Ultra-processed foods: background, concepts and scientific evidence

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Changes in food purchases by the Brazilian population (1987-2009)

Sources: Brazilian Household Budget Surveys
Changes in food purchases by the Brazilian population (1987-2009)

Sources: Brazilian Household Budget Surveys
NOVA classification system and types of food processing: harmless, beneficial or essential processing

- **Unprocessed foods**
  - Industrial processing to increase the durability, optimize or shorten preparation time and modify sensory characteristics.
  - Removing non-edible parts, drying, freezing, pasteurization, fermentation, pressing, packaging, adding salt or sugar...

- **Processed foods**
  - Minimally processed foods
  - Processed culinary ingredients
  - Freshly prepared culinary preparations
NOVA classification system and types of food processing: harmful processing

Unprocessed foods → Several step of industrial processing: ultra-processing → Ready-to-eat industrial formulations of food-derived substances (oils, fats, sugars, starch, protein isolates) that contain little or no whole food and are often added with flavorings, colorings, emulsifiers and other cosmetic additives.

Whole foods broken down into components (oils / proteins / starch / sugar)
- Hydrogenation, hydrolysis and other chemical modifications
- “Recombination” (extrusion, immersion frying, etc.)
- Addition of flavorings, dyes, emulsifiers...
- Sophisticated packaging often with synthetic materials
Why avoid ultra-processed foods?
Impact of ultra-processed food consumption on children’s, adolescent’s and adult’s health: a systematic literature review.


**Children/adolescent**

- Bawaked et al., 2020
- Costa et al., 2020
- Cunha et al., 2018
- Costa et al., 2015
- Rauber et al., 2015
- Azeredo et al., 2020

**Cohort studies (n=25)**

- Obesity indicators, blood pressure* and dyslipidemia
- Obesity indicators
- Obesity indicators and glycemia
- Dyslipidemia*
- Asthma

**Case-control and cross-sectional studies (n=27)**

- Obesity indicators
- Obesity indicators and blood pressure* and dyslipidemia
- Obesity indicators and blood pressure
- Obesity indicators and glycemia
- Metabolic syndrome*
- Asthma*

**Adult**

- Obesity indicators*
- Obesity indicators*
- Obesity indicators*
- Obesity indicators*
- Obesity indicators*
- Hypertension*
- CVC disease*
- T2 Diabetes*
- T2 Diabetes*
- Cancer*
- All-cause mortality*
- All-cause mortality*
- All-cause mortality*
- All-cause mortality*
- Depression*
- Depression*
- Frailty*
- Inflammatory Bowel Diseases

- Obesity indicators
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Ultra-processed foods and obesity in adults


**Ultra-processed foods and obesity in adults**

- **Children/adolescent**
  - Cohort studies (n=25)
    - Obesity indicators
    - Obesity indicators and blood pressure
    - Obesity indicators and blood pressure and dyslipidemia
    - Obesity indicators and blood pressure and glycemia
    - Dyslipidemia
    - Asthma
  - Case-control and cross-sectional studies (n=27)
    - Obesity indicators
    - Obesity indicators and blood pressure
    - Obesity indicators and blood pressure and dyslipidemia
    - Obesity indicators and blood pressure and glycemia
    - Metabolic syndrome
    - Asthma
    - Asthma
- **Adult**
  - RCT (n=1)
    - Obesity indicators
    - Obesity indicators
    - Obesity indicators
  - Nationally representative samples from Brazil, US, UK, Australia and Canada

*Statistically significant dose-response associations*
Ultra-processed foods and obesity in adults

Ultra-processed foods and obesity in adults


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**Children/adolescent**

- Ultra-processed foods and obesity
- Obesity indicators, blood pressure* and dyslipidemia
- Obesity indicators* and glycemia
- Dyslipidemia*
- Asthma

**Adult**

- Obesity indicators*
- Obesity indicators* and gestational diabetes
- Metabolic syndrome*
- Metabolic syndrome*
- C-reactive Protein
- Cancer*
- Depression*
- Functional Gastrointestinal Disorders*

**Cohort studies** (n=25)

- Canhada et al., 2019
- Mendonça et al, 2016
- Rauber et al., 2020
- Vandevijvere et al., 2019
- PAHO, 2015
- Rohatgi et al., 2017 (pregnant woman)
- Mendonça et al., 2017
- Srour et al., 2019
- Srour et al., 2020
- Levy et al., 2020
- Fiolet et al, 2018
- Blanco-Rojo et al., 2019
- Rico-Campá et al., 2019
- Schnabel et al., 2019
- Kim et al., 2019
- Gómez-Donoso et al, 2019
- Adjibade et al., 2019
- Sandoval-Insausti et al., 2019
- Vasseur et al., 2020

**Case-control and cross-sectional studies** (n=27)

- Gadelha et al., 2019
- De Melo et al, 2017
- Enes et al., 2019
- D’Avilla et al., 2017
- Tavares et al., 2012
- Melo et al., 2018
- Elias et al., 2019
- Badanai et al., 2019

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*Statistically significant dose-response associations.
Ultra-processed diets cause excess calorie intake and weight gain.
Ultra-processed diets cause excess calorie intake and weight gain

Hall et al., 2019
Ultra-processed foods and cardiovascular disease, diabetes and cancer

Ultra-processed food intake and risk of cardiovascular disease: prospective cohort study (NutriNet-Santé)

Bernard Srour, Léopold K Fezeu, Emmanuelle Kesse-Guyot, Benjamin Allès, Caroline Méjean, Roland M Andriansolo, Eloi Chazelas, Mélanie Deschasaux, Serge Hercberg, Pilar Galan, Carlos A Monteiro, Chantal Julia, Mathilde Touvier

BMJ 2018;360:k322

Ultraprocessed Food Consumption and Risk of Type 2 Diabetes Among Participants of the NutriNet-Santé Prospective Cohort

Bernard Srour, PharmD, MPH, PhD; Léopold K. Fezeu, MD, PhD; Emmanuelle Kesse-Guyot, MSc, PhD; Benjamin Allès, PhD; Charlotte Debras, MSc; Nathalie Druesne-Pecollo, PhD; Eloi Chazelas, MSc; Mélanie Deschasaux, MSc, PhD; Serge Hercberg, MD, PhD; Pilar Galan, MD, PhD; Carlos A. Monteiro, MD, PhD; Chantal Julia, MD, MPH, PhD; Mathilde Touvier, PhD, MSc, MPH

JAMA Intern Med. 2020;180(2):283-291

Consumption of ultra-processed foods and cancer risk: results from NutriNet-Santé prospective cohort

Thibault Fiolet, Bernard Srour, Laury Sellem, Emmanuelle Kesse-Guyot, Benjamin Allès, Caroline Méjean, Mélanie Deschasaux, Philippe Fassier, Paule Latino-Martel, Marie Beslany, Serge Hercberg, Céline Lavalette, Carlos A Monteiro, Chantal Julia, Mathilde Touvier

BMJ 2019;365:l1949
Ultra-processed foods and depression
Ultra-processed foods and all-cause mortality

Association between consumption of ultra-processed foods and all cause mortality: SUN prospective cohort study
Anaïs Rico-Campà,1,2 Miguel A Martínez-González,1,2,3,4 Ismael Alvarez-Alvarez,1 Raquel de Deus Mendonça,1,5 Carmen de la Fuente-Arrillaga,1,2,3 Clara Gómez-Donoso,1 Maira Bes-Rastrollo1,2,3
BMJ 2019;365:l1949

Consumption of Ultra-Processed Foods and Mortality: A National Prospective Cohort in Spain
Ruth Blanco-Rojo, PhD; Helena Sandoval-Imsauti, MD, MPH; Esther López-García, MPharm, PhD; Auxiliadora Graciani, MD, PhD; Jose M. Ordovás, PhD; Jose R. Banegas, MD, PhD; Fernando Rodríguez-Artalejo, MD, PhD; and Pilar Guallar-Castillón, MD, PhD

Ultra-processed food intake and mortality in the United States: Results from the Third National Health and Nutrition Examination Survey (NHANES III 1988-1994)
Hyunju Kim1,2, Emily A. Hu2,3, and Casey M. Rebholz2,3

Association Between Ultraprocessed Food Consumption and Risk of Mortality Among Middle-aged Adults in France
Laure Schnabel, MD, MSc; Emmanuelle Kesse-Guyot, PhD; Benjamin Allès, PhD; Mathilde Touvier, PhD; Bernard Sourd, PharmD; Serge Hercberg, MD, PhD; Camille Buscail, MD, PhD; Chantal Julia, MD, PhD
Ultra-processed food and NCDs: mechanisms

Convenient, assessible, ready-to-eat, and “appealing”.

Higher energy intake rates (kcal/min) [Forde et al. (2020)]

Large portion sizes

Excessive and “mindless” calorie consumption

Replacement of freshly made meals based on unprocessed or minimally processed foods.
Ultra-processed food and NCDs: mechanisms

• Higher **energy density**, more **free sugar** and **saturated and trans fats**

• Less dietary **fiber, protein, vitamins and minerals** and **bioactive compounds**.

• Overall deterioration of the nutritional dietary quality demonstrated in nationally representative studies of 10 middle- and high-income countries.

Moubarac et al., 2017; Louzada et al., 2018; Cediel et al., 2018; Steele et al., Rauber et al., 2018, Marron-Ponce et al., 2019; Koiwai et al., 2019; Parra et al., 2019, Machado et al., 2019; Andrade et al. *unpublished*
Ultra-processed food and NCDs: mechanisms

- Sugars and oils/fats (often simultaneously and acellular)
- Cosmetic additives
- Destruction of food matrix
- Removal of water content

Higher glycemic response
Alteration of satiety control systems
Ultra-processed food and NCDs: mechanisms

- Sugars and oils/fats (often simultaneously and acellular)
- Cosmetic additives
- Destruction of food matrix
- Removal of water content

Higher glycemic response
Alteration of satiety control systems
Metabolic alterations and neoplastic lesions
Ultra-processed food and NCDs: mechanisms

Sugars and oils/fats (often simultaneously and acellular)

Cosmetic additives

Destruction of food matrix

Removal of water content

Higher glycemic response

Alteration of satiety control systems

Metabolic alterations and neoplastic lesions

Ultra-processed food and NCDs: mechanisms
Ultra-processed food and NCDs: mechanisms

- Neoformed contaminants
  - Nitrosamines
  - Acrylamide

- Plastic packaging
  - Bisphenol A

Increased risk of some chronic diseases such as cardiovascular diseases and cancer
Retail sales per capita of ultra-processed food and drink products in global regions, 2000 and 2013

PAHO, 215. Ultra-processed food and drink products in Latin America: Trends, impact on obesity, policy implications