2726. doi:10.1016/S0140-6736(25)01567-3

170. Palmedo PC, Dorfman L, Garza S, Murphy E, Freudenberg N. Countermarketing Alcohol and Unhealthy Food: An Effective Strategy for Preventing Noncommunicable Diseases? Lessons from Tobacco. *Annu Rev Public Health*. 2017;38(Volume 38, 2017):119-144. doi:10.1146/annurev-publhealth-031816-044303

171. Siegel M, Biener L. Evaluating the Impact of Statewide Anti-Tobacco Campaigns: The Massachusetts and California Tobacco Control Programs. *J Soc Issues*. 1997;53(1):147-168. doi:10.1111/j.1540-4560.1997.tb02436.x

172. Farrelly MC, Davis KC, Haviland ML, Messeri P, Healton CG. Evidence of a Dose—Response Relationship Between "truth" Antismoking Ads and Youth Smoking Prevalence. *Am J Public Health*. 2005;95(3):425-431. doi:10.2105/AJPH.2004.049692

173. Krieger J, Kwon T, Ruiz R, Walkinshaw LP, Yan J, Roberto CA. Countermarketing About Fruit Drinks, Alone or With Water Promotion: A 2019 Randomized Controlled Trial in Latinx Parents. *Am J Public Health*. 2021;111(11):1997-2007. doi:10.2105/AJPH.2021.306488

174. McGurk MD, Ogawa G, Inoue K, et al. Sweet Lies! Lessons Learned from Hawai'i's Sweetened Fruit Drink Countermarketing Campaign. *J Health Commun*. 2025;30(sup1):14-27. doi:10.1080/10810730.2025.2461588

175. Schillinger D, Huey N. Messengers of Truth and Health—Young Artists of Color Raise Their Voices to Prevent Diabetes. *JAMA*. 2018;319(11):1076-1078. doi:10.1001/jama.2018.0986

176. Rogers EA, Fine S, Handley MA, Davis H, Kass J, Schillinger D. Development and Early Implementation of The Bigger Picture, a Youth-Targeted Public Health Literacy Campaign to Prevent Type 2 Diabetes. *J Health Commun*. 2014;19(sup2):144-160. doi:10.1080/10810730.2014.940476

177. Department of Health and Human Services, U.S. Department of Agriculture. The Scientific Foundation for the Dietary Guidelines for Americans, 2025–2030.

178. Helping Kids Build Healthy Active Lives: AAP Policy Explained. HealthyChildren.org. January 13, 2026. Accessed April 1, 2026. https://www.healthychildren.org/English/health-issues/conditions/obesity/Pages/obesity-prevention-aap-policy-explained.aspx

179. Vadiveloo MK, Gardner CD, Bleich SN, et al. Ultraprocessed Foods and Their Association With Cardiometabolic Health: Evidence, Gaps, and Opportunities: A Science Advisory From the American Heart Association. *Circulation*. 2025;152(12):e245-e263. doi:10.1161/CIR.0000000000001365

180. Shams-White MM, Pannucci TE, Lerman JL, et al. Healthy Eating Index-2020: Review and Update Process to Reflect the Dietary Guidelines for Americans, 2020-2025. *J Acad Nutr Diet*. 2023;123(9):1280-1288. doi:10.1016/j.jand.2023.05.015

181. McCausland HC, Nasser JA, LaFata EM. A narrative review of public and expert perceptions of ultra-processed foods: Knowledge, opinions, and educational directions. *Appetite*. 2026;216:108273. doi:10.1016/j.appet.2025.108273

182. Aguirre A, Borneo MT, El Khori S, Borneo R. Exploring the understanding of the term "ultra-processed foods" by young consumers. *Food Res Int*. 2019;115:535-540. doi:10.1016/j.foodres.2018.09.059

183. Ares G, Vidal L, Allegue G, et al. Consumers' conceptualization of ultra-processed foods. *Appetite*. 2016;105:611-617. doi:10.1016/j.appet.2016.06.028

184. Menegassi B, Scagliusi FB, Nardocci M, Moubarac JC. Knowledge of the NOVA food classification in a sample of Brazilian adults. *Rev Chil Nutr*. 2020;47(6):6. doi:10.4067/S0717-75182020000600950

185. Robinson E, Cummings JR, Gough T, Jones A, Evans R. Consumer Awareness, Perceptions and Avoidance of Ultra-Processed Foods: A Study of UK Adults in 2024. *Foods*. 2024;13(15):2317. doi:10.3390/foods13152317

186. Roberto CA, Ng SW, Ganderats-Fuentes M, et al. The Influence of Front-of-Package Nutrition Labeling on Consumer Behavior and Product Reformulation. *Annu Rev Nutr*. 2021;41(1):1. doi:10.1146/annurev-nutr-111120-094932

187. Global Food Research Program UNC. *Front-of-Package Labeling Map*. 2025. https://www.globalfoodresearchprogram.org/wp-content/uploads/2022/02/FOP_Regs_maps_2022_02.pdf

188. D'Angelo Campos A, Ng SW, McNeel K, Hall MG. How Promising Are "Ultraprocessed" Front-of-Package Labels? A Formative Study with US Adults. *Nutrients*. 2024;16(7):7. doi:10.3390/nu16071072

189. D'Angelo Campos A, Ng SW, Duran AC, et al. "Warning: ultra-processed": an online experiment examining the impact of ultra-processed warning labels on consumers' product perceptions and behavioral intentions. *Int J Behav Nutr Phys Act*. 2024;21(1):1. doi:10.1186/s12966-024-01664-w

190. Gomez P. The Role of Processing-Related Labels in Consumer Identification and Choice of Ultra-Processed Foods. *J Consum Policy*. 2025;48(4):421-444. doi:10.1007/s10603-025-09595-0

191. Srour B, Hercberg S, Galan P, et al. Effect of a new graphically modified Nutri-Score on the objective understanding of foods' nutrient profile and ultraprocessing: a randomised controlled trial. *BMJ Nutr Prev Health*. 2023;6(1). doi:10.1136/bmjnph-2022-000599

192. Sarda B, Kesse-Guyot E, Deschamps V, et al. Complementarity between the updated version of the front-of-pack nutrition label Nutri-Score and the food-processing NOVA classification. *Public Health Nutr*. Published online February 1, 2024:1-24. doi:10.1017/S1368980024000296

193. Glanz K, Bader MDM, Iyer S. Retail Grocery Store Marketing Strategies and Obesity: An Integrative Review. *Am J Prev Med*. 2012;42(5):503-512. doi:10.1016/j.amepre.2012.01.013

194. Karpyn A, McCallops K, Wolgast H, Glanz K. Improving Consumption and Purchases of Healthier Foods in Retail Environments: A Systematic Review. *Int J Environ Res Public Health*. 2020;17(20):7524. doi:10.3390/ijerph17207524

195. Falbe J, Marinello S, Wolf EC, et al. Food and Beverage Environments at Store Checkouts in California: Mostly Unhealthy Products. *Curr Dev Nutr*. 2023;7(6):100075. doi:10.1016/j.cdnut.2023.100075

196. City of Berkeley. *Berkeley Healthy Checkout: Informational Packet*. 2024. https://berkeleyca.gov/sites/default/files/legislative-body-meeting-attachments/2024-07-29%20ITEM%2004%20HEALTHY%20CHECKOUT%20SUPPLEMENTAL%20MATERIAL.pdf

197. City of Perris. *ORDINANCE NUMBER 1423*. 2023. https://mcclibraryfunctions-stage.azurewebsites.us/api/ordinanceDownload/16553/1205784/pdf

198. Contra Costa County Board of Supervisors. *ORDINANCE REQUIRING LARGE RETAIL STORES TO STOCK HEALTHY FOOD AND BEVERAGES IN CHECKOUT AREA*. https://mcclibraryfunctions.azurewebsites.us/api/ordinanceDownload/16286/1382577/pdf?forceDownload=true#:~:text=A%20large%20retail%20store%2C%20at,of%20sodium%20per%20labeled%20serving.

199. Falbe J, Marinello S, Wolf EC, Solar S, Powell LM. Food Environment After Implementation of a Healthy Checkout Policy. *JAMA Netw Open*. 2024;7(8):e2421731. doi:10.1001/jamanetworkopen.2024.21731

200. Jenneson VL, Kininmonth AR, Wilkins EL, et al. Did High in Fat, Sugar, and Salt (HFSS) product placement legislation in England lead to reduced HFSS purchases? An interrupted time series analysis. *OSF Preprints*. Preprint posted online 2025. osf.io/j6b8p_v1

201. Center for Science in the Public Interest. Healthy retail. December 2025. Accessed April 1, 2026. https://www.cspi.org/advocacy/nutrition/healthy-retail

202. *Food Is Medicine Fact Sheet*. Tufts University Food Is Medicine Institute; 2025. https://tuftsfoodismedicine.org/wp-content/uploads/2025/03/Food-is-Medicine-Fact-Sheet-2025.pdf

203. Schwartz CM, Wohrman AM, Holubowich EJ, Sanders LD, Volpp KG. What Is 'Food Is Medicine,' Really? Policy Considerations On The Road To Health Care Coverage. *Health Aff (Millwood)*. 2025;44(4):406-412. doi:10.1377/hlthaff.2024.01343

204. Hanson E, Raza S, Garfield K, et al. *Food Is Medicine: A State Medicaid Policy Toolkit*. Center for Health Law and Policy Innovation and Food is Medicine Coalition. https://fimcoalition.org/wp-content/uploads/2024/07/Food-is-Medicine-A-State-Medicaid-Policy-Toolkit_Final-July-2024-1.pdf

205. Medicaid Waiver Tracker: Approved and Pending Section 1115 Waivers by State. KFF. March 9, 2026. Accessed April 1, 2026. https://www.kff.org/medicaid/medicaid-waiver-tracker-approved-and-pending-section-1115-waivers-by-state/

206. *Medically Tailored Meal Nutrition Standards: Medical Tailoring Following the FIMC Clinical Committee Guidelines*. Food is Medicine Coalition; 2023. https://fimcoalition.org/wp-content/uploads/2025/09/Food-is-Medicine-Coalition-Medically-Tailored-Meal-Nutrition-Standards.pdf

207. California Department of Health Care Services. *Community Supports: Select Service Definition Updates*. 2025. https://www.dhcs.ca.gov/Documents/MCQMD/Community-Supports-February-2025-Service-Definition-Updates.pdf

208. Michigan Department of Health and Human Services. Michigan's Comprehensive Health Care Program In Lieu of Services Policy Guide. Published online 2026. https://www.michigan.gov/mdhhs/-/media/Project/Websites/mdhhs/MI-Healthy-Life/202410-Michigans-Comprehensive-Health-Care-Program-In-Lieu-of-Services-Policy-Guide.pdf?rev=e9e4d91898424dc7a2d6d260079a6045&hash=9FA3E69508285105DE32FC424692D56D

209. Seligman HK, Angell SY, Berkowitz SA, et al. A Systematic Review of "Food Is Medicine" Randomized Controlled Trials for Noncommunicable Disease in the United States: A Scientific Statement From the American Heart Association. *Circulation*. 152.4(32-46). doi:10.1161/CIR.0000000000001343

210. Micha R, Peñalvo JL, Cudhea F, Imamura F, Rehm CD, Mozaffarian D. Association Between Dietary Factors and Mortality From Heart Disease, Stroke, and Type 2 Diabetes in the United States. *JAMA*. 2017;317(9):9. doi:10.1001/jama.2017.0947

211. Jardim TV, Mozaffarian D, Abrahams-Gessel S, et al. Cardiometabolic disease costs associated with suboptimal diet in the United States: A cost analysis based on a microsimulation model. *PLOS Med*. 2019;16(12):e1002981. doi:10.1371/journal.pmed.1002981

212. Society of Health and Physical Educators. National Health Education Standards (NHES). Accessed April 1, 2026. https://www.shapeamerica.org/MemberPortal/standards/health/default.aspx

213. Eisenbeis H, Beerman S, Dekinder-Smith M. *Disconneceted: The Topic of Ultraprocessed Food Exposes Four Significant Gaps for US Shoppers*. Food Integrity Collective; 2025. https://drive.google.com/file/d/1YdqY18tOHtFWI4Lzpe8KXGGdc2mW5lpC/view

214. Atoloye AT, Savoie-Roskos MR, Guenther PM, Durward CM. Effectiveness of *Expanded Food and Nutrition Education Program* in Changing Nutrition-Related Outcomes Among Adults With Low Income: A Systematic Review. *J Nutr Educ Behav*. 2021;53(8):691-705. doi:10.1016/j.jneb.2021.03.006

215. Kenney EL, Poole MK, McCulloch SM, et al. School-based nutrition education programs alone are not cost effective for preventing childhood obesity: a microsimulation study. *Am J Clin Nutr*. 2025;121(1):167-173. doi:10.1016/j.ajcnut.2024.11.006

216. Koch PA, Contento IR, Gray HL, et al. *Food, Health, & Choices*: Curriculum and Wellness Interventions to Decrease Childhood Obesity in Fifth-Graders. *J Nutr Educ Behav*. 2019;51(4):440-455. doi:10.1016/j.jneb.2018.12.001

217. Rana T, Konapur A, Mishra P, et al. The impact of educational interventions on food label comprehension and food choices among adolescents: a scoping review. *BMC Public Health*. 2025;25(1):2682. doi:10.1186/s12889-025-23940-5

218. Grummon AH, Hall MG. Sugary drink warnings: A meta-analysis of experimental studies. *PLOS Med*. 2020;17(5):5. doi:10.1371/journal.pmed.1003120

219. An R, Liu J, Liu R, Barker AR, Figueroa RB, McBride TD. Impact of Sugar-Sweetened Beverage Warning Labels on Consumer Behaviors: A Systematic Review and Meta-Analysis. *Am J Prev Med*. 2021;60(1):1. doi:10.1016/j.amepre.2020.07.003

220. Grummon AH, Goodman D, Jaacks LM, et al. Awareness of and reactions to health and environmental harms of red meat among parents in the United States. *Public Health Nutr*. 2022;25(4):893-903. doi:10.1017/S1368980021003098

221. Hughes JP, Weick M, Vasiljevic M. Impact of pictorial warning labels on meat meal selection: A randomised experimental study with UK meat consumers. *Appetite*. 2023;190:107026. doi:10.1016/j.appet.2023.107026

222. Koch JA, Bolderdijk JW, van Ittersum K. Can graphic warning labels reduce the consumption of meat? *Appetite*. 2022;168:105690. doi:10.1016/j.appet.2021.105690

223. Taillie LS, Prestemon CE, Hall MG, Grummon AH, Vesely A, Jaacks LM. Developing health and environmental warning messages about red meat: An online experiment. *PLOS ONE*. 2022;17(6):e0268121. doi:10.1371/journal.pone.0268121

224. Willits-Smith A, Taillie LS, Jaacks LM, Frank SM, Grummon AH. Effects of red meat taxes and warning labels on food groups selected in a randomized controlled trial. *Int J Behav Nutr Phys Act*. 2024;21(1):39. doi:10.1186/s12966-024-01584-9

225. Noar SM, Hall MG, Francis DB, Ribisl KM, Pepper JK, Brewer NT. Pictorial cigarette pack warnings: a meta-analysis of experimental studies. *Tob Control*. 2016;25(3):3. doi:10.1136/tobaccocontrol-2014-051978

226. Hammond D. Health warning messages on tobacco products: a review. *Tob Control*. 2011;20(5):327-337. doi:10.1136/tc.2010.037630

227. Clarke N, Pechey E, Kosīte D, et al. Impact of health warning labels on selection and consumption of food and alcohol products: systematic review with meta-analysis. *Health Psychol Rev*. 2021;15(3):3. doi:10.1080/17437199.2020.1780147

228. State of California OEHHA. About Proposition 65. January 12, 2015. Accessed April 1, 2026. https://oehha.ca.gov/proposition-65/about-proposition-65

229. Watt TL, Beckert W, Smith RD, Cornelsen L. Reducing consumption of unhealthy foods and beverages through banning price promotions: what is the evidence and will it work? *Public Health Nutr*. 2020;23(12):2228-2233. doi:10.1017/S1368980019004956

230. Bennett R, Zorbas C, Huse O, et al. Prevalence of healthy and unhealthy food and beverage price promotions and their potential influence on shopper purchasing behaviour: A systematic review of the literature. *Obes Rev*. 2020;21(1):e12948. doi:10.1111/obr.12948

231. Kaur A, Lewis T, Lipkova V, et al. A systematic review, and meta-analysis, examining the prevalence of price promotions on foods and whether they are more likely to be found on less-healthy foods. *Public Health Nutr*. 2020;23(8):1281-1296. doi:10.1017/S1368980019004129

232. Riesenberg D, Backholer K, Zorbas C, et al. Price Promotions by Food Category and Product Healthiness in an Australian Supermarket Chain, 2017–2018. *Am J Public Health*. 2019;109(10):1434-1439. doi:10.2105/AJPH.2019.305229

233. Zorbas C, Eyles H, Orellana L, et al. Do purchases of price promoted and generic branded foods and beverages vary according to food category and income level? Evidence from a consumer research panel. *Appetite*. 2020;144:104481. doi:10.1016/j.appet.2019.104481

234. Luick M, Pechey R, Harmer G, Bandy L, Jebb SA, Piernas C. The impact of price promotions on confectionery and snacks on the energy content of shopping baskets: A randomised controlled trial in an experimental online supermarket. *Appetite*. 2023;186:106539. doi:10.1016/j.appet.2023.106539

235. *The Food (Promotion and Placement) (England) Regulations 2021*. King's Printer of Acts of Parliament; 2021. Accessed April 1, 2026. https://www.legislation.gov.uk/uksi/2021/1368

236. Ribisl KM, Golden SD, Huang J, Scollo M. Addressing lower-priced cigarette products through three-pronged comprehensive regulation on excise taxes, minimum price policies and restrictions on price promotions. *Tob Control*. Published online 2022:229-234.

237. Increasing Tobacco Prices Through Non-Tax Approaches. Countertobacco.org. https://countertobacco.org/policy/raising-tobacco-prices-through-non-tax-approaches/#:~:text=After%20being%20challenged%20in%20court,Louis.&text=New%20York%20City's%20Sensible%20Tobacco,legal%20considerations%2C%20and%20lessons%20learned.

238. Lange T, Hoefges M, Ribisl KM. Regulating Tobacco Product Advertising and Promotions in the Retail Environment: A Roadmap for States and Localities. *J Law Med Ethics*. 2015;43(4):878-896. doi:10.1111/jlme.12326

239. Code of Federal Regulations. *26 U.S. Code § 162 - Trade or Business Expenses*. Accessed April 1, 2026. https://www.law.cornell.edu/uscode/text/26/162

240. Ilieva RT, Gottlieb N, Christian H, Freudenberg N. Exposure to and Impact of Unhealthy Food Marketing on Adolescents and Young Adults: A Narrative Review and Research Agenda. *Obes Rev*. 2025;26(11):e13957. doi:10.1111/obr.13957

241. Sadeghirad B, Duhaney T, Motaghipisheh S, Campbell NRC, Johnston BC. Influence of unhealthy food and beverage marketing on children's dietary intake and preference: a systematic review and meta-analysis of randomized trials. *Obes Rev*. 2016;17(10):945-959. doi:10.1111/obr.12445

242. Boyland E, Muc M, Coates A, et al. Food marketing, eating and health outcomes in children and adults: a systematic review and meta-analysis. *Br J Nutr*. 2025;133(6):781-805. doi:10.1017/S0007114524000102

243. Harris JL, Taillie LS. More than a Nuisance: Implications of Food Marketing for Public Health Efforts to Curb Childhood Obesity. *Annu Rev Public Health*. 2024;45(Volume 45, 2024):213-233. doi:10.1146/annurev-publhealth-090419-102616

244. Republic of Ecuador. *Ley Orgánica de Eficiencia Económica y Generación de Empleo. Registro Oficial Suplemento No.* 2023.

245. Gortmaker SL, Wang YC, Long MW, et al. Three Interventions That Reduce Childhood Obesity Are Projected To Save More Than They Cost To Implement. *Health Aff (Millwood)*. 2015;34(11):1932-1939. doi:10.1377/hlthaff.2015.0631

246. Sonneville KR, Long MW, Ward ZJ, et al. BMI and Healthcare Cost Impact of Eliminating Tax Subsidy for Advertising Unhealthy Food to Youth. *Am J Prev Med*. 2015;49(1):124-134. doi:10.1016/j.amepre.2015.02.026

247. Taillie LS, Ng SW, Xue Y, Busey E, Harding M. No Fat, No Sugar, No Salt . . . No Problem? Prevalence of "Low-Content" Nutrient Claims and Their Associations with the Nutritional Profile of Food and Beverage Purchases in the United States. *J Acad Nutr Diet*. 2017;117(9):1366-1374.e6. doi:10.1016/j.jand.2017.01.011

248. Duffy EW, Hall MG, Dillman Carpentier FR, et al. Nutrition Claims on Fruit Drinks Are Inconsistent Indicators of Nutritional Profile: A Content Analysis of Fruit Drinks Purchased by Households With Young Children. *J Acad Nutr Diet*. 2021;121(1):36-46.e4. doi:10.1016/j.jand.2020.08.009

249. Kaur A, Scarborough P, Rayner M. A systematic review, and meta-analyses, of the impact of health-related claims on dietary choices. *Int J Behav Nutr Phys Act*. 2017;14(1):1. doi:10.1186/s12966-017-0548-1

250. Iles IA, Nan X, Verrill L. Nutrient Content Claims: How They Impact Perceived Healthfulness of Fortified Snack Foods and the Moderating Effects of Nutrition Facts Labels. *Health Commun*. 2018;33(10):10. doi:10.1080/10410236.2017.1351277

251. Hall MG, Lazard AJ, Grummon AH, Mendel JR, Taillie LS. The impact of front-of-package claims, fruit images, and health warnings on consumers' perceptions of sugar-sweetened fruit drinks: Three randomized experiments. *Prev Med*. 2020;132:105998. doi:10.1016/j.ypmed.2020.105998

252. Mediano Stoltze F, Busey E, Taillie LS, Dillman Carpentier FR. Impact of warning labels on reducing health halo effects of nutrient content claims on breakfast cereal packages: A mixed-measures experiment. *Appetite*. 2021;163:105229. doi:10.1016/j.appet.2021.105229

253. França CG, de Alcantara M, Deliza R. Effect of nutrition warning, brand, and claims on the perception of product healthiness by Brazilian consumers. *Food Res Int*. 2025;201:115525. doi:10.1016/j.foodres.2024.115525

254. Federal Food, Drug, and Cosmetic Act (FDCA). Accessed April 1, 2026. https://www.fda.gov/regulatory-information/laws-enforced-fda/federal-food-drug-and-cosmetic-act-fdc-act

255. U.S. Food and Drug Administration. NUTRITION LABELING AND EDUCATION ACT (NLEA) REQUIREMENTS-ATTACHMENT 1. FDA. December 26, 2019. Accessed April 1, 2026. https://www.fda.gov/nutrition-labeling-and-education-act-nlea-requirements-attachment-1

256. Code of Federal Regulations. *21 CFR Part 101 - Food Labeling*. https://www.ecfr.gov/current/title-21/chapter-I/subchapter-B/part-101

257. Kessler DA. The Federal Regulation of Food Labeling. *N Engl J Med*. 1989;321(11):717-725. doi:10.1056/NEJM198909143211105

258. Zhong A, Kenney EL, Dai J, Soto MJ, Bleich SN. The Marketing of Ultraprocessed Foods in a National Sample of U.S. Supermarket Circulars: A Pilot Study. *AJPM Focus*. 2022;1(1). doi:10.1016/j.focus.2022.100009

259. World Health Organization. *Set of Recommendations on the Marketing of Foods and Non-Alcoholic Beverages to Children*. 2010. https://iris.who.int/server/api/core/bitstreams/6ad6b30a-57e0-4193-8515-6e8d9f9545e1/content

260. Vergeer L, Gillis G, Rynard VL, et al. The association between exposure to food marketing and dietary intake among youth in six countries. *Int J Behav Nutr Phys Act*. 2025;22(1):130. doi:10.1186/s12966-025-01828-2

261. Ares G, Antúnez L, Alcaire F, et al. Associations between exposure to digital food marketing and food consumption in adolescence: a cross-sectional study in an emerging country. *BMC Public Health*. 2025;25(1):3158. doi:10.1186/s12889-025-24443-z

262. Harris J, Reed L, Maksi S, et al. *Evidence-Based Recommendations to Mitigate Harms from Digital Food Marketing to Children Ages 2-17*. Healthy Eating Research:10/2024. https://healthyeatingresearch.org/wp-content/uploads/2024/10/HER-Digital-Marketing-Report-2024.pdf

263. Landmark junk food ad ban to protect kids' health. GOV.UK. Accessed April 1, 2026. https://www.gov.uk/government/news/landmark-junk-food-ad-ban-to-protect-kids-health

264. Corvalán C, Reyes M, Garmendia ML, Uauy R. Structural responses to the obesity and non-communicable diseases epidemic: the Chilean Law of Food Labeling and Advertising. *Obes Rev*. 2013;14(S2):79-87. doi:10.1111/obr.12099

265. Taillie LS, Bercholz M, Popkin B, Reyes M, Colchero MA, Corvalán C. Changes in food purchases after the Chilean policies on food labelling, marketing, and sales in schools: a before and after study. *Lancet Planet Health*. 2021;5(8):e526-e533. doi:10.1016/S2542-5196(21)00172-8

266. *Consumer Survey: Public Perceptions of Processed Foods in a Healthy Diet*. International Food Information Council; 2024. https://ific.org/wp-content/uploads/2025/04/IFIC-Processed-In-A-Healthy-Diet.pdf

267. Luo Y, Maafs-Rodríguez AG, Hatfield DP. The individual-level effects of social media campaigns related to healthy eating, physical activity, and healthy weight: A narrative review. *Obes Sci Pract*. 2024;10(1):e731. doi:10.1002/osp4.731

268. Snyder LB, Hamilton MA, Mitchell EW, Kiwanuka-Tondo J, Fleming-Milici F, Proctor D. A Meta-Analysis of the Effect of Mediated Health Communication Campaigns on Behavior Change in the United States. *J Health Commun*. 2004;9(sup1):71-96. doi:10.1080/10810730490271548

269. Wakefield MA, Loken B, Hornik RC. Use of mass media campaigns to change health behaviour. *The Lancet*. 2010;376(9748):1261-1271. doi:10.1016/S0140-6736(10)60809-4

270. Stead M, Angus K, Langley T, et al. Mass media to communicate public health messages in six health topic areas: a systematic review and other reviews of the evidence. *Public Health Res*. 2019;7(8). doi:10.3310/phr07080

271. Reed L, Johnson J, Lott M, Story M. *The Current State of Knowledge on SNAP Restrictions and Disincentives*. Healthy Eating Research; 2025. https://healthyeatingresearch.org/wp-content/uploads/2025/09/HER-SNAP-Waivers-Brief.pdf

272. Leung CW, Fulay AP, Parnarouskis L, Martinez-Steele E, Gearhardt AN, Wolfson JA. Food insecurity and ultra-processed food consumption: the modifying role of participation in the Supplemental Nutrition Assistance Program (SNAP). *Am J Clin Nutr*. 2022;116(1):197-205. doi:10.1093/ajcn/nqac049

273. Fulay A, Juul F, Wolfson J, et al. Associations between food insecurity and Supplemental Nutrition Assistance Program participation with ultra-processed food acquisitions for home consumption in US households. *Public Health Nutr*. 2026;29(1):e25. doi:10.1017/S1368980025101808

274. SNAP Food Restriction Waivers. U.S. Department of Agriculture, Food and Nutrition Service. Accessed April 1, 2026. https://www.fns.usda.gov/snap/waivers/foodrestriction

275. Harnack LJ, Oakes JM, Elbel B, et al. Effects of Inclusion of Food Purchase Restrictions and Incentives in a Food Benefit Program on Diet Quality and Food Purchasing: Results From a Randomized Trial. *J Acad Nutr Diet*. 2024;124(5):569-582.e3. doi:10.1016/j.jand.2023.11.024

276. Alba C, Wang X, An R. Are Supplemental Nutrition Assistance Program Restrictions on Sugar-Sweetened Beverages Effective in Reducing Purchase or Consumption? A Systematic Review. *Nutrients*. 2024;16(10):1459. doi:10.3390/nu16101459

277. Roberto CA, Moran AJ. SNAP Benefits Shouldn't Cover Sugary Drinks Like Soda. Newsweek. March 31, 2025. Accessed April 1, 2026. https://www.newsweek.com/snap-benefits-shouldnt-cover-sugary-drinks-like-soda-opinion-2051513

278. Chrisinger BW. Ethical imperatives against item restriction in the Supplemental Nutrition Assistance Program. *Prev Med*. 2017;100:56-60. doi:10.1016/j.ypmed.2017.04.009

279. Leschewski A, Kuhns A. Supplemental Nutrition Assistance Program participation and current restricted food expenditures: implications for policy. *Public Health Nutr*. 2020;23(18):3448-3455. doi:10.1017/S1368980020000749

280. Thapa K, Rajbhandari-Thapa J, Hanks A, Lee JS, Zhen C. Sugar sweetened beverage restriction or fruit and vegetable purchase incentive in Supplemental Nutrition Assistance Program (SNAP): Participant's voice and choice behavior. *J Hunger Environ Nutr*. 2024;19(1):1-22. doi:10.1080/19320248.2023.2179448

281. Leung CW, Wolfson JA. A Path Forward for Strengthening SNAP Nutrition Policy—Making the US Healthy Again. *JAMA Health Forum*. 2025;6(5):e251115. doi:10.1001/jamahealthforum.2025.1115

282. Camargo JM, Nilson EAF, Ferrari G, Rezende LFM. Effect of Ultraprocessed Foods Taxation on Overweight Prevalence and Noncommunicable Diseases in Brazil. *Am J Prev Med*. 2026;70(4). doi:10.1016/j.amepre.2025.108209

283. CSPI's Food Additive Safety Ratings. Center for Science in the Public Interest. Accessed April 1, 2026. https://www.cspi.org/page/chemical-cuisine-food-additive-safety-ratings

284. EWG's Dirty Dozen Guide to Food Chemicals: The top 12 to avoid. Environmental Working Group. March 18, 2025. Accessed April 1, 2026. https://www.ewg.org/consumer-guides/ewgs-dirty-dozen-guide-food-chemicals-top-12-avoid

285. West Virginia House of Representatives. HB 2354. February 13, 2025. Accessed April 1, 2026. https://www.wvlegislature.gov/bill_status/bills_text.cfm?billdoc=hb2354%20intr.htm&yr=2025&sesstype=RS&i=2354

286. Lee SH. Adults Meeting Fruit and Vegetable Intake Recommendations — United States, 2019. *MMWR Morb Mortal Wkly Rep*. 2022;71. doi:10.15585/mmwr.mm7101a1

287. Stewart H, Young SK, Dong D, Byrne AT. *Trends in U.S. Fruit Consumption Relative to Recommendations in the Dietary Guidelines for Americans*. U.S. Department of Agriculture, Economic Research Service; 2024. doi:10.32747/2024.8754754.ers

288. Darmon N, Drewnowski A. Contribution of food prices and diet cost to socioeconomic disparities in diet quality and health: a systematic review and analysis. *Nutr Rev*. 2015;73(10):10. doi:10.1093/nutrit/nuv027

289. Barriers that Constrain the Adequacy of SNAP Allotments. U.S. Department of Agriculture, Food and Nutrition Service. Accessed April 1, 2026. https://www.fns.usda.gov/research/snap/barriers-constrain-adequacy-allotments

290. Cassady D, Jetter KM, Culp J. Is Price a Barrier to Eating More Fruits and Vegetables for Low-Income Families? *J Am Diet Assoc*. 2007;107(11):1909-1915. doi:10.1016/j.jada.2007.08.015

291. Conrad Z, Reinhardt S, Boehm R, McDowell A. Higher-diet quality is associated with higher diet costs when eating at home and away from home: National Health and Nutrition Examination Survey, 2005–2016. *Public Health Nutr*. 2021;24(15):5047-5057. doi:10.1017/S1368980021002810

292. Williams AM, Couch CA, Emmerich SD, Ogburn DF. *Ultra-Processed Food Consumption in Youth and Adults: United States, August 2021-August 2023*. National Center for Health Statistics; 2025. Accessed August 29, 2025. https://stacks.cdc.gov/view/cdc/174612

293. Olsho LE, Klerman JA, Wilde PE, Bartlett S. Financial incentives increase fruit and vegetable intake among Supplemental Nutrition Assistance Program participants: a randomized controlled trial of the USDA Healthy Incentives Pilot1, 2, 3. *Am J Clin Nutr*. 2016;104(2):423-435. doi:10.3945/ajcn.115.129320

294. Berkowitz SA, Curran N, Hoeffler S, Henderson R, Price A, Ng SW. Association of a Fruit and Vegetable Subsidy Program With Food Purchases by Individuals With Low Income in the US. *JAMA Netw Open*. 2021;4(8):8. doi:10.1001/jamanetworkopen.2021.20377

295. Engel K, Ruder EH. Fruit and Vegetable Incentive Programs for Supplemental Nutrition Assistance Program (SNAP) Participants: A Scoping Review of Program Structure. *Nutrients*. 2020;12(6):1676. doi:10.3390/nu12061676

296. Parks CA, Han P, Fricke HE, Parker HA, Hesterman OB, Yaroch AL. Reducing food insecurity and improving fruit and vegetable intake through a nutrition incentive program in Michigan, USA. *SSM - Popul Health*. 2021;15:100898. doi:10.1016/j.ssmph.2021.100898

297. Hanson E, Albert-Rozenberg D, Garfield KM, et al. The evolution and scope of Medicaid Section 1115 demonstrations to address nutrition: a US survey. *Health Aff Sch*. 2024;2(2):qxae013. doi:10.1093/haschl/qxae013

298. Bremer AA, Adas S, Brown AG, et al. NIH-FDA Nutrition Regulatory Science Workshop: advancing research and policy. *Am J Clin Nutr*. Published online March 10, 2026:101267. doi:10.1016/j.ajcnut.2026.101267

299. Code of Federal Regulations. *21 CFR 182.10 - Spices and Other Natural Seasonings and Flavorings*. Accessed April 1, 2026. https://www.ecfr.gov/current/title-21/part-182/section-182.10

300. Dunford EK, Miles DR, Popkin B. Food Additives in Ultra-Processed Packaged Foods: An Examination of US Household Grocery Store Purchases. *J Acad Nutr Diet*. 2023;123(6):889-901. doi:10.1016/j.jand.2022.11.007

301. Vatavuk-Serrati G, Meyer KA, Miles DR, Taillie LS. Prevalence of ultra-processed foods and beverages in newly launched products across the Americas: a comparison between the United States and Latin American countries from 2018 to 2023. *Front Public Health*. 2025;13. doi:10.3389/fpubh.2025.1659915

302. *PAHO Nutrient Profile Model*. Pan American Health Organization; 2016. https://www.paho.org/en/nutrient-profile-model

303. World Health Organization. WHO Regional Office for Europe nutrient profile model. Accessed April 1, 2026. https://www.who.int/publications/i/item/WHO-EURO-2015-6894-46660-67850

304. Restricting promotions of products high in fat, sugar or salt by location and by volume price: implementation guidance. GOV.UK. Accessed April 1, 2026. https://www.gov.uk/government/publications/restricting-promotions-of-products-high-in-fat-sugar-or-salt-by-location-and-by-volume-price/restricting-promotions-of-products-high-in-fat-sugar-or-salt-by-location-and-by-volume-price-implementation-guidance

305. Contreras-Manzano A, Cruz-Casarrubias C, Munguía A, et al. Evaluation of the Mexican warning label nutrient profile on food products marketed in Mexico in 2016 and 2017: A cross-sectional analysis. *PLOS Med*. 2022;19(4):e1003968. doi:10.1371/journal.pmed.1003968

306. Chilean Law of Food Labeling and Advertising: Nutrient thresholds. Global Food Research Program. Accessed April 1, 2026. https://www.globalfoodresearchprogram.org/chilean-law-of-food-labeling-and-advertising-nutrient-thresholds/

307. Baldridge AS, Huffman MD, Taylor F, et al. The Healthfulness of the US Packaged Food and Beverage Supply: A Cross-Sectional Study. *Nutrients*. 2019;11(8):1704. doi:10.3390/nu11081704

308. Food Consumption and Nutrient Intake Trends Emerge Over Past Four Decades. U.S. Department of Agriculture, Economic Research Service. August 28, 2024. Accessed April 1, 2026. https://www.ers.usda.gov/amber-waves/2024/august/food-consumption-and-nutrient-intake-trends-emerge-over-past-four-decades

309. Code of Federal Regulations. *21 CFR 170.3 - Definitions*. Accessed April 1, 2026. https://www.ecfr.gov/current/title-21/part-170/section-170.3

310. Codex Alimentarius Commission. Food and Agriculture Organization. Accessed April 1, 2026. https://www.fao.org/fao-who-codexalimentarius/committees/cac/about/en/

311. World Health Organization. Joint FAO/WHO Expert Committee on Food Additives (JECFA). Accessed April 1, 2026. https://www.who.int/groups/joint-fao-who-expert-committee-on-food-additives-(jecfa)/about

312. Kretser A, Murphy D, Starke-Reed P. A partnership for public health: USDA branded food products database. *J Food Compos Anal*. 2017;64:10-12. doi:10.1016/j.jfca.2017.07.019

About Healthy Eating Research

Healthy Eating Research (HER) is a national research program with funding provided by the Robert Wood Johnson Foundation. Technical assistance and direction are provided by Duke University under the direction of Mary Story, PhD, RD, program director, and Megan Lott, MPH, RDN, deputy director. HER supports research to identify, analyze, and evaluate environmental and policy strategies that can promote healthy eating among children and prevent childhood obesity. Special emphasis is given to research projects that benefit children and adolescents and their families, especially among lower-income and racial and ethnic minority population groups that are at highest risk for poor health and wellbeing and nutrition related health disparities. For more information, visit ***www.healthyeatingresearch.org***.