GLI ULTRA-PROCESSED FOOD: ASPETTI TECNOLOGICI ED IMPLICAZIONI SENSORIALI

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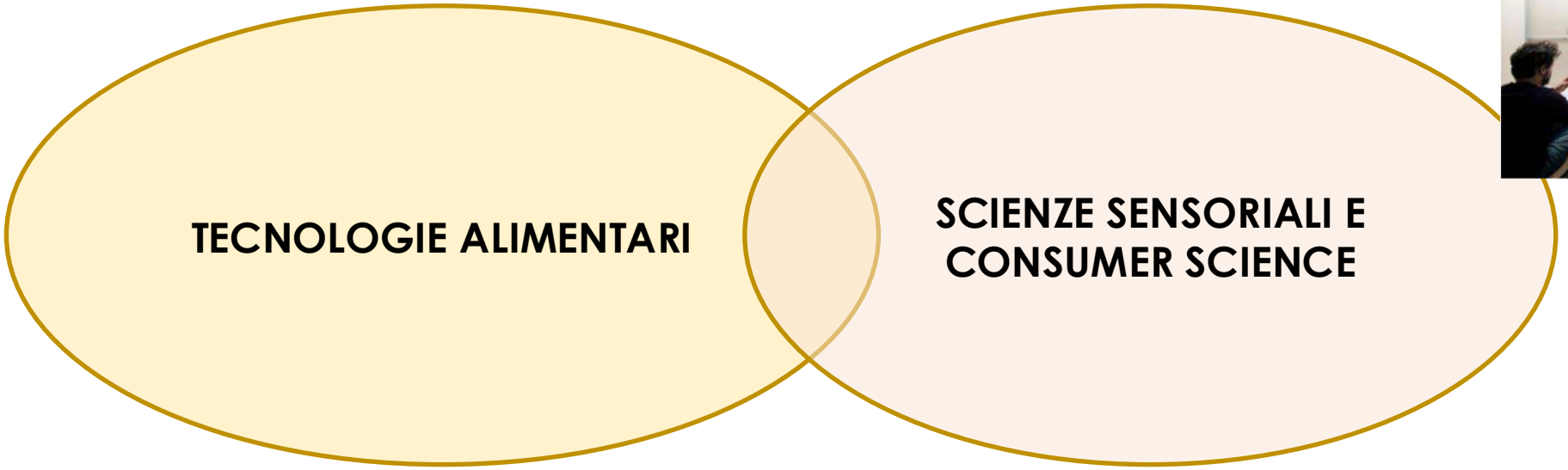
Contenuti dell'intervento



Food processing **Food experience**





- Che cosa cambia da un punto di vista qualitativo quando **trasformiamo** un alimento?
- Quali sono i **processi**, **ingredienti (formulazione**) e struttura/composizione caratteristici degli UPF?

- Qual sono le **proprietà sensoriali caratteristiche** degli UPF?
- Perché sono generalmente **graditi** dai consumatori?
- Quali implicazioni sui comportamenti alimentari e sulle diete?
- Ci sono particolari target sensibili?

Perché trasformiamo gli alimenti?

- **SICUREZZA** — Riduzione dei pericoli microbiologici, chimici e fisici, controllo della stabilità
- **CONSERVAZIONE** — Gestione dei principali parametri legati alla stabilità (acqua, temperatura, presenza di antimicrobici, etc.)
- **FRUIBILITA'** — Alimenti commestibili, pratici e disponibili nel tempo
- **PIACERE** — Soddisfare la dimensione edonica, la condivisione sociale, soddisfare *cravings*

Processo e formulazione: due piani distinti

Il processo

Quali **operazioni unitarie** subisce l'alimento?
The transformation of an ingredient or a food by physical, chemical, or biological means.
Frazionamento, modificazione, ricomposizione.

La formulazione

Quali **ingredienti** contiene e quale funzione svolgono?
The act of combining ingredients and additives with the purpose to create a specific functionality in a food, including texture, appearance, taste, smell, stability, and safety.

Ubbik et al. 2025

Le cinque gamme alimentari



I gamma
Freschi



II gamma
Conserve



III gamma
Surgelati



IV gamma
Freschi pronti all'uso
Minimalli processed



V gamma
Precotti



Le cinque gamme alimentari

Classificazione per preparazione e conservazione - esempi ortofrutticoli

Gamma	Caratteristiche essenziali	Conservazione*	Esempi
I · Freschi	Prodotti freschi, senza trattamenti di stabilizzazione	Secondo il prodotto, anche refrigerati	Ortaggi interi, frutta fresca
II · Conserve	Trattamento termico e confezionamento asettico ermetico	Ambiente, se confezione integra	Piselli in scatola, carote in barattolo
III · Surgelati	Surgelazione	Catena del freddo (surgelati: ≤ −18 °C)	Broccoli e minestrone surgelati
IV · Freschi pronti all'uso (minimamente processati)	Crudi, lavati, eventualmente porzionati e confezionati, pronti all'uso	Refrigerazione (4°C)	Insalata in busta, verdure crude da cuocere
V · Cotti pronti all'uso	Cotti e confezionati, pronti al consumo o da rinvenire	Generalmente refrigerati	Barbabietole cotte sottovuoto, verdure cotte

Le gamme non corrispondono ai gruppi NOVA e non esprimono un giudizio nutrizionale.

La qualità nutrizionale non è legata necessariamente alla gamma

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Original research article

Selected nutrient analyses of fresh, fresh-stored, and frozen fruits and vegetables

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ABSTRACT

This two-year study compared the status of targeted nutrients in selected fresh and frozen fruits and vegetables. In addition, a novel third category was examined—a "fresh-stored" categorization intended to mimic typical consumer storage patterns of produce following purchase (five days of refrigeration). Broccoli, cauliflower, corn, green beans, green peas, spinach, blueberries, and strawberries of all three categories of freshness were analyzed for their concentrations of L-ascorbic acid (vitamin C), *trans*-β-carotene (provitamin A), and total folate. Analyses were performed in triplicate on representative samples using standardized analytical methods and included a quality control plan for each nutrient. In the majority of comparisons between nutrients within the categories of fresh, frozen, and "fresh-stored", the findings showed no significant differences in assessed vitamin contents. In the cases of significant differences, frozen produce outperformed "fresh-stored" more frequently than "fresh-stored" outperformed frozen. When considering the refrigerated storage to which consumers may expose their fresh produce prior to consumption, the findings of this study do not support the common belief of consumers that fresh food has significantly greater nutritional value than its frozen counterpart.

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Elemento considerato	Contenuto dello studio
Prodotti	Broccoli, cavolfiori, mais, fagiolini, piselli, spinaci, mirtilli e fragole
Confronto	Fresco all'acquisto, fresco dopo 5 giorni di refrigerazione (simulazioni di situazione domestica), surgelato
Parametri misurati	Vitamina C, trans-β-carotene (provitamina A), folati totali

- Nella maggior parte dei confronti non emergono differenze significative sul contenuto di nutrienti target.
- Quando presenti, favoriscono più frequentemente il **surgelato** rispetto al fresco conservato che viceversa.

Impatto della trasformazione sulla qualità nutrizionale degli alimenti

In ogni fase della trasformazione, la qualità nutrizionale degli ingredienti e degli alimenti subisce modifiche, talvolta minime, spesso piuttosto significative, che possono avere effetti **benefici** o **sfavorevoli**.

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- **Aumento di biodisponibilità:** ↑ vitamina B3 (niacina) attraverso la cottura dei chicchi di mais in una soluzione alcalina (nixtamalizzazione), praticata da millenni dalle popolazioni native americane (Wacher 2004).

- **Riduzione dei fattori antinutrizionali:** ammollo e cottura dei legumi ↓ inibitori delle proteasi, ↓ lectine, ↓ acido fitico e tannini (Marcos-Méndez et al. 2021), oppure ammollo e pestatura della manioca, che favoriscono l'eliminazione dei glicosidi cianogenici (Montagnac et al. 2009).

- **Fortificazione nutrizionale:** aggiunta di micronutrienti essenziali per reintegrare le perdite di processo o arricchire gli alimenti (Allen et al. 2006, Bishai & Nalubola 2002).

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- **Rimozione di nutrienti:** la raffinazione dei cereali ↓ vitamine, minerali e fibra alimentare (Slavin et al. 2000).

- **Formazione di composti indesiderati**: alcuni processi possono generare sostanze tossiche o cancerogene, come acrilammide (Yaylayan & Stadler 2005) e idrocarburi policiclici aromatici (Guillen et al. 1997).

- **Degradazione di nutrienti per reazioni chimiche**: es. ossidazione di vitamine e carotenoidi nella trasformazione di frutta e verdura (Kong & Singh, 2016; Ordóñez-Santos & Martínez-Girón, 2020; Pénicaud et al., 2011).

Ultra-processed foods (UPF)

- Il termine cibi ultra-processati (Ultra-processed foods - UPF) è comunemente associato alla **classificazione NOVA** introdotta nel **2019*** da un gruppo di ricercatori per la **FAO**.
- Gli alimenti ultraprocessati (UPF) sono generalmente formulati per essere **comodi all'uso**, **conservabili** a lungo e **iperpalatabili**, spesso mediante l'impiego di **additivi alimentari** quali conservanti, emulsionanti, coloranti e aromi.
- Hanno spesso **un'elevata densità calorica** e per questo associati al termine '**Junk-food'**
- Gli UPF sono prevedono tipicamente diversi fasi di lavorazione (operazioni unitarie) e sono sottoposti a processi quali **stampaggio, estrusione, idrogenazione o frittura**.
- Gli UPF sono diventati ubiquitari nei sistemi alimentari occidentali dagli **anni '80** con l'intensificarsi **dell'industrializzazione** dei processi.

Monteiro, C.A., Cannon, G., Lawrence, M., Costa Louzada, M.L. and Pereira Machado, P. 2019. Ultra-processed foods, diet quality, and health using the NOVA classification system. Rome, FAO.

Additivi e coadiuvanti tecnologici

Gli **additivi alimentari** sono sostanze normalmente non consumate come alimenti in sé né utilizzate come ingredienti caratteristici, aggiunte intenzionalmente per uno **scopo tecnologico** e destinate a diventare, direttamente o tramite loro derivati, componenti dell'alimento. Esempi: conservanti, antiossidanti, emulsionanti e gelificanti.
Un **coadiuvante tecnologico** è una sostanza impiegata intenzionalmente per facilitare una fase della lavorazione alimentare. Tipicamente è rimosso alla fine del trattamento. Può lasciare nel prodotto finito soltanto residui tecnicamente inevitabili, sicuri e privi di effetti tecnologici.

	Additivo alimentare	**Coadiuvante tecnologico**
Finalità	Svolgere una funzione tecnologica nella produzione o conservazione dell'alimento.	Facilitare una fase della lavorazione o trasformazione.
Nel prodotto finito	La sostanza o i suoi derivati diventano componenti dell'alimento.	Possono rimanere **soltanto residui non intenzionali** e tecnicamente inevitabili, sicuri e **privi di effetti tecnologici**.
Etichettatura	Di norma: **categoria funzionale + nome o codice E**, ad esempio "emulsionante: lecitine" oppure "E322".	Di norma non compare nell'elenco ingredienti; resta l'obbligo di dichiarare eventuali allergeni presenti nel prodotto finito.

Reg. (CE) 1333/2008 e successive modifiche, art. 3, par. 2, lett. a–b (testo consolidato al **18 agosto 2026**);
Reg. (UE) 1169/2011, artt. 20–21 e allegato VII, parte C

C’è una classificazione univocamente accettata?

- Non c’è una classificazione univocamente accettata degli UPF dal Codex Alimentarius e dalla Comunità Europea!

Principi, criteri e limiti della classificazione NOVA

CONSIDERA

Principio	Che cosa considera
Tipologia e funzione degli ingredienti	Per identificare il gruppo 4, presenza di sostanze di uso culinario raro o assente, di **additivi** con funzione prevalentemente **sensoriale**, definiti dagli autori "**cosmetici**".
Natura e estensione della trasformazione	Quanto il prodotto conserva l'alimento originario oppure deriva dall'assemblaggio di sue frazioni.
Finalità della trasformazione	Conservare l'alimento, ottenere ingredienti culinari oppure creare formulazioni pronte al consumo con specifiche caratteristiche sensoriali e commerciali.

NON considera

Dimensione	Limite di NOVA
Profilo nutrizionale quantitativo	Non quantifica quanto una specifica lavorazione migliori o peggiori digeribilità, biodisponibilità e conservazione dei nutrienti. Non assegna il gruppo attraverso soglie di zuccheri, sale, grassi saturi, fibra o proteine. Prodotti della stessa classe possono avere composizioni molto diverse.
Intensità effettiva del processo	Non calcola una "dose di trasformazione" attraverso temperatura, durata, pressione o energia meccanica o numero di fasi.
Rischio del singolo prodotto	Non sostituisce una valutazione di sicurezza basata su sostanza, concentrazione ed esposizione.

Classificazione NOVA

GROUP 1 Unprocessed and minimally processed foods

Non trasformati/ minimamente processati

Frutta, latte semplice, carni fresche, uova, vegetali, acqua











NOVA GROUP	DEFINITION	EXAMPLES
|GROUP 1| Unprocessed or minimally processed foods	*Unprocessed* Edible parts of plants (fruit, seeds, leaves, stems, roots, tubers) or of or from animals (muscle, fat, offal, eggs, milk), and also fungi, algae, all after separation from nature. Spring and tap water. *Minimally processed* Unprocessed foods altered by industrial processes such as removal of inedible or unwanted parts, drying, powdering, squeezing, crushing, grinding, fractioning, steaming, poaching, boiling, roasting, and pasteurization, chilling, freezing, placing in containers, vacuum packaging, non-alcoholic fermentation, and other methods that do not add salt, sugar, oils or fats or other food substances to the original food. The main aim of these processes is to extend the life of unprocessed foods, enabling their storage for longer use, or to make them edible, and, often, to make their preparation easier or more diverse. Infrequently, minimally processed foods contain additives that prolong product duration, protect original properties or prevent proliferation of microorganisms.	Fresh, squeezed, chilled, frozen, or dried fruit and leafy and root vegetables; grains such as brown, parboiled or white rice, corn cob or kernel, wheat berry or grain; legumes such as beans, lentils, and chickpeas; starchy roots and tubers such as potatoes, sweet potatoes and cassava; fungi such as fresh or dried mushrooms; meat, poultry, fish and seafood, whole or in the form of steaks, fillets and other cuts; fresh, powdered, chilled or frozen eggs; fresh, powdered or pasteurized milk; fresh or pasteurized fruit or vegetable juices (with no added sugar, sweeteners or flavours); grits, flakes or flour made from corn, wheat, oats, or cassava; tree and ground nuts and other oily seeds (with no added salt or sugar); herbs and spices used in culinary preparations, such as thyme, oregano, mint, pepper, cloves and cinnamon, whole or powdered, fresh or dried; fresh or pasteurized plain yoghurt; tea, coffee, and drinking water. Also includes foods made up from two or more items in this group, such as dried mixed fruits, granola made from cereals, nuts and dried fruit with no added sugar, honey or oil; pasta, couscous and polenta made with flours, flakes or grits and water; and foods with vitamins and minerals added generally to replace nutrients lost during processing, such as wheat or corn flour fortified with iron and folic acid.

Classificazione NOVA

GROUP 2 Processed culinary ingredients –
Ingredienti culinari

Olio, burro, zucchero, sale









NOVA GROUP	DEFINITION	EXAMPLES
|GROUP 2| Processed culinary ingredients	Substances obtained directly from group 1 foods or from nature by industrial processes such as pressing, centrifuging, refining, extracting or mining. Used to prepare, season and cook group 1 foods. May contain additives that prolong product duration, protect original properties or prevent proliferation of microorganisms.	Vegetable oils crushed from seeds, nuts or fruit (notably olives); butter and lard obtained from milk and pork; sugar and molasses obtained from cane or beet; honey extracted from combs and syrup from maple trees; starches extracted from corn and other plants; vegetable oils with added anti-oxidants; salt mined or from seawater, and table salt with added drying agents. Also includes products consisting of group 2 items, such as salted butter, and group 2 items with added vitamins or minerals, such as iodised salt.

Classificazione NOVA

GROUP 3 Processed foods - Trasformati

Conserve con sale (legumi, vegetali), derivati della carne e prodotti ittici trasformati,
Formaggi e latticini

NOVA GROUP	DEFINITION	EXAMPLES
[GROUP 3] Processed foods	Products made by adding salt, oil, sugar or other group 2 ingredients to group 1 foods, using preservation methods such as canning and bottling, and, in the case of breads and cheeses, using non-alcoholic fermentation. Processes and ingredients here are designed to increase the durability of group 1 foods and make them more enjoyable by modifying or enhancing their sensory qualities. They may contain additives that prolong product duration, protect original properties, or prevent proliferation of microorganisms.	Canned or bottled vegetables and legumes in brine; salted or sugared nuts and seeds; salted, dried, cured, or smoked meats and fish; canned fish (with or without added preservatives); fruit in syrup (with or without added anti-oxidants); freshly made unpackaged breads and cheeses.









Classificazione NOVA

GROUP 4 Ultra-processed foods – Ultra-trasformati

Formulazioni **industriali** con ingredienti e **additivi** caratteristici.

|GROUP 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 (hence 'ultra-processed'). Processes used to make ultra-processed foods include the fractioning of whole foods into substances, chemical modifications of these substances, assembly of unmodified and modified food substances using industrial techniques such as extrusion, moulding and pre-frying; use of additives at various stages of manufacture whose functions include making the final product palatable or hyper-palatable; and sophisticated packaging, usually with plastic and other synthetic materials. Ingredients include sugar, oils or fats, or salt, generally in combination, and substances that are sources of energy and nutrients that are of no or rare culinary use such as high fructose corn syrup, hydrogenated or interesterified oils, and protein isolates; classes of additives whose function is to make the final product palatable or more appealing such as flavours, flavour enhancers, colours, emulsifiers, and sweeteners, thickeners, and anti-foaming, bulking, carbonating, foaming, gelling, and glazing agents; and additives that prolong product duration, protect original properties or prevent proliferation of microorganisms.

Processes and ingredients used to manufacture ultra-processed foods are designed to create highly profitable products (low-cost ingredients, long shelf-life, emphatic branding), convenient (ready-to-consume) hyper-palatable products liable to displace freshly prepared dishes and meals made from all other NOVA food groups.

Adapted from Monteiro *et al.*, 2017a.

Many ready-to-consume products such as carbonated soft drinks; sweet or savoury packaged snacks; chocolate, candies (confectionery); ice-cream; mass-produced packaged breads and buns; margarines and other spreads; cookies (biscuits), pastries, cakes, and cake mixes; breakfast 'cereals', 'cereal' and 'energy' bars; 'energy' drinks; milk drinks, 'fruit' yoghurts and 'fruit' drinks; 'cocoa' drinks; 'instant' sauces.

Many pre-prepared ready-to-heat products including pies and pasta and pizza dishes; poultry and fish 'nuggets' and 'sticks', sausages, burgers, hot dogs, and other reconstituted meat products; and powdered and packaged 'instant' soups, noodles and desserts.

Infant formulas, follow-on milks, other baby products; 'health' and 'slimming' products such as meal replacement shakes and powders.













Pane fresco



DENOMINAZIONE DI VENDITA
Pane di tipo 1

INGREDIENTI: farina di frumento, acqua, sale, lievito madre.

NOVA 3 – Trasformato
A partire da alimenti e ingredienti culinari.



DENOMINAZIONE DI VENDITA
Pane ai cereali con semi di sesamo, girasole, lino e fiocchi di farro

INGREDIENTI: farina di grano tenero tipo 00, miscela multicereali e multisemi 39,9% [farina di grano tenero tipo 00, semi di sesamo 12%, soia integrale, farina di mais, semi di lino 7%, farina di segale integrale, fiocchi di avena, sale marino iodato (sale, iodato di potassio), farina di orzo, pasta acida essiccata (contiene frumento), miglio, glutine di frumento, farina di malto di frumento], acqua, lievito di birra. Decorato in superficie con: semi di sesamo 2,5%, semi di girasole 1,4%, semi di lino 1,3%, fiocchi di grano farro 1,1%.

NOVA 4 – Ultraprocessato
Per presenza di glutine.

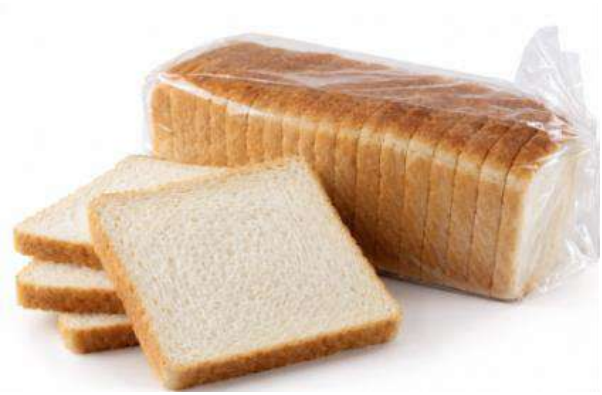
Pane in cassetta



DENOMINAZIONE DI VENDITA
Pane di tipo "0" con olio extravergine di oliva 2,4%

INGREDIENTI : Farina di grano tenero tipo "0" 71,7%*, Acqua, Olio extra vergine di oliva 2,4%*, Lievito, Sale, Farina d'orzo maltato, Trattato con alcool etilico in superficie

NOVA 3 – Trasformato
La forma, l'affettatura e il confezionamento non bastano a renderlo UPF.



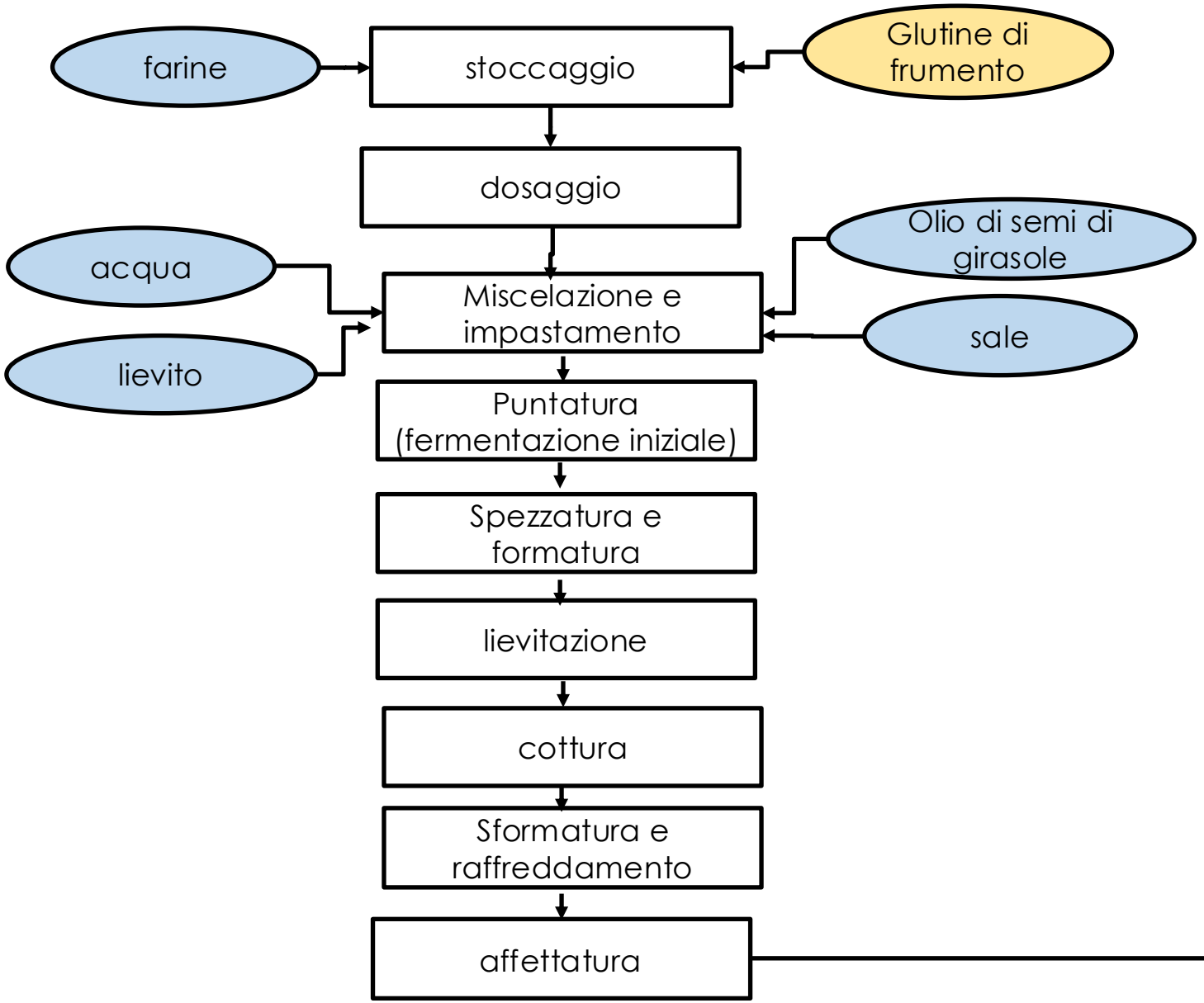
DENOMINAZIONE DI VENDITA
Pane di tipo "0" con olio di semi di girasole

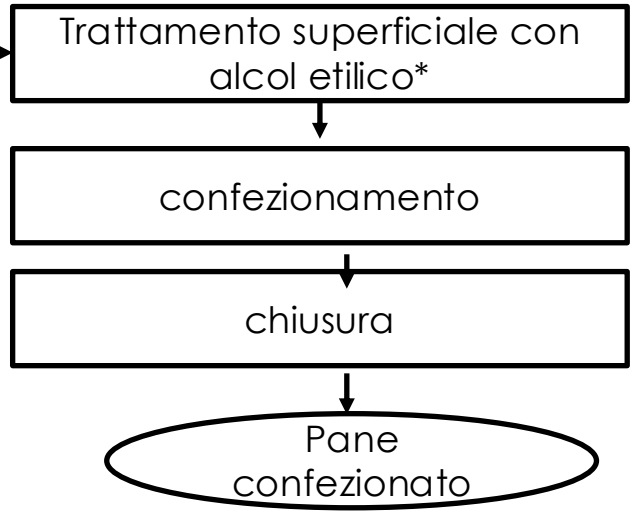
Ingredienti: farina di frumento, acqua, lievito, olio di semi di girasole, destrosio, emulsionanti (E471 - mono- e digliceridi degli acidi grassi)), aromi, conservante (E282 – acido propionico).

NOVA 4 – Ultraprocessato
Per presenza di emulsionanti, aromi conservanti

Diagramma di flusso di produzione industriale del pane in casetta





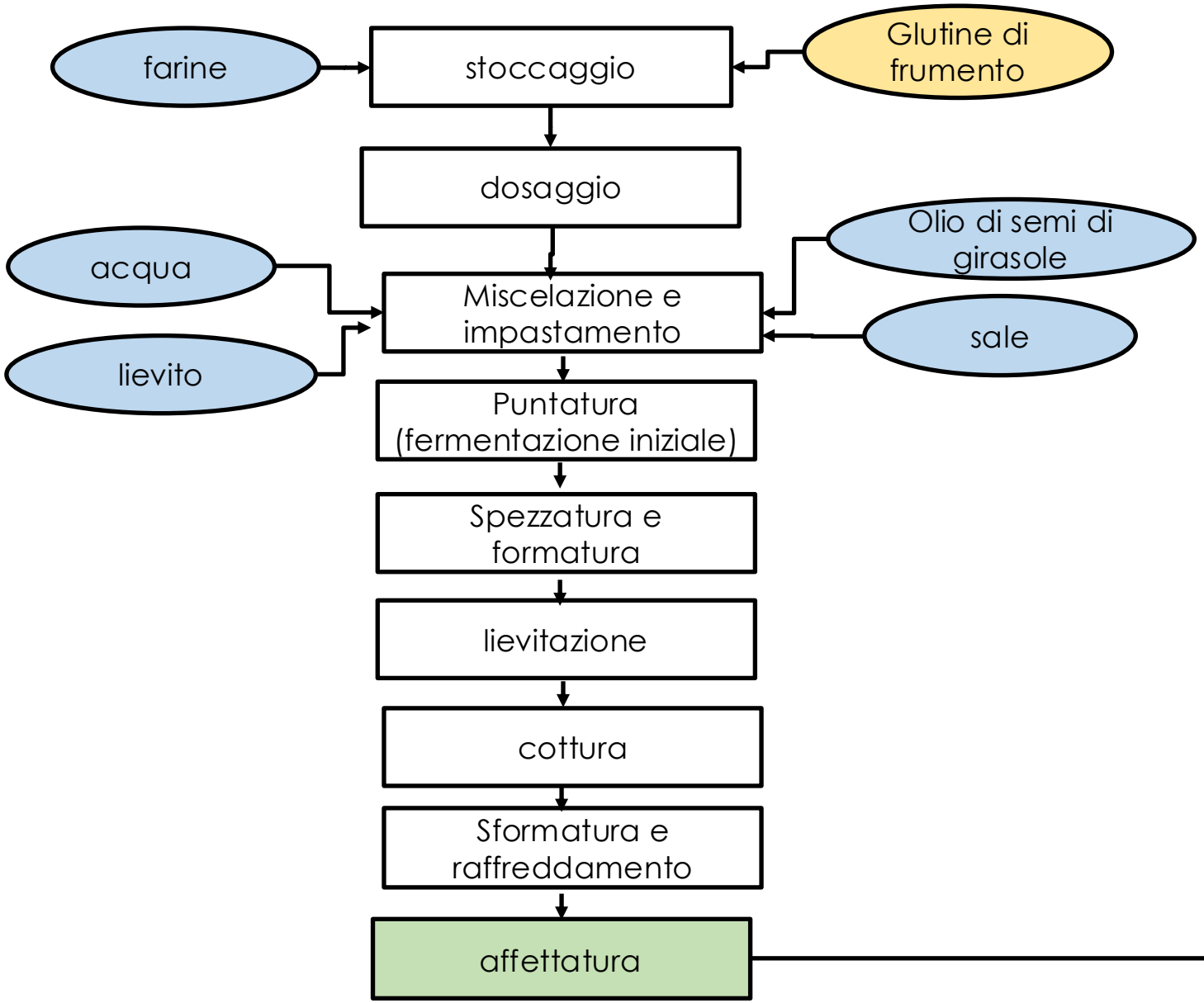


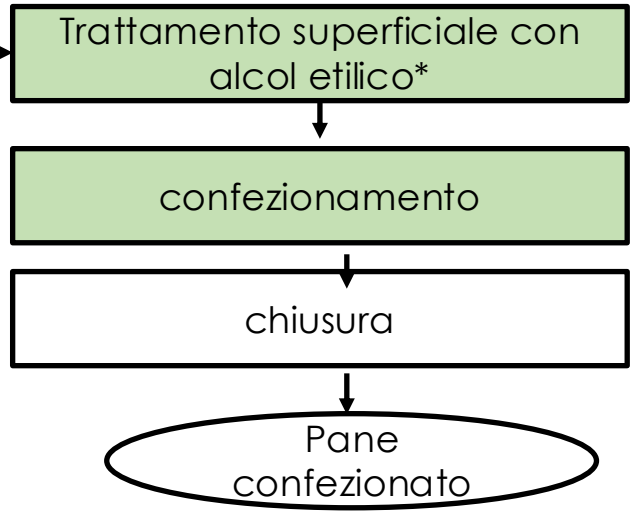
La presenza nel processo produttivo di operazioni unitarie caratteristiche solo dei sistemi meccanizzati (industriali) non è, di per sé, requisito sufficiente a rendere il prodotto di classe 4.

*«Trattamento superficiale con alcol etilico a funzione conservante antimicotica, autorizzato dal D.M. 312/1998».

Diagramma di flusso di produzione industriale del pane in casetta







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*«Trattamento superficiale con alcol etilico a funzione conservante antimicotica, autorizzato dal D.M. 312/1998».

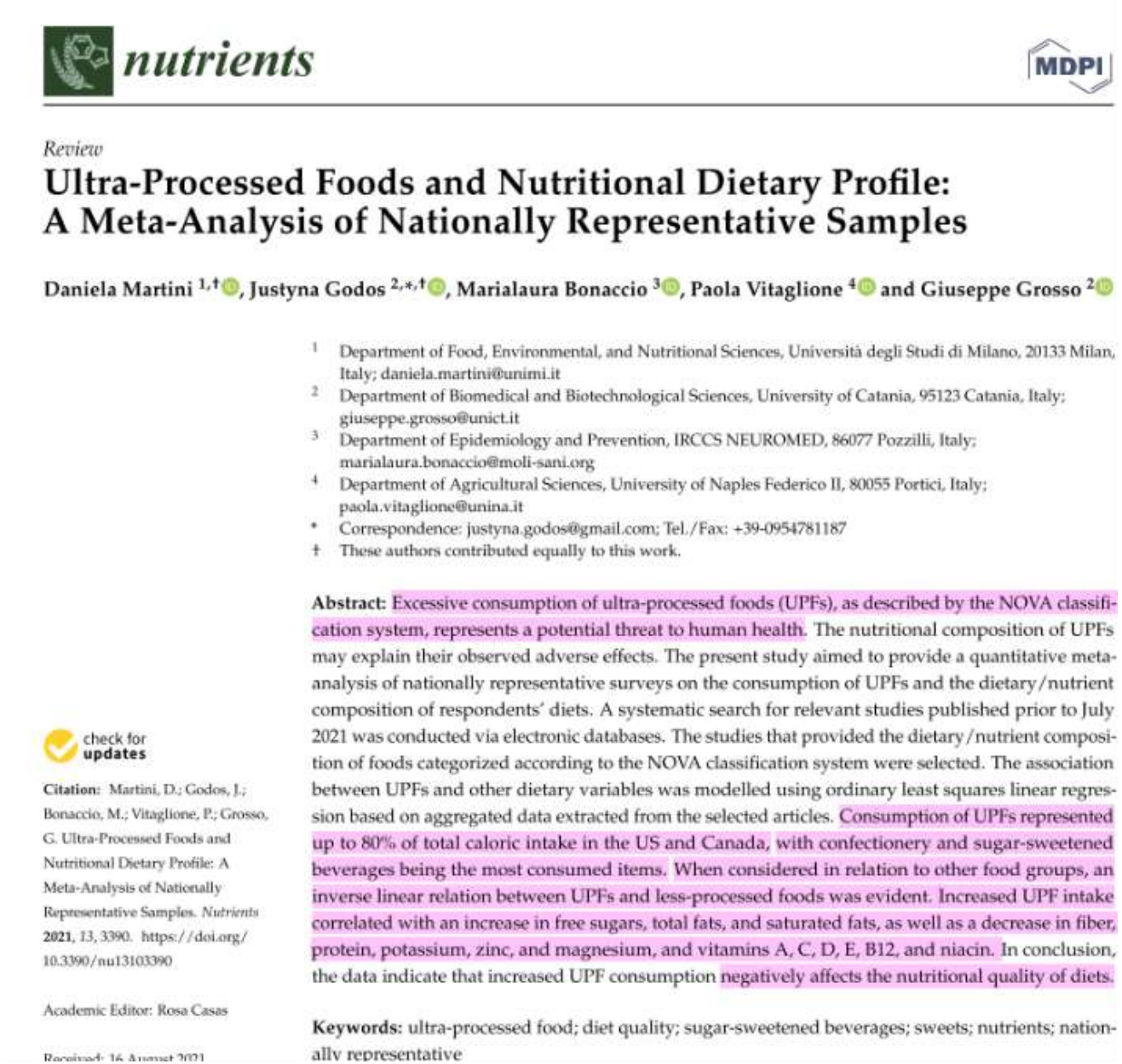
Trattamento superficiale con alcol etilico

- **Non è un coadiuvante:** l'alcol continua a esercitare un effetto antimuffa nel pane confezionato. Il **Reg. (CE) n. 1333/2008, art. 3, par. 2, lett. b)** sui coadiuvanti tecnologici richiede invece che gli eventuali residui di un coadiuvante **non abbiano effetti tecnologici sul prodotto finito**. EUR-Lex

- L'alcol etilico **non è un additivo alimentare** dell'elenco **UE del Reg. (CE) 1333/2008** e non ha un codice E assegnato in tale elenco.

- **Qual è il suo inquadramento specifico:** il **D.M. 13 luglio 1998, n. 312** ne autorizza il trattamento sul pane speciale preconfezionato per l'azione conservativa antimicotica, in sostituzione di determinati conservanti. L'**art. 4** prescrive la dicitura **«Trattato con alcool etilico»**.

Ultra-processed foods (UPF) e dieta



nutrients

MDPI

Review

Ultra-Processed Foods and Nutritional Dietary Profile: A Meta-Analysis of Nationally Representative Samples

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Abstract: Excessive consumption of ultra-processed foods (UPFs), as described by the NOVA classification system, represents a potential threat to human health. The nutritional composition of UPFs may explain their observed adverse effects. The present study aimed to provide a quantitative meta-analysis of nationally representative surveys on the consumption of UPFs and the dietary/nutrient composition of respondents' diets. A systematic search for relevant studies published prior to July 2021 was conducted via electronic databases. The studies that provided the dietary/nutrient composition of foods categorized according to the NOVA classification system were selected. The association between UPFs and other dietary variables was modelled using ordinary least squares linear regression based on aggregated data extracted from the selected articles. Consumption of UPFs represented up to 80% of total caloric intake in the US and Canada, with confectionery and sugar-sweetened beverages being the most consumed items. When considered in relation to other food groups, an inverse linear relation between UPFs and less-processed foods was evident. Increased UPF intake correlated with an increase in free sugars, total fats, and saturated fats, as well as a decrease in fiber, protein, potassium, zinc, and magnesium, and vitamins A, C, D, E, B12, and niacin. In conclusion, the data indicate that increased UPF consumption negatively affects the nutritional quality of diets.

Keywords: ultra-processed food; diet quality; sugar-sweetened beverages; sweets; nutrients; nationally representative

check for updates

Citation: 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*, 3390. https://doi.org/10.3390/nu13103390

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- Associa un maggiore consumo di UPF a più **zuccheri liberi e grassi saturi** e **a minori apporti di fibra e diversi micronutrienti**.
- Un aumento del consumo di UPF impatta **negativamente sulla qualità** della dieta.

Martini, D., Godos, J., Bonaccio, M., Vitaglione, P., & Grosso, G. (2021). *Ultra-Processed Foods and Nutritional Dietary Profile: A Meta-Analysis of Nationally Representative Samples.* Nutrients, 13(10), 3390

Ultra-processed foods (UPF) e salute



Ultra-Processed Foods and Human Health 1

Ultra-processed foods and human health: the main thesis and the evidence

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This first paper in a three-part *Lancet* Series combines narrative and systematic reviews with original analyses and meta-analyses to assess three hypotheses concerning a dietary pattern based on ultra-processed foods. The first hypothesis—that this pattern is globally displacing long-established diets centred on whole foods and their culinary preparation as dishes and meals—is supported by decades of national food intake and purchase surveys, and recent global sales data. The second—that this pattern results in deterioration of diet quality, especially in relation to chronic disease prevention—is confirmed by national food intake surveys, large cohorts, and interventional studies showing gross nutrient imbalances; overeating driven by high energy density, hyper-palatability, soft texture, and disrupted food matrices; reduced intake of health-protective phytochemicals; and increased intake of toxic compounds, endocrine disruptors, and potentially harmful classes and mixtures of food additives. The third and final hypothesis—that this pattern increases the risk of multiple diet-related chronic diseases through various mechanisms—is substantiated by more than 100 prospective studies, meta-analyses, randomised controlled trials, and mechanistic studies, covering adverse outcomes across nearly all organ systems. The totality of the evidence supports the thesis that displacement of long-established dietary patterns by ultra-processed foods is a key driver of the escalating global burden of multiple diet-related chronic diseases. Two companion papers in this Series specify policy actions and wider public health strategies to promote, protect, and support diets based on fresh and minimally processed foods and prevent their displacement by ultra-processed foods.

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See Comment pages 2608 and 2610

This is the first in a Series of three papers about ultra-processed foods and human health. All papers in the Series are available at thelancet.com/series/ultra-processed-food

Un maggiore consumo di alimenti ultra-processati si associa a una peggiore qualità nutrizionale della dieta e a un **maggior** rischio di insorgenza di **obesità, diabete di tipo 2, malattie cardiovascolari e mortalità**.

Monteiro CA, Louzada MLC, Steele-Martinez E, Cannon G, Andrade GC, Baker P, Bes-Rastrollo M, Bonaccio M, Gearhardt AN, Khandpur N, et al. 2025. Ultra-processed foods and human health: the main thesis and the evidence. Lancet [Internet]. 406(10520):2667–2684. https://doi.org/10.1016/S0140-6736(25)01565-X

Ultra-processed foods (UPF) e dieta

Come atteso, c'è una differenza nella geografia dei consumi di UPF.

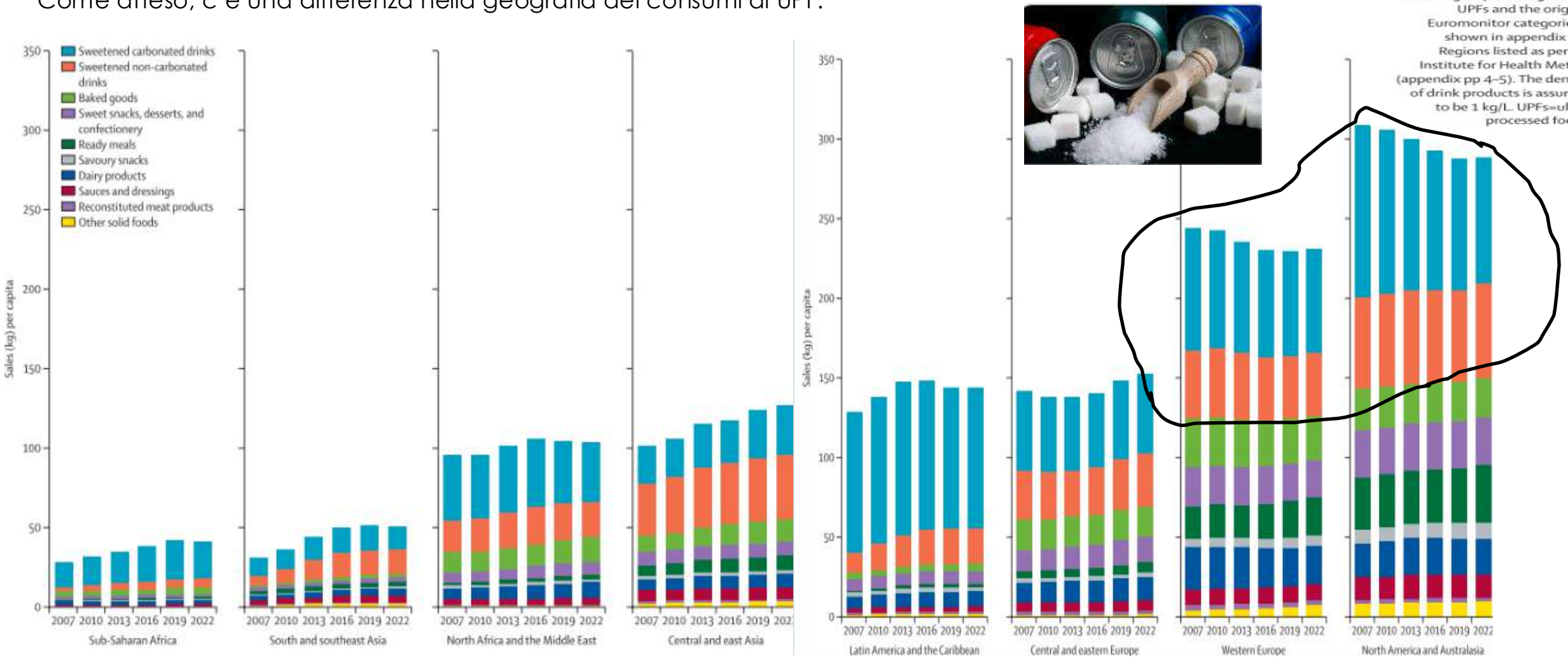

***Figure 3*: Time trends in Euromonitor International's food sales data of UPFs (in kg per capita) in 93 countries grouped according to region, 2007–22**
The correspondence between the ten grouped categories of UPFs and the original Euromonitor categories is shown in appendix p 3. Regions listed as per the Institute for Health Metrics (appendix pp 4–5). The density of drink products is assumed to be 1 kg/L. UPFs=ultra-processed foods.

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Consumo degli Ultra-processed foods

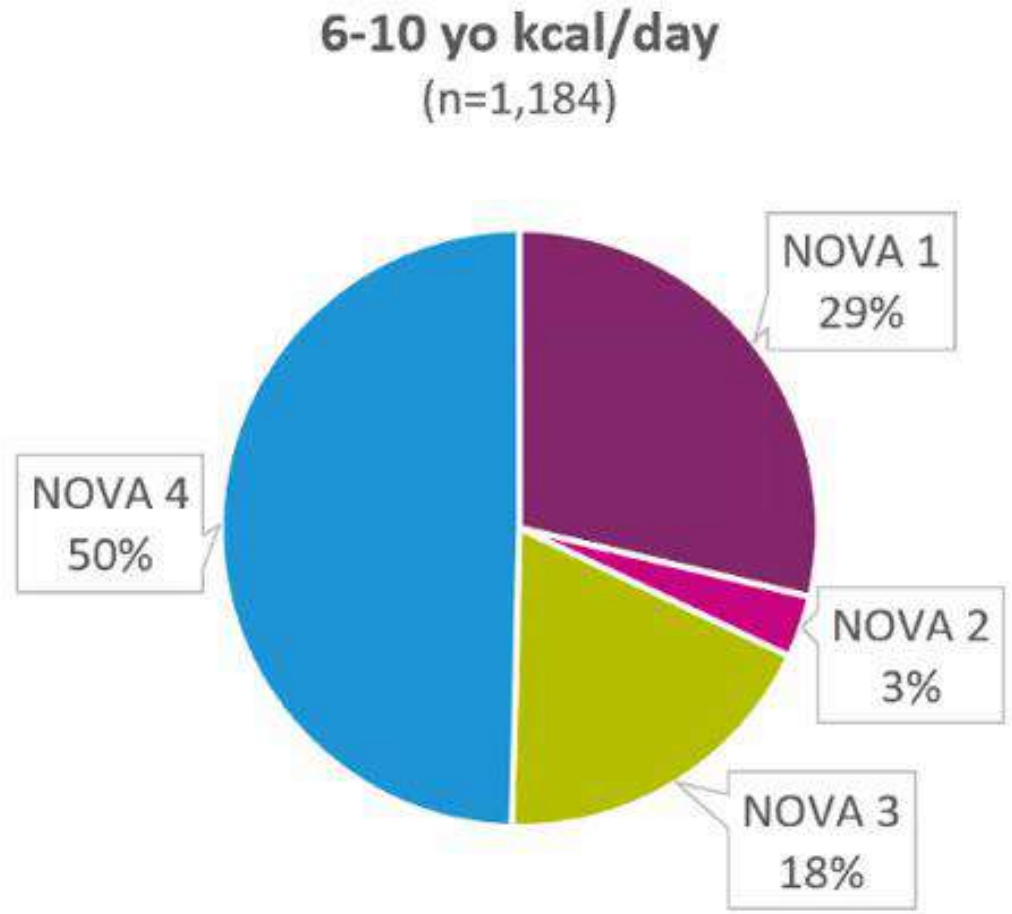
- Ultraprocessed food (UPFs) consumption is very high in certain Western contries: in Swiss **adults 36%** of total daily energy intake come from UPFs and the consumption is higher amongs younger adults aged 18-29 years old (Bertoni et al 2022)

- In **children and adolescents**, the high consumption of UPFs is associated with:

Reduced cognitive function in 4-7 y.o. children (Liu et al. 2023)
Reduced cooking skills and knowledge on nutritional properties of food (Ares et al. 2024)
Higher dependence on convinience food (Silva et al., 2023)



Consumo degli Ultra-processed foods nei bambini



Lauria, F., Dello Russo, M., Formisano, A., De Henauw, S., Hebestreit, A., Hunsberger, M., Krogh, V., Intemann, T., Lissner, L., Molnar, D., Moreno, L. A., Reisch, L. A., Tornaritis, M., Veidebaum, T., Williams, G., Siani, A., & Russo, P. (2021). Ultra-processed foods consumption and diet quality of European children, adolescents and adults: Results from the I.Family study. Nutrition, *Metabolism and Cardiovascular Diseases*

Comparative Study > Nutr Metab Cardiovasc Dis. 2021 Oct 28;31(11):3031-3043.
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Ultra-processed foods consumption and diet quality of European children, adolescents and adults: Results from the I.Family study

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Affiliations + expand

PMID: 34518085 DOI: 10.1016/j.numecd.2021.07.019

Abstract

Background and aims: Food processing has been indicated as a factor capable of negatively affecting the global food system, including the profile of consumers' diets. The objectives of the present study were to provide a description of the consumption of ultra-processed foods (UPFs) in the large population of children, adolescents and adults from eight European countries participating to the I.Family study, and to investigate the association between UPFs intake and nutritional quality of the diet.

Methods and results: Dietary intake was assessed using a 24-h dietary recall. The quality of the diet was evaluated by the Healthy Dietary Adherence Score (HDAS) using an FFQ. UPFs were classified according to the NOVA classification. Almost half of the daily energy intake of the 7073 participants came from UPFs, and this trend decreased progressively with age. UPFs contributed more than 50 % of the daily intake of total and saturated fat, carbohydrates and about 70 % of sugars intake in children and adolescents. No differences in UPFs consumption were found according to the educational and socio-economic status of the population. Energy intake increased across the quintiles of UPFs intake, while HDAS decreased. The frequency of consumption of fruit and vegetable, fish, and fibre rich foods was low in the fifth quintile of UPFs intake, both in adolescents and in adults. The consumption of foods rich in calories and low in nutritional content, operationally defined as "junk food", was significantly higher in the fifth quintile.

Conclusions: In the population of the European I.Family study, UPFs contributed a large proportion of the daily energy intake, especially in children and adolescents. Higher consumption of UPFs was associated with a lower quality of the diet.

Registration number for clinical trials: ISRCTN62310987.

Keywords: Adolescents; Adults; Children; Diet quality; Nova classification; Ultra-processed foods.

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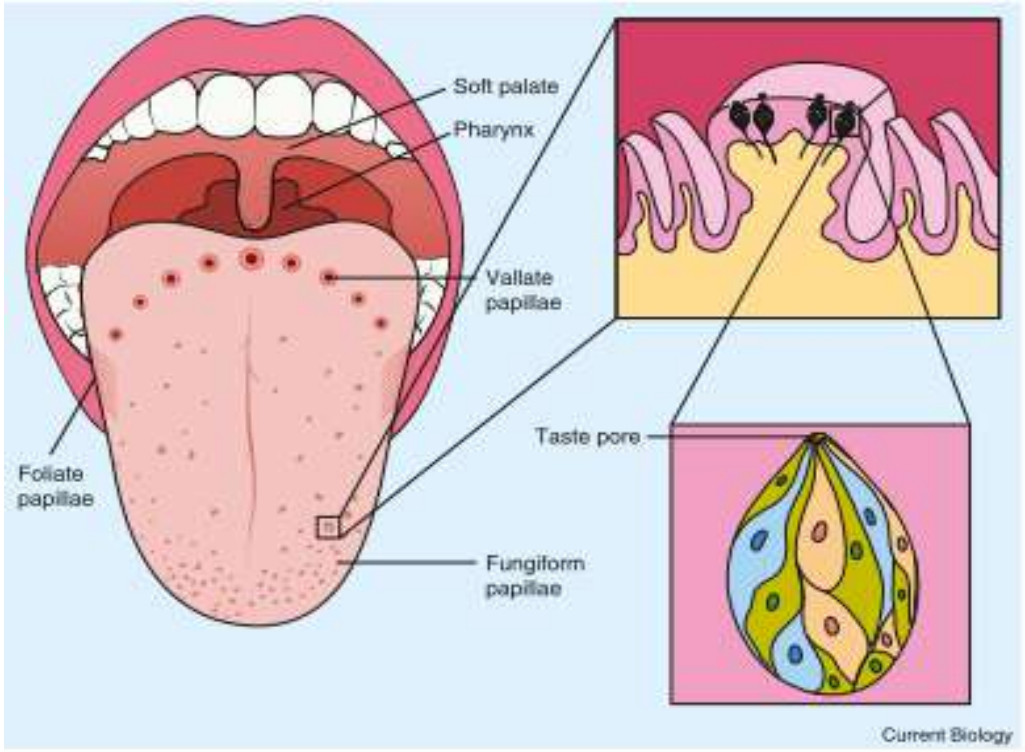
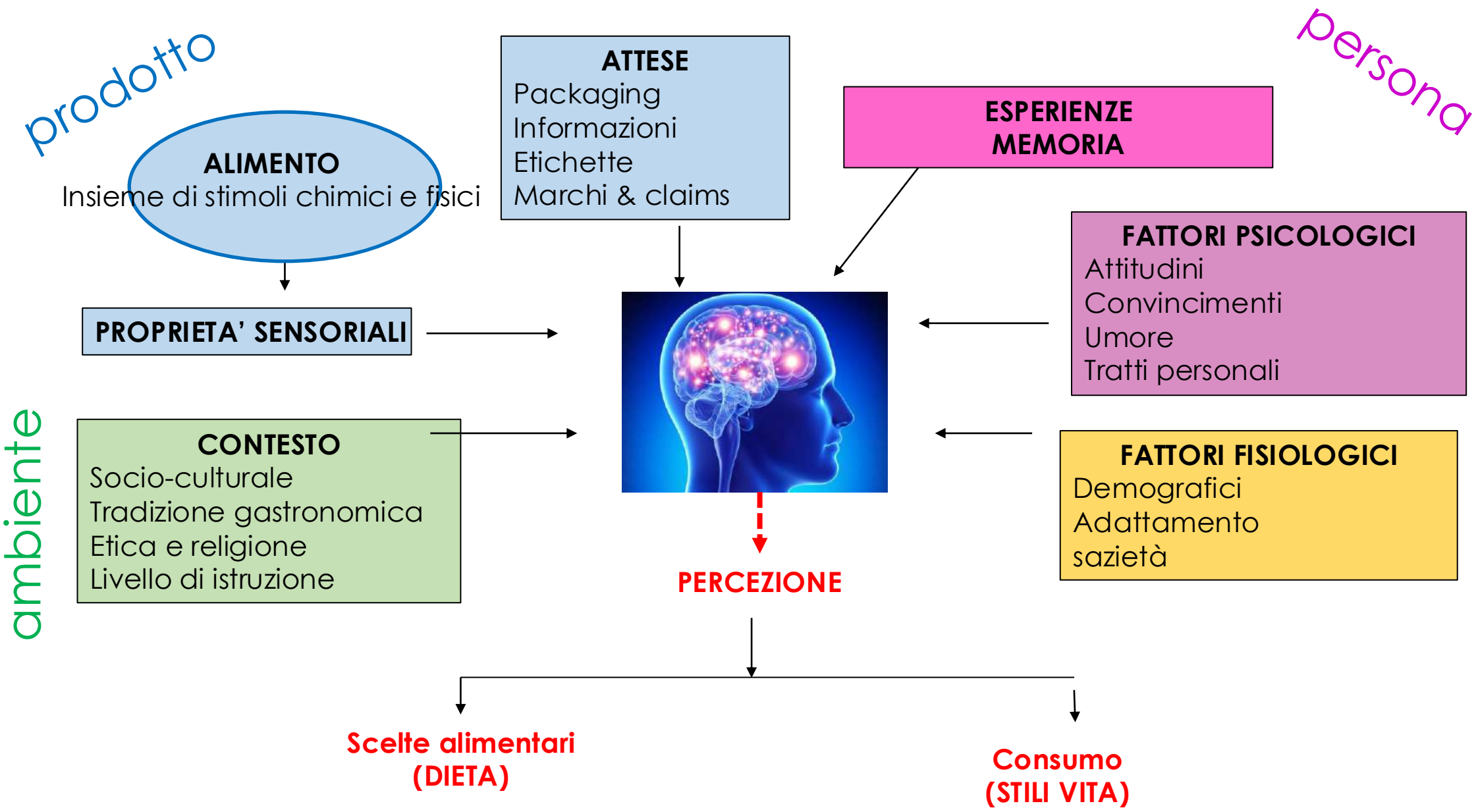
Proprietà sensoriali comuni negli UPF

. Gli UPF sono tipicamente associati a sensazioni/gusti **DOLCE**, **SALATO**, **UMAMI**, e alla percezione del **GRASSO**.

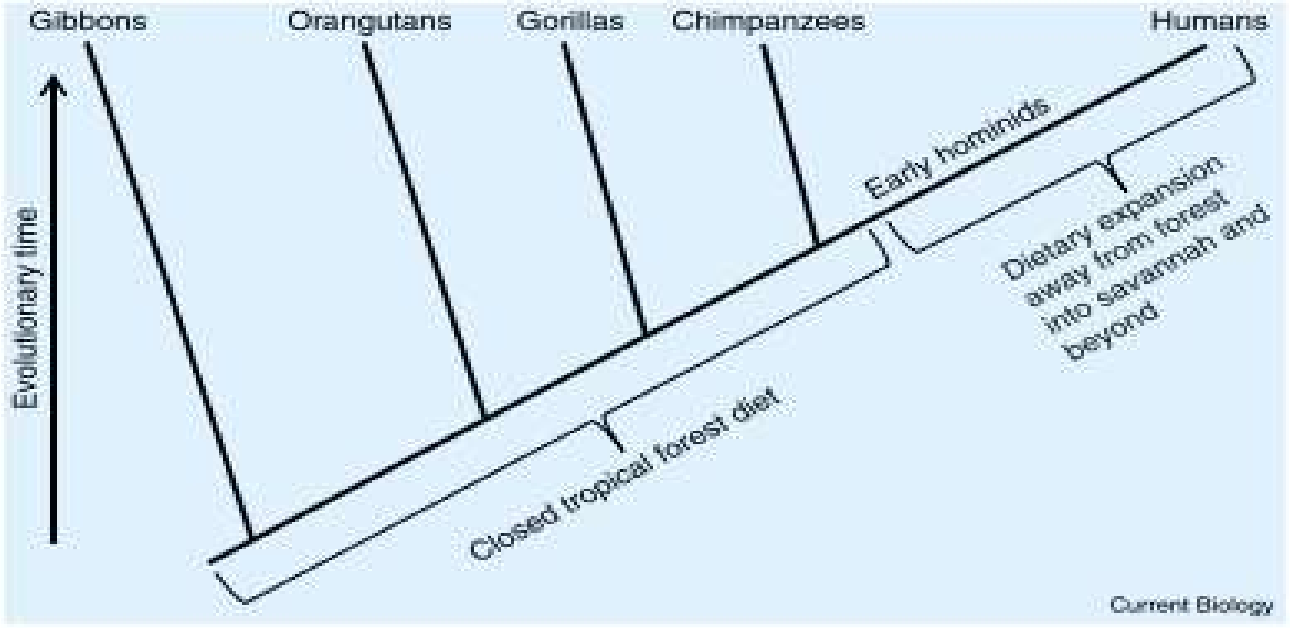


Lo sviluppo del meccanismo di preferenza del cibo



Una prospettiva evoluzionistica sulla percezione del cibo

- I gusti **DOLCE, SALATO, UMAMI, e la sensazione di GRASSO** sono **innatamente graditi** nell'uomo per ragioni evoluzionistiche.



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An Evolutionary Perspective on Food and Human Taste

Paul A.S. Breslin

The sense of taste is stimulated when nutrients or other chemical compounds activate specialized receptor cells within the oral cavity. Taste helps us decide what to eat and influences how efficiently we digest these foods. Human taste abilities have been shaped, in large part, by the ecological niches our evolutionary ancestors occupied and by the nutrients they sought. Early hominoids sought nutrition within a closed tropical forest environment, probably eating mostly fruit and leaves, and early hominids left this environment for the savannah and greatly expanded their dietary repertoire. They would have used their sense of taste to identify nutritious food items. The risks of making poor food selections when foraging not only entail wasted energy and metabolic harm from eating foods of low nutrient and energy content, but also the harmful and potentially lethal ingestion of toxins. The learned consequences of ingested foods may subsequently guide our future food choices. The evolved taste abilities of humans are still useful for the one billion humans living with very low food security by helping them identify nutrients. But for those who have easy access to tasty, energy-dense foods our sensitivities for sugary, salty and fatty foods have also helped cause over nutrition-related diseases, such as obesity and diabetes.

TAKE-HOME MESSAGE

- La trasformazione alimentare risponde a esigenze di **sicurezza, conservazione, praticità e piacere.**
- Gli UPF sono **formulazioni industriali** contenenti sostanze di uso culinario raro o assente e/o additivi con funzione "cosmetica", impiegati per aumentarne l'attrattività sensoriale. Sono spesso pronti al consumo, conservabili a lungo e altamente appetibili.
- Per comprendere gli Ultra-processed Foods (UPF) occorre valutare insieme **processo, formulazione e matrice alimentare:** la singola tecnologia o il confezionamento non determinano da soli la categoria NOVA.
- Un elevato consumo di UPF si associa a una **peggiore qualità della dieta** e a esiti sfavorevoli di salute.
- Gli UPF sono spesso caratterizzati da proprietà sensoriali caratteristiche quali i gusti dolce, salato, umami e la percezione di grasso, legati alla relativa formulazione.
- **Le proprietà sensoriali contribuiscono al gradimento e al consumo:** combinazioni di gusti, aromi e texture possono favorire un'elevata appetibilità.
- Il gradimento **innato** nell'uomo verso i gusti dolce, salato e la percezione dei grassi ha una radice evoluzionistica legata al ruolo che le molecole che inducono queste sensazioni hanno sull'organismo (segnalano rispettivamente alimenti potenzialmente energetici, la disponibilità di sodio e risorse ad alta densità energetica).
- La diffusione degli alimenti ultraprocessati modifica gli stili di vita, le relazioni familiari e le dinamiche sociali.
- Servono cambiamenti sistemici per migliorare stabilmente i sistemi alimentari e favorire l'adozione di diete salutari.

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Troppa responsabilità al consumatore?

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Analysis | Published: 10 January 2025

Regulatory responses to ultra-processed foods are skewed towards behaviour change and not food system transformation

Tanita Northcott, Mark Lawrence, Christine Parker, Belinda Reeve & Phillip Baker

Nature Food 6, 273–282 (2025) | Cite this article

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Abstract

Growing evidence suggests that diets high in ultra-processed foods (UPFs) are harming human and planetary health. UPFs therefore pose a complex regulatory challenge, yet, to date, little research has systematically assessed how governments have responded to UPFs in national food policies. Here we analyse data from the NOURISHING database to assess the scope and strength of UPF-related regulatory interventions worldwide, using three frameworks—namely, NOURISHING, the Nuffield Ladder and the Modalities of Control framework. Of the 417 UPF-related measures identified, most imply food processing or mention UPF examples rather than refer to processing or UPFs specifically. The scope of action is narrow; 85.9% of interventions change the food environment, largely represented by nutrition labelling. The strength of action is limited; interventions are skewed towards informational measures to influence consumer choice, and 47.1% of measures use consensus to shape food business conduct. These findings highlight an opportunity to broaden the scope and strength of UPF-related regulation.

Critiche al sistema NOVA

- Low precision in defining ultra-processed foods (UPFs)
- High Within-group nutrient profile heterogeneity
- Unknown mechanisms of UPFs on health
- Few randomised controlled trials (RCTs)

Monteiro et al. 2025



Pane in cassetta integrale

NOVA 4 – Ultraprocessato

Elemento	Rilevanza per NOVA
Farina integrale, acqua, olio, lievito e sale	Compatibili con un pane NOVA 3.
Glutine di frumento aggiunto	Monteiro et al. includono il glutine tra le sostanze di uso culinario raro o assente che identificano gli UPF. È l'elemento determinante in questa formulazione.
Trattamento superficiale con alcol	Non è il criterio determinante per questa attribuzione.

Sensibilità gustativa, preferenza e intake

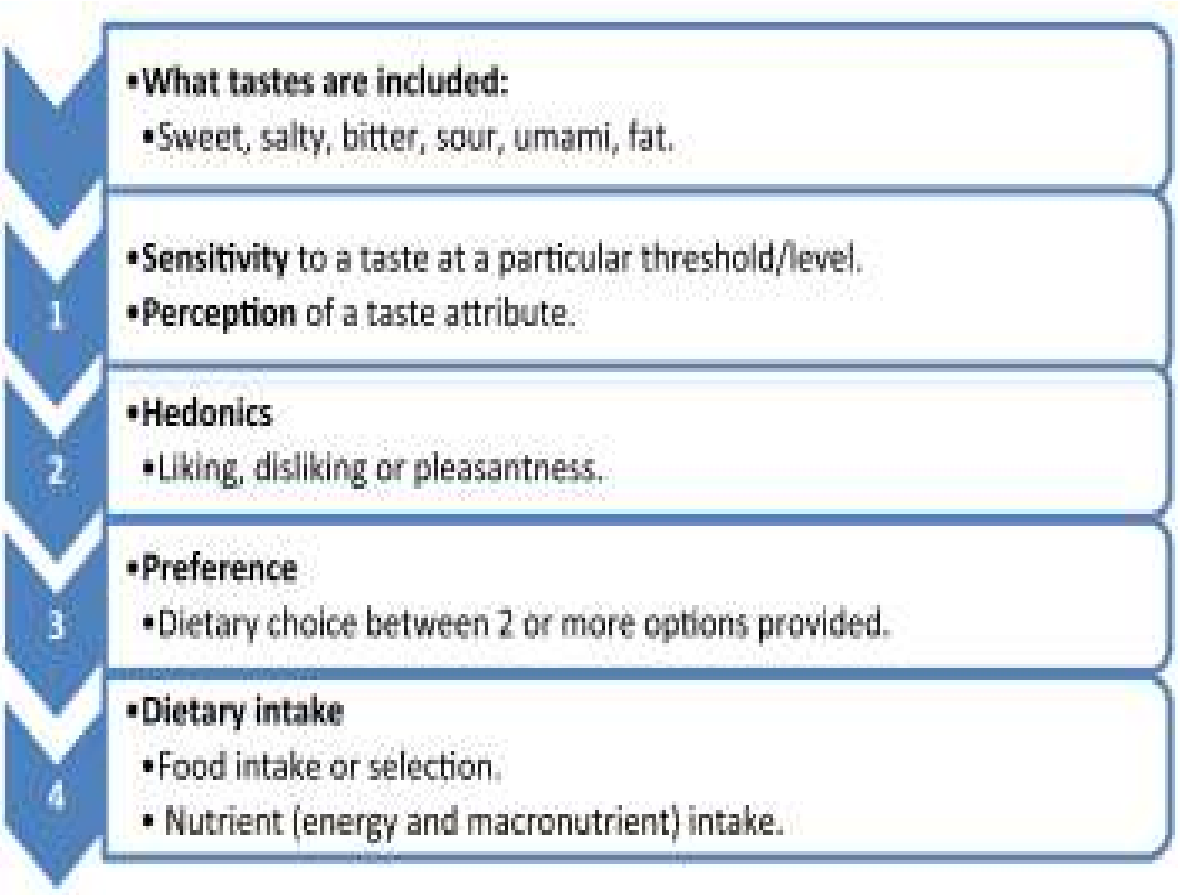

Fig. 1. Conceptual model of the relationship between variables (and their definitions) described in this review.

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Food Quality and Preference

journal homepage: www.elsevier.com/locate/foodqual

Sensitivity, hedonics and preferences for basic tastes and fat amongst adults and children of differing weight status: A comprehensive review

David N. Cox[a,*], Gilly A. Hendrie[a], Danika Carty[b]

A B S T R A C T

It is likely that variation in individual responsiveness to taste stimuli plays a pivotal role in food choice, however the importance of this role in relation to weight status is not yet known. This comprehensive review sought to determine if sensitivity, hedonics, and preference for the basic tastes and fat characteristics of food differs between normal and overweight/obese individuals. We identified 25 human studies (1980–2013) that sought to measure one or more variables' relationship to weight status. There is no clear evidence of a negative association between fat taste sensitivity and weight status, and little evidence of a relationship between sweet, salty, sour or bitter tastes and weight status. There was some evidence for an association for fat hedonics and a preference for fat and increased weight status. Amongst children there was suggestive evidence for a positive relationship between salt, dietary intake and weight status. There is a need to clearly define and adopt a hypothesis-led approach, using more rigorous measures of sensory characterisation and dietary intake to better understand whether the sensory characteristics of diet influence food choices and weight status.

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Cox et al. 2016