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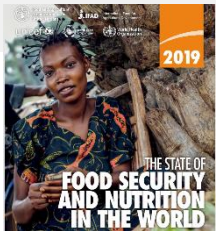
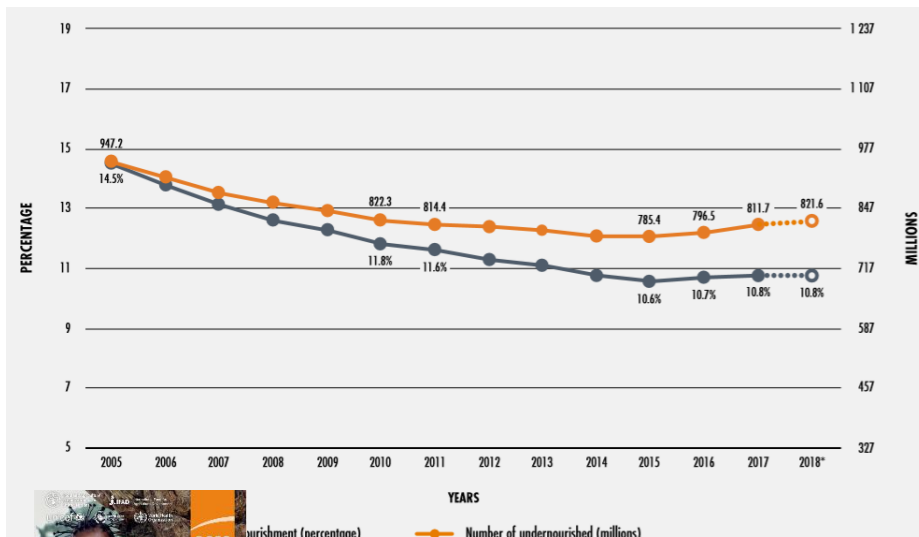


NUTRITION: MAJOR CHALLENGES, TRENDS

<http://hyg.lf1.cuni.cz/> Materials to download

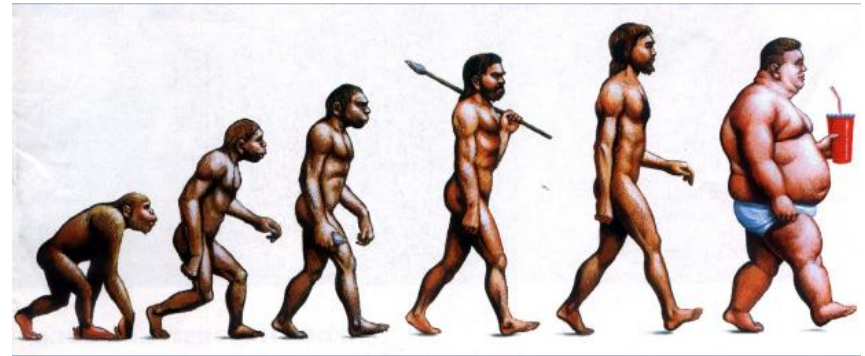
Nutrition – the most important external factor influencing human health

FAO: Hunger in the World 2019 >820 million



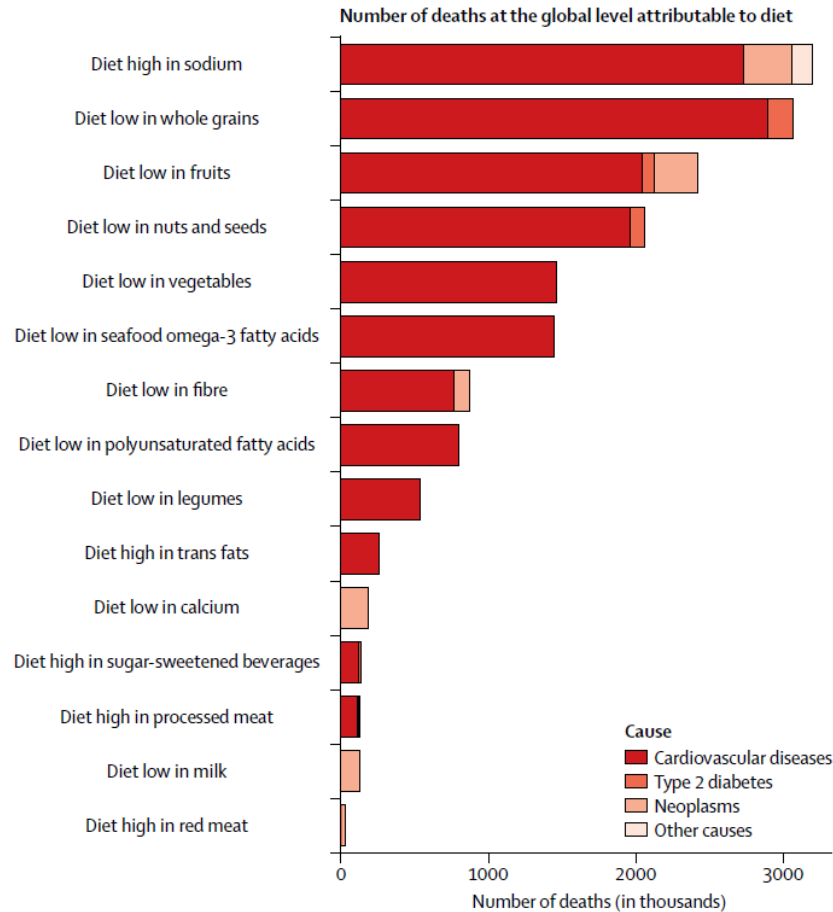
WHO Fact sheet 311 (2021) adults >18 years:

- 1.9 billion (39%) overweight
- 650 million (13%) obesity



70 % morbidity +mortality in the World

Number of deaths at the global level attributable to diet



Our health is more influenced by what we do not eat than by what we eat

Nutrition: Challenges + needs

Challenges

1. Unhealthy diets increase the burden of obesity and diet-related noncommunicable diseases
2. Food production contributes to environmental degradation
3. Growth of global population

Needs

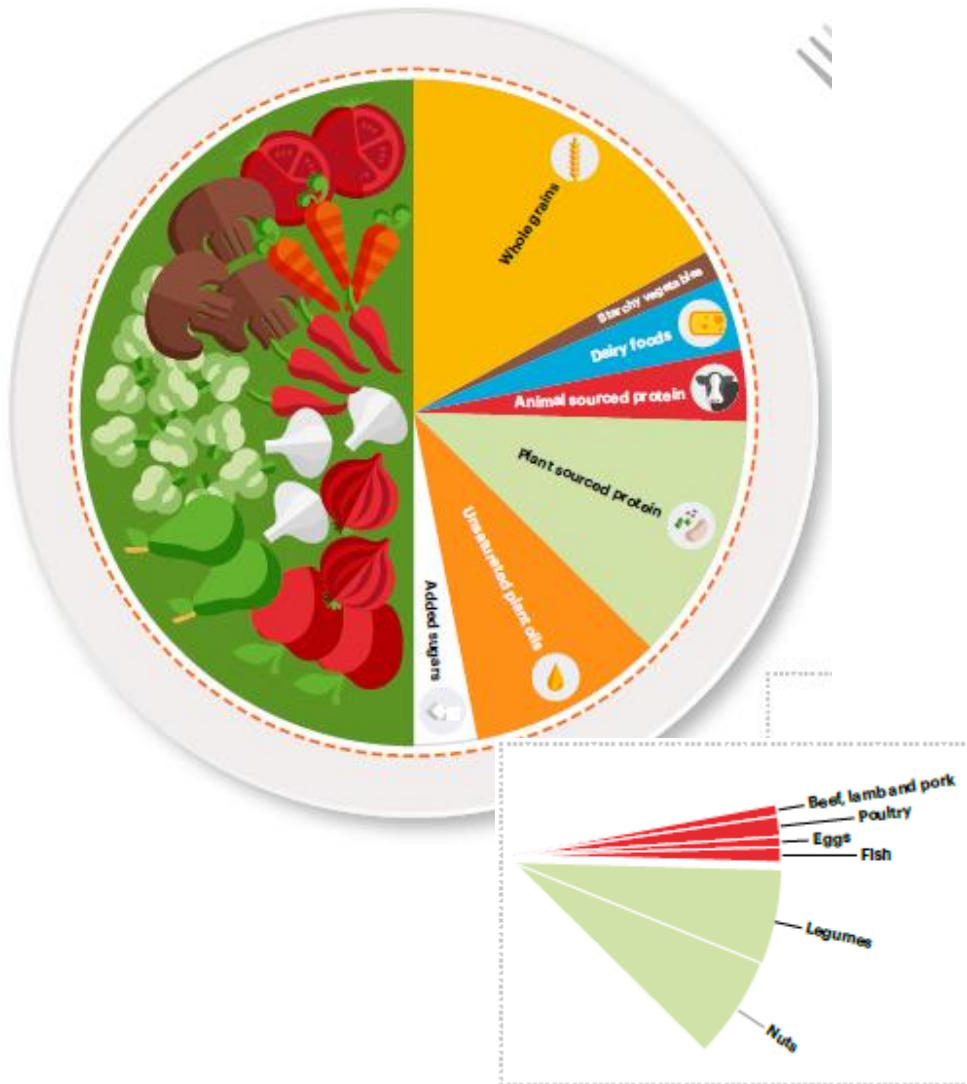
Global transformation of the food system:

1. Healthy diet
2. Sustainable food systems
3. 10 billion people to feed in 2050

Global transformation of the food system requires

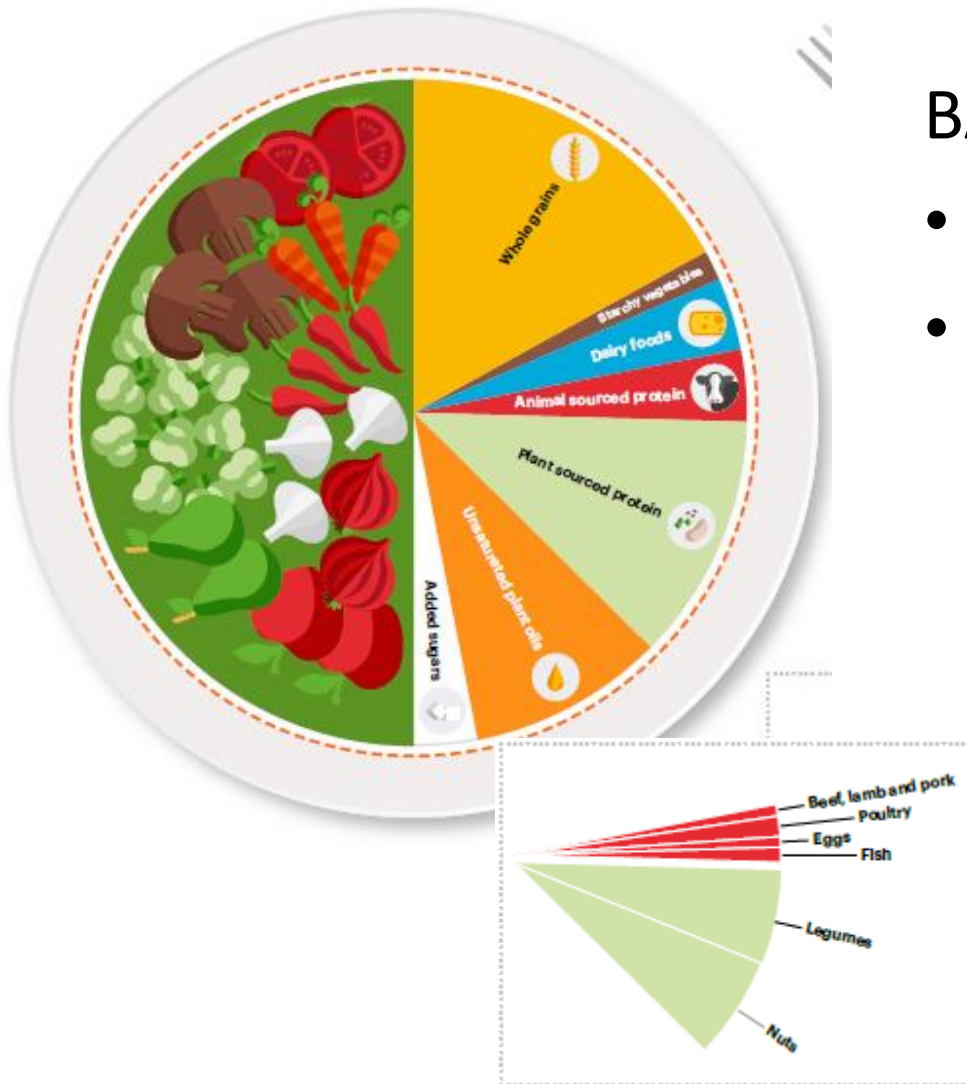
- Substantial **dietary shifts**, including
 - > 50% reduction in global consumption of unhealthy foods, such as red meat and sugar
 - > 100% increase in consumption of healthy foods, such as nuts, fruits, vegetables, and legumes.
 - The changes needed differ greatly by region
- **Transformation could avert about 11 million deaths per year** (19.0–23.6% reduction)
- Large **reductions in food losses and waste**
- Major **improvements in food production practices**

EAT + Lancet commission



- EAT (science-based global platform for food system transformation) + Lancet: commission of 37 experts from different fields
- 2019 Reference diet based on the best evidence for
 - healthy diet
 - from sustainable food systems

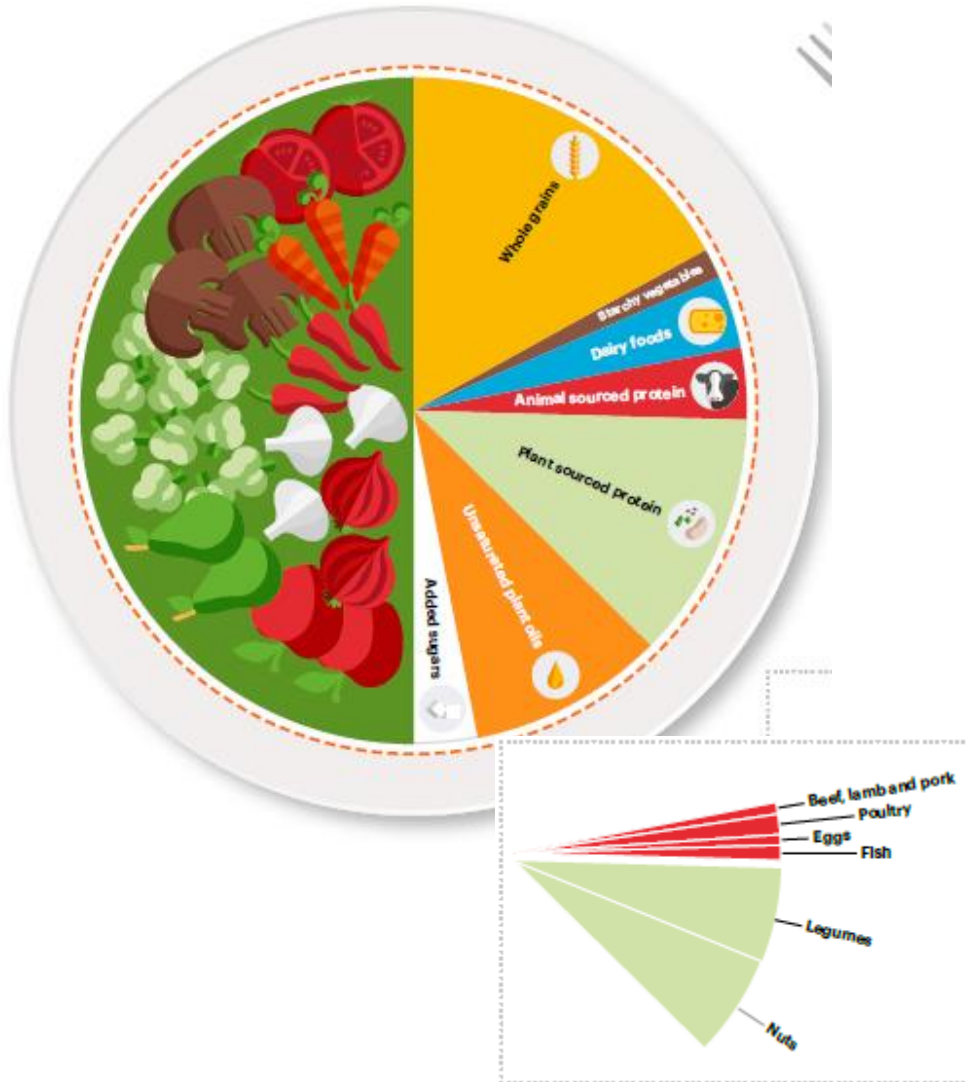
EAT 2019: Global reference diet



BASED ON:

- $\frac{1}{2}$ vegetables and fruits
- $\frac{1}{2}$ (by % of energy)
 - whole grain foods,
 - plant protein sources,
 - unsaturated vegetable oils

EAT 2019: Global reference diet



LITTLE

- Animal protein sources
- Refined cereals
- Saturated fat
- Ultra - processed foods
- Added sugar

EAT 2019: Global reference diet

	Macronutrient intake grams per day (possible range)	Caloric intake kcal per day
 Whole grains Rice, wheat, corn and other	232	811
 Tubers or starchy vegetables Potatoes and cassava	50 (0-100)	39
 Vegetables All vegetables	300 (200-600)	78
 Fruits All fruits	200 (100-300)	126
 Dairy foods Whole milk or equivalents	250 (0-500)	153
Protein sources		
 Beef, lamb and pork	14 (0-28)	30
 Chicken and other poultry	29 (0-58)	62
 Eggs	13 (0-25)	19
 Fish	28 (0-100)	40
 Legumes	75 (0-100)	284
 Nuts	50 (0-75)	291
Added fats		
 Unsaturated oils	40 (20-80)	354
Saturated oils	11.8 (0-11.8)	96
Added sugars		
 All sugars	31 (0-31)	120

- Does not mean that everyone should eat the same
- Intake ranges of foods provided
- Local adaptation required

**THE SHIFT TOWARDS PLANT-BASED
DIETS IN EU IS ACCELERATING**

What are plant-based diets?

- Diverse range of dietary patterns that emphasize foods derived from plant sources coupled with **lower consumption or exclusion of animal products**
 - Vegetarian diets form a subset of plant-based diets - exclude the consumption of some or all animal foods

Vegetarian diets

- **Vegan**
 - omit all animal products, including meat, dairy, fish, eggs and (usually) honey
- **Lacto-vegetarian**
 - exclude meat, fish, poultry and eggs, but include dairy products such as milk, cheese, yoghurt and butter.
- **Lacto-ovo vegetarian**
 - include eggs and dairy, but not meat or fish.
- **Ovo-vegetarian**
 - exclude meat, poultry, seafood and dairy products, but allow eggs.
- **Pesco-vegetarian (or pescatarian)**
 - include fish, dairy and eggs, but not meat
- **Semi-vegetarian (or flexitarian)**
 - primarily vegetarian but include meat, dairy, eggs, poultry and fish on occasion, or in small quantities

Plant based diets - Not all are healthy

- **Strict plant-based diets:** concerns about micronutrient deficiencies
- **Food selection**
 - **Healthy plant food groups:** whole grains, fruits, vegetables, nuts, legumes, vegetable oils, and tea/coffee
 - **Less healthy plant food groups:** fruit juices, sugar-sweetened beverages, refined grains, potatoes, and sweets/desserts
- **Food processing**
 - **Ultraprocessed foods (UPF)**

Food Processing

- Nutrients, food groups are important

... BUT

New dimension is emerging:

- Degree of industrial food processing



NOVA food classification system

first proposed by Monteiro et al. in 2009

NOVA food classification according to the degree of industrial food processing (Monteiro CA et al)

- **Group 1. Unprocessed or minimally processed food**
 - Edible parts of plants or of animals after separation from nature.
 - Allowed: drying, crushing, grinding, fractioning, filtering, roasting, boiling, non-alcoholic fermentation, pasteurization, refrigeration, chilling, freezing, placing in containers and vacuum-packaging
- **Group 2. Processed culinary ingredients and ingredients**
 - E.g. oils, butter, sugar and salt
- **Group 3. Processed food**
 - E.g. **preserved** vegetables, fish, compotes, cheeses and **freshly prepared pastries**; they may contain additives used to preserve their original properties or inhibit the growth of microbes (antioxidants, preservatives and stabilizers).

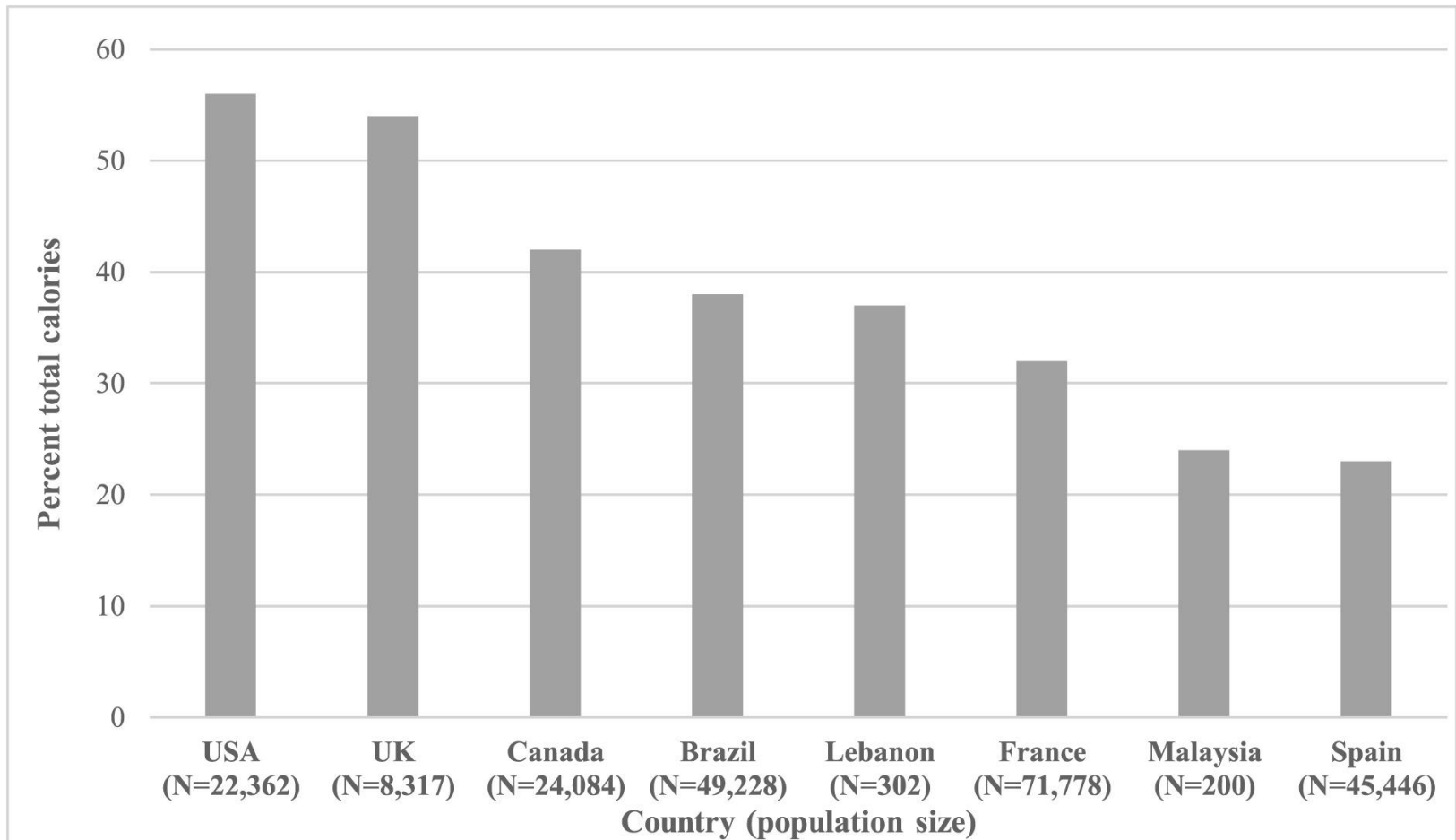
NOVA food classification according to the degree of industrial food processing (Monteiro CA et al)



Group 4. Ultraprocessed foods (UPF)

- Formulations of substances derived from foods, such as starches, sugars, fats, and protein isolates, with **little, if any, whole food**
- **Typically ≥ 5 ingredients**; often additives other than antioxidants, preservatives and stabilizers - often flavours, colours, emulsifiers, and other cosmetic additives
- The processing also includes **processes that are not used for cooking at home** (hydrogenation, hydrolysis, extrusion, pre-frying
- Usually **convenient to use, attractively packed and intensively promoted**
- Tend to have **high energy density, and to be high in sodium, saturated fat and free sugars**
- **Lacking in dietary fiber and in vitamins and minerals** found in unprocessed foods and minimally processed plant-based foods

The average intake of ultraprocessed food (% calories) by country



Obesity Reviews, Volume: 22, Issue: 3, First published: 09 November 2020, DOI: (10.1111/obr.13146)

Lane MM, et al. Ultraprocessed food and chronic noncommunicable diseases: A systematic review and meta-analysis of 43 observational studies.

UPF and health: review (Elisabeth 2020)

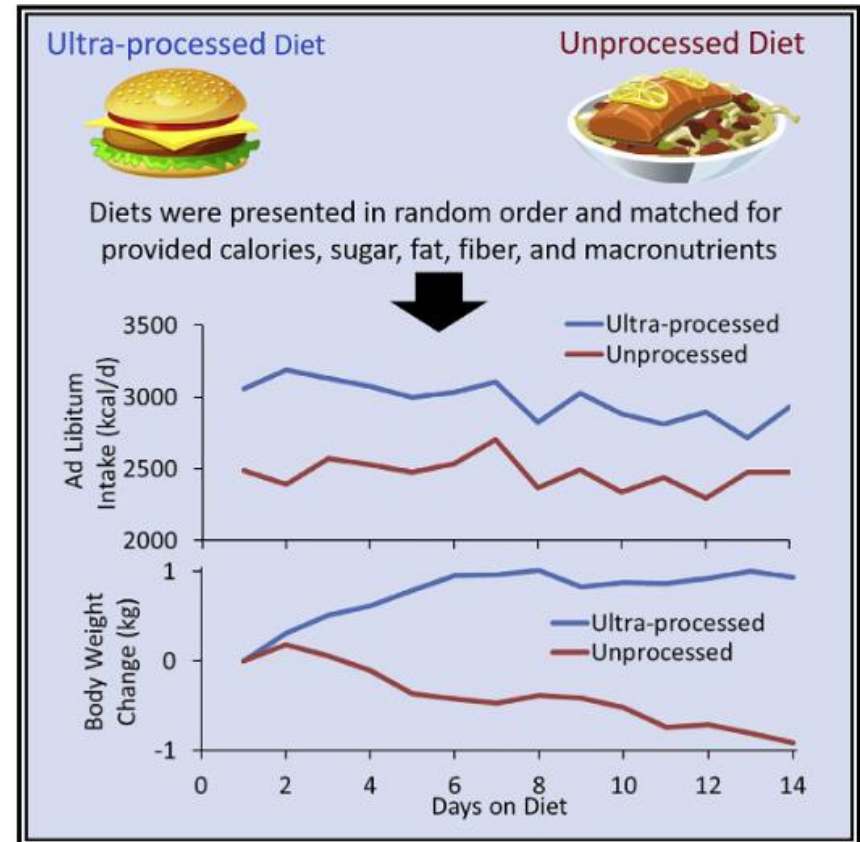
- Of 43 studies reviewed, 37 found dietary UPF exposure associated with **at least one adverse health outcome:**
 - overweight, obesity and cardio-metabolic risks;
 - cancer, type-2 diabetes and cardiovascular diseases;
 - irritable bowel syndrome,
 - depression and frailty conditions;
 - all-cause mortality.
- No study reported an association between UPF and beneficial health outcomes.

UPF and health: Causality

- Most findings derived from observational studies.
- Evidence still needs to be strengthened to establish a causal link
- Long term randomized controlled trials (RCT) are not feasible for ethical reasons
- Associations between UPF and health outcomes were observed even when overall poorer nutritional quality of UPF was fully accounted for in the models, suggesting that other factors probably play a role.
- The concept of ultra-processed foods (UPF) recognised as a descriptor of unhealthy diets.

2 week RCT: UPF diet led to increased energy intake and weight gain compared with an unprocessed diet

- An Inpatient Randomized Controlled Trial of Ad Libitum Food Intake
- 20 inpatient adults received ultra-processed and unprocessed diets for 14 days each
- Ad libitum **intake was approx. 500 kcal/day more on the ultra-processed versus unprocessed diet**
- Body weight changes were highly correlated with diet differences in energy intake



Hall KD 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 Jul 2;30(1):226.

Meta-analysis: Association of UPF consumption with the all-cause mortality risk

- Systematic review and meta-analysis evaluating the association of ultraprocessed food (UPF) consumption with the all-cause mortality risk. Five bibliographic databases were searched for relevant studies. Random effects models were used to calculate pooled relative risks (RR) and 95% confidence intervals (CI).
- 40 prospective cohort studies (from 1984 to 2021) comprising 5,750,133 individuals were included.
- Compared to low consumption, highest consumption of
 - UPF (RR=1.29, 95% CI 1.17-1.42),
 - sugar-sweetened beverages (RR=1.11, 95% CI, 1.04-1.18),
 - artificially sweetened beverages (RR=1.14, 95% CI, 1.05-1.22)
 - processed meat/red meat (RR=1.15, 95% CI, 1.10-1.21)

were significantly associated with increased risk of mortality.

Questions

1. What is characteristic of ultraprocessed foods?
2. What can you say about the relative risk and confidence interval in this study?
3. What can you say about the causal relationship between UPF consumption and overall mortality?

Apps Open Food Facts List of NOVA groups

4 - Ultra processed food and drink products

NOVA group : 4 - Ultra processed food and drink products

↳ 446,981 products

⌵ Recently modified products

🔍 Explore products by...

Classify the 100 products below according to your preferences

👤 Edit your food preferences

The screenshot displays a grid of 20 food products, all categorized as NOVA group 4 (Ultra processed food and drink products). Each product card includes an image, the product name, the manufacturer, weight, and a traffic light score. The products shown are:

- Zitrone kuchen - Dr.Oetker - 350g
- Fromage Au Chèvre - Maredsous - 200 g
- Céréales Trésor Kellogg's Chocoroulette - 620 g
- Rôti de porc - Casino - 150 g
- Guacamole - Hacendado - 200g
- Dessert végétal soja vanille
- Zwiebak - Burger - 225g
- Capuccino - Tizio - 250ml 263g
- Ail & Ciboulette - F - 175 ml
- Biscuit Assortement - Papagena Fine Bakeries - 200 g
- Вафлен десерт с какао и Фъстъци - Pobeda - 75 гр
- Creme douche nourrissante - L'Arbre Vert
- Naturel dressing - 250 ml

- <https://world.openfoodfacts.org/nova-groups>

NOVA group	Products	*
4 - Ultra processed food and drink products	446981	
Unknown	174131	*
3 - Processed foods	134538	
1 - Unprocessed or minimally processed foods	74631	
2 - Processed culinary ingredients	33928	

Plant based diets and UPF

Instead of unprocessed or minimally processed plant-based foods



... plant-based substitutes



- **Not all** plant-based meat and dairy substitutes can be classified as **UPFs** but **many are**
- Higher intake of plant-based UPF **might reduce or cancel their potential health benefits** described in studies

Study: Consumption of ultra-processed foods by pesco-vegetarians, vegetarians, and vegans

- A French study population (n = 21,212) was divided into 4 groups: 19,812 meat eaters, 646 pesco-vegetarians, 500 lacto-ovo/lacto/ovo vegetarians, and 254 vegans. Daily food intakes were collected using repeated 24-h dietary records.
- Higher avoidance of animal-based foods was associated with a higher consumption of ultra-processed foods (UPF) ($P < 0.001$), with UPFs supplying following % of energy intakes:
 - 33.0% for meat eaters
 - 32.5% for pesco-vegetarians
 - 37.0% for lacto-ovo/lacto vegetarians
 - **39.5% for vegans**
- A larger number of vegans and vegetarians favored more unhealthy plant-based foods over healthy plant-based foods than did meat eaters ($P < 0.001$).
- Short duration and young age at diet initiation were associated with an increased consumption of UPFs.

Questions

1. How would you characterize pesco-vegetarian, lacto-ovo-vegetarian, lacto-vegetarian, ovo-vegetarian and vegan diets?
2. What is characteristic of ultra-processed foods?
3. What can be considered healthy and what unhealthy plant foods?

Recommended reading

- **Plant-based diets and their impact on health, sustainability and the environment: a review of the evidence:** WHO European Office for the Prevention and Control of Noncommunicable Diseases. Copenhagen: WHO Regional Office for Europe; 2021
- [WHO-EURO-2021-4007-43766-61591-eng.pdf](#)

Advise on foods, food groups and dietary patterns
to provide the required nutrients to the general public
to promote overall health + prevent chronic diseases

FOOD BASED DIETARY GUIDELINES

Food-based dietary guidelines

- WHO: Healthy diet

<http://www.who.int/news-room/fact-sheets/detail/healthy-diet>

- WHO EURO: 12 steps to healthy eating

<http://www.euro.who.int/en/health-topics/disease-prevention/nutrition/a-healthy-lifestyle>

WHO: A healthy diet sustainably produced

<https://www.who.int/publications/i/item/WHO-NMH-NHD-18.12>

Food-based dietary guidelines

- > 100 countries have dietary guidelines developed by authoritative bodies
 - based on systematic reviews
 - adapted to their nutrition situation, food availability, culinary cultures and eating habits
 - wide range of dietary patterns are consistent with a healthy diet
- Available at <http://www.fao.org/nutrition/education/food-dietary-guidelines/en/>
- **Consistently advise:**
 - limit intake of saturated fat in favour of monounsaturated and polyunsaturated fats,
 - limit sugar and highly refined carbohydrates in favour of wholegrains, fresh fruit, and vegetables

DIETARY GUIDELINES Czech Rep.

Healthy 13 (2006, updated 2021)

[Zdravá třináctka – stručná výživová doporučení pro obyvatelstvo – Společnost pro výživu \(vyzivaspol.cz\)](#)

The Czech Society for Nutrition

The Czech Society for Nutrition (CSN) was established in 1945 as an association of professionals and workers in the field of human nutrition

Healthy 13

[01.pptx](#) Maintain an adequate **body weight**

[02.pptx](#) **Move** daily at least 30 minutes e.g. fast walk

[03.pptx](#) Eat a **variety of food; 3-5 daily**, do not skip breakfast

[04.pptx](#) Eat at least **400 g vegetables + fruits**, small amounts of nuts from time to time.

[05.pptx](#) Prefer **wholegrain products** (dark bread, wholegrain is best) or potatoes at most 4 times a day. **Legumes** at least once a week.

[06.pptx](#) Eat **fish** and fish products at least twice a week

[07.pptx](#) 7. Eat daily **milk + milk products**, especially fermented; preferably chose medium fat

[08.pptx](#) Monitor your **fat** consumption, limit your fat intake

[09.pptx](#) Limit your **sugar** consumption

[10.pptx](#) Limit your **salt** consumption

[11.pptx](#) **Prevent food borne infection & poisoning**; use **suitable methods of cooking**

[12.pptx](#) Drink sufficient quantities of **fluids**, at least 1.5 litre

[13.pptx](#) If you drink alcoholic beverages, **do not exceed daily intake of 20 g of alcohol** (women 10 g)

Thanks

