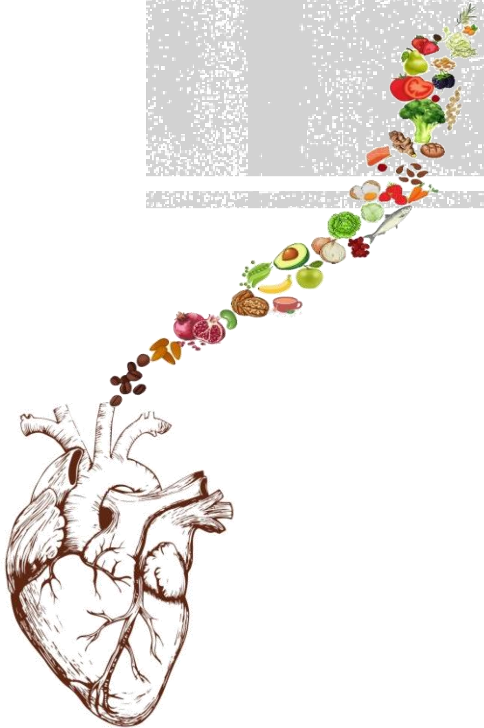
Facultat de Farmàcia i Ciències de l'Alimentació

Departament de Nutrició, Ciències de l'Alimentació i Gastronomia

A (poly)phenol-rich dietary pattern and cardiometabolic health from the MAX study: "Diet, Cancer and Health – Next Generations (DCH-NG)" subcohort.



Dr. Fabián Ignacio Lanuza Rilling *(PhD. MSc.)*

Research Seminar

October, 2023

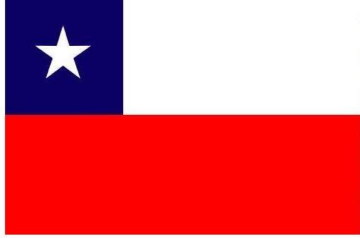
https://www.linkedin.com/in/fabianlanuza/

https://www.researchgate.net/profile/Fabian-Lanuza

https://orcid.org/0000-0001-8545-9301

No presento ningún conflicto de interés con la siguiente ponencia.

WHERE ARE YOU FROM?: CHILE

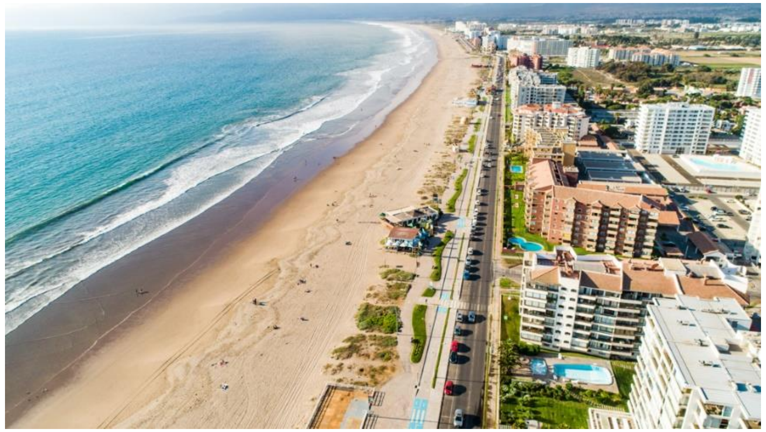


OSORNO, CHILE

TEMUCO, CHILE

17,574,003 habitantes
North-South
4,300 km.
2,700 miles

YOU NEED VACATIONS?



La Serena

Elqui Valley

San Pedro de Atacama

Pucon

Patagonia

Degree

Undergraduate: Nutritionist

2012, Temuco, Chile.

MSc: Human Nutrition

2016, Santiago, Chile.

PhD.: Food and Nutrition

2019, Barcelona, UB.

UNIVERSIDAD DE LA FRONTERA

UNIVERSIDAD DE CHILE
inta Instituto de Nutrición y Tecnología de los Alimentos Doctor Fernando Monckeberg Barros

UNIVERSITAT DE BARCELONA

https://www.ufro.cl/

http://www.inta.cl/

PROFESSIONAL EXPERIENCE

2013: - Clinical Nutritional Consultant

- Health Care Program Coordinator

2015: - Research assistant:

International Network for Food and Obesity/non-communicable diseases Research, Monitoring and Action Support (INFORMAS) in INTA. –

University San Sebastián

(Classes, workshops & clinical practice supervision)

2016-2019 – Professor in Universidad de La Frontera.

2023 – Professor in Universidad Católica de Temuco

UNIVERSIDAD CATOLICA DE TEMUCO

Elige VidaSana
Prevención ENTs – Atención Primaria MINSAL

2016-2019: *TEACHING, WS, DIETETIC LABORATORY, COURSES.*

Clinical Supervisor

HHHA: Hospital

Child Nutrition Seminar

CONTENT

- **INTRODUCTION**
- HYPOTHESIS AND OBJECTIVES
- MATERIALS AND METHODS
- RESULTS AND DISCUSSION
- CONCLUSIONS

ARTICLE 1-2
(PERSPECTIVE & REVIEW)

ARTICLE 3-8
(ORIGINAL RESEARCH)

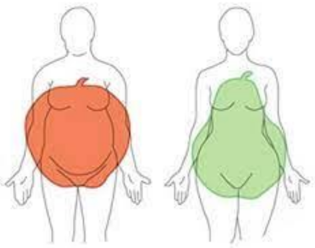
❑ Metabolic Syndrome (MetS)

2-8%
25.8 mill.
Childrens

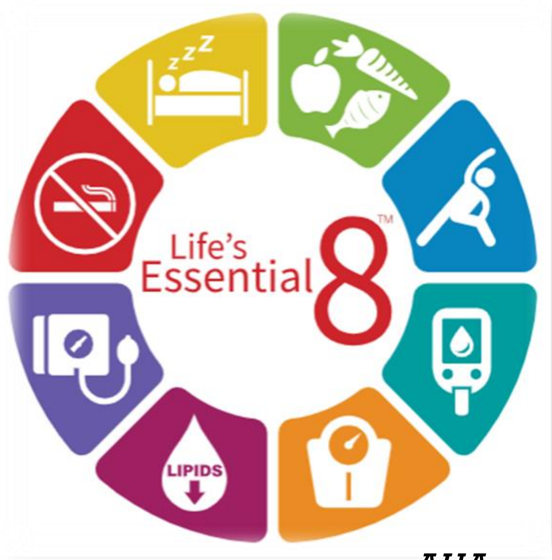
4-8%
35,5 mill.
Adolescents

12-35%
1 billion
Adults

Obesity / Overweight



650 million
1.9 BILL.

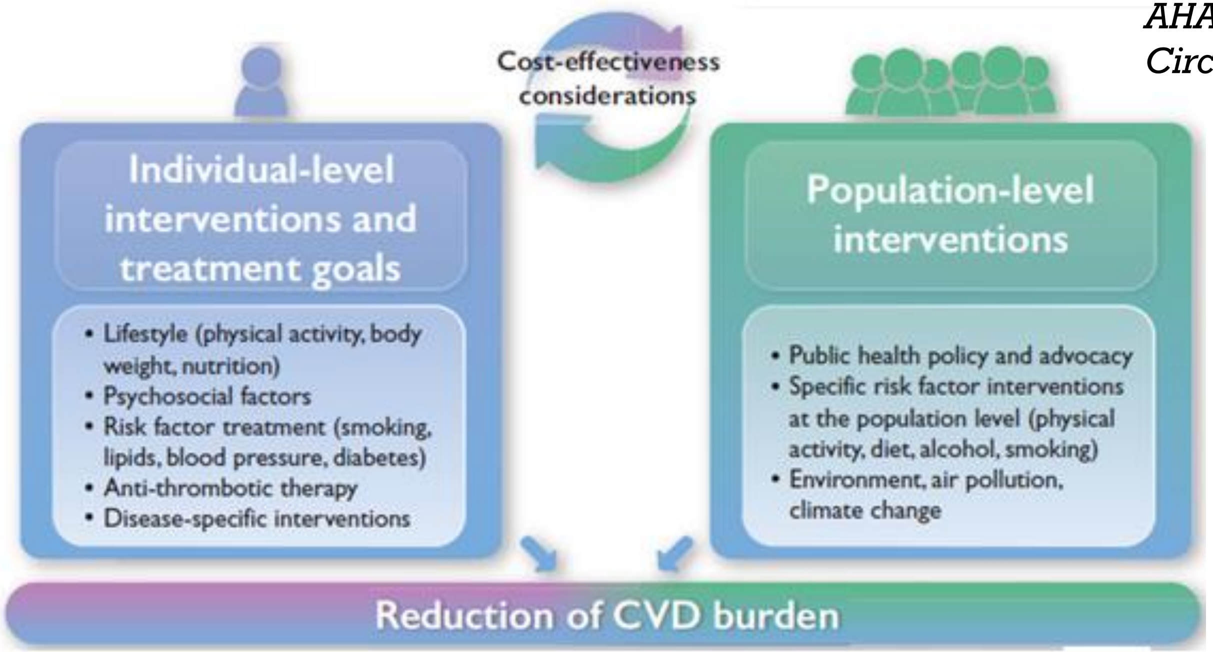


AHA Circulation 2023.

MetS

2-fold increase in cardiovascular outcomes

1.5-fold increase in all-cause mortality

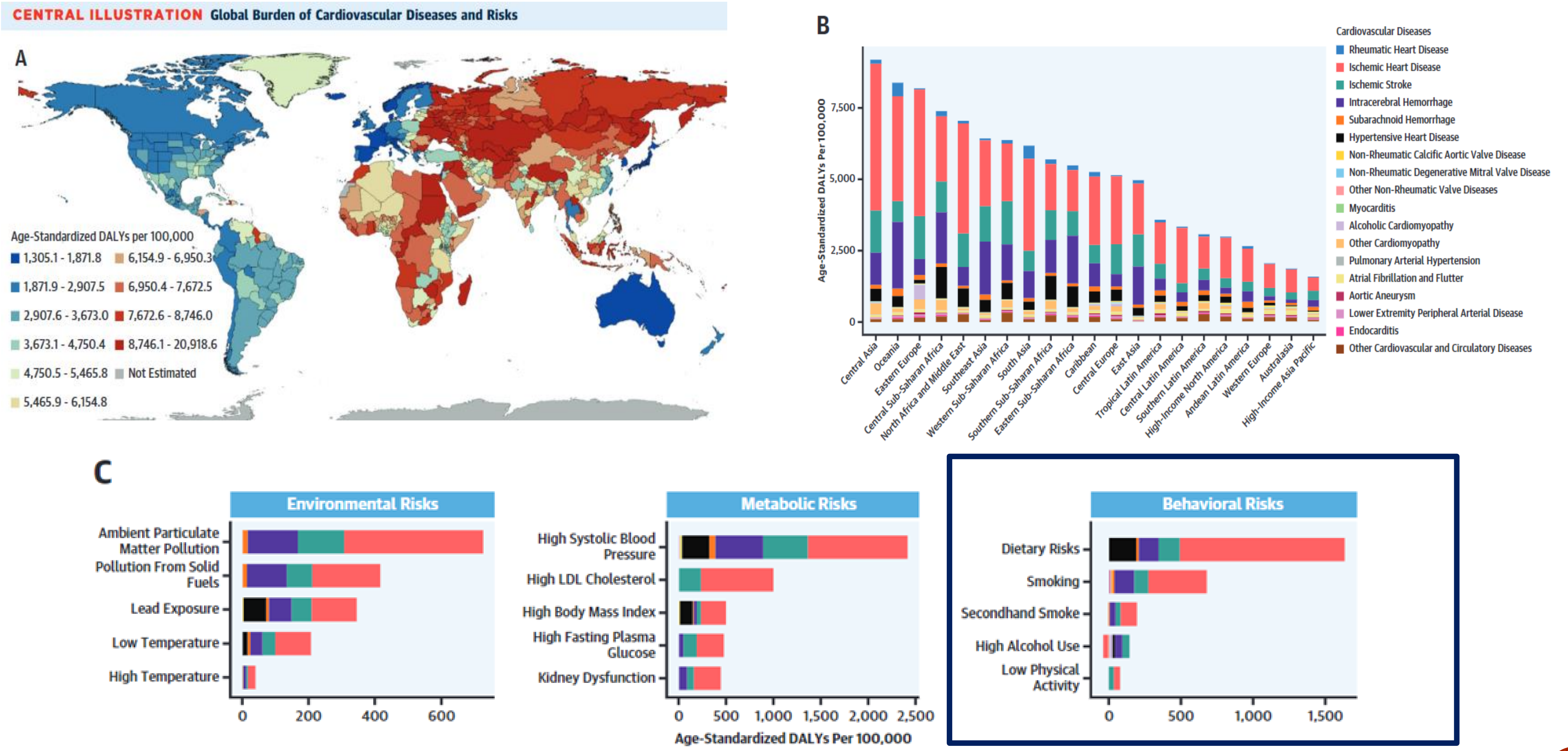


ESC European Society of Cardiology

Lancet Child Adolesc Health. 2022. Mar;6(3):158-170
Diabetes Res Clin. Pract. 2022. Jan;183:109119.
Curr Hypertens Rep. 2018. Feb 26;20(2):12.

Eur Heart J . 2021 Sep 7;42(34):3227-3337.

❑ Global Burden of Cardiovascular Diseases and Risks Collaboration, 1990-2021



Remember: One DALY represents the loss of the equivalent of one year of full health

J Am Coll Cardiol. 2022 Dec, 80 (25) 2372–2425

❑ The exposome and health: Where chemistry meets biology

Ecosystems

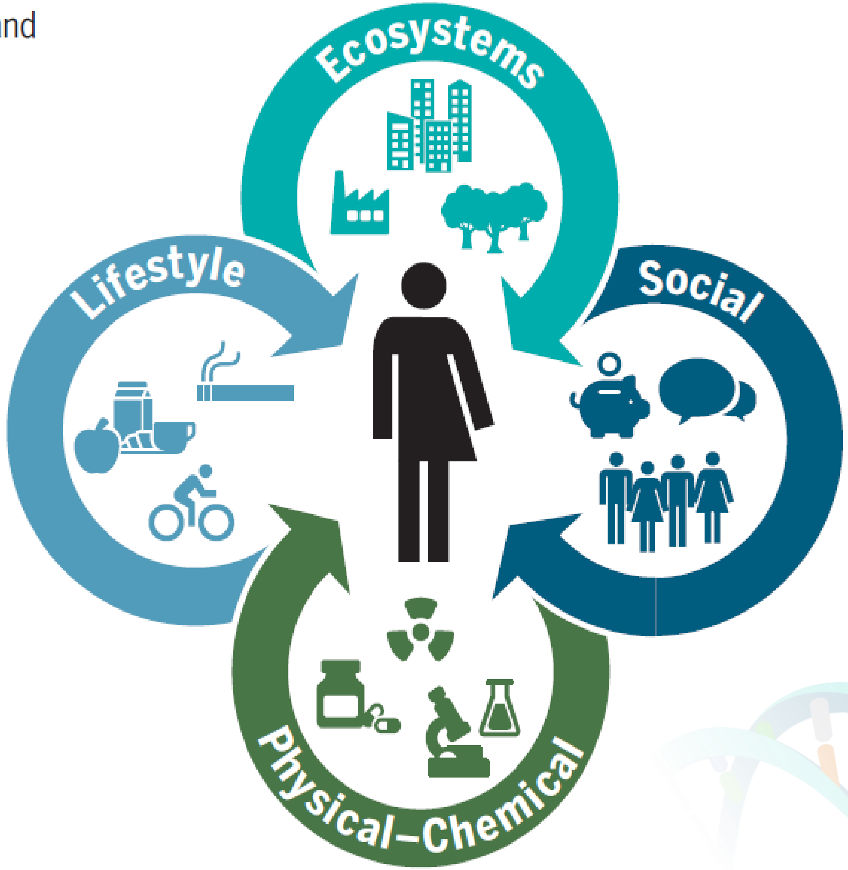
Food outlets, alcohol outlets
Built environment and urban land uses
Population density
Walkability
Green/blue space

Lifestyle

Physical activity
Sleep behavior
Diet
Drug use
Smoking
Alcohol use

Social

Household income
Inequality
Social capital
Social networks
Cultural norms
Cultural capital
Psychological and mental stress

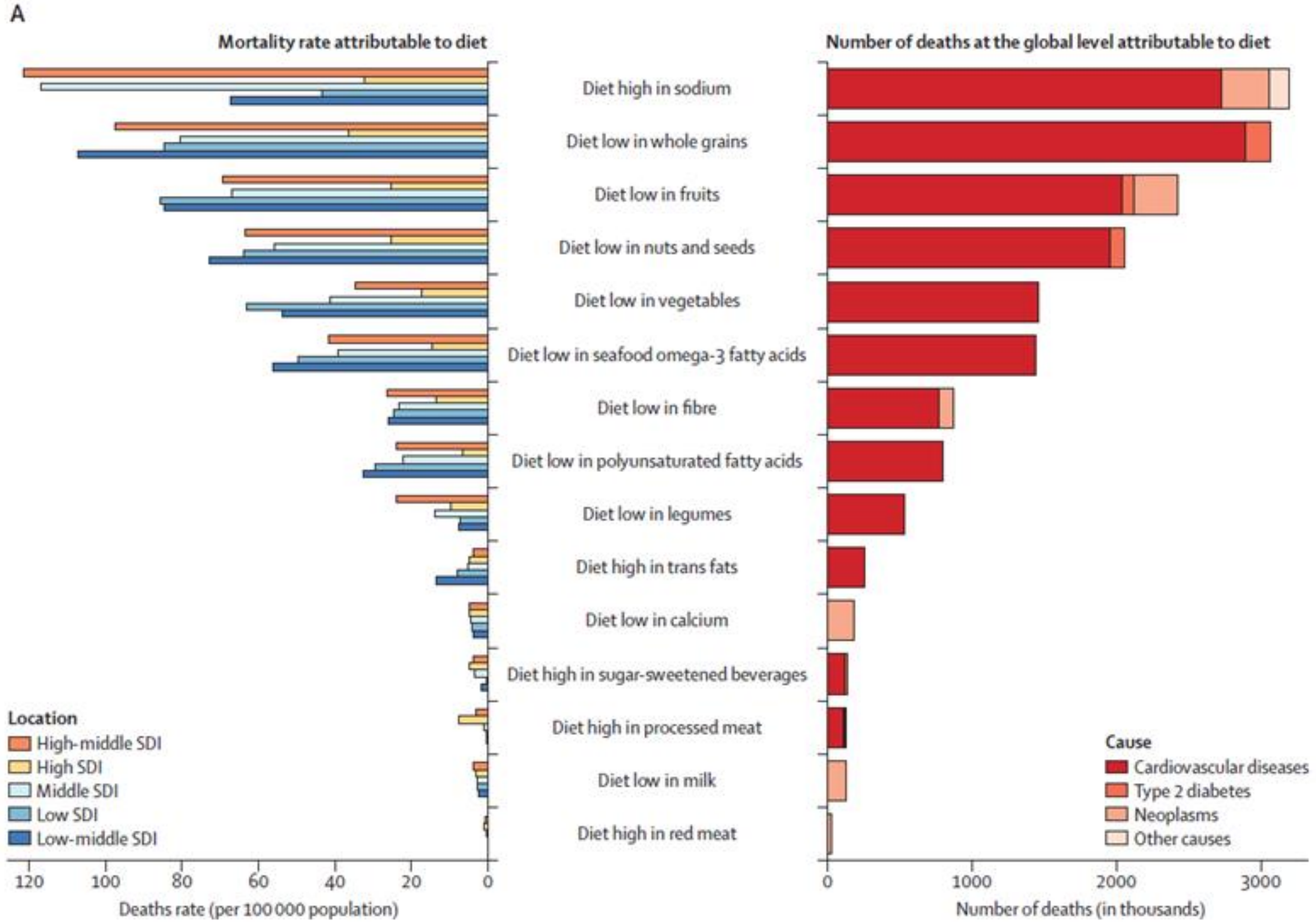


Physical–Chemical

Temperature/humidity
Electromagnetic fields
Ambient light
Odor and noise
Point, line sources, e.g, factories, ports
Outdoor and indoor air pollution
Agricultural activities, livestock
Pollen/mold/fungus
Pesticides
Fragrance products
Flame retardants (PBDEs)
Persistent organic pollutants
Plastic and plasticizers
Food contaminants
Soil contaminants
Drinking water contamination
Groundwater contamination
Surface water contamination
Occupational exposures

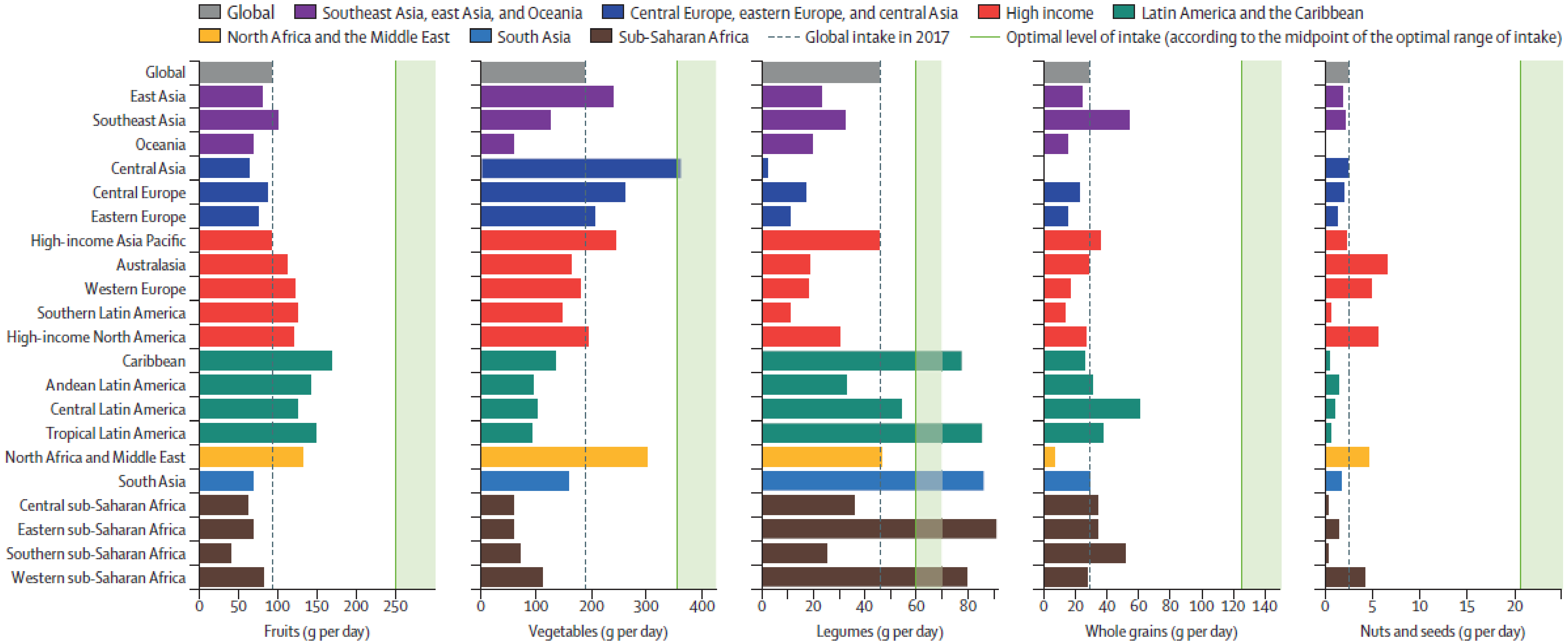
Vermeulen, et al. 2020 Jan 24;367(6476):392-396.

- **Health effects of dietary risks: 195 countries, 1990–2017: A systematic Analysis for the Global Burden of Disease Study.**



Lancet 2019; May393: 1958–72

- **Health effects of dietary risks: 195 countries, 1990–2017: A systematic Analysis for the Global Burden of Disease Study.**

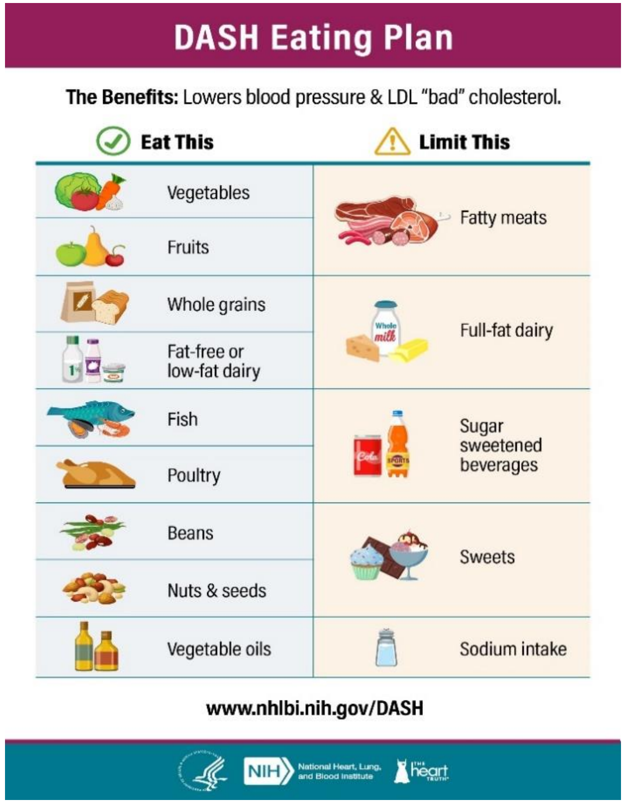


Lancet 2019; May393: 1958–72

❑ *Dietary patterns*

Mediterranean Diet

Dietary Guidelines for Americans



Planetary Health Diet

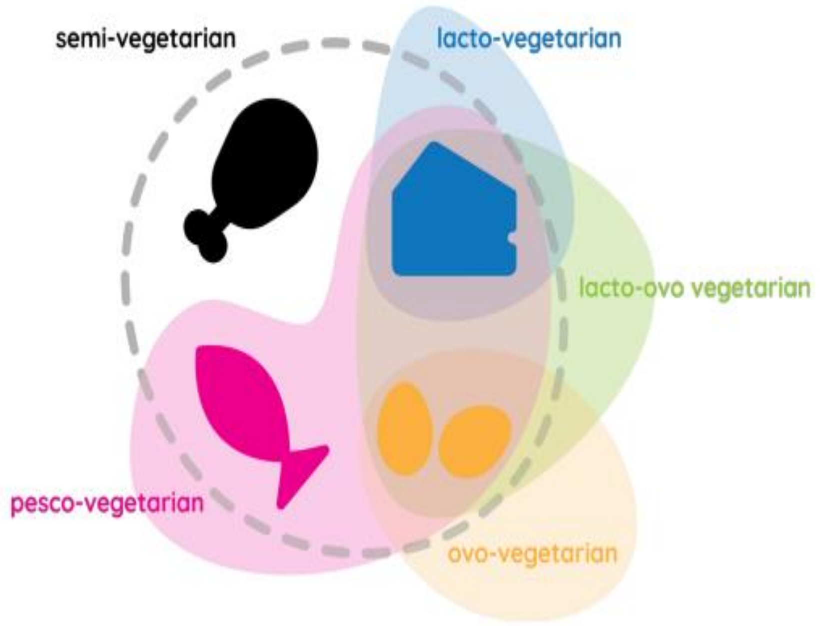
Analysis in Nutrition Research 2019. Chapter 4 - Dietary Pattern Analysis: p75-101.

Plant-based diets

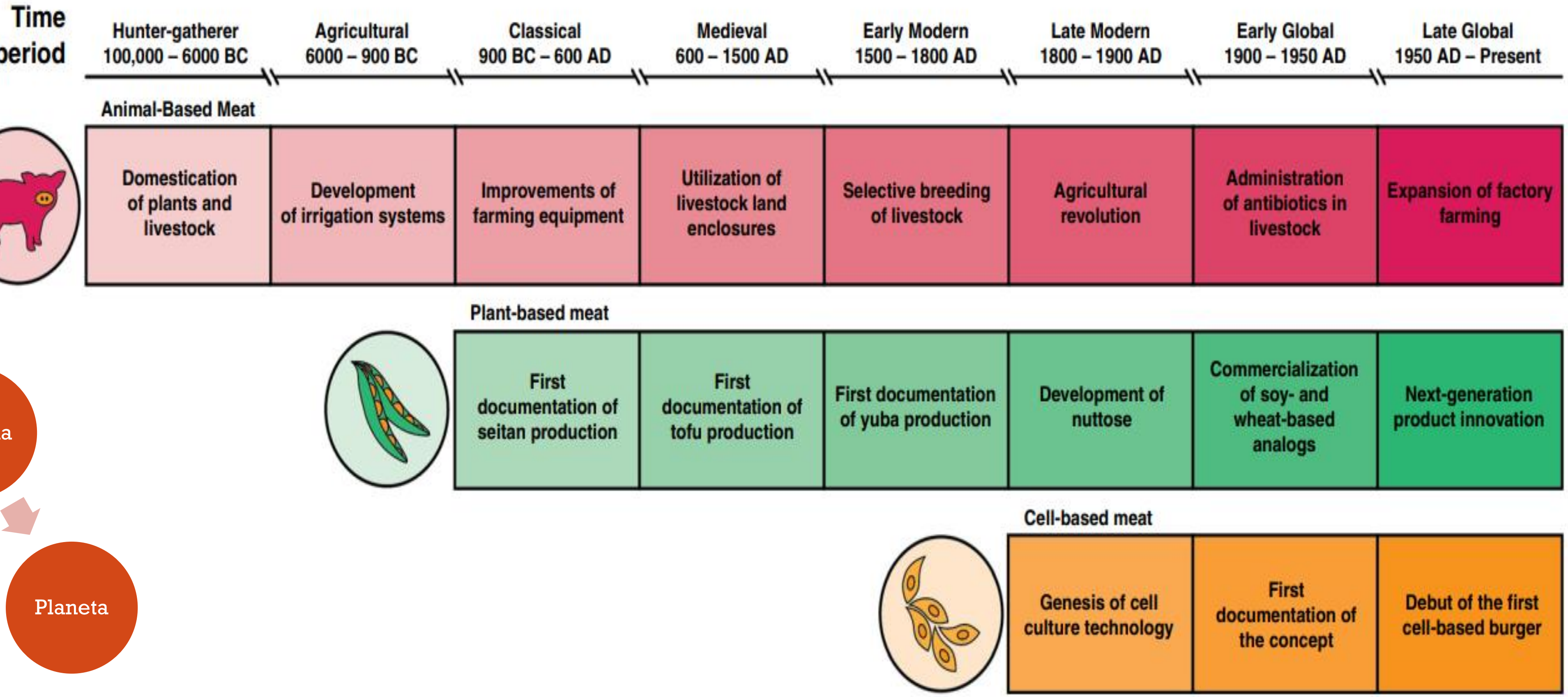
Plant-based diets constitute a diverse range of dietary patterns that emphasize foods derived from plant sources coupled with lower consumption or exclusion of animal products. Vegetarian diets form a subset of plant-based diets, which may exclude the consumption of some or all forms of animal foods (see box).

Common vegetarian diets

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



FOOD SUPPLY AND SAFETY



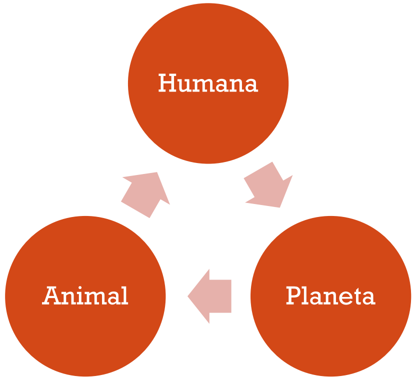
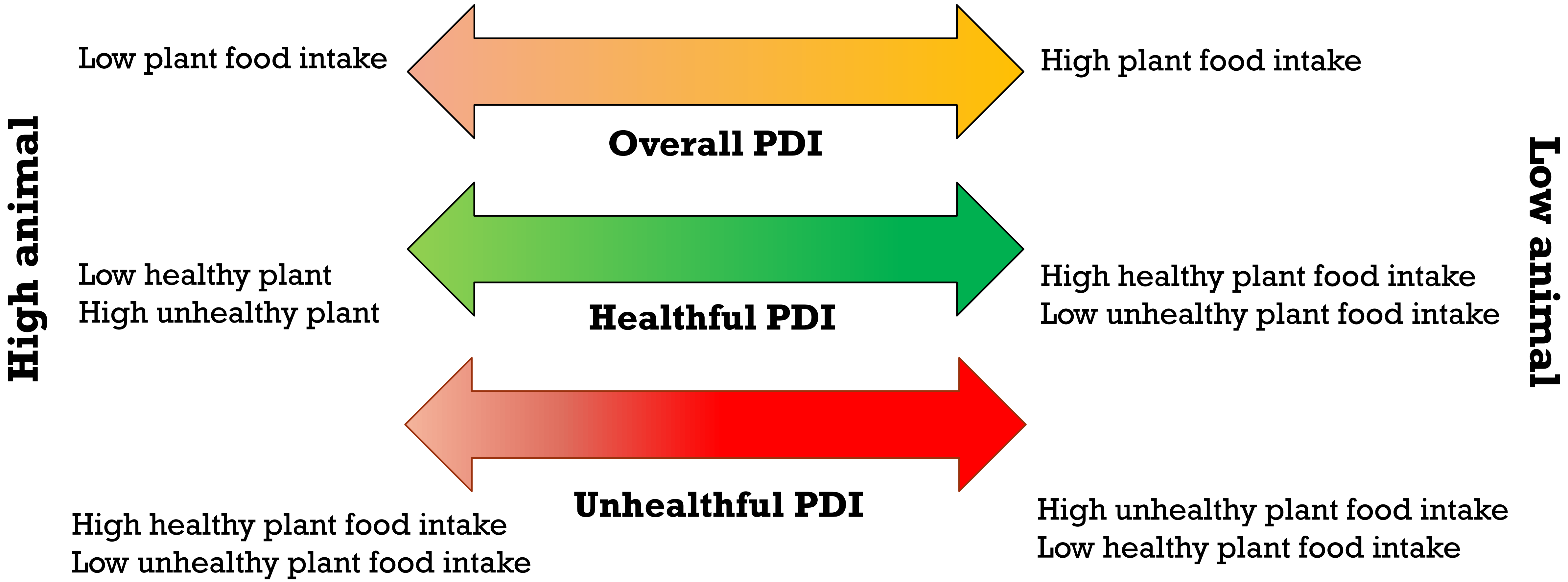


Fig. 1. The history and evolution of animal-, plant- and cell-based approaches to meat production. [13,87-93]. Humans have consumed plant-based meat (2555 years ago) for only 0.098% of the time period for which their ancestors have consumed animal-based meat (2,600,000 years ago). Likewise, humans have eaten cell-based meat (7 years ago) for only 0.274% of the time period for which they have consumed plant-based meat.

NATURE COMMUNICATIONS | (2020)11:6276 | https://doi.org/10.1038/s41467-020-20061-y | www.nature.com/naturecommunications

Fig. 2 Geographical distribution of plant-based (green circles) and cell-based (orange circles) meat companies. Companies were included as listed in the Good Food Institute alternative protein company database (August 2020).

❑ Plant-based Diet Indexes (PDIs)



PLoS Med . 2016 Jun 14;13(6):e1002039

❑ Categories of PDIs

Healthy plant foods

- Whole Grains
- Fruits
- Vegetables
- Legumes
- Nuts
- Vegetable Oils
- Tea and Coffee

Less healthy plant foods

- F & V juices
- Refined grains
- Potatoes/fries
- Sugar sweetened beverages
- Sweet and desserts

Animal foods

- Animal fat
- Dairy
- Eggs
- Fish or seafood
- Meat
- Miscellaneous



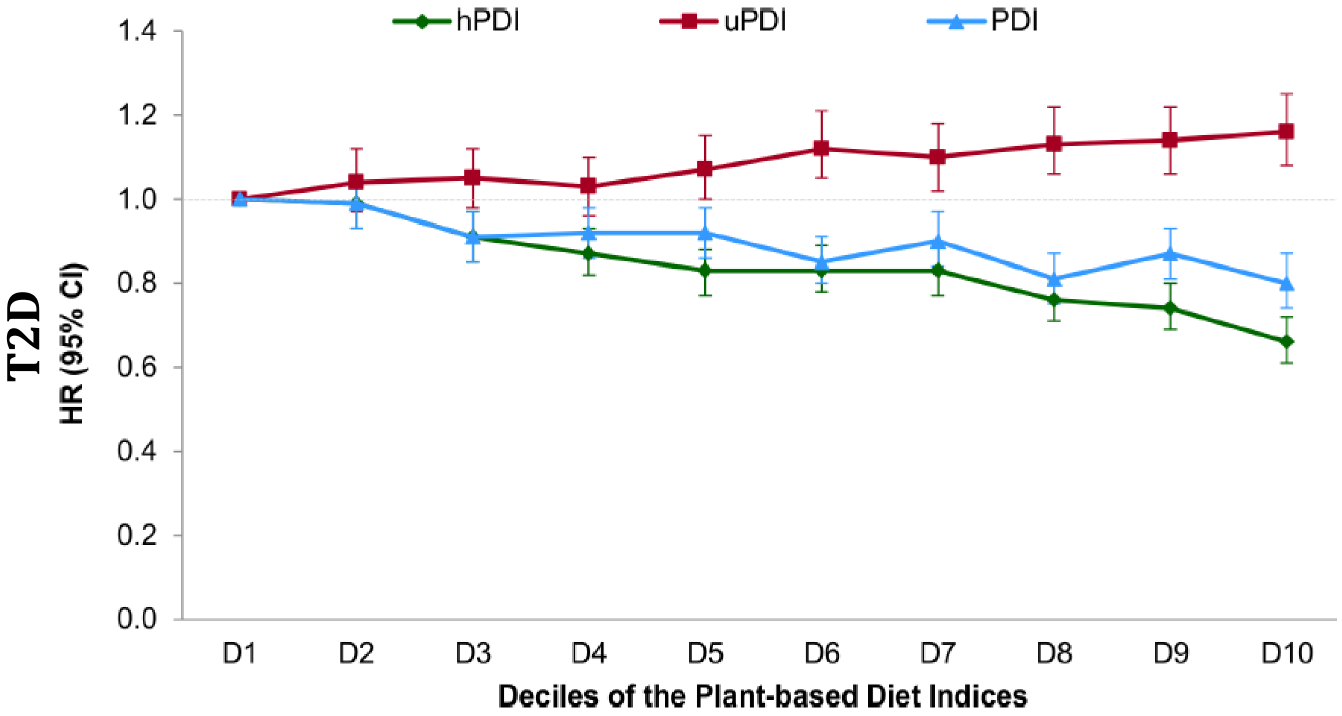


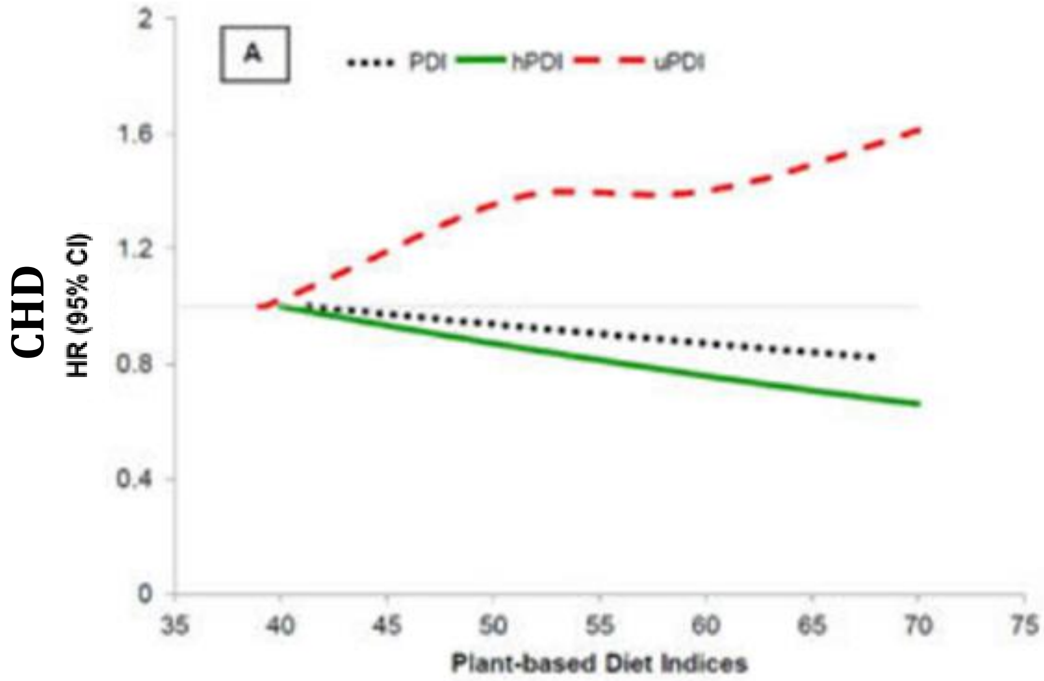

PLoS Med . 2016 Jun 14;13(6):e1002039

S1 Table. Scoring system and classification of food items in the Korean Genome and Epidemiology Study (KoGES)[1]

Food groups	Items in the food frequency questionnaire	PDI	hPDI	uPDI	Pro-vegetarian
Healthy plant foods					
Whole grains	Mixed grains, barley, grain with beans	Positive	Positive	Reverse	Positive[2]
Fruits	Strawberry, watermelon, banana, peach/plum, oriental melon/melon, persimmon/dried persimmon, pear/pear juice, tangerine, orange/orange juice, apple/apple juice, grape/grape juice	Positive	Positive	Reverse	Positive
Vegetables	Sweet potatoes, radish, napa cabbage/napa cabbage soup, spinach, lettuce, perilla leaves, sesame leaves/vegetable salad, other green vegetable, Deodeok/bellflower root, bean sprouts/mung-bean sprouts, bracken/sweet potato stem, oyster mushroom, other mushrooms, green pepper leaf/chamnamul, crown daisy /chive /watercress, cucumber, carrot/carrot juice, onion, green peppers, zucchini, pumpkin/kabocha squash, laver, kelp/seaweed, tomato/tomato juice	Positive	Positive	Reverse	Positive
Nuts	Peanuts/almonds/pine nuts	Positive	Positive	Reverse	Positive
Legumes	Beans/beans cooked in soy sauce, tofu, bean curd, soybean milk	Positive	Positive	Reverse	Positive
Tea and coffee	Coffee, green tea	Positive	Positive	Reverse	Not scored
Less healthy plant foods					
Refined grains	White rice, instant noodles, other noodles (udon noodles), black bean sauce noodles, cold noodles, rice cake/rice cake soup, other rice cakes, cereals, white breads, other breads, grain powder, starch jelly, stir-fried noodles and vegetables	Positive	Reverse	Positive	Positive[2]
Potatoes	Potatoes	Positive	Reverse	Positive	Positive
Sugar sweetened beverages	soft drink, other beverages (sweetened rice tea, citron tea)	Positive	Reverse	Positive	Not scored
Sweets and desserts	Sweet red bean bread, cake/chocolate pie, cookies/crackers/snacks, candies/chocolates, sugars (added to tea or coffee)	Positive	Reverse	Positive	Not scored
Salty food group	Bean paste, Bean paste/bean paste soup, Kimchi (Korean cabbage, radish), watery radish kimchi, other kimchi, pickled vegetable (preserved in soy sauce or salt),	Positive	Reverse	Positive	Not scored

❑ PDIs and Incidence of Type 2 Diabetes/ Risk of Coronary Heart Disease in US Men and Women





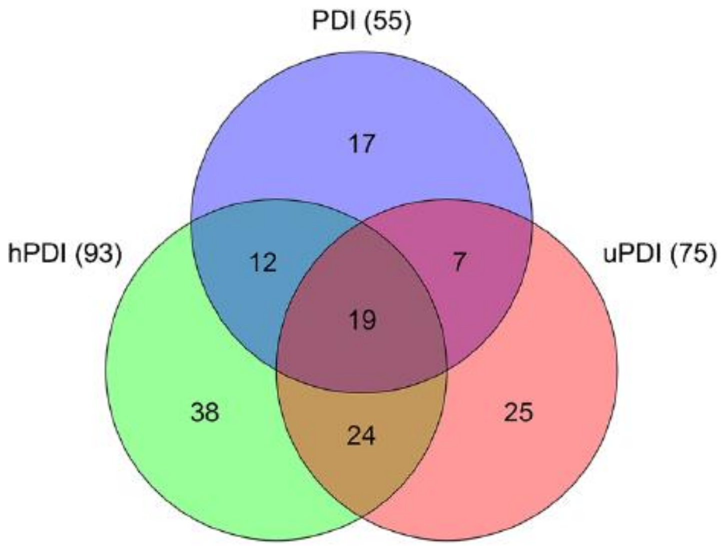
Three cohorts:
Nurses' Health Study (NHS)
Nurses' Health Study 2 (NHS2)
Health Professionals Follow-Up Study (HPFS)

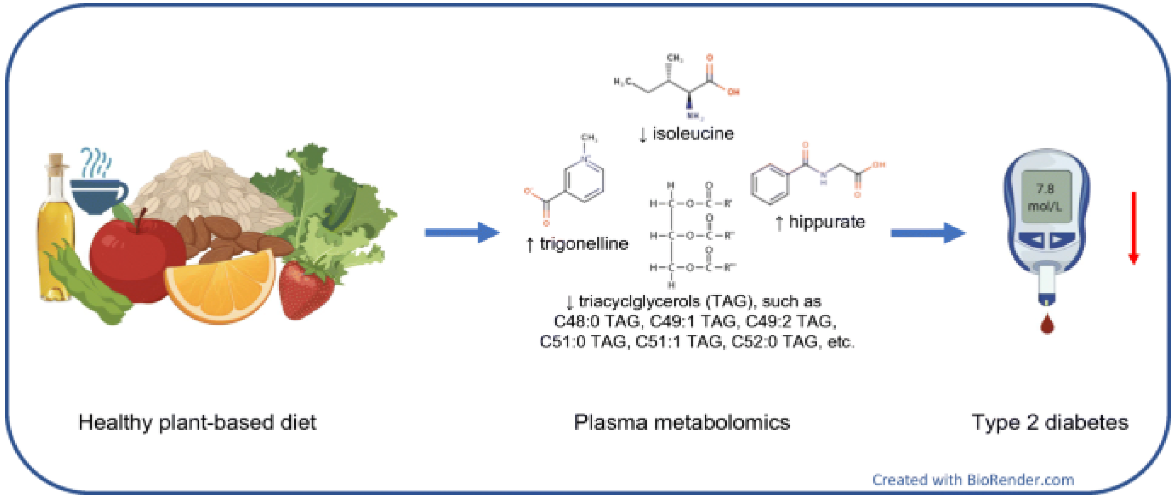
≈ 200,000 participants

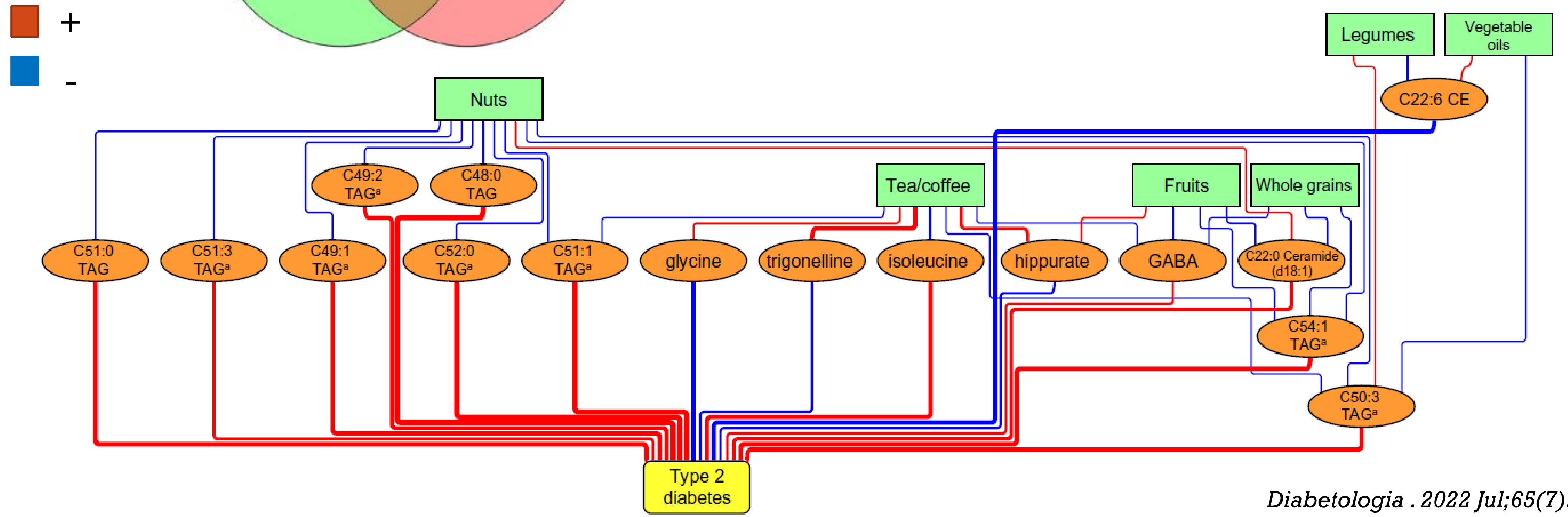
NOT ALL PLANT-BASED DIETS ARE HEALTHY

PLoS Med . 2016 Jun 14;13(6):e1002039
J Am Coll Cardiol. 2017 Jul 25;70(4):411-422.

❑ Plasma metabolite profiles related to plant-based diets and the risk of type 2 diabetes







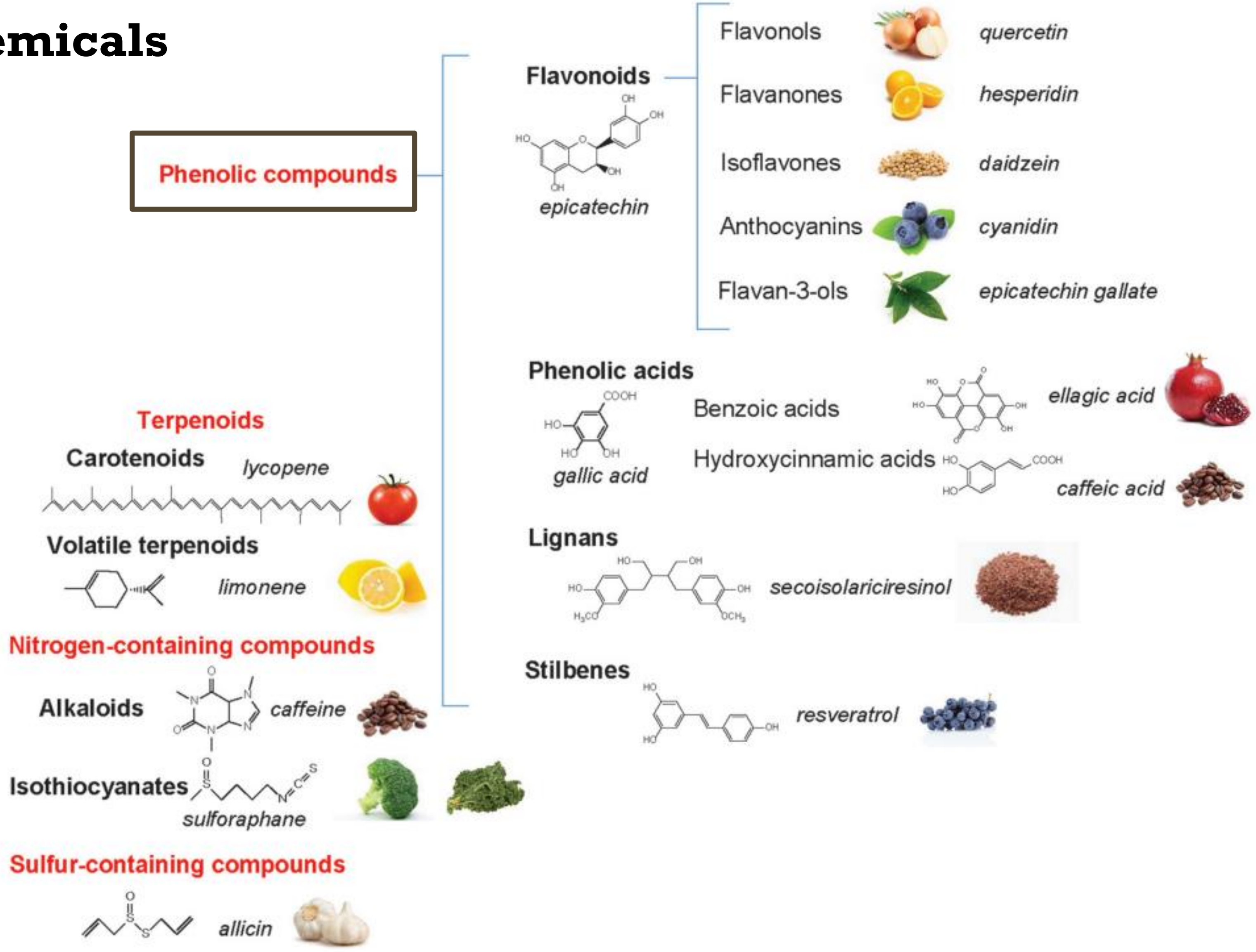
Diabetologia . 2022 Jul;65(7):1119-1132

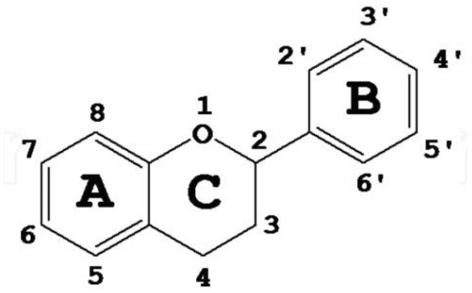
❑ Plant-Based Foods

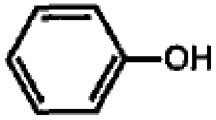
Fiber
Vitamins and
Minerals.

J Agric Food Chem . 2011 May 11;59(9):4331-48

❑ Phytochemicals

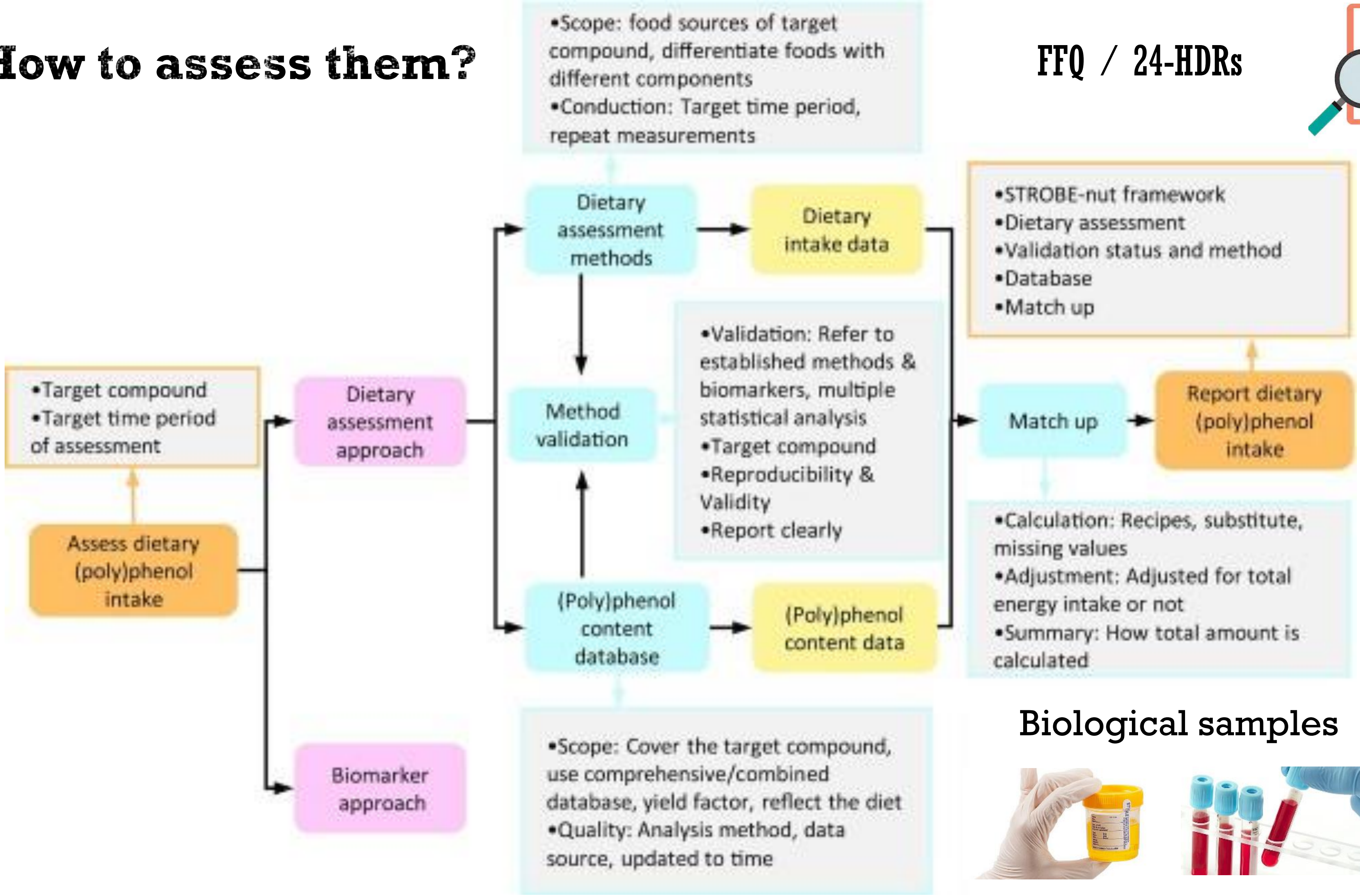






Food Funct . 2019 Feb 20;10(2):514-528.

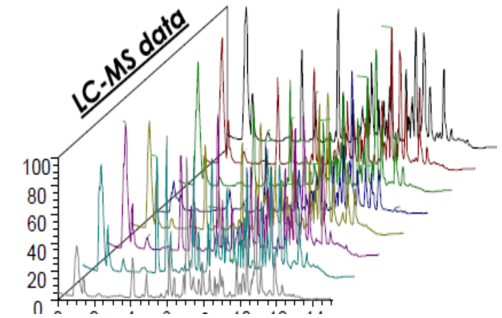
❑ How to assess them?



FFQ / 24-HDRs

USDA

Phenol-Explorer
Database on polyphenol content in foods

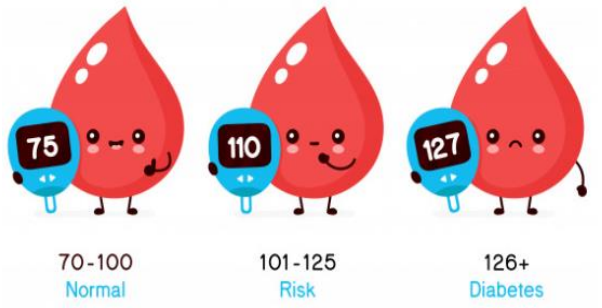


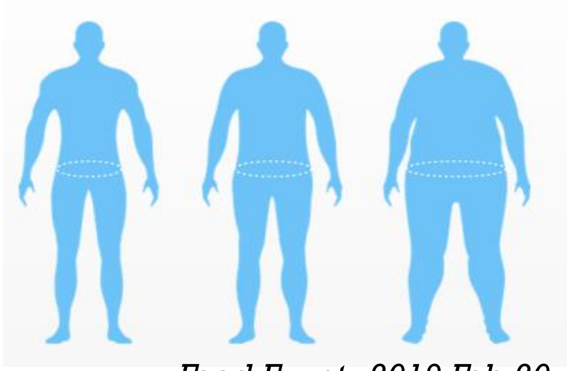
Biological samples

Adv Nutr 2021;12:1781–1801

❑ Potential properties of polyphenols related to cardiovascular health

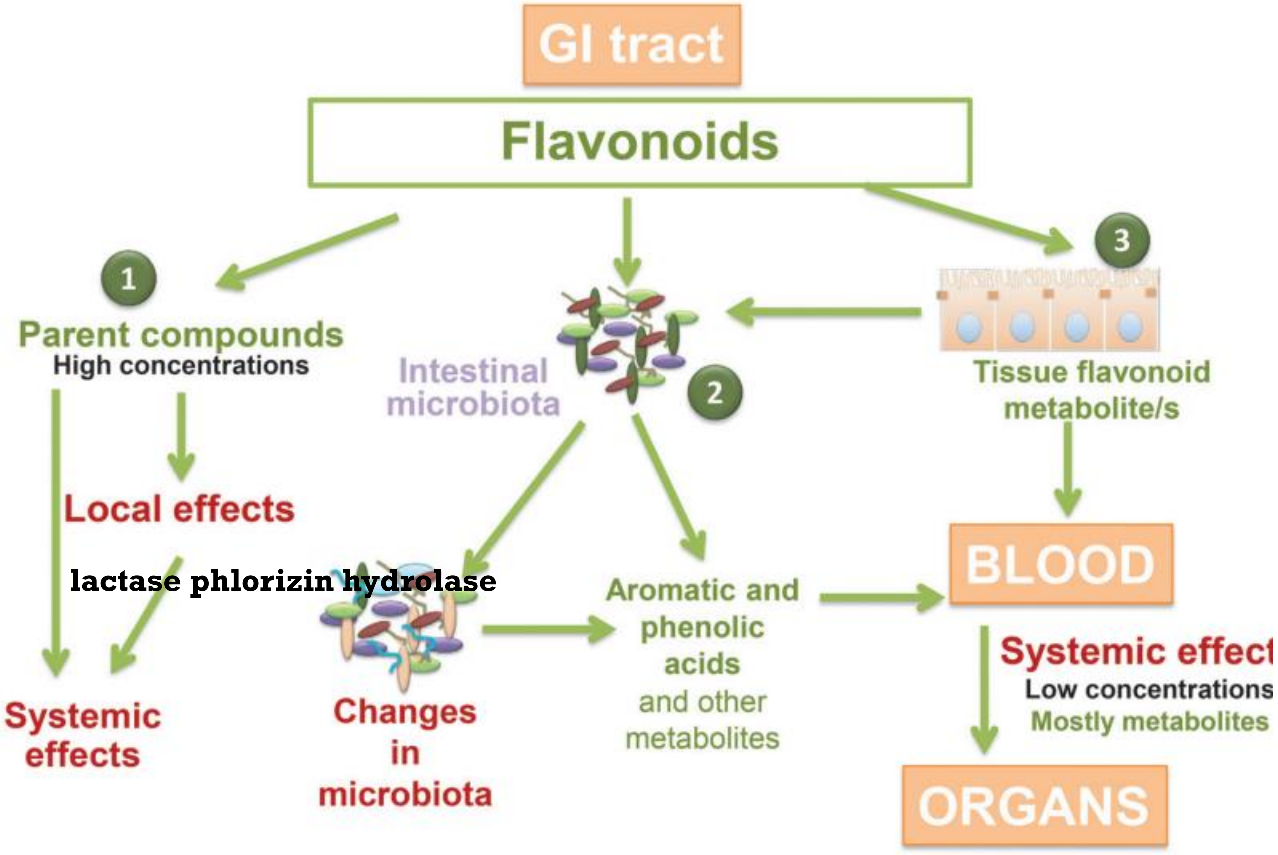
- ✓ Antioxidant
- ✓ Anti-inflammatory
- ✓ Anti-obesigenic
- ✓ Anti-carcinogenic
- ✓ Anti-diabetics
- ✓ Anti-microbial

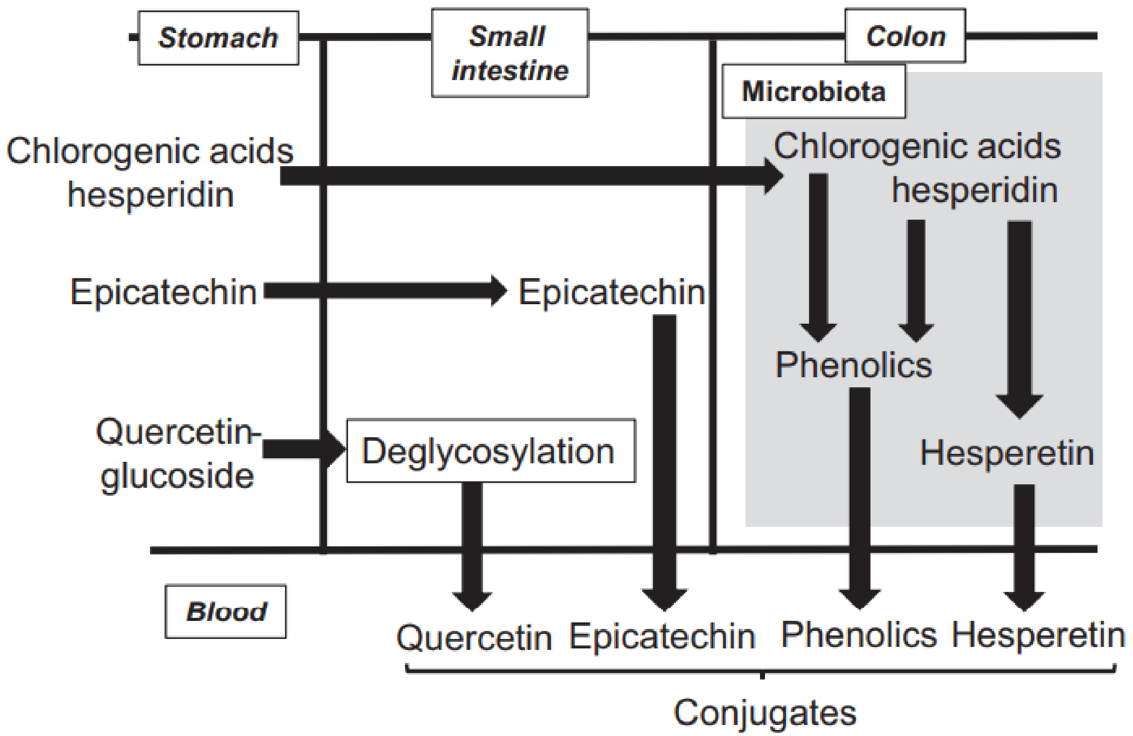




Food Funct . 2019 Feb 20;10(2):514-528.

❑ Polyphenol metabolism in the colon and metabolite absorption

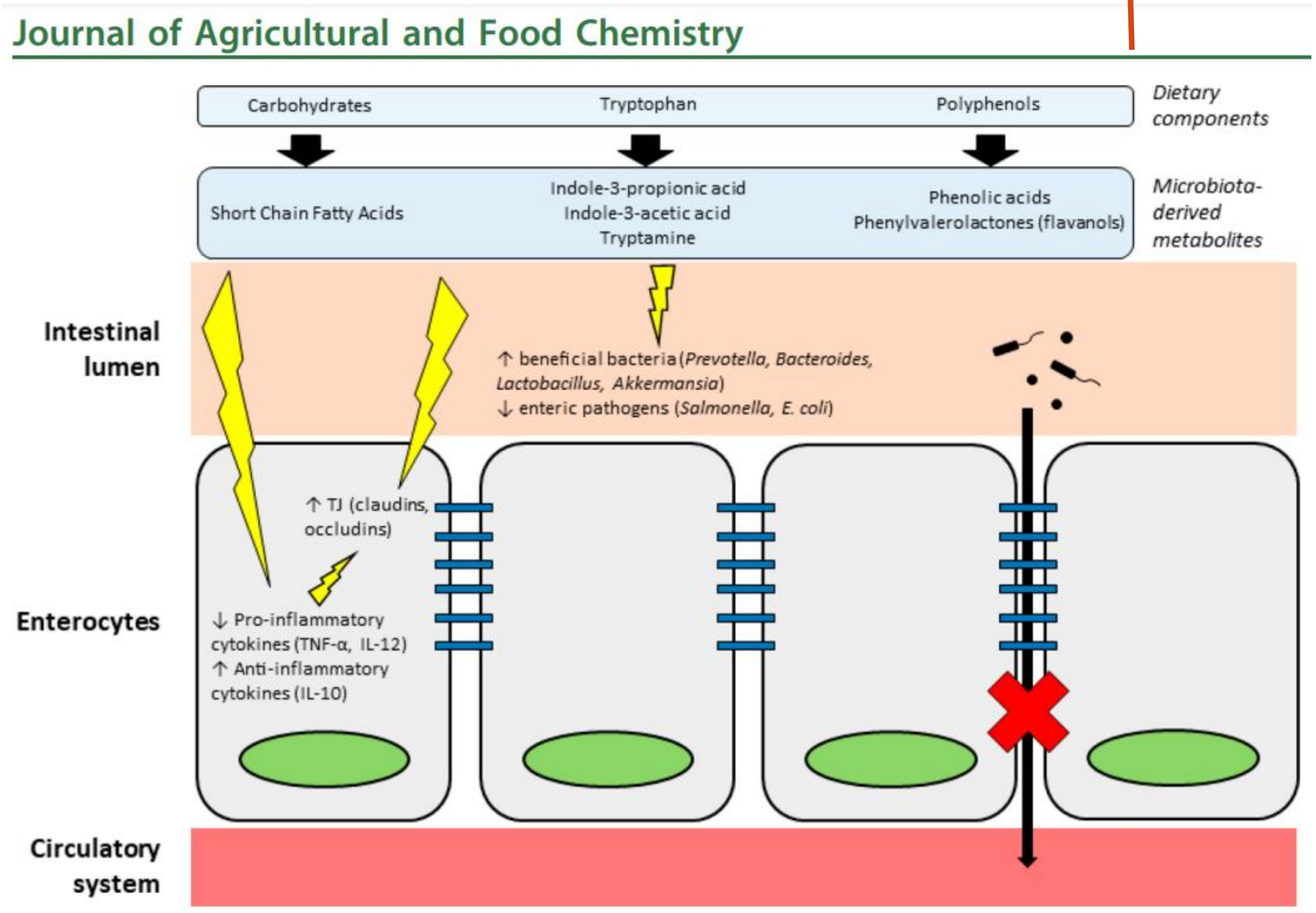




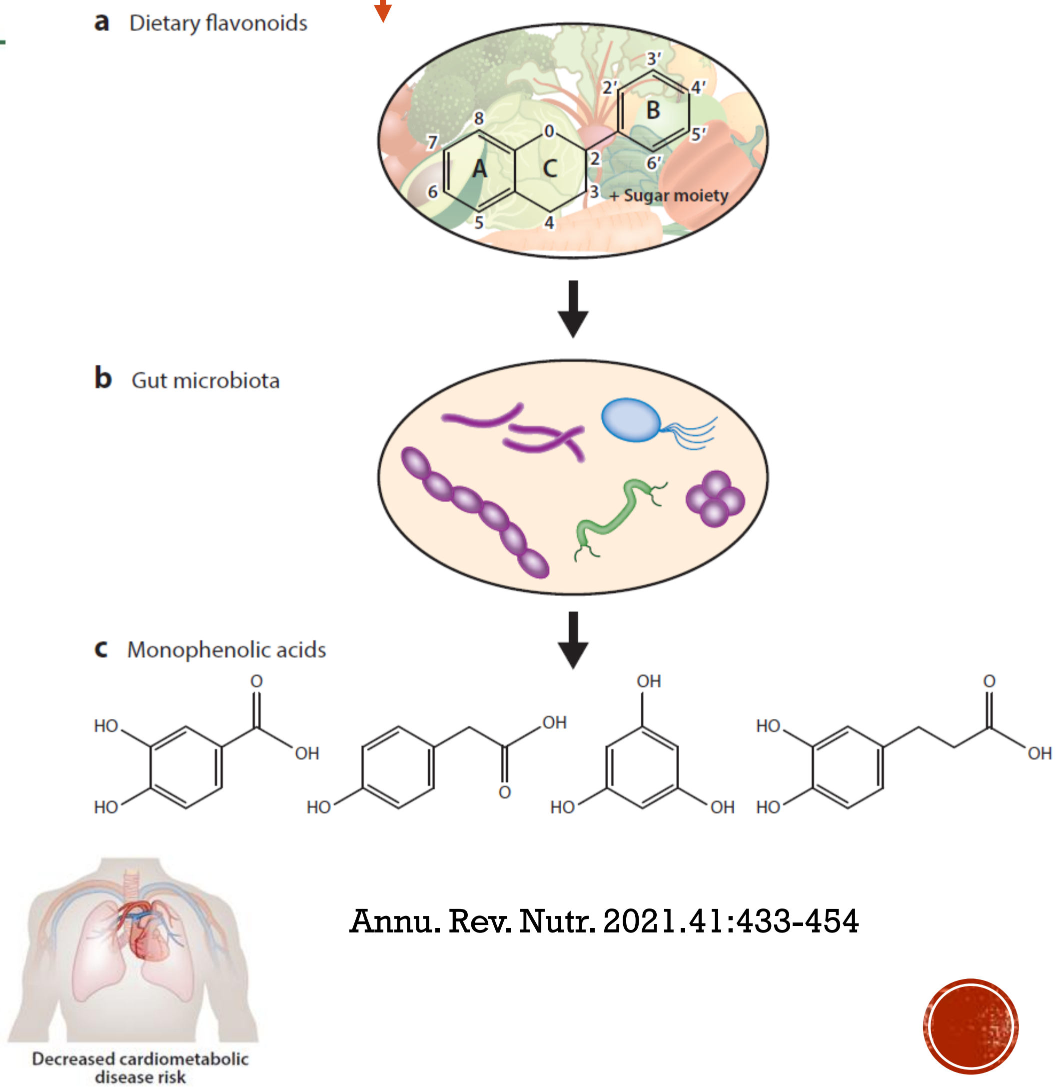
Do not forget interindividual variability, external factors (sex, age, BMI, others)

Food Funct . 2019 Feb 20;10(2):514-528.

- **Schematic representation of the mechanisms of action responsible for the effects of microbiota-derived dietary metabolites on intestinal permeability.**



J Agric Food Chem . 2020 Feb 19;68(7):1780-1789.



Annu. Rev. Nutr. 2021.41:433-454

PRE-TRAINING

1

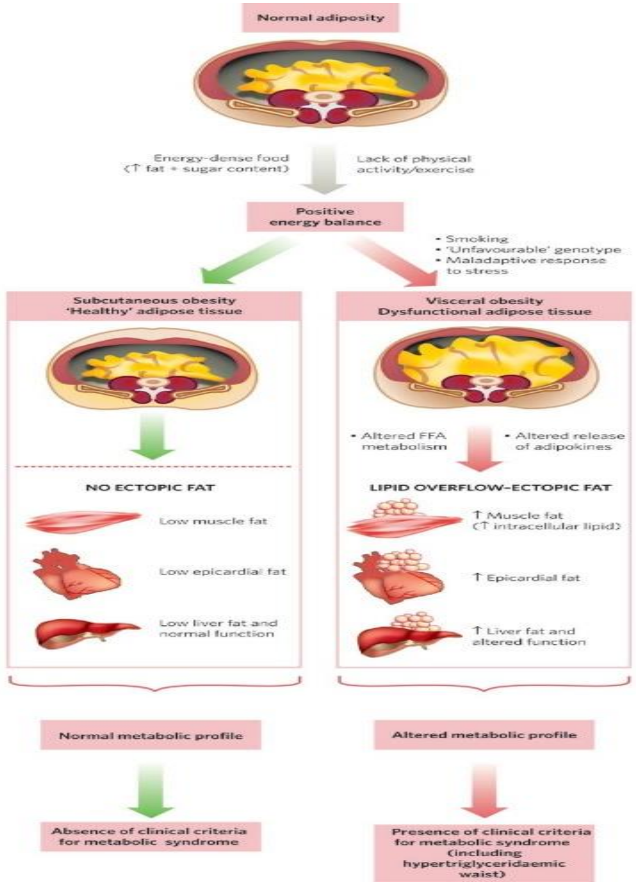
3

METABOLIC SYNDROME AND CVD RISK FACTORS

PDIs

2

DIETARY POLYPHENOL



MEAL EVENT

FLAVONOID METHODS

CONTENT

- INTRODUCTION
- **HYPOTHESIS AND OBJECTIVES**
- MATERIALS AND METHODS
- RESULTS AND DISCUSSION
- CONCLUSIONS

ARTICLE 1-2
(PERSPECTIVE & REVIEW)

ARTICLE 3-8
(ORIGINAL RESEARCH)

GLOBAL HYPOTHESIS

Adherence to a healthy dietary pattern could have protective effects on cardiometabolic risk and the development of chronic noncommunicable diseases.

PRINCIPAL STUDY

We hypothesized how better adherence to certain plant-based dietary patterns, and theoretically with higher amount of (poly)phenol-rich foods, could have a beneficial effect on cardiometabolic factors and metabolic syndrome.

GENERAL OBJECTIVE

To study adherence to a (poly)phenol-rich dietary pattern and its association with health outcomes in participants of the DCH-NG MAX sub-cohort of the DiGuMet project.

SPECIFIC OBJECTIVES

1. To analyze the interconnection and current challenges of the four pillars of the food system, from a psychological perspective. **(Manuscript 1)**

Received: 9 September 2022 | Revised: 21 October 2022 | Accepted: 3 November 2022
DOI: 10.1002/oby.23644
Obesity A Research Journal — THE OBESITY SOCIETY — WILEY

PERSPECTIVE

Perceptual blindness in nutrition: We are in a critical time to be connected

Fabian Lanuza[1,2] | Raul Zamora-Ros[1,3] | Fanny Petermann-Rocha[4] | Cristina Andrés-Lacueva[1,5]

2. To review the advances in polyphenols research which have been conducted in Chile, with a focus on (poly)phenol-rich foods and health-related outcomes. **(Manuscript 2)**

FOOD REVIEWS INTERNATIONAL
https://doi.org/10.1080/87559129.2021.2009508
Taylor & Francis
Taylor & Francis Group

REVIEW

Check for updates

Advances in Polyphenol Research from Chile: A Literature Review

F Lanuza[a,b,c], R Zamora-Ros[a,d], F Petermann-Rocha[e,f], MA Martínez-Sanguinetti[g], C Troncoso-Pantoja[h], AM Labraña[i], AM Leiva-Ordoñez[j], G Nazar[k], K Ramírez-Alarcón[i], N Ulloa[l], N Lasserre-Laso[m], S Parra-Soto[e,f], M Martorell[i], M Villagrán[n], DF Garcia-Diaz[o], C Andrés-Lacueva[a,b], and C Celis-Morales[f,p,q]

SPECIFIC OBJECTIVES

3. To evaluate the association between whole grain consumption and cardiometabolic risk factors in adults from the Chilean National Health Survey 2016-2017. **(Manuscript 3 – Pre-training)**

nutrients MDPI

Article

Wholegrain Consumption and Risk Factors for Cardiorenal Metabolic Diseases in Chile: A Cross-Sectional Analysis of 2016–2017 Health National Survey

Fabian Lanuza [1,2,†], Raul Zamora-Ros [1,3,†], Nicole Hidalgo-Liberona [1], Cristina Andrés-Lacueva [1,4,*] and Tomás Meroño [1,*]

4. To analyze the association between a healthy eating score with depression in older adults from the Chilean National Health Survey 2016-2017. **(Manuscript 4 – Pre-training)**

Public Health Nutrition: page 1 of 12 doi:10.1017/S1368980021004869

A healthy eating score is inversely associated with depression in older adults: results from the Chilean National Health Survey 2016–2017

Fabian Lanuza[1,2,3], Fanny Petermann-Rocha[4,5], Carlos Celis-Morales[4,6,7], Yeny Concha-Cisternas[8,9], Gabriela Nazar[10,11], Claudia Troncoso-Pantoja[12], Nicole Lassere-Laso[13], María Adela Martínez-Sanguinetti[14], Solange Parra-Soto[4], Raul Zamora-Ros[1,15], Cristina Andrés-Lacueva[1,2] and Tomás Meroño[1,2,*]

CAMBRIDGE UNIVERSITY PRESS

SPECIFIC OBJECTIVES

5. To descriptive analysis of dietary intakes of all individual (poly)phenols and total intake per class and subclass by meal event, and to identify their main food sources using 24-HDRs in the subcohort MAX from the DCH-NG. **(Manuscript 5)**

European Journal of Nutrition
https://doi.org/10.1007/s00394-022-02977-x

ORIGINAL CONTRIBUTION

Check for updates

Descriptive analysis of dietary (poly)phenol intake in the subcohort MAX from DCH-NG: "Diet, Cancer and Health—Next Generations cohort"

Fabian Lanuza[1,2] · Raul Zamora-Ros[1,3] · Agnetha Linn Rostgaard-Hansen[4] · Anne Tjønneland[4] · Rikard Landberg[5] · Jytte Halkjær[4] · Cristina Andres-Lacueva[1,2]

6. To compare the flavonoid intakes using different methods based on USDA and Phenol Explorer databases in participants from subcohort DCH-NG MAX. **(Manuscript 6)**

frontiers | Frontiers in Nutrition

ORIGINAL RESEARCH
published: 04 April 2022
doi: 10.3389/fnut.2022.873774

Check for updates

OPEN ACCESS

Edited by:
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University of Teramo, Italy

Reviewed by:
Gunter Kuhnle,
University of Reading, United Kingdom
Letizia Bresciani,
University of Parma, Italy

Comparison of Flavonoid Intake Assessment Methods Using USDA and Phenol Explorer Databases: Subcohort Diet, Cancer and Health-Next Generations—MAX Study

Fabian Lanuza[1,2], Nicola P. Bondonno[3,4], Raul Zamora-Ros[1,5], Agnetha Linn Rostgaard-Hansen[3], Anne Tjønneland[3,6], Rikard Landberg[7], Jytte Halkjær[3†] and Cristina Andres-Lacueva[1,2†]*

SPECIFIC OBJECTIVES

7. To analyze the relationships between (poly)phenol intakes using 24-HDRs and cardiometabolic risk, with a longitudinal design using DCH-NG MAX subcohort. **(Manuscript 7)**

Nutrition, Metabolism & Cardiovascular Diseases (xxxx) xxx, xxx

Available online at www.sciencedirect.com

Nutrition, Metabolism & Cardiovascular Diseases

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

ELSEVIER

Dietary polyphenols, metabolic syndrome and cardiometabolic risk factors: An observational study based on the DCH-NG subcohort

Fabian Lanuza [a,b], Raul Zamora-Ros [a,c,*], Nicola P. Bondonno [d,e], Tomas Meroño [a,b], Agnetha Linn Rostgaard-Hansen [d], Gabriele Riccardi [f], Anne Tjønneland [d], Rikard Landberg [g], Jytte Halkjær [d,1], Cristina Andres-Lacueva [a,b,1]

8. To analyze the associations between plant-based dietary patterns (based on 24-HDRs), cardiometabolic risk, and metabolomic profiles (based on plasma), with a longitudinal study design of the MAX sub-cohort. **(Manuscript 8 – Accepted)**

RESEARCH ARTICLE | ARTICLES IN PRESS, 117285

Plasma metabolomic profiles of plant-based dietary indices reveal potential pathways for metabolic syndrome associations

Fabian Lanuza • Tomas Meroño • Raul Zamora-Ros • Nicola P. Bondonno • Agnetha Linn Rostgaard-Hansen • Alex Sánchez-Pla • Berta Miro • Francesc Carmona-Pontaque • Gabriele Riccardi • Anne Tjønneland • Rikard Landberg • Jytte Halkjær [1] • Cristina Andres-Lacueva [1] •

Show less • Show footnotes

Open Access • Published: September 08, 2023 • DOI: https://doi.org/10.1016/j.atherosclerosis.2023.117285

CONTENT

- INTRODUCTION
- HYPOTHESIS AND OBJECTIVES
- **MATERIALS AND METHODS**
- RESULTS AND DISCUSSION
- CONCLUSIONS

ARTICLE 1-2
(PERSPECTIVE & REVIEW)

ARTICLE 3-8
(ORIGINAL RESEARCH)

❑ Study design – Observational studies

1. Chilean National Health Survey (CNHS)

Encuesta Nacional de Salud 2016 -2017

2. Diet Cancer Health – Next Generations (MAX study)

Joint Programming Initiative - A Healthy Diet for a Healthy Life (JPI HDHL)

DIET, CANCER AND HEALTH NEXT GENERATIONS

❑ Chilean National Health Survey[1]

Area	Description
Responsible institution	Ministry of Health, Dept. of Epidemiology, Chilean government.
Executing institution	PUC (Pontificia Universidad Católica de Chile)
Design	Cross-sectional population survey
Population	Individuals with ≥ 15 years, Chilean or foreign residents in all regions of Chile
Representative	National, regional, urban/rural
Application mode	Interview – tablet (trained interviewer and nurse)
Sample size	6233 participants
Laboratory measurements	25
Anthopometrical measurements	3 (weight, height, circumference waist)

Encuesta Nacional de Salud 2016 -2017

[1] Free available survey database: https://www.gob.cl/ministerios/ministerio-de-salud/

❑ Flow chart of participants from DCH-NG[1]

Figure: Subcohort MAX. [1] completed FFQ, lifestyle questionnaire and the study center assessment. [2] validation sub-study that included 24 HDRs and re-visit the center at 6 and 12 months after the baseline. [3] 14 participants had only twelve months of dietary data, 8 participants had six months of dietary data and 6 participants with both days (six and twelve months). Only the dietary data of yesterday 24-hour diet recalls were included.

[1] *Eur J Epidemiol . 2022 Jan;37(1):117-127.*

The Diet, Cancer and Health – Next Generations cohort (DCH – NG)
N = 255,608

Invited by letter
N = 183,764

Non-Participants
N = 138,895

Participants
N = 44,869

DCH – NG
N = 39,554[1]

Invited to participate DCH – NG MAX
N = 720[2]

Excluded the participants who did not have any 24-HDR (N=48)

DCH – NG MAX
N = 676

Participants with complete plasma metabolomics data

Baseline[3] → N = 648
6 months[3] → N = 406
12 months[3] → N = 382

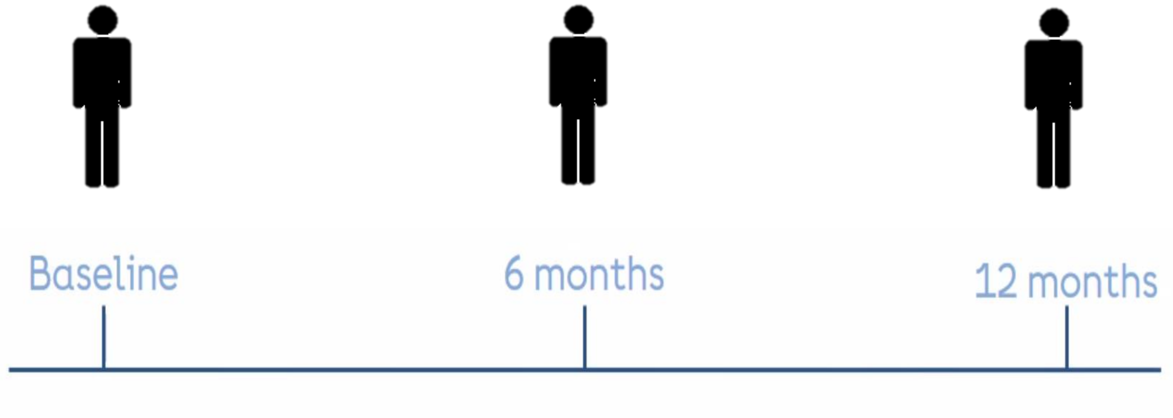
Baseline → N = 624
6 months → N = 380
12 months → N = 349

Baseline, 6 and 12 months
N= 301

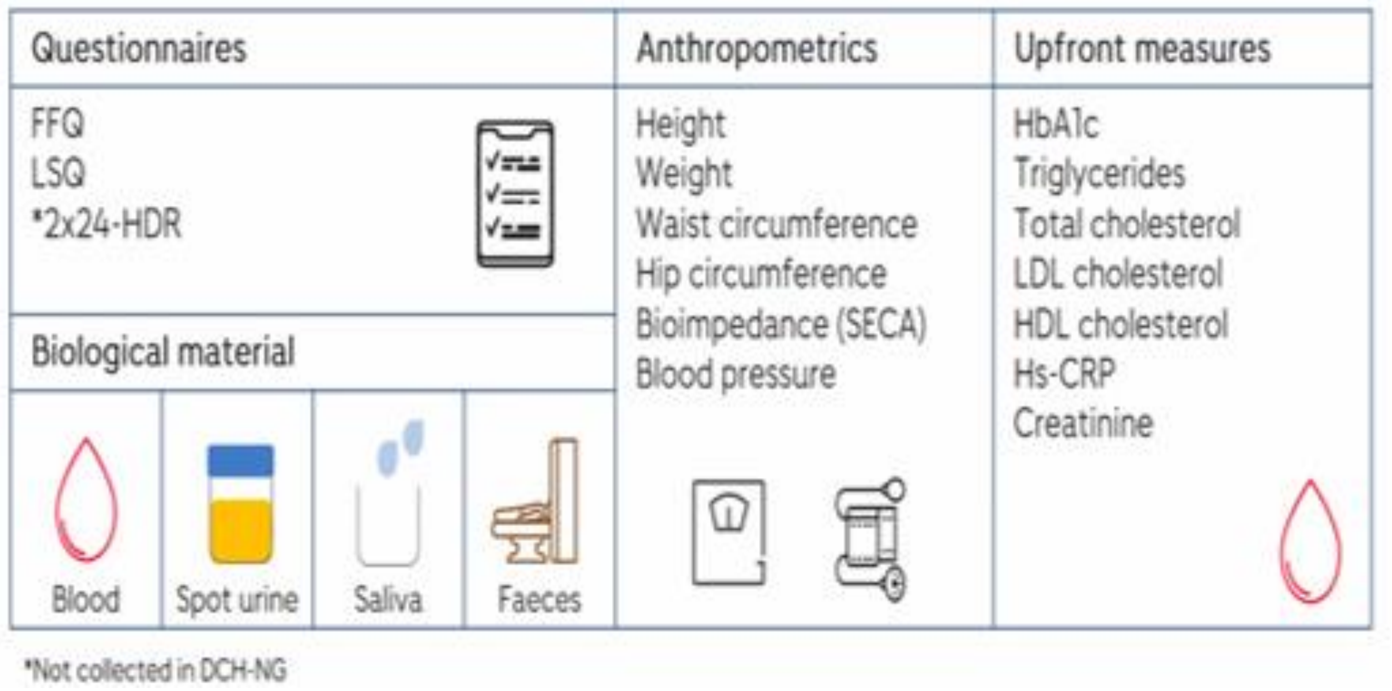
Baseline, 6 and 12 months
N= 287

❑ Study design and data collection

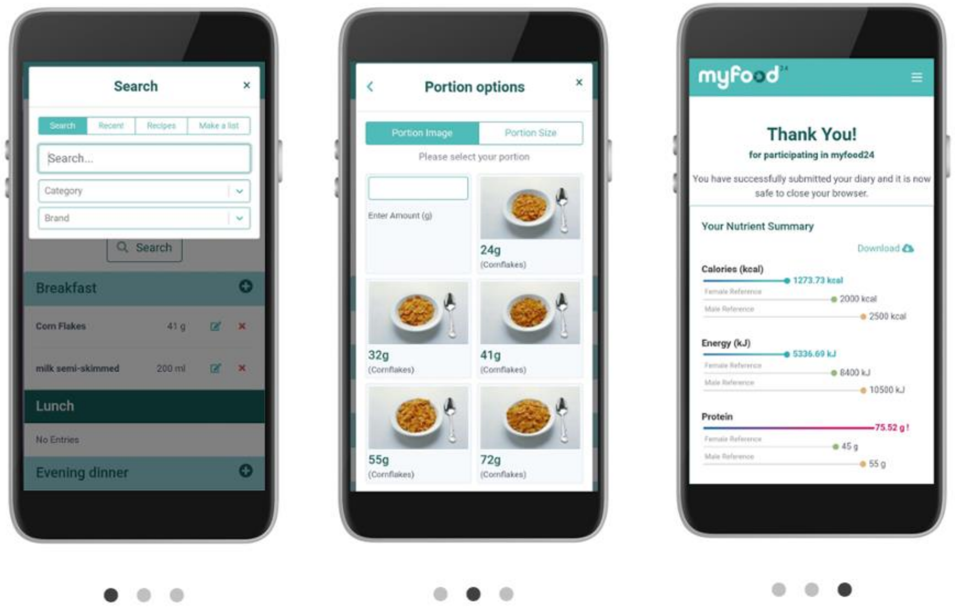
MAX ≈ n:720



24-HDR **24-HDR** **24-HDR**



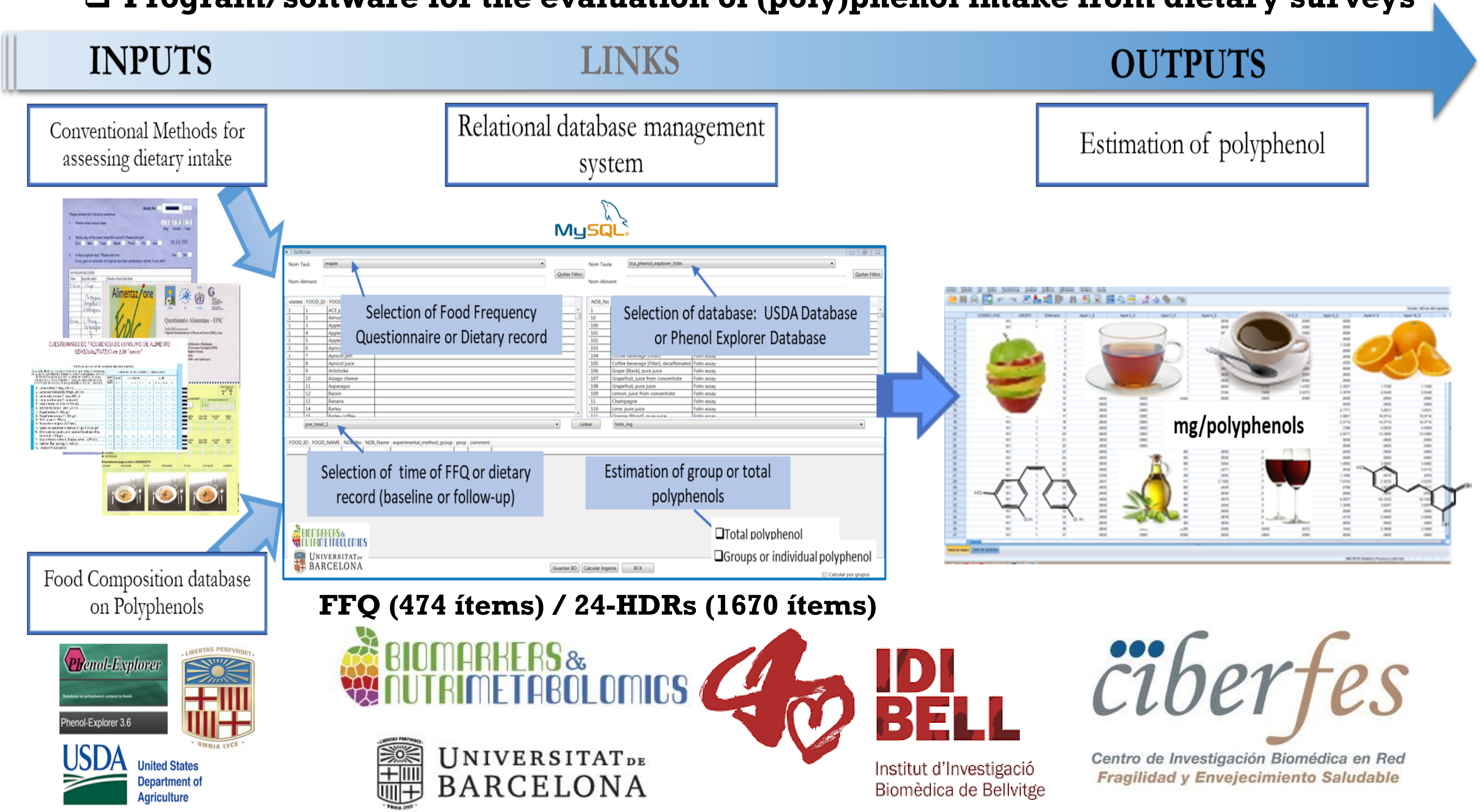
❑ 24 HDRs



- ✓ Web/App-online
- ✓ 1600 Food items
- ✓ Portion images
- ✓ Recipe builder

Source	Database	Description	Website/Book
Denmark	FRIDA	Danish national food database	https://frida.fooddata.dk/
Sweden	Livsmedelsverket	Swedish national food database	https://www.livsmedelsverket.se/en
United States	USDA	American national food database	https://fdc.nal.usda.gov/
United Kingdom	McCance and Widdowson's	English national food database	Edition of McCance and Widdowson's The Composition of Foods (MW 6 & 7)
Myfood 24	Marcas de productos alimenticios	Brand database in the English Myfood24 database	https://www.myfood24.org/

❑ Program/software for the evaluation of (poly)phenol intake from dietary surveys[1]



FFQ (474 ítems) / 24-HDRs (1670 ítems)

BIOMARKERS & NUTRIMETABOLOMICS

UNIVERSITAT DE BARCELONA

IDIBELL Institut d'Investigació Biomèdica de Bellvitge

ciberfes Centro de Investigación Biomédica en Red Fragilidad y Envejecimiento Saludable

[1] *Software published in digital repository → http://diposit.ub.edu/dspace/handle/2445/187698)*

❑ Plant-Based Diet Indexes (PDIs)

	Health Plant Foods	Less Health Plant Foods	Animal
PDI	+	+	-
hPDI	+*	-*	-
uPDI	-	+	-

Characteristics

- ✓ Mean dietary intakes
- ✓ Three versions and categories
- ✓ 18 food groups
- ✓ Total score:

  18 pts. (lowest possible score)

  90 pts. (highest possible score)

Positive score (+):

Q1=1, Q2=2, Q3=3, Q4=4 y Q5=5

Reverse score (-):

Q1=5, Q2=4, Q3=3, Q4=2, Q5=1

***Example 1 (positive)**
Individuals with the highest intake quintile for fruit consumption received a score of 5.

***Example 2 (reverse)**
Individuals with the highest intake quintile for SSB consumption received a score of 1.

PLoS Med . 2016 Jun 14;13(6):e1002039

❑ Metabolic Syndrome

Three or more of its five components according to the International Diabetes Federation (IDF) definition, AHA, among others.

- ✓ WC (> 88 cm in women and > 102 cm in men);
- ✓ high serum TG concentration ≥ 1.7 mmol/L;
- ✓ reduced serum HDL-C (< 1.3 mmol/L in women and < 1.0 mmol/L in men);
- ✓ high blood pressure, SBP (> 130 mmHg) and/or DBP (> 85 mmHg);
- ✓ **high HbA1c (> 42 mmol/mol) as a biomarker for long-term glycemic control, replacing fasting plasma glucose[1,2]**

HbA1c
48 → 6,5%
42 → 6,0%
38 → 5,7%

PLUS → high hs-CRP as a cardiovascular risk factor (≥ 2.0 mg/L)[3,4]

1. J Clin Med. 2019;8:1–11.
2. BMC Medicine; 2021;19:1–11.
3. Circulation. 2019. 596–646 p
4. J Am Heart Assoc. 2020;9.

CONTENT

- INTRODUCTION
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ARTICLE 1-2
(PERSPECTIVE & REVIEW)

ARTICLE 3-8
(ORIGINAL RESEARCH)

Objective 1: To analyze the interconnection and current challenges of the four pillars of the food system, from a psychological perspective.

Received: 9 September 2022 | Revised: 21 October 2022 | Accepted: 3 November 2022

DOI: 10.1002/oby.23644

Obesity A Research Journal | THE OBESITY SOCIETY | WILEY

PERSPECTIVE

Perceptual blindless in nutrition: We are in a critical time to be connected

Fabian Lanuza[1,2] | Raul Zamora-Ros[1,3] | Fanny Petermann-Rocha[4] | Cristina Andrés-Lacueva[1,5]

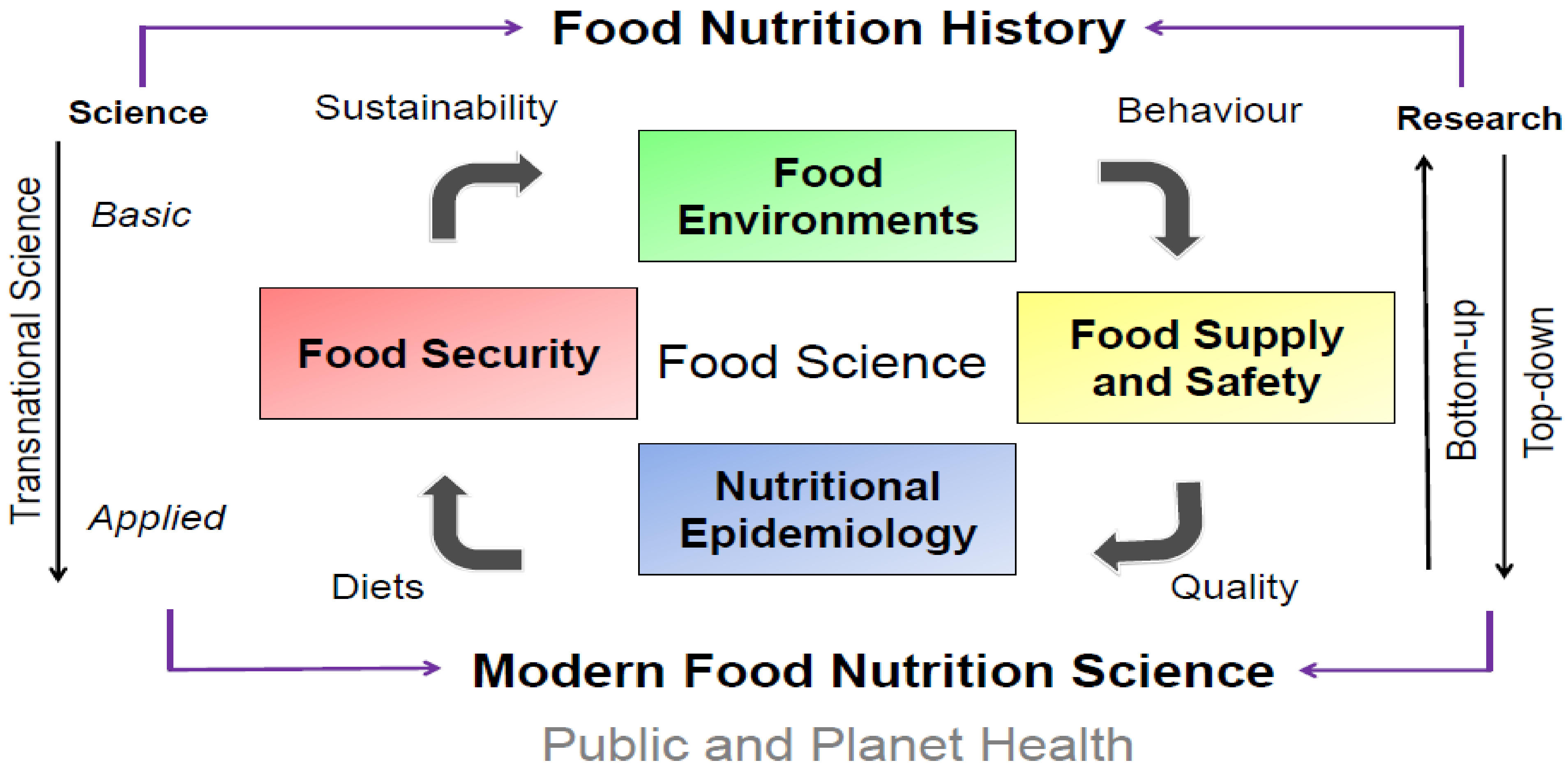
Abstract

Our health and well-being are affected by our food systems. The new nutrition reality has been linked to complex food systems, interrelated with several pathways and determinants, including physical, socioeconomic, environmental, and ecological, and lately, has been strongly associated with population health, the increase in chronic diseases, and climate change. We briefly comment on four pillars, namely food environments, food security, food supply, and safety and nutritional epidemiology, all of which are key determinants of food systems. We overview some highlights, challenges, and methodologies with a view to advancing food and nutrition science as an integrated field of research. By modifying food systems, we are able to improve the aging and well-being of populations and the health of the planet. Trusted science, nutritional education, new scientific-public communication, integrated policy, investment, food availability, and cultural strategies are all essential for creating better food systems. Perceptual blindness in nutrition must be transformed.

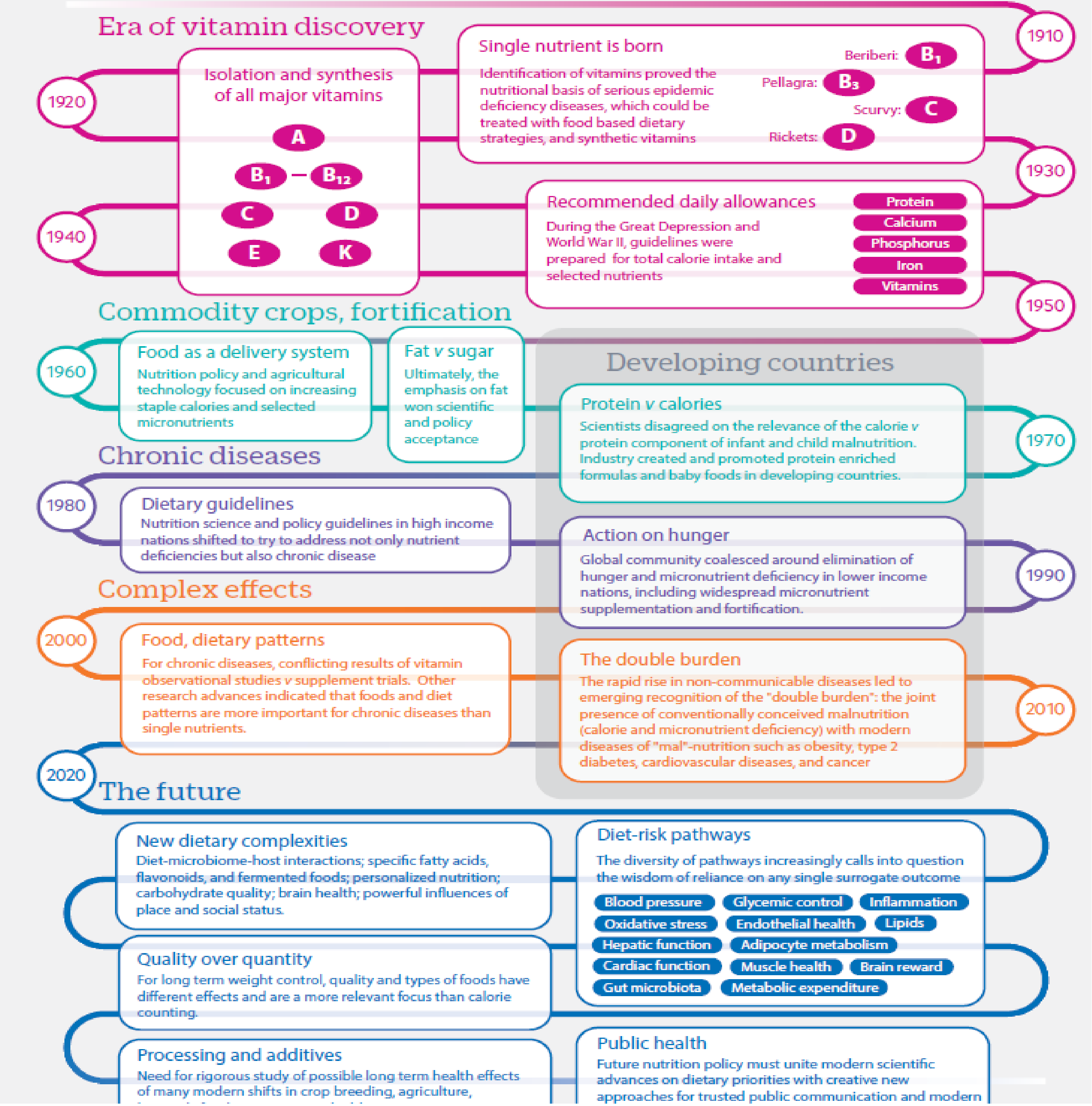
- **Manuscript 1: Perspective**

Lanuza, et al. Obesity 2023 Feb;31(2):302-305.

❑ Pillars and key determinants of Food Systems



Lanuza, et al. Obesity 2023 Feb;31(2):302-305.



Mozaffarian & Colleagues, BMJ, 2018.

DOI: https://doi.org/10.1136/bmj.k2392

PANDEMIA, GUERRA, INFLACIÓN Y CAMBIO CLIMÁTICO.

Guerra ruso ucraniana /

Guerra Rusia Ucrania hoy: Rusia se niega a ampliar el acuerdo de exportación de cereales con Ucrania

Sigue la última hora sobre la guerra entre Ucrania y Rusia en directo. Rusia rechazó la ampliación del acuerdo de exportación de cereales y fertilizantes con Ucrania si no se levantan las sanciones que pesan sobre el comercio ruso de productos agrícolas. Toda la actualidad de la guerra ruso-ucraniana, Vladímir Putin y Volodímir Zelenski.

CLIMATE CHANGE

Global food system emissions could preclude achieving the 1.5° and 2°C climate change targets

Michael A. Clark[1*], Nina G. G. Domingo[2], Kimberly Colgan[2], Sumil K. Thakrar[2], David Tilman[3,4], John Lynch[5], Inês L. Azevedo[6,7], Jason D. Hill[2]

Objective 2: To review the advances in (poly)phenols research which have been conducted in Chile, with a focus on polyphenol-rich foods and health-related outcomes.

FOOD REVIEWS INTERNATIONAL
https://doi.org/10.1080/87559129.2021.2009508

Taylor & Francis
Taylor & Francis Group

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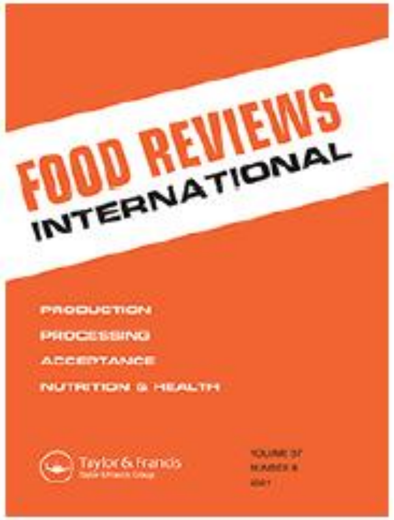
REVIEW

Advances in Polyphenol Research from Chile: A Literature Review

F Lanuza[a,b,c], R Zamora-Ros[a,d], F Petermann-Rocha[e,f], MA Martínez-Sanguinetti[g], C Troncoso-Pantoja[h], AM Labraña[i], AM Leiva-Ordoñez[j], G Nazar[k], K Ramírez-Alarcón[i], N Ulloa[l], N Lasserre-Laso[m], S Parra-Soto[e,f], M Martorell[i], M Villagrán[n], DF Garcia-Diaz[o], C Andrés-Lacueva[a,b], and C Celis-Morales[f,p,q]



ABSTRACT
Certain countries have the privilege of diverse ecosystems that allow access to wide food availability. This fact carries an intrinsic diversity in bioactive compounds such as phytochemicals, especially polyphenols. The aim of this review is to summarize the advances in polyphenols research which have been conducted in Chile, with a focus on polyphenol-rich foods and health-related outcomes. In the first part, several studies that have analyzed food sources rich in polyphenols are presented. This is followed by a description of *in vitro* and *in vivo* studies from Chile that have evaluated the polyphenol compounds of Chilean foods or their extracts along with their biological activity or health effects. Most polyphenol studies in our search have an *in vitro* experimental design where mainly protective activities are tested. The antioxidant effect is remarkable in all studies. As well as discussing the future direction of dietary assessment and the approach to biomarkers in this field, currently, additional emphasis and research investment are necessary to explore more native foods with an added value.

- **Manuscript 2: Review**

Lanuza, et al. Food Review International 2021, Dec;6(39):3134-3171

- Summary of the total phenolic content (mg GAE/100 g) by food sources, species, regions of Chile, origin and weight expressed.

Table 1. (Continued).

Food (common name)	Species	Region of Chile	Origin	Weight	Total Phenolic Content (mg GAE/100 g)	Reference
Maqui	*Aristotelia chilensis* (Molina) Stuntz	Valparaíso	Fruit	FW	1230	[30]
		O'Higgins			1580	
		Maule			1500	
		La Araucanía			1370	
		NA (Chile)	Fruit	FW	1664	[37]
		O'Higgins	Fruit	FW	880	[38]
		Aysén	Fruit	FW	1970	[39]
		La Araucanía	Fruit	FW[a]	1222	
			Juice	FW	730	
			Juice	FW	911	[40]
		Maule	Fruit	FW	1620	[41]
		Valparaíso			1450	
		La Araucanía			1110	
		O'Higgins			1600	
		La Araucanía	Fruit	FW[a]	1750	[42]
			Stem		990	
			Leaves		2640	
		Biobío	Fruit	FW[b]	113	[43]
		Araucanía			75	
		Los Ríos			103	
		Biobío	Fruit	FW[a]	1300	[44]
		Los Ríos	Fruit	FW[a]	728	[45]
		Biobío	Fruit	FW[a]	1900	[46]

(Continued)

Lanuza, et al. Food Review International 2021, Dec;6(39):3134-3171

❑ Summary of study sample, biological activity and potential health benefits by food sources and species.

Table 2. (Continued).

Food	Specie	Main polyphenolic groups	Material or subject of intervention (Type)	Biological activity and potential health benefits	Ref
Maqui	*Aristotelia chilensis* (Molina) Stuntz	Anthocyanins Proanthocyanidin Phenolic acids	Male C57BL/6 J mice H4IIE and L6 cell	Improves hyperglycemia and insulin resistance.	[96]
			Fruit, leave and stems.	Inhibiting effects on *α*-glucosidase and *α*-amylase activity. Antioxidant activity.	[42]
			RAW264.7 mice cell 3T3- L1 cell mice cell	Prevention of macrophage activation. Improving effects on adipocytes apoptosis.	[45]
			Rat brain homogenates	Reduce oxidative stress. Antioxidant activity.	[98]
			HUVEC Cells	Oxidative stress protection. Antioxidant activity.	[134]
			RAW264.7 mice cell 3T3- L1 cell mice cell	Reduce adipogenesis and lipid accumulation in adipocytes. Anti-inflammatory effect in macrophages.	[135]
			Male Wistar rats RAW264.7 mice cell	Inhibitory effects on inflammatory. Antioxidant activity.	[136]
			C57BL/6 male mice RAW 264.7 cell Blood and fecal samples	Antioxidant and anti-inflammatory activities. Reduces immune stress. Regulates gut microbiota.	[136]
			RAW264.7 mice cell 3T3- L1 cell mice cell	Increased GSH/GSSG ratio. Prevented caspase-3 induction. Decreased MCP-1 gene expression. Improved IRS-1 phosphorylation.	[137]
			HT-29 and Caco-2 cell	Exhibited chemoprotective abilities on decreasing growth of cellular models. Inhibiting lipid peroxidation.	[138]
			C57BL/6 J male mice	Improve insulin response. Decreased weight gain. Increased thermogenic activity.	[139]
			Male BALB/c mice Human keratinocyte (HaCaT) cells	Prevents inflammation in skin mice by UVB-induced method. Protects against the damage caused by UVB exposure.	[140]
			PC-12 cell mice (Sprague-Dawley)	Neuronal protection against amyloid *Aβ* toxicity.	[141]
			Male Wistar rats	Protects heart from damage induced. Inhibiting lipid peroxidation. Antioxidant activity.	[142]
			36 prediabetic human adult subjects. Delphinol capsule (maqui berry extract).	Decrease fasting blood glucose and insulin levels.	[143]
			C57Bl/6 J mice.	Reduces the glucose absorption in intestine by interaction with sodium	[144]

Lanuza, et al. Food Review International 2021, Dec;6(39):3134-3171

Objective 5: To descriptive analysis of dietary intakes of all individual (poly)phenols and total intake per class and subclass by meal event, and to identify their main food sources using 24-HDRs in the subcohort MAX from the DCH-NG.

European Journal of Nutrition
https://doi.org/10.1007/s00394-022-02977-x

ORIGINAL CONTRIBUTION

Check for updates

Descriptive analysis of dietary (poly)phenol intake in the subcohort MAX from DCH-NG: "Diet, Cancer and Health—Next Generations cohort"

Fabian Lanuza[1,2] · Raul Zamora-Ros[1,3] · Agnetha Linn Rostgaard-Hansen[4] · Anne Tjønneland[4] · Rikard Landberg[5] · Jytte Halkjær[4] · Cristina Andres-Lacueva[1,2]

Received: 9 December 2021 / Accepted: 29 July 2022

Lanuza, et al. Eur J Nutr . 2023 Feb;62(1):337-350.

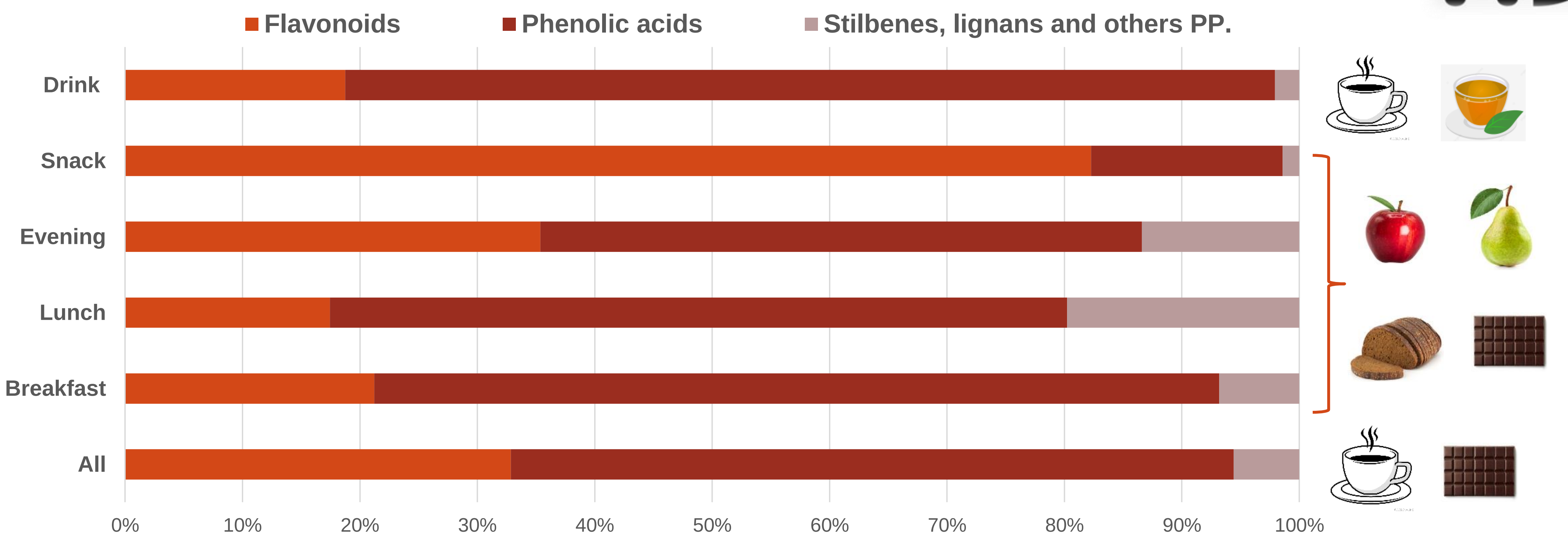
- Total (poly)phenol/classes median content by meal events in all sample (n=676).

	All* (mg/day)	Breakfast* (mg/day)	Lunch* (mg/day)	Evening* (mg/day)	Snack* (mg/day)	Drink* (mg/day)
Total (poly)phenols	1164 (722-1731)	201 (63-430)	114 (58-208)	106 (60-179)	191 (62-370)	363 (144-897)
Flavonoids	335 (178-563)	28 (7-94)	15 (4-46)	29 (8-75)	116 (23-246)	54 (1-167)
Phenolic acids	628 (265-1132)	95 (21-312)	54 (25-105)	42 (21-80)	23 (6-103)	228 (47-698)
Stilbenes	0.0 (0.0-1.7)	0.0 (0.0-0.1)	0.0 (0.0-0.1)	0.0 (0.0-0.1)	0.0 (0.0-0.1)	1.7 (0.3-4.0)
Lignans	5 (1-15)	0.1 (0.0-2.0)	0.5 (0.1-7.4)	0.3 (0.1-0.9)	0.0 (0.0-0.1)	0.0 (0.0-0.1)
Other (poly)phenol class	52 (33-78)	9.1 (3-18)	17 (7-33)	11 (5-18)	2.3 (0.2-8)	4.3 (1-10)

**Median (P25-P75)*

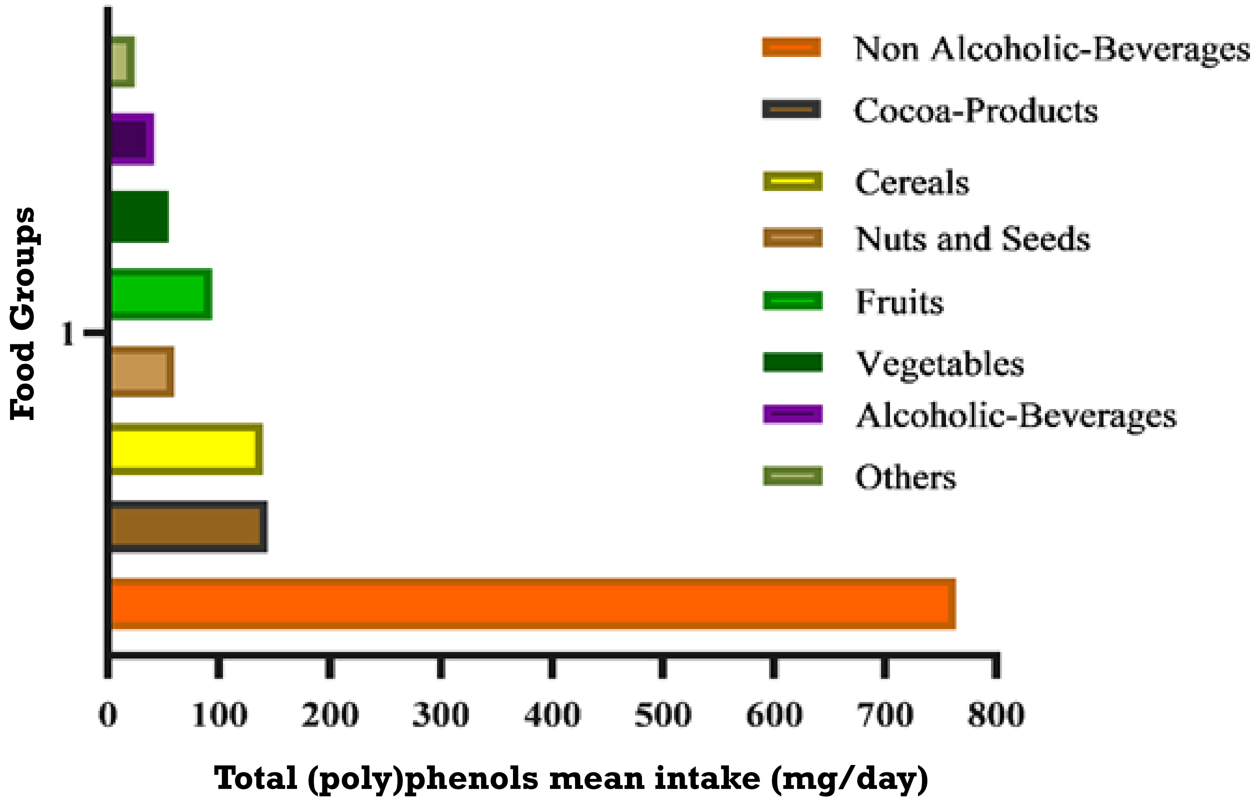
Lanuza, et al. Eur J Nutr . 2023 Feb;62(1):337-350.

❑ Percentage contribution of (poly)phenol classes by all and meal events (n = 676).

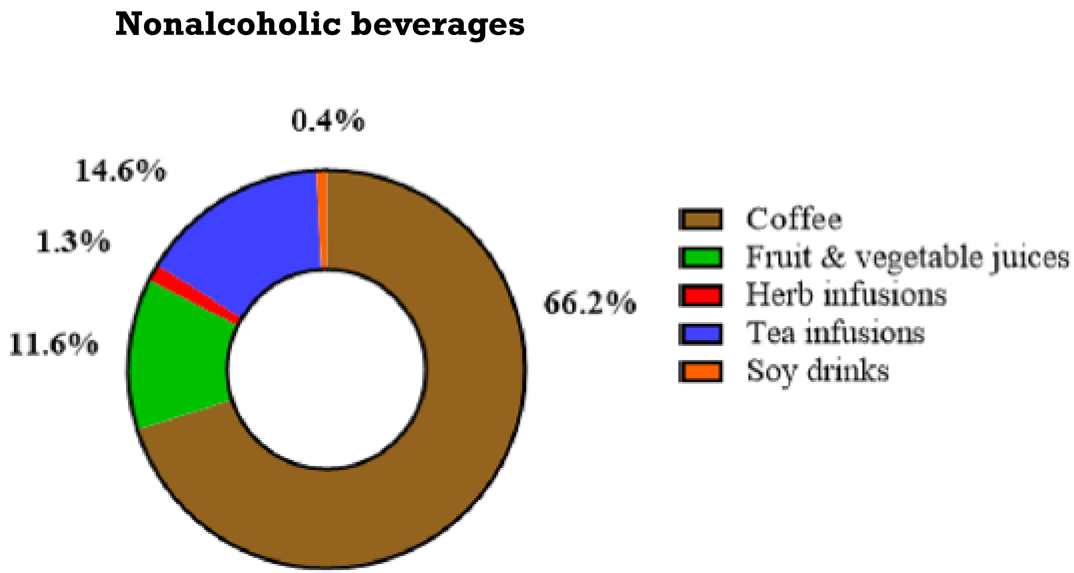


Lanuza, et al. Eur J Nutr . 2023 Feb;62(1):337-350.

- Total (poly)phenol mean intake from main food groups in all sample (n=676).



Top 5 (Poly)phenols	Mean (s.e.)
5-Caffeoylquinic acid	268 (13.4)
4-Caffeoylquinic acid	181 (11.3)
3-Caffeoylquinic acid	152 (9.8)
Proanthocyanidin polymers (> 10 mers)	113 (5.5)
Ferulic acid	67 (2.8)



Lanuza, et al. Eur J Nutr . 2023 Feb;62(1):337-350.

Objective 6: To compare the flavonoid intakes using different methods based on USDA and Phenol Explorer databases in participants from subcohort DCH-NG MAX.

frontiers | Frontiers in Nutrition

ORIGINAL RESEARCH
published: 04 April 2022
doi: 10.3389/fnut.2022.873774

Comparison of Flavonoid Intake Assessment Methods Using USDA and Phenol Explorer Databases: Subcohort Diet, Cancer and Health-Next Generations—MAX Study

Fabian Lanuza [1,2], Nicola P. Bondonno [3,4], Raul Zamora-Ros [1,5], Agnetha Linn Rostgaard-Hansen [3], Anne Tjønneland [3,6], Rikard Landberg [7], Jytte Halkjær [3†] and Cristina Andres-Lacueva [1,2†]*

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Lanuza, et al. Front Nutr . 2022 Apr 4;9:873774.

❑ Total flavonoids content by (poly)phenol databases and the methods of estimation used in MAX study.

	Flavonoid Databases				
	Phenol Explorer (PE)			USDA	
	Total aglycones (mg/day)	Total aglycones transformed (mg/day)	Total glycosides[a] (mg/day)	Total aglycones[b] (mg/day)	Aglycones (mg/day)
Methods	Chromatography with/ after hydrolysis (1)	Chromatography without hydrolysis /Transformation (2)	Chromatography without hydrolysis (3)	Chromatography without hydrolysis / Transformation (4)	Chromatography without hydrolysis /Transformation (5)
Mean ± SD	378 ± 393	367 ± 392	427 ± 422	457 ± 608	197 ± 328
Median[c] *(p25-p75)*	275 (116–524)	261 (106–511)	312 (140–592)	283 (122–592)	78 (36–187)
P20	90	80	110	93	30
P40	205	192	239	207	62
P60	361	348	415	370	105
P80	608	587	679	721	236

[a] *All forms (glycosides, aglycones, and esters), Phenol Explorer.*
[b] *Sum of flavonoids, isoflavones. and proanthocyanidins, USDA.*
[c] *Results are significant different by Wilcoxon (between all pairs) and Friedman tests ($p < 0.001$).*

Lanuza, et al. Front Nutr . 2022 Apr 4;9:873774.

❑ Top food sources by databases and methods used in MAX Study

Top food sources	Flavonoid Databases			
	Phenol Explorer			USDA
	Total aglycones	Total aglycones transformed[a]	Total glycosides[b]	Total aglycones
Food items (*n*)	955	912	912	1,030
Cocoa products (%)	31.2	33.8	29.1	26.4
Total fruits (%)- Apple (%)	20.7-12.0	20.5-10.7	21.1-11.9	19.5-10.8
Tea (%)	17.9	18.7	20.8	27.0
Nuts and seeds (%)	11.4	9.3	8.4	6.7
Wine (%)	6.1	6.5	6.6	5.3
Cereals and baked products (%)	5.4	5.6	7.4	2.7
Vegetables (%)	4.0	3.5	4.5	4.8
Cumulative percentage (%)[c]	96.7	97.9	97.9	92.4

[a] *Transformed (converted from glycosides by chromatography without hydrolysis).*
[b] *All forms (glycosides, aglycones, and esters), Phenol Explorer.*
[c] *The residual percentage of food sources comes from oils, herbs, seasonings, and others beverages.*





Lanuza, et al. Front Nutr . 2022 Apr 4;9:873774.

- Degree of reliability and correlation in continuous and quintiles flavonoid intake estimations by databases and methods used.

Comparison	Intra Class Coefficient (ICC) (95% CI)	Kappa (95% CI)	Spearman´s Rho
PE - Total aglycones & PE - Total aglycones transformed.	0.99 (0.99-0.99)	0.98 (0.94-0.96)	0.99
PE - Total aglycones & PE - Total glycosides	0.97 (0.94-0.99)	0.96 (0.96-0.97)	0.98
PE - Aglycones tranformed & PE Total glycosides	0.98 (0.84-0.99)	0.96 (0.96-0.97)	0.99
PE - Total aglycones & USDA - Total aglycones	**0.73 (0.70-0.76)**	**0.89 (0.88-0.90)**	**0.92**
PE - Aglycones transformed. & USDA - Total aglycones	0.72 (0.68-0.76)	0.88 (0.87-0.90)	0.91
PE Total glycosides & USDA - Total aglycones	0.76 (0.73-0.77)	0.87 (0.86-0.89)	0.91

Lanuza, et al. Front Nutr . 2022 Apr 4;9:873774.

Objective 7: To analyze the relationships between (poly)phenol intakes using 24-HDRs and cardiometabolic risk, with a longitudinal design using DCH-NG MAX subcohort.

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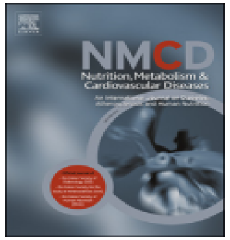

Dietary polyphenols, metabolic syndrome and cardiometabolic risk factors: An observational study based on the DCH-NG subcohort

Fabian Lanuza [a,b], Raul Zamora-Ros [a,c,*], Nicola P. Bondonno [d,e], Tomas Meroño [a,b], Agnetha Linn Rostgaard-Hansen [d], Gabriele Riccardi [f], Anne Tjønneland [d], Rikard Landberg [g], Jytte Halkjær [d,1], Cristina Andres-Lacueva [a,b,1]

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Lanuza, et al. Nutr Metab Cardiovasc. 2023 June 33;6:1167-1178.

- MetS associations by total and quartiles of total (poly)phenol intake and class of (poly)phenol[1].

Metabolic Syndrome Prevalence	Quartile 1 k=358	Quartile 2 k=360	Quartile 3 k=360	Quartile 4 k=358	P trend	Continuous (log2) n=676, k=1436
(Poly)phenols						
Cutoff	<651	652-1053	1053-1798	>1799		1368 (19)*
Model 3	1 Ref.	0.52 (0.28-0.96)	0.40 (0.21-0.75)	**0.50 (0.27-0.91)**	**0.059**	**0.83 (0.69-0.99)**
Flavonoids						
Cutoff	<135	136-291	292-552	>553		420 (6.7)*
Model 3	1 Ref.	0.61 (0.34-1.07)	0.44 (0.23-0.83)	**0.49 (0.26-0.91)**	**0.046**	**0.88 (0.79-0.99)**
Phenolic acids						
Cutoff	<234	235-552	553-1151	>1152		867 (18.9)*
Model 3	1 Ref.	0.63 (0.35-1.13)	0.38 (0.19-0.73)	**0.55 (0.30-1.00)**	**0.134**	**0.86 (0.75-0.97)**
Stilbenes[2]						
Cutoff	<0.00	0.00-0.01	0.01-0.31	>0.32		1.4 (0.1)*
Model 3	1 Ref.	1.17 (0.65-2.09)	0.77 (0.41-1.45)	0.97 (0.50-1.88)	0.987	0.98 (0.94-1.01)
Lignans						
Cutoff	<0.6	0.6-2.2	2.2-16.5	>16.5		11.7 (0.3)*
Model 3	1 Ref.	0.67 (0.37-1.23)	0.69 (0.37-1.27)	0.71 (0.37-1.34)	0.692	0.94 (0.86-1.02)
Alkylphenols						
Cutoff	<8.8	8.9-26.6	26.7-51.6	>51.7		39.1 (0.5)*
Model 3	1 Ref.	1.19 (0.64-2.19)	1.49 (0.80-2.78)	0.96 (0.46-1.98)	0.781	0.99 (0.89-1.10)
Tyrosol[2]						
Cutoff	<1.6	1.7-5.5	5.6-13.7	>13.7		10.8 (0.3)*
Model 3	1 Ref.	1.71 (0.94-3.11)	1.24 (0.67-2.32)	1.03 (0.53-2.00)	0.478	0.98 (0.89-1.07)

1 All data were computed using **generalized linear mixed models.** *All (poly)phenol values are mean and standard error (s.e.) adjusted for age, sex, time origin and energy intake. The data models represent the OR (odds ratios) and CI (confidence interval). n: subjects, k: measures. MetS, metabolic syndrome. **Model 3 adjusted for all covariates in Model 2 plus intakes of saturated FA, polyunsaturated FA, monounsaturated FA, total sugars, fiber, sodium and total energy**; P for trend used the continuous variable of quartiles of polyphenols. 676: Q1 (k: 359); Q2 (k: 359); Q3 (k: 360); Q4 (k: 358).

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❑ Cardiometabolic risk factor associations by total and classes of (poly)phenols

Cardiometabolic risk factors (prevalence)	**(Poly)phenols** n=676, k=1436	**Flavonoids** n=676, k=1436	**Phenolic acids** n=676, k=1436	**Stilbenes** n=676, k=1436	**Lignans** n=676, k=1436	**Alkyphenols** n=676, k=1436	**Tyrosols** n=676, k=1436
WC (22.6%)							
Model 3	0.91 (0.77-1.08)	**0.90 (0.81-1.00)**	0.93 (0.82-1.05)	**0.96 (0.93-0.99)**	0.96 (0.89-1.04)	0.94 (0.86-1.03)	**0.92 (0.85-1.00)**
SBP (18.1%)							
Model 3	**0.81 (0.68-0.97)**	**0.90 (0.81-1.00)**	**0.86 (0.76-0.98)**	1.01 (0.97-1.05)	0.97 (0.90-1.05)	1.02 (0.93-1.13)	0.95 (0.88-1.03)
DBP (29.1%)							
Model 3	0.87 (0.76-1.00)	0.96 (0.88-1.05)	0.94 (0.85-1.04)	1.01 (0.98-1.04)	0.98 (0.92-1.04)	1.00 (0.93-1.08)	0.98 (0.92-1.04)
HbA1c (4.5%)							
Model 3	0.94 (0.78-1.14)	1.03 (0.90-1.17)	0.91 (0.80-1.05)	1.00 (0.96-1.04)	0.97 (0.88-1.07)	0.94 (0.86-1.04)	0.98 (0.89-1.08)
TG (22.0%)							
Model 3	0.89 (0.77-1.02)	0.95 (0.87-1.04)	0.93 (0.83-1.03)	0.99 (0.96-1.02)	0.99 (0.92-1.06)	1.06 (0.98-1.15)	0.97 (0.90-1.04)
HDL (11.0%)							
Model 3	**0.77 (0.64-0.91)**	**0.88 (0.78-0.98)**	**0.86 (0.76-0.98)**	0.98 (0.95-1.02)	0.98 (0.90-1.07)	1.14 (1.02-1.28)	0.94 (0.86-1.02)
hsCRP (18.8%)							
Model 3	0.88 (0.76-1.02)	0.98 (0.89-1.07)	**0.89 (0.80-0.99)**	1.01 (0.97-1.04)	0.96 (0.90-1.03)	1.05 (0.96-1.14)	0.95 (0.88-1.02)

Model 3 adjusted for all covariates in Model 2 plus intakes of saturated FA, polyunsaturated FA, monounsaturated FA, total sugars, fiber, sodium and total energy;

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Objective 8. To analyze the associations between plant-based dietary patterns (based on 24-HDRs), cardiometabolic risk, and metabolomic profiles (based on plasma), with a longitudinal study design of the MAX sub-cohort.

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Atherosclerosis

Available online 9 September 2023, 117285

In Press, Journal Pre-proof What's this?

atherosclerosis

Plasma metabolomic profiles of plant-based dietary indices reveal potential pathways for metabolic syndrome associations

Fabian Lanuza [a b], Tomas Meroño [a b], Raul Zamora-Ros [a c], Nicola P. Bondonno [d e], Agnetha Linn Rostgaard-Hansen [d], Alex Sánchez-Pla [f], Berta Miro [a f], Francesc Carmona-Pontaque [f], Gabriele Riccardi [g], Anne Tjønneland [d], Rikard Landberg [h], Jytte Halkjær [d 1], Cristina Andres-Lacueva [a b 1]

Accepted

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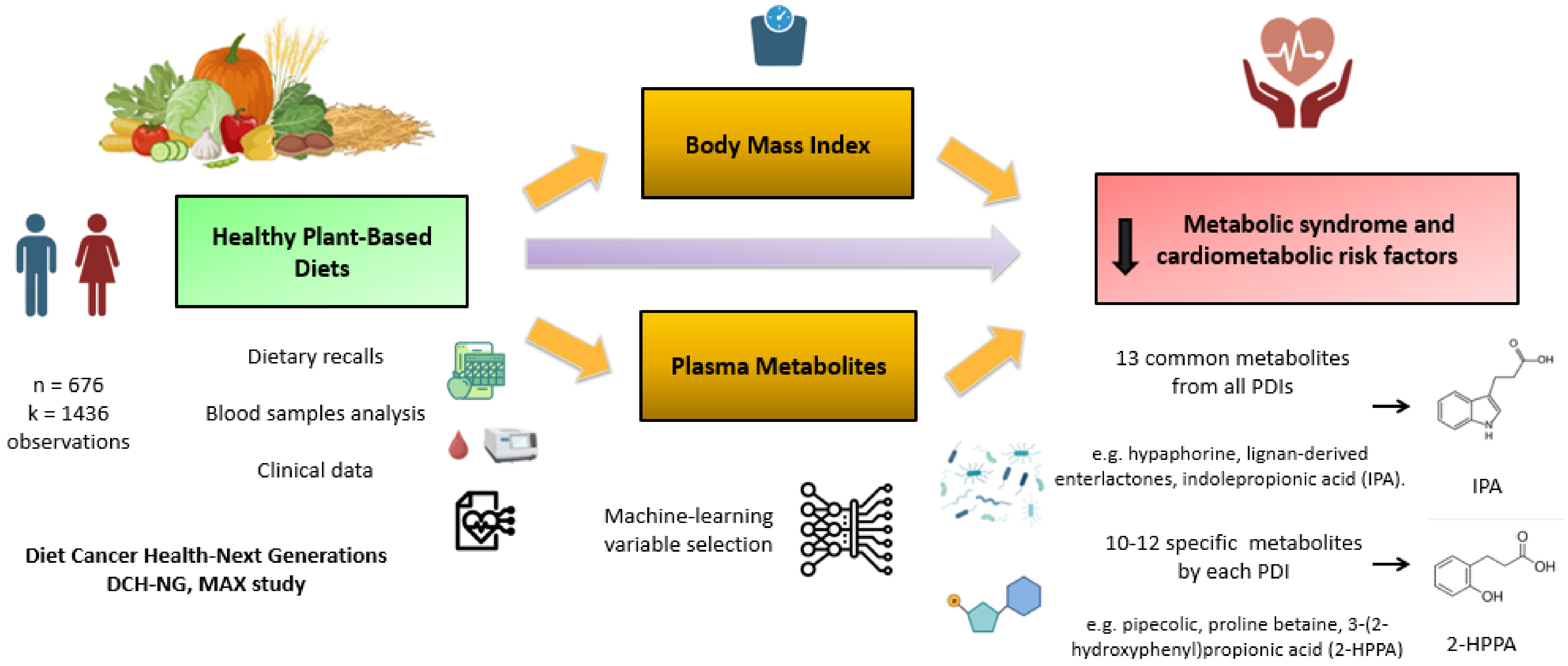
❑ Metabolomics, plant-based diets and MetS



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❑ Associations between Plant-Based Diet indices and prevalent Metabolic Syndrome (n = 676).

	Tertile 1	Tertile 2	Tertile 3	P-trend	Per SD
Overall plant-based diet					
Number of cases	72	53	30		155
K-measures	474	467	495		1436
Model 1	Ref.	0. 73 (0.45-1.18)	0.37 (0.21-0.64)	< 0.001	0.68 (0.54-0.85)
Model 2	Ref.	0.80 (0.48-1.34)	0.43 (0.24-0.79)	0.007	**0.70 (0.55-0.90)**
Healthful plant-based diet					
Number of cases	85	43	27		155
K-measures	490	474	472		1436
Model 1	Ref.	0.46 (0.28-0.75)	0.27 (0.15-0.48)	< 0.001	0.60 (0.47-0.75)
Model 2	Ref.	0.38 (0.22-0.65)	0.26 (0.14-0.49)	< 0.001	**0.56 (0.43-0.74)**
Unhealthful plant-based diet					
Number of cases	35	49	71		155
K-measures	481	490	465		1436
Model 1	Ref.	1.50 (0.86-2.60)	2.48 (1.45-4.24)	< 0.001	1.50 (1.21-1.86)
Model 2	Ref.	1.49 (0.82-2.72)	2.70 (1.50-4.85)	< 0.001	**1.61 (1.26-2.05)**

Total mean plant-based scores were used as a continuous variable, after SD transformation. The data represent the OR (odds ratios) and confidence interval (CI). n, subjects. k, measures. Model 1 was an unadjusted model. Model 2 was adjusted for age, sex, time point, total energy intake, physical activity, smoking and alcohol intake.

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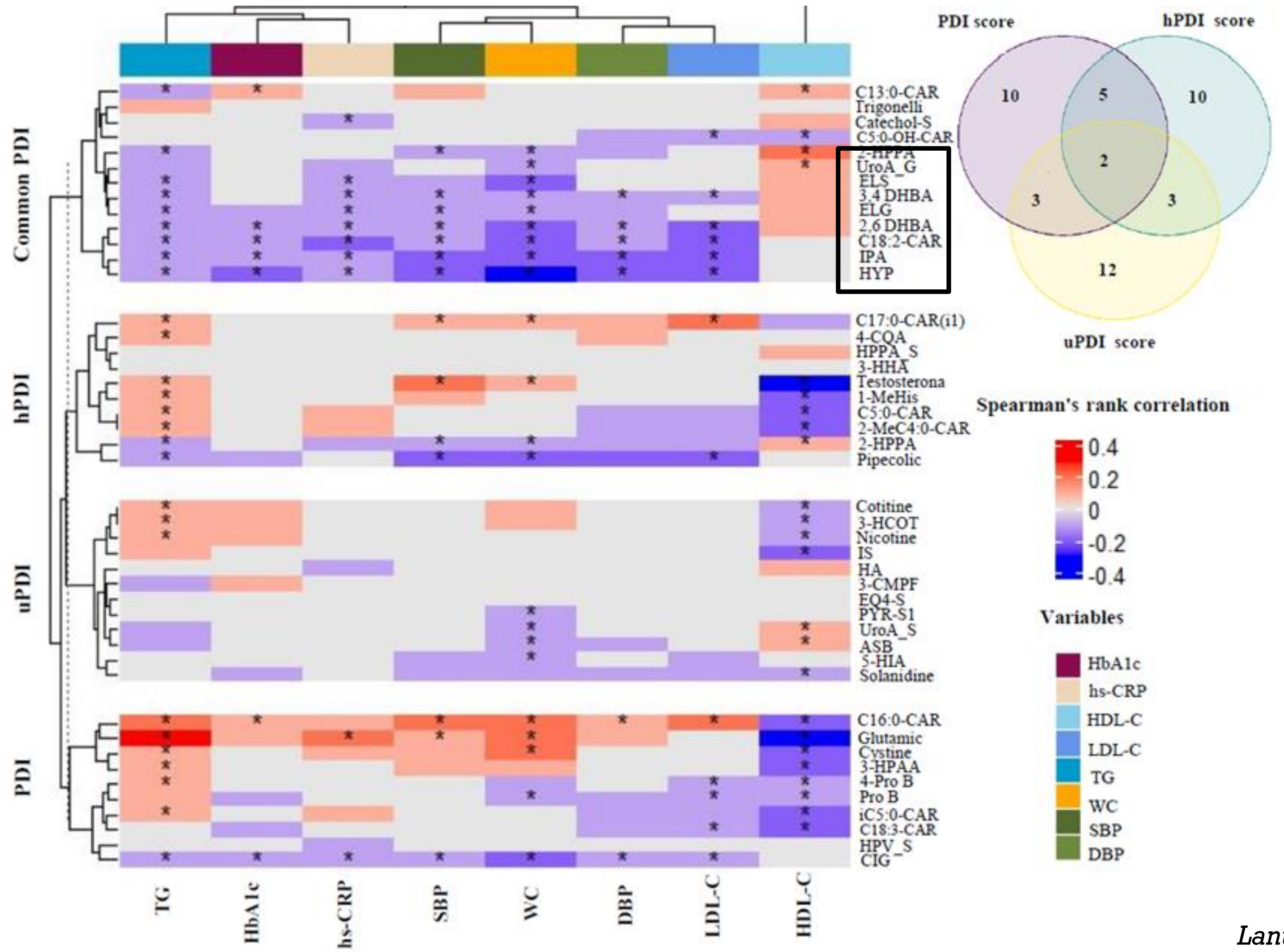

Figure: Correlations between the specific and common metabolites selected from plant-bases diet indices by metabolomics profiling and cardiometabolic risk factors (n: 625, k = 1353)

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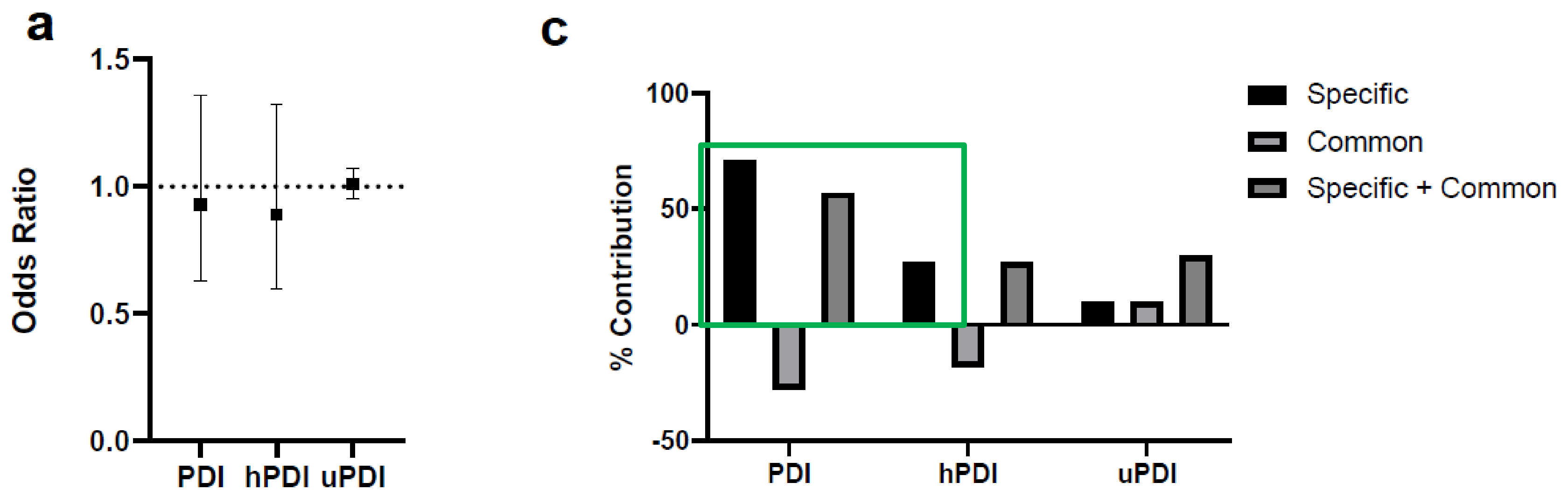
❑ **Normal - BMI**



❑ **OV/OB - BMI**

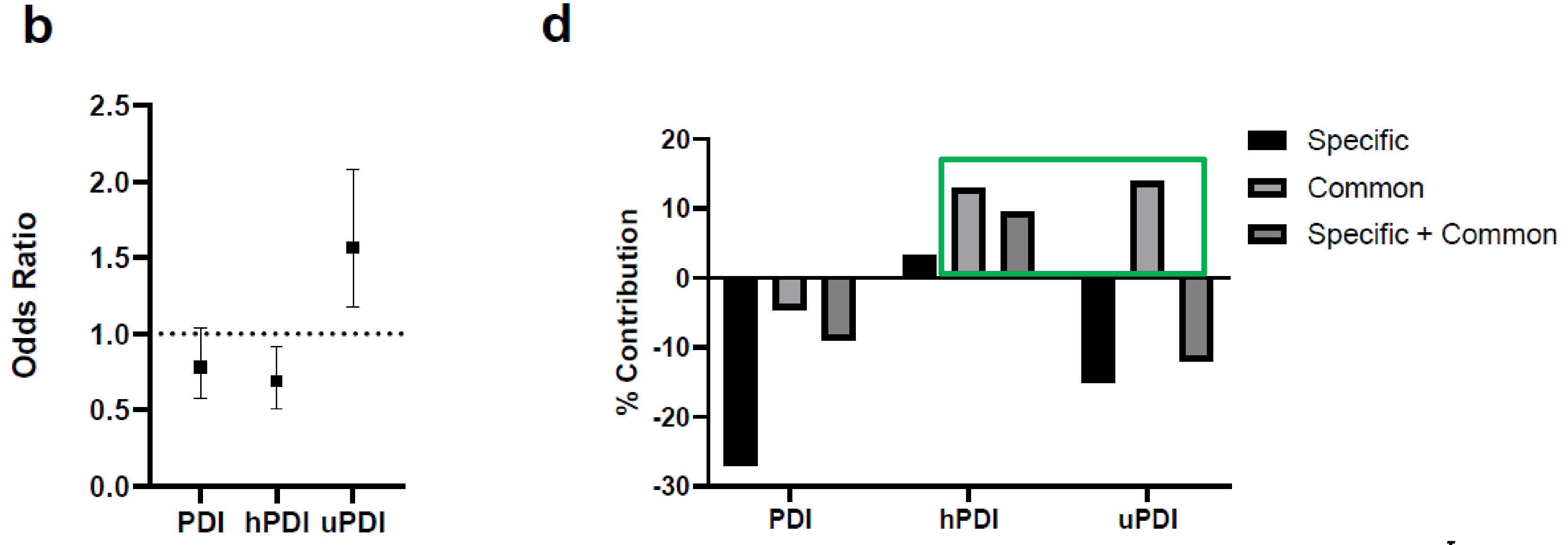


Figure: Odds ratio for metabolic syndrome of each plant-based diet indices according to participants with **normal BMI** (n= 377, k= 816) (a & c) and **overweight and obesity** (n= 248, k= 537) (b & d).

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❑ Diet, Cancer, Health – Next Generations / MAX study

Strengths	Limitations	Advantages/implications
✓ Prospective observational analysis of the variables ✓ Estimation of dietary (poly)phenols using UB Software. ✓ Comparative of flavonoid methods according to FCDB of (poly)phenols. ✓ Analysis of various dietary patterns, especially PDIs	✓ Size of study and short follow-up. ✓ Common measurement errors and biases for 24 HDRs. ✓ Without representation in the general population. ✓ It does not allow establishing a cause-effect relationship.	✓ Descriptive and inferential analyses, exploration/support associations (diet & cardiometabolic health). ✓ Three measurement timepoints for assessing biochemical, dietary, metabolomic, and lifestyles variables. ✓ Most comprehensive (FCDB) for (poly)phenols. ✓ Integrated dietary, metabolomic, and biostatistical methods.

CONTENT

- INTRODUCTION
- HYPOTHESIS AND OBJECTIVES
- MATERIALS AND METHODS
- RESULTS AND DISCUSSION
- **CONCLUSIONS**

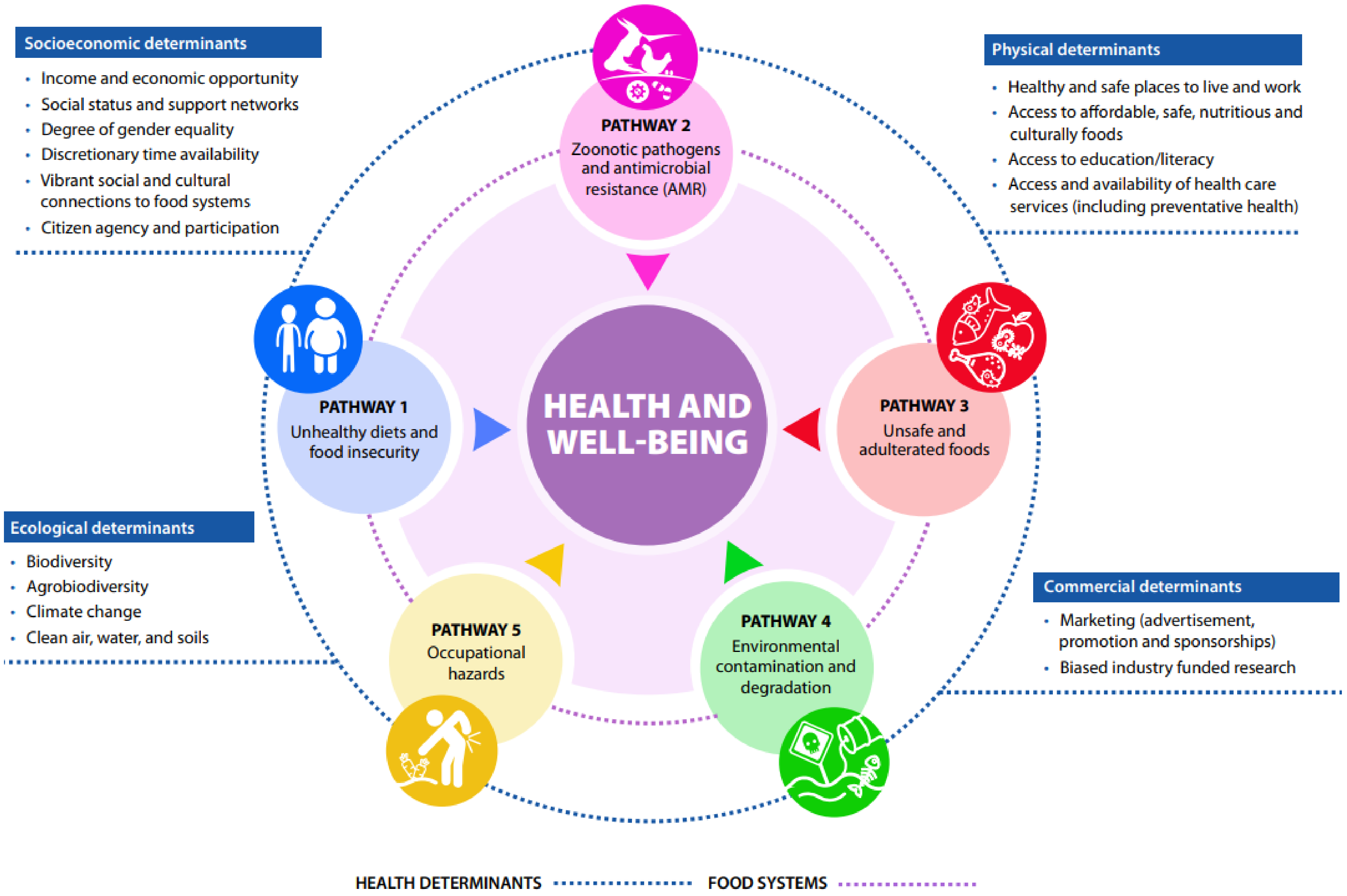
ARTICLE 1-2
(PERSPECTIVE & REVIEW)

ARTICLE 3-8
(ORIGINAL RESEARCH)

Objectives	Conclusions
5. To descriptive analysis of dietary intakes of all individual polyphenols and total intake per class and subclass by meal event, and to identify their main food sources using 24-HDRs in the subcohort MAX from the DCN-NG.	The meal events that provided the biggest contribution of polyphenols were **drinks meal events**, which occurred extensively during the day, and also the breakfast meal event. **The main food sources** for individual **polyphenols** were **nonalcoholic beverages such as coffee and tea, cocoa products such as dark chocolate, and cereals such as rye products**. The individual polyphenols consumed the most were hydroxycinnamic acids and proanthocyanidins.
6. To compare the flavonoid intakes using different methods based on USDA and Phenol Explorer databases in participants from subcohort DCH-NG MAX.	**When comparing PE and USDA total aglycones, there was a moderate reliability when a continuous variable was used, while the reliability was excellent when flavonoid intake was modeled as a categorical variable.** It is worth mentioning that the recommendation would be to use categorical variables and similar methods of estimated flavonoid intakes.

Objectives	Conclusions
7. To analyze the relationships between polyphenol intakes using 24-HDRs and cardiometabolic risk, with a longitudinal design using DCH-NG MAX subcohort.	**Total polyphenol, flavonoid and phenolic acid intakes were associated with lower odds of MetS**, after adjusting for age, sex, lifestyle and dietary confounders. These intakes were also consistently and significantly associated with a lower risk for higher SBP and lower HDL-c concentrations.
8. To analyze the associations between plant-based dietary patterns (based on 24-HDRs), cardiometabolic risk, and metabolomic profiles (based on plasma), with a longitudinal study design of the MAX sub-cohort.	PDIs, especially the healthful and unhealthful versions, were associated with lower and higher odds of MetS, respectively. Additionally, we identified a common metabolic fingerprint reflecting mainly the BMI-mediation pathway of diet on MetS risk. **We identified specific selected metabolites for each dietary pattern, 10 metabolites for PDI, 10 metabolites for hPDI and 12 for uPDI, and 13 metabolites at the intersection of all PDI**. Those common metabolites in PDI and hPDI showed an inverse association with some cardiovascular risk factors.

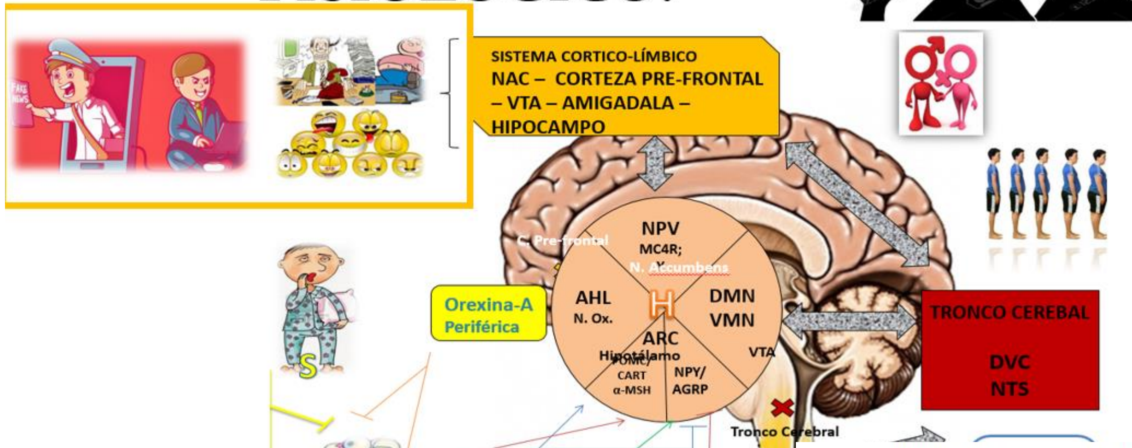
CONCLUSIONES



What are 'food environments'?

by European Public Health Alliance | Dec 20, 2019 | Europe and Health, Healthy Environments

¿QUÉ PASA A NIVEL FISIOLÓGICO?



Box 1. Glossary

Dietary restriction (DR): a broad term describing the reduction in specific dietary components or in amounts of food provided

Caloric restriction (CR): reduction in total calorie intake

Protein restriction (PR): reduction in protein content of the diet

Methionine restriction (MR): reduction in levels of the amino acid methionine in the diet

Time-restricted feeding (TRF): reduction in the daily period of food intake (animal studies)

Time-restricted eating (TRE): reduction in the daily period of food intake (clinical studies)

Intermittant fasting (IF): short-term daily or weekly fasting periods of 12–48 hours

Periodic fasting (PF): prolonged fasting periods lasting 48 or more hours and normally occurring twice a month or less

Fasting-mimicking diet (FMD): a nutritional program containing ingredients at quantities that do not interfere with the fasting response

Ketogenic diet (KD): diet very high in fat, and very low in carbohydrates

Healthspan: the period of life during which health and functional capacity are maintained

Longevity diet (LD): diet composition or feeding regimen designed to enhance healthy longevity

Cell

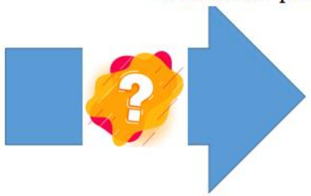
Leading Edge

Men'sHealth

Cómo adelgazar rápido con la dieta militar

Este tipo de dieta militar es la más indicada para ocasiones puntuales, ya que están pensadas para depurar el organismo y bajar volumen en poco tiempo, favoreciendo la quema de grasa. Una herramienta muy útil para perder peso en cualquier momento del año.

Dieta militar para perder peso en tres días, ¿dónde hay que firmar?



Review

Nutrition, longevity and disease: From molecular mechanisms to interventions

Type	Name/Symbol	Display	Countries
Summary system	Health Star Ratings 	½ star (least healthy) to 5 stars (most healthy)	Australia, New Zealand
Summary system	Nutriscore 	A, B, C, D, E according to healthiness with A the most healthy	France
Warning labels	Warning labels 	Logo	Finland
Warning labels	Warning labels Symbol says "*Should consume in small amounts and exercise for better health*"	Text	Thailand
Warning labels	Warning labels 	Black warning label for each critical nutrient	Chile
Warning labels	Warning labels Symbol not given since not finalized	Red Warning label for each critical nutrient	Israel

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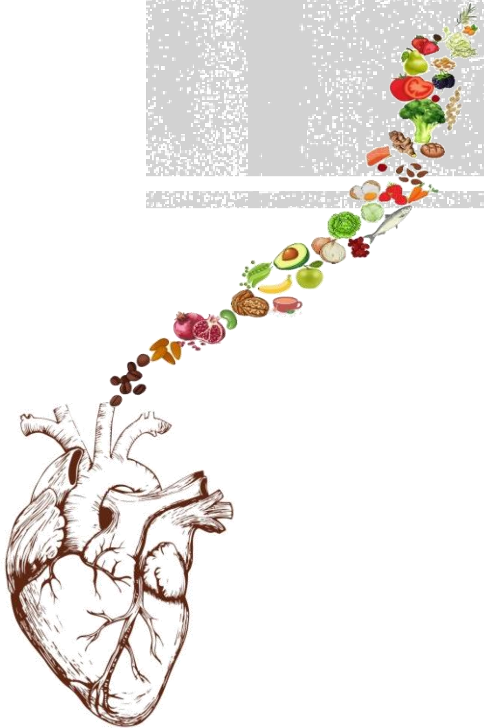
Danish Cancer Society

Facultat de Farmàcia i Ciències de l'Alimentació

Departament de Nutrició, Ciències de l'Alimentació i Gastronomia

A (poly)phenol-rich dietary pattern and cardiometabolic health from the MAX study: "Diet, Cancer and Health – Next Generations (DCH-NG)" subcohort.



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Research Seminar

October, 2023

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