Food Classification Systems for Identifying Healthfulness of Foods

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Food Forum Workshop: The Role of Science, Technology, and Communication in Advancing Healthful Foods and Diets

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CENTER FOR Science IN THE Public Interest

Disclosures for Aviva Musicus

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Other	Adjunct Assistant Professor of Nutrition at the Harvard T.H. Chan School of Public Health

Evidence-based advocacy at CSPI

Non-profit established 1971 to improve the public's health

CSPI envisions thriving communities supported by equitable, sustainable, and science-based solutions advancing nutrition, food safety, and health.

- CSPI is an independent organization that does not accept any corporate funding
- CSPI publishes Nutrition Action (NA) and is supported by the subscribers to NA, individual donors, and foundation grants

Food classification is an integral part of CSPI's work

Extensive history of advocating for policies that aim to improve the quality of the U.S. diet:

- Sodium & added sugar reduction targets
- Healthy federal dietary guidance
- School meal nutrition standards
- Front of package nutrition labeling
- FDA healthy labeling
- Defining ultra-processed foods
- **Food additive safety ratings**

Chemical Cuisine Additive Safety Ratings

Name	Purpose	Health Concern
Azodicarbonamide	Coloring	Cancer
Beta-carotene	Coloring	
Brazzein	Sweetener	Allergies & Sensitivities
Brominated vegetable oil (bvo)	Emulsifier	Neurological & Behavioral
Butylated hydroxyanisole (bha)	Preservative	Cancer
Butylated hydroxytoluene (bht)	Preservative	Cancer
Caffeine	Vitamins & Supplements	Neurological & Behavioral
Calcium propionate	Preservative	
Cannabidiol (CBD)	Vitamins & Supplements	
Caramel coloring	Coloring	Cancer
Carbon dioxide (carbonated water)	Other	
Carboxymethyl cellulose (cmc, cellulose gum), sodium carboxymethyl cellulose	Other	Digestive

https://www.cspi.org/page/chemical-cuisine-food-additive-safety-ratings

Outline

- Why classify foods by healthfulness?
- Evolution of efforts to classify foods as more/less healthful
  - History of federal dietary guidance
  - Examples of food classification systems
- Synthesis: Comparing classification systems
- Conclusions

Why classify foods as healthful or unhealthful?

No single food is healthful or unhealthful by itself.

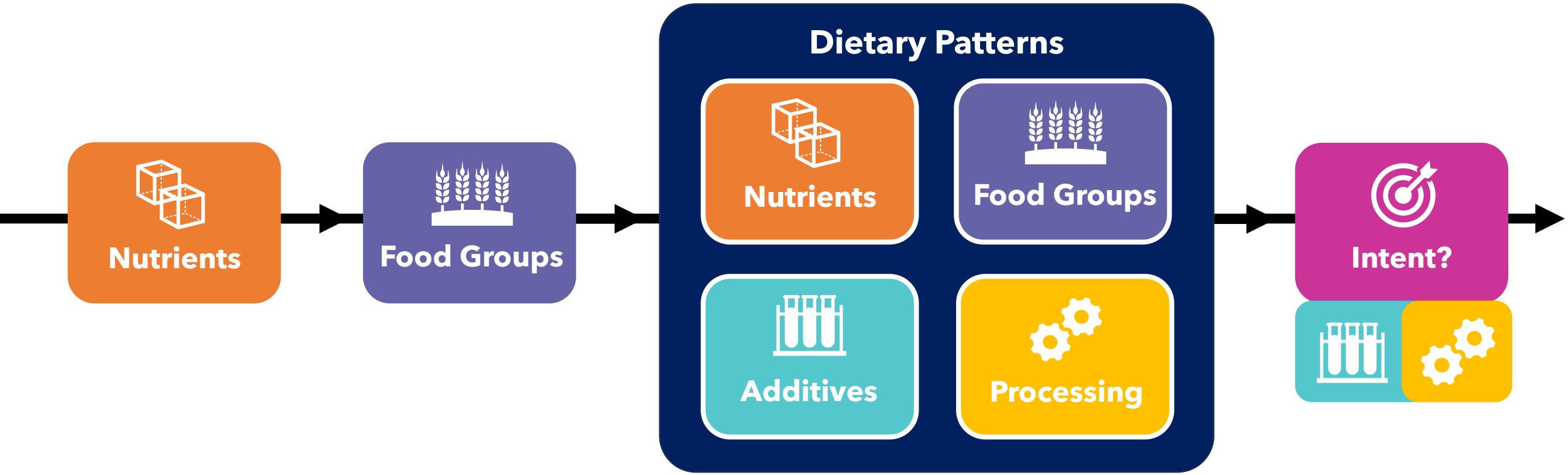
Goal of healthful food classification: Identify foods to encourage and limit as part of a healthful dietary pattern that can ultimately reduce disease risk and promote health

Many applications:

- Formulating policies to promote public health and regulate the food supply
- Inform dietary advice
- Aid researchers in testing new hypotheses about diet and health

Evolution of efforts to classify foods as more/less healthful

Overview: Nutrition science and our understanding of healthfulness have evolved over time…



resulting in the evolution of different classification systems

1980

Early federal dietary guidance emphasized nutrients for health

1980 U.S. Dietary Guidelines for Americans (first edition)

https://www.dietaryguidelines.gov/about-dietary-guidelines/history-dietary-guidelines

Early federal dietary guidance emphasized nutrients for health

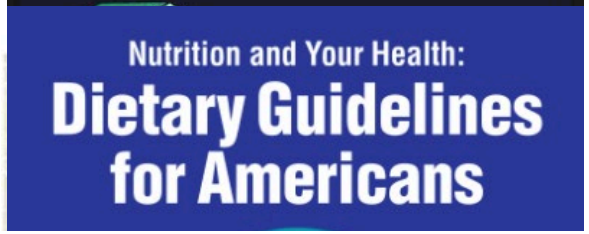
1980 U.S. Dietary Guidelines for Americans (first edition)

…and subsequent editions through 2000

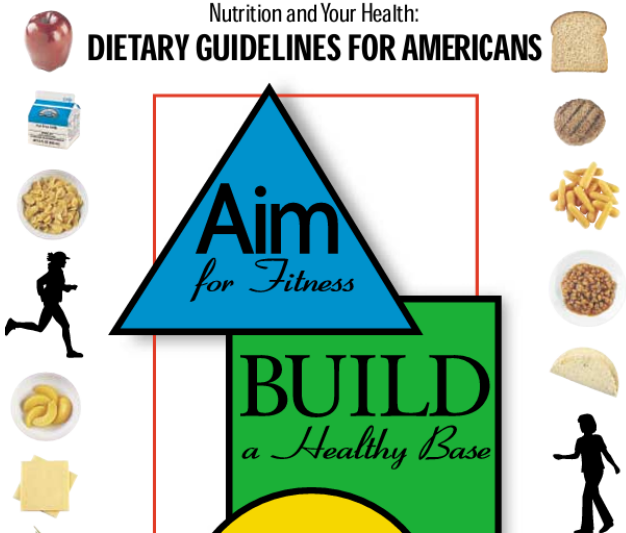
1980

1985

1990



1995



2000

https://www.dietaryguidelines.gov/about-dietary-guidelines/history-dietary-guidelines

Evolving nutrition science

More recent federal dietary guidance emphasizes food groups and nutrients *as part of healthful dietary patterns*

U.S. Dietary Guidelines for Americans 2005 to 2020

https://www.dietaryguidelines.gov/about-dietary-guidelines/history-dietary-guidelines

Healthful food classification system: Nutrients & Food Groups

FDA "Healthy"

Voluntary claim (+ forthcoming icon) permitted to be used on US foods

Original "Healthy" Claim, 1994	Updated "Healthy" Claim, 2024
Nutrient limits: • Saturated Fat • Sodium • Total Fat • Dietary Cholesterol	**Nutrient limits:** • Saturated Fat • Sodium • Added Sugars 
Nutrient requirements: Minimum amount of beneficial individual nutrients (Vitamin A, vitamin C, calcium, iron, protein, or fiber)	**Food group requirements:** Minimum amount of recommended food groups and sub-groups (vegetables, fruits, dairy, protein foods, whole grains)

https://www.fda.gov/media/184535/download?attachment

Healthful food classification system: Nutrients, Food Groups, Additives & Processing

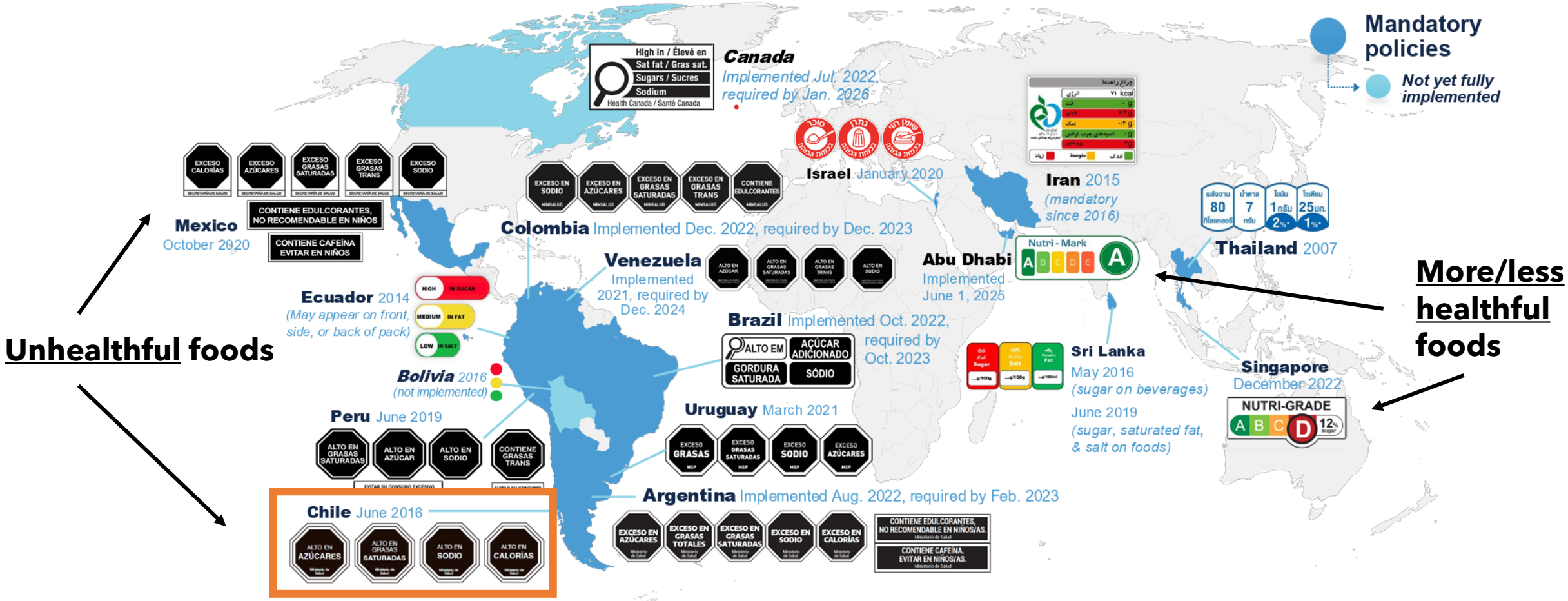
Non-government voluntary certification system: **American Heart Association Heart-Check**

Healthful classification:
Nutrient limits: Fat, saturated fat, trans fat, cholesterol, sodium
Nutrient requirements: Minimum amount of at least one of the following: vitamin A, vitamin C, iron, calcium, protein or dietary fiber
Food-group-specific requirements
Additives: Caffeine and other stimulants, non-nutritive sweeteners not allowed in some beverages
Processing: Processed meats not allowed

https://www.heart.org/en/healthy-living/company-collaboration/heart-check-certification

Healthful food classification system: Nutrients, Food Groups, Additives & Processing

Mandatory Front-of-Package Labeling



GLOBAL FOOD RESEARCH PROGRAM at UNC-CHAPEL HILL

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Healthful food classification system: Nutrients

Chile's Law of Food Labeling and Advertising (2016)

Unhealthful classification:

Exceed nutrient density thresholds (calories, sugar, saturated fat, and/or sodium)

- Require "high in" nutrient warning labels
- Marketing restrictions, school bans

Law resulted in:

- Decreased purchases of "unhealthful" foods
- Industry reformulation of "unhealthful" foods (reduced sugar, sat fat, sodium)

https://www.globalfoodresearchprogram.org/policy/law-of-nutritional-composition-of-food-and-advertising/
Taillie et al., PLoS Med. 2024, Reyes et al., PLoS Med. 2020

A conceptual shift in healthful food classification: Nova and Ultra-Processed Foods

Cad. Saúde Pública, Rio de Janeiro, 26(11):2039-2049, 2010

A new classification of foods based on the extent and purpose of their processing

Uma nova classificação de alimentos baseada na extensão e propósito do seu processamento

Carlos Augusto Monteiro [1]
Renata Bertazzi Levy [1,2]
Rafael Moreira Claro [3]
Inês Rugani Ribeiro de Castro [4]
Geoffrey Cannon [5]

- Developed by Dr. Carlos Monteiro in 2010 in response to increasing rates of obesity and chronic disease and displacement of traditional diets in Brazil
- Goal: Describe the foods interfering with and transforming traditional Brazilian diets to the detriment of public health
- **Criteria: <u>extent</u> and <u>purpose</u> of processing**

Nova Classification System

based on extent and purpose of processing

Group	Extent of processing	Purpose of processing	Examples
Nova 1: Unprocessed and minimally processed foods	Edible parts of plants or animals that remain whole or undergo minimal alterations like cutting, drying, freezing, or pasteurization. No other food substances added to the original food.	To extend food life, enable longer storage, make preparation easier.	Milled grains, raw meat, fresh fruits and vegetables, milk, eggs, nuts 

Adapted from: Adams J, PLoS Med 2024; Monteiro et al, Public Health Nutr, 2019; Images: Louie J. The Proceedings of the Nutrition Society, 2025.

Nova Classification System

based on extent and purpose of processing

Group	Extent of processing	Purpose of processing	Examples
Nova 2: Processed culinary ingredients	Substances extracted from Nova 1 foods through pressing, refining, or grinding.	For use in the preparation, seasoning, and cooking of Nova 1 foods. *May contain preservatives*	Oil, butter, sugar, salt 

Adapted from: Adams J, PLoS Med 2024; Monteiro et al, Public Health Nutr, 2019; Images: Louie J. The Proceedings of the Nutrition Society, 2025.

Nova Classification System

based on extent and purpose of processing

Group	Extent of processing	Purpose of processing	Examples
Nova 3: Processed foods	Nova 1 foods with added Nova 2 ingredients, using preservation methods such as canning, pickling, curing, smoking, or fermentation.	To increase the durability of Nova 1 foods and make them more enjoyable by modifying or enhancing their sensory qualities. *May contain preservatives*	Canned vegetables in brine; salted nuts; cured meats, fruits in syrup, freshly made unpackaged breads and cheeses. 

Adapted from: Adams J, PLoS Med 2024; Monteiro et al, Public Health Nutr, 2019; Images: Louie J. The Proceedings of the Nutrition Society, 2025.

Nova Classification System

based on extent and purpose of processing

Group	Extent of processing	Purpose of processing	Examples
Nova 4: Ultra-processed foods	Industrial formulations using extracted substances, chemically modified ingredients, and cosmetic additives (flavors, colors, emulsifiers). Multiple processing steps.	To create highly profitable products (low-cost ingredients, long shelf-life, branding + marketing) that are convenient (ready-to-consume) and hyper-palatable. Liable to displace all other Nova food groups, especially Nova 1 foods.	Soda, packaged bread, breakfast cereal, frozen pizza, hot dogs, ice cream 

Adapted from: Adams J, PLoS Med 2024; Monteiro et al, Public Health Nutr, 2019; Images: Louie J. The Proceedings of the Nutrition Society, 2025.

Healthful food classification system:
Intent of Formulation (Processing, Additives)

Nova: Ultra-Processed Foods (UPFs)

Unhealthful classification:

UPFs (Nova category 4): Industrial formulations designed to compete with the other three Nova groups and maximize industry profits.

To identify UPFs:

Manufacturers do not disclose intent of processing, so Nova uses additives as markers for intent:

- Food substances of no culinary use (e.g., high-fructose corn syrup, modified starches)
- Cosmetic additives (e.g., flavors, colors)

Monteiro et al., Lancet, 2025; Martinez-Steele et al., Nature Food, 2023

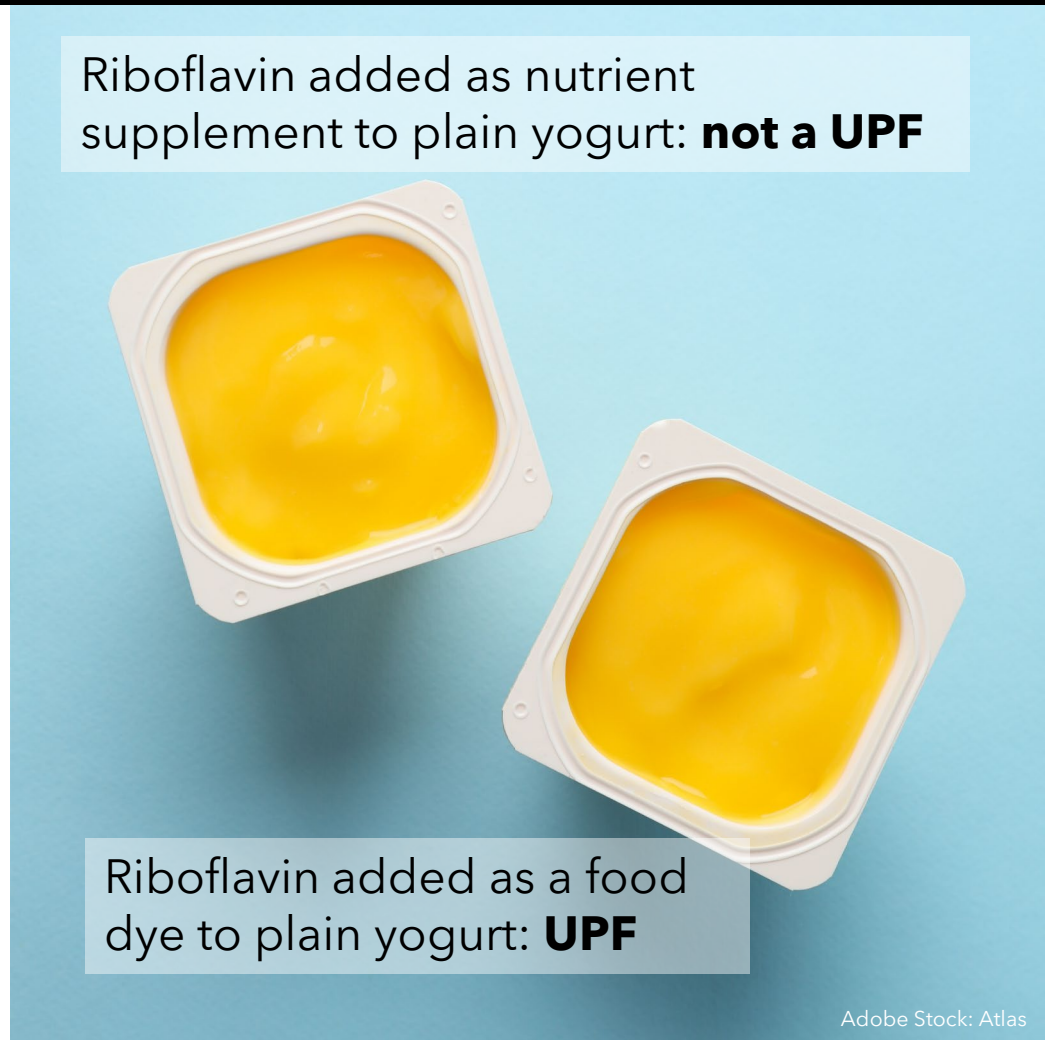
Healthful food classification system:
Intent of Formulation (Processing, Additives)

Nova: Ultra-Processed Foods (UPFs)

IMPORTANT CONCEPTUAL NUANCE:

Additives that are used in Nova to identify UPFs are not selected based on their inherent harm.

Two products with identical formulations may be classified differently depending on the manufacturer's intent in using the additive.



Nova argument: Ultra-processed dietary patterns are harmful


THE LANCET

EDITORIAL · Online first, November 18, 2025

Ultra-processed foods: time to put health before profit

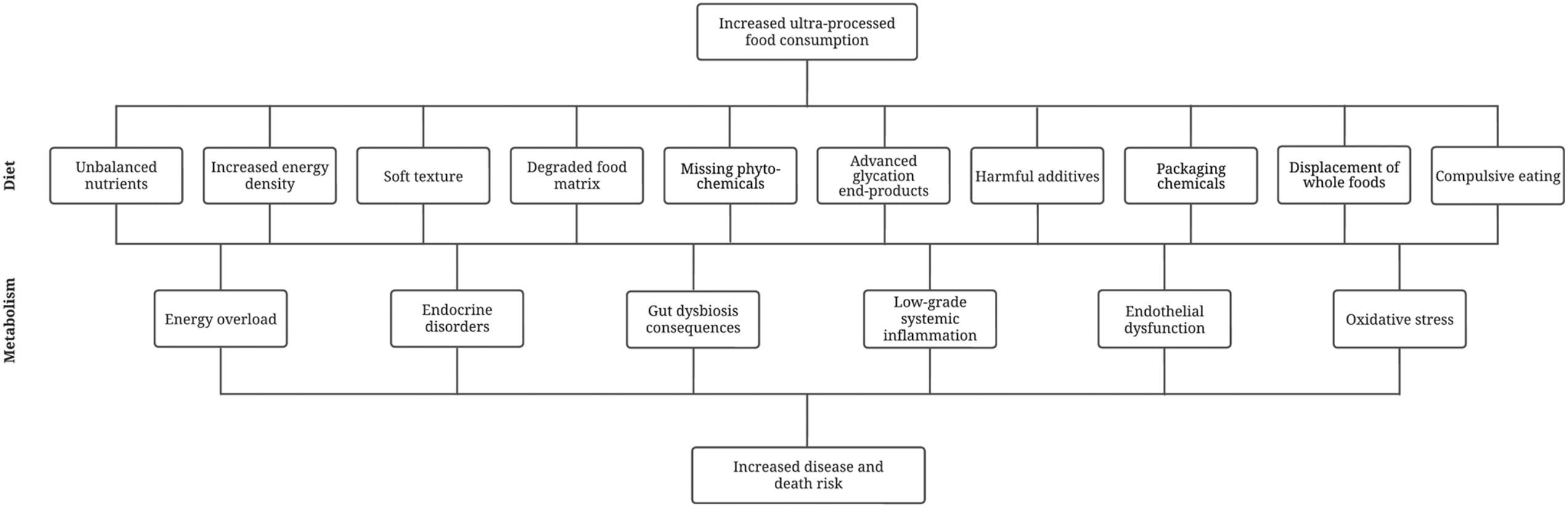
"Some critics argue that grouping foods that might have nutritional value into the UPF category, including fortified breakfast cereals and flavoured yoghurts, together with products such as reconstituted meats or sugary drinks, is unhelpful. But UPFs are rarely consumed in isolation. It is the overall UPF dietary pattern, whereby whole and minimally processed foods are replaced by processed alternatives, and the interaction between multiple harmful additives, that drives adverse health effects."

Key hypotheses about the ultra-processed dietary pattern

1. Globally displacing long-established dietary patterns
2. Associated with broad deterioration of diet quality
3. Associated with higher risk of diet-related chronic diseases

Monteiro CA, Louzada ML, Steele-Martinez E, et al. Ultra-processed foods and human health: the main thesis and the evidence. Lancet. 2025 Nov 18:S0140-6736(25)01565-X.

Hypothesized mechanisms of harm from UPF dietary pattern



Monteiro & Astrup, ASN Great Debates in Nutrition, 2022

Synthesis & Conclusions

Healthful/unhealthful food classification systems use varied criteria

	Nutrients	Food Groups	Additives	Processing
Chile's High Nutrient Density FOPNL	X			
FDA Healthy (2024)	X	X		
AHA Heart Check	X	X	X	X
Nova 4: Ultra-processed food			INTENT	INTENT

Policy and communication challenges: Different categorizations across systems: healthful, unhealthful, gray area

Chile's High Nutrient Density FOPNL	ALTO EN AZÚCARES Ministerio de Salud	*Not "High" Nut.*	*Not "High" Nut.*	**Unhealthful** *High Sat Fat*	**Unhealthful** *High Sodium*
FDA Healthy (2024)	FDA HEALTHY	**Healthful** *FDA Healthy*	*Not FDA Healthy*	*Not FDA Healthy*	**Healthful** *FDA Healthy*
AHA Heart Check	American Heart Association CERTIFIED Meets Criteria For Heart-Healthy Food	*Not Certified*	*Not heart healthy*	*Not heart healthy*	*Not heart healthy*
Nova 4: Ultra-processed food		**Unhealthful** *Nova 4 UPF*	**Unhealthful** *Nova 4 UPF*	**Healthful** *Nova 1*	**Unhealthful** *Nova 4 UPF*

https://www.lightandfit.com/light-yogurt/greek-yogurt/strawberry-cheesecake/, https://www.citymarket.com/p/simple-truth-natural-85-lean-ground-bison-patties/0001111002856, https://www.coca-cola.com/gb/en/brands/diet-coke, https://www.pepsicoschoolsource.com/prod/s3fs-public/2025-08/PFS_SunchipsHoneyBBQ_%2878785%29_1oz_2025.pdf

Conclusions

1. **Systems for classifying foods have evolved as our understanding of nutrition science has evolved.**

2. **Although no single food can be healthful or unhealthful, food classification systems are needed to help consumers understand which foods to eat more of/limit as part of a healthful diet, and for policymakers to regulate the food supply.**

3. **Healthful food classification systems should be:**
   - Supported by strong scientific evidence
   - Operationalizable for policy
   - Communicated clearly to the public

4. **Coexisting healthful food classification systems may require thoughtful communication and coordination to avoid consumer confusion**

Special thanks
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