Ultra Processed Foods and Nutrition Research: What Do We Know?

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Disclosure: Dr. Slavin was a member of the 2010 Dietary Guidelines Advisory Committee (DGAC)

Competing Interests

- Dr. Slavin thanks the following organizations for research funds the past 5 years:
  - United States Department of Agriculture, NIH, Taiyo, Barilla, Institute on the Environment (IonE), and the University of Minnesota Extension Southwest Regional Sustainable Development Partnership.

- These research projects are in the areas of dietary fiber, whole grains, legumes, digestive health including the microbiome, plant and animal protein needs, carbohydrate needs, snacking and sustainable agriculture.

- She serves on scientific advisory boards for Simply Good Foods, the Sustainable Nutrition Scientific Board, and Olipop.

- She owns and manages the Slavin Sisters Farm LLC, a 119 acre mixed use family farm in Walworth, WI

Learning about human nutrition

- Humans have survived on a wide range of diets, mostly reflecting access to food supply.
- Although protein needs are based on ideal body weight (0.8 g protein/kg body weight for adults), the amounts of carbohydrates and fats in healthy diets vary greatly.
- Traditional Arctic diets contain 80% of calories as fat, whereas traditional African diets are 80% of calories as carbohydrates.
- The trick for good nutrition is to consume diets that contain the appropriate number of calories, adequate protein, and essential vitamins, minerals, and fluids.
  - Slavin, *Nutrition Today* 47(5), September/October 2012

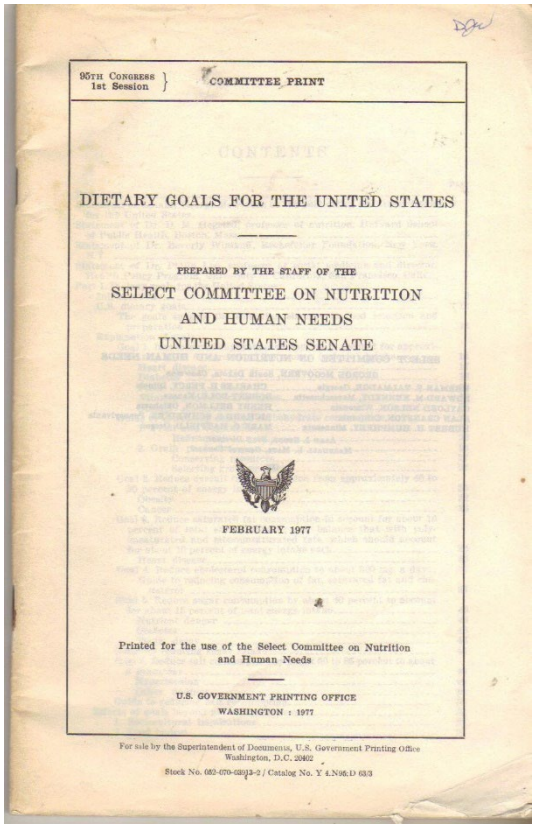
Nutritional science – nutrients to prevent deficiency diseases

- **1941 -** National Academy of Sciences began issuing Recommended Dietary Allowances (RDAs)
  - *"quantity of nutrients a person needed to consume daily to ensure basic good health, proper growth and reproductive success, and to prevent nutrient deficiency diseases"*
  - Nutritional deficiency diseases have been virtually eliminated in the US thanks to enrichment of refined grains and other fortification strategies.

Beyond deficiency diseases: Diet and chronic disease prevention

- The US Senate Select Committee on Nutrition and Human Needs led by Senator George McGovern issued the Dietary Goals for Americans (1977).

- The underlying premise for the work was that “too much fat, too much sugar or salt, can be and are linked directly to heart disease, cancer, obesity, and stroke, among other **killer** diseases.”



95TH CONGRESS
1st Session

COMMITTEE PRINT

DIETARY GOALS FOR THE UNITED STATES

PREPARED BY THE STAFF OF THE
SELECT COMMITTEE ON NUTRITION
AND HUMAN NEEDS
UNITED STATES SENATE

FEBRUARY 1977

Printed for the use of the Select Committee on Nutrition and Human Needs

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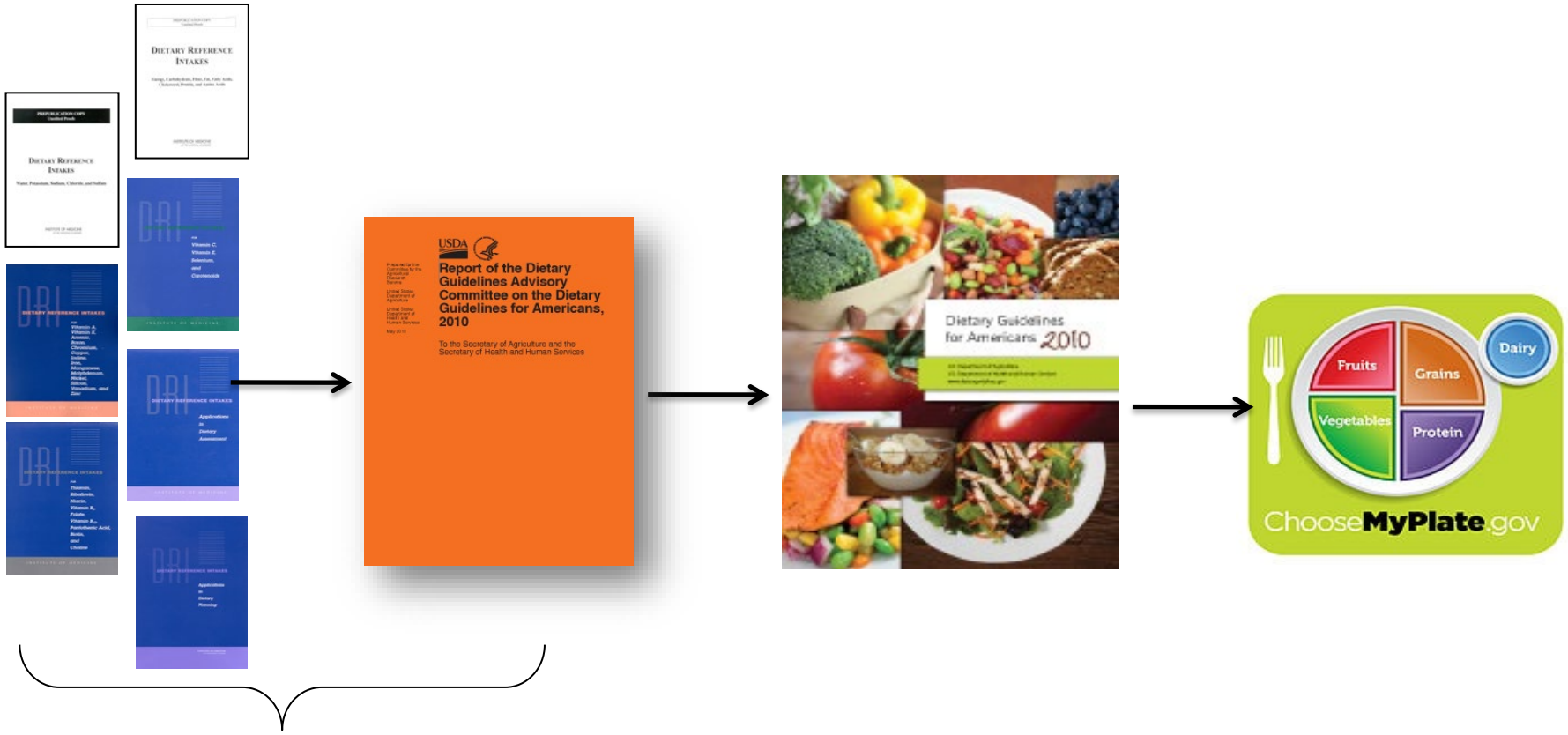
From the Science to Me – A Long Journey



The Science Behind the Guidelines

Dietary Guidelines Advisory Committee considers:

- Original systematic scientific reviews
- Existing systematic reviews, meta-analyses and scientific reports
- Dietary data analyses
- Food pattern modeling analyses

Issues technical report with nutrition and health recommendations

DHHS/USDA uses technical report and comments to develop updated *Dietary Guidelines*

Scientific rationale based on various research methods:

Dietary Guidelines for Americans

Four nutrients of concern: Calcium, Vitamin D, potassium, dietary fiber

A healthy pattern limits:

- **Sat fat: <10% of calories/day**
- **Trans fat: keep as low as possible**
- **Added sugars: <10% of calories/day**
- **Sodium: < 2,300 mg of sodium/day**

Shift from Individual Foods and Ingredients to Healthy Eating Patterns!

DGA Impacts Nutrition Policy and the Health and Wellness Marketplace

Policy

Marketing
Labeling
Reformulation

Nutrition
Education

SNAP Supplemental Nutrition Assistance Program

WIC Women Infants & Children

National School Lunch Program
School Breakfast Program

Dietary Guidelines for Americans, 2025-2030

- 3 scientific approaches to examine the evidence: data analysis, food pattern modeling, and systematic reviews
- USDA's Nutrition Evidence Systematic Review (NESR) team plans to conduct a limited number of systematic reviews with meta-analyses
- HHS and USDA are working to enhance food pattern modeling methodology to better reflect the complex interactions involved, variability in intakes, and range of possible healthy diets.
- DGAC will conduct an extensive review that builds on the previous findings of the 2020 Committee, which developed conclusions from more than 70 systematic reviews, including more than 2000 research articles, and considered over 155 analyses of federal data sets.
  - Reed et al. *Am J Clin Nutr* 2023;117:1061-1062.

NOVA Food Classification System

Published ‘system’ that groups foods according to the nature, extent & purposes of the industrial processes they undergo. Monteiro et al. 2019.

Unprocessed & minimally processed foods

Processed culinary ingredients

Processed foods

Ultra-processed foods

Dietary Guidelines Meet NOVA

- 1. Unprocessed/minimally processed – edible parts of plants (fruit, seeds, leaves, etc.) or from animal (muscle, fat, eggs, milk) and fungi, algae. Processing such as drying, squeezing, grinding, roasting, pasteurizing, freezing, fermenting acceptable (no added salt or sugar). Also includes foods made from two or more items in this group – dried mixed fruit, granola made from cereals, nuts, foods with vitamins & minerals added to replace nutrients lost (such as wheat flour fortified with iron & folic acid)
- 2. Processed culinary ingredients – substances obtained from unprocessed/minimal processed group – e.g. pressing, refining, extracting. Vegetable oils, butter, sugar, honey.
- 3. Processed foods – products made by adding salt, oil, sugar or other processed culinary ingredients to unprocessed/minimally processed foods. Canned or bottled vegetables, legumes; salted nuts; canned fish; canned fruit; cheese.

Dietary Guidelines Meet NOVA

- 4. Ultra-processed foods – Formulations of ingredients, mostly of exclusive industrial use, made by a series of industrial processes, many requiring sophisticated equipment and technology. Examples include ready to consume packaged snacks, chocolate, ice cream, packaged breads and buns, cakes, cereal, milk drink, yogurt, prepared pizza, sausage, hot dog, noodles, infant formula, etc.

Monteiro, CA et al. 2019 Ultra processed foods, diet quality, and health using the NOVA classification system. Rome, FAO

2025-2030 Dietary Guidelines question:

- The 2025 – 2030 Dietary Guidelines for Americans Scientific Advisory Committee is addressing the relationship between dietary patterns with UPF and body composition and weight status

  - **What is the relationship between consumption of dietary patterns with varying amounts of ultra-processed foods and growth, size, body composition, risk of overweight and obesity, and weight loss and maintenance?**

Ultraprocessed diets (UPF)

- In a proof-of-concept study, we developed a list of foods that fit NOVA criteria for UPF, fit within dietary patterns in the 2020 DGAs, and are commonly consumed by Americans.
- We then used these foods to develop a 7-day, 2000 kcalorie menu.
- 91% of foods were UPF, NOVA category 4, recommended by DGA
- The Healthy Eating Index-2015 (HEI-2015) score was 86 out of a possible 100 points, mostly because of excess sodium and insufficient whole grains.
- Healthy dietary patterns can include most of their energy from UPF and still receive a high diet quality score and contain adequate amounts of most macro-and micronutrients.
  - Hess et al. *J. Nutr*. 2023; 153(8):2472-2481.

Where do dairy products fall in UPFs?

- Dairy foods are broadly classified as follows:
  - Milk and plain yogurt fall into the unprocessed or minimally processed food group
  - Cheeses which are processed simply and not packaged are considered processed foods
  - Dairy foods that undergo further processing and use of sugars or additives such as flavoring may be considered ultra-processed
  - Plant-based milk alternatives (PBMA) would be considered ultra-processed

The Case for Meeting Dairy Recommendations

- “Consumption of dairy foods provides numerous health benefits including lower risk of diabetes, metabolic syndrome, cardiovascular disease and obesity.”
- “When consumed in the amounts recommended by the Food Patterns, on average across the calorie levels, dairy foods contribute about 67 percent of calcium, 64 percent of vitamin D, and 17 percent of magnesium.”

- 2015 Dietary Guidelines Advisory Committee (p. 67)

https://health.gov/sites/default/files/2019-09/Scientific-Report-of-the-2015-Dietary-Guidelines-Advisory-Committee.pdf

Social role that dairy plays

- Dairy products are in high demand at food banks
- FAO report focuses on central role dairy products play in reducing global hunger
- Although milk delivers higher nutrient levels than PBMAs, milk is less expensive than PBMAs
- Dairy is critical in government programs, including WIC, school lunch, SNAP
- Dairy products are enjoyed across all cultures

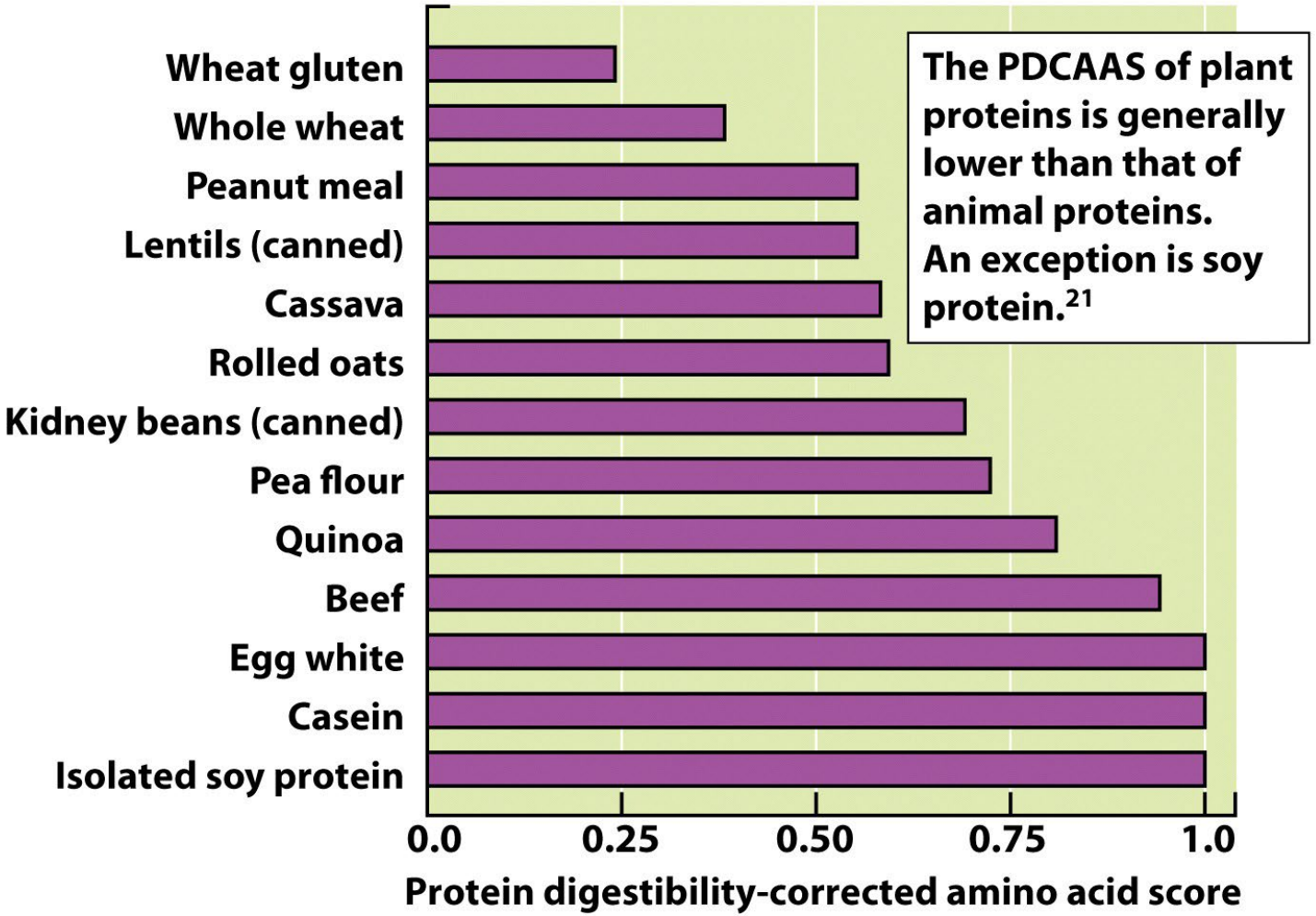
Plant-based milk alternatives (PBMA)

- Plant-based products that are marketed and sold as alternatives to milk are made from nuts (including hazelnuts, walnuts, coconuts, cashews, and almonds), seeds (including sesame, flax and hemp), rice, oats, or legumes (including soy).
- The composition of these PBMAs, including their nutrient profiles, varies depending on the plant source, processing methods and added ingredients.
- PBMAs are often used the same ways as milk, but the DGAs currently only include fortified soy beverages in the dairy group because they have key nutrients similar to those found in milk
- In February 2023, FDA issued draft guidance that notes that common or usual names of some PBMAs, such as “soy milk” and “almond milk” have been established by common usage
- Suggest voluntary nutrient statement that conveys how the product compares with milk (FNS fluid milk substitutes nutrient criteria)
- All PBMAs are UPFs

Sources of Protein in the Diet

- Protein deficiency is rare in the U.S.
  - About two-thirds of dietary protein comes from meat, poultry, seafood, eggs and dairy products
- Most of the world relies on plant proteins from grains and vegetables
- As a country's economy improves, the proportion of animal foods in the diet tends to increase
- It is not possible to separate the health-promoting effects of dietary fiber, vitamins, minerals, and phytochemicals in plant foods from the plant protein they contain.
- When we focus on removing the nutritional "bad guys", such as added sugars and solid fats, we may have the unintended consequences of reducing intakes of high-quality protein, and nutrients of concern such as calcium, iron, Vitamin D, potassium, dietary fiber, and folate.
  - Ahnen, Jonnalagadda, Slavin. *Nutrition Reviews* 2019;77:735-747.

Considering Protein Quality



Carbohydrate dietary guidance

- Plant foods are universally promoted for their links to improved human health, yet carbohydrate-containing foods are often maligned based on isolated, reductionist methods that fail to assess carbohydrate foods as a matrix of nutrients and food components (Schulz, Slavin, *Advances in Nutrition*, 2021;12:1108-1121).
- Currently accepted positive carbohydrate quality indices include whole grain content and dietary fiber content.
- Added sugar content is recommended to be less than 10% of total calories, although these guidelines do not meet criteria for trustworthy recommendations and are based on low-quality evidence (Erickson, et al. *Ann Intern Med* 2017; 166:257-267).
- Fruits are universally promoted in dietary guidance, although they are mostly sugar, not “complex carbohydrate” as suggested in the original DGAs.

Fat dietary guidance

- Whereas past dietary guidelines placed limits on total fat intake especially saturated fats, recent studies indicate more complex links with health (Meijaard et al. *Front Nutr*. 2022;9:878644)
- Fat-free dairy products are recommended because of their nutrient density, not a link to their fat content or health or disease outcomes (Kirahatake, et al. *Adv Nutr* 2020;11:533-547).
- Since fats contain 2.5 times the number of calories per gram as carbohydrate or protein, a low-calorie diet typically is low in fat.
- Guidelines for fat intake must differ between regions of general poverty and malnutrition compared to those where obesity is a growing problem.

Sustainable diets

- With a growing global population, the demand for high-quality food to meet nutritional needs continues to increase.
- Our ability to meet those needs is challenged by a changing environment that includes constraints on land and water resources and concerns about the impact of human activity including agricultural practices on the changing climate (Reiten, et al. *Curr Dev Nutrition* 2020;4:nzaa087.
- Animal source foods provide a wide array of nutrients, including high quality protein, but the impacts on the environment must be considered in the future of agricultural production.
- A case study of vegetable oils supports that sustainable nutrition should be considered beyond pure nutritional facts, at the light of soil preservation, local resources and human needs in terms of health, employment and socio-economic development
  - (Mannucci, et al. *Front Public Health* 2023 11:1106083).

A scoping review of the environmental impacts and nutrient composition of plant-based milks

- Consumers are increasingly seeking alternatives to dairy, called plant-based milks (PBMs) to avoid allergens, pursue a plant-based diet, or reduce their environmental impacts
- The base ingredients used in PBMs have a wide range of environmental impacts, which may translate to substantial variation across the impacts associated with PBMs themselves.
- 20 studies covering 6 types of PBMs
- The most data regarding environmental impacts were available for soy- and almond-based milks, and the most common impact quantified was greenhouse gas emissions.
- PBMs attempt to replicate the organoleptic properties of dairy but often do not exactly match the nutrient profile of dairy
- Need for the application of a standardized methodology to facilitate more comprehensive assessment of environmental impacts of PBMs, which are presented as environmentally preferable to dairy.
  - Berady, Rubin-Garcia, Sabate. *Adv Nutr* 2022;13:2559-2572.

Nutritional challenges of avoiding UPFs

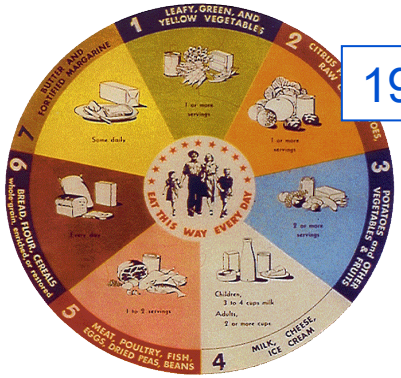
- Required vitamins and minerals for enrichment and fortification cannot meet rules of clean label
- Nutrients of concern – fiber, potassium, calcium, and Vitamin D – intakes will only get worse by clean label rules
- Improvements in digestion and absorption – plant-based proteins – are only realized with food processing
- Improvements in healthy ingredients – whole grains, vegetables, fruits, pulses – made possible by food processing
- Removal of added sugar, sodium, saturated and trans fats – made possible by food processing

Food advice: Evolution of USDA's Food Guidance – Moderation and Variety

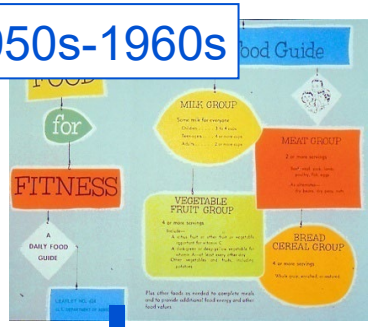
1916

Food for Young Children

1940s

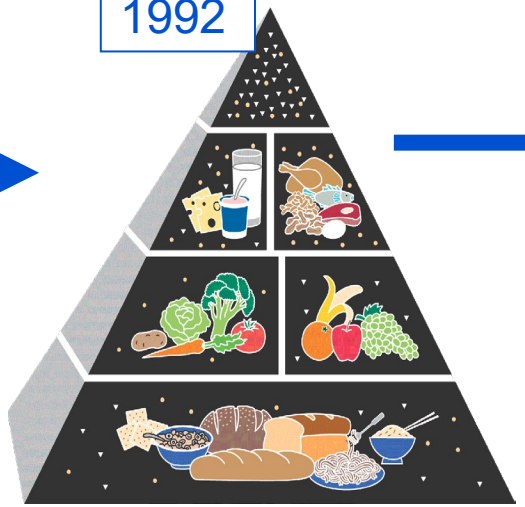


1950s-1960s



1970s

1992



2005

An Eating Patterns is More Than the Sum of Its Parts

Canada's Food Guide 2019

Conclusions

- Healthy dietary patterns can include most of their energy from UPFs, still receive a high diet quality score, and contain adequate amounts of most macro- and micronutrients
- Dietary guidelines must consider criteria such as equity, feasibility, acceptability, and socioeconomic conditions.
- Rather than discourage food processing, innovative processing technologies that can modify the food matrix with beneficial health effects must be pursued, highlighting the possible links between processing, sustainability, and the circular economy
  - Agostoni C et al. *Eur J Internal Med* 126 (2024): 26-32.

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